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CFA Institute

PRIVATE MARKETS PATHWAY

CFA® Program Curriculum

2026 • LEVEL III PRIVATE MARKETS PATHWAY

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Private Markets Pathway

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LEARNING MODULE

1

Private Investments and Structures

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	contrast the features of private and public investments, and discuss characteristics of private and public markets
☐	discuss private investment methods and structures and their uses
☐	discuss the difference between public and private market performance, and calculate, interpret, and discuss the use of performance metrics including distributed to paid-in, residual value to paid-in, and total value to paid-in
☐	compare the risk and return of investing in private markets and public markets as part of a strategic asset allocation

INTRODUCTION

A major trend among institutional investors over the past few decades is the initiation of or significant increase in private market asset allocations to complement existing public market portfolios of listed equities, fixed-income securities, and cash. According to Preqin, an alternative data provider, private market assets under management (AUM) among global investors rose from under USD1 trillion in 2000 to nearly USD12 trillion in 2022. Historically dominated by the largest institutional investors (such as sovereign wealth funds and endowments), private market investments consisting of large direct purchases of entire companies or real estate properties have evolved over the past few decades to include professionally managed private investment portfolios. For example, private market funds in the form of closed-end limited partnerships have greatly expanded private market access among small institutional investors and high-net-worth individuals.

To better prepare candidates to identify, target, evaluate, and manage private market investments throughout their financial industry careers, CFA Institute has introduced a series of Level III Private Markets Pathway learning modules, the first of which focuses on private market investments and structures.

While public markets usually involve more standardized, liquid securities of mature issuers with price transparency, private investments are characterized by unique, illiquid investments across a broader range of company life cycle stages or project

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development phases held for longer periods. The distinct features of private markets also lead to different investment methods and structures, which vary based on investment size, asset type, and the internal resources an investor is willing and able to commit to managing the private asset over the investment holding period. Given a greater focus on asset price appreciation over an investment life cycle among private market investments, private market performance is measured using compounded return over a multiyear period, as opposed to periodic measures more common among public market securities. These distinct features of private market investments contribute to their complementary role when combined with more traditional public equity and fixed-income securities in a strategic asset allocation.

LEARNING MODULE OVERVIEW

- Public investments typically include non-controlling positions in debt or equity claims of mature issuers. Private investments, in contrast, often include controlling or large minority stakes in firms across the entire company life cycle, as well as private real estate or infrastructure. Public markets are characterized by the ability to readily buy or sell positions, while private markets are illiquid and trade on a negotiated basis.
- Private investment methods include a direct approach for the largest investors with sufficient expertise to manage positions over an investment period and indirect approaches, such as a closed-end limited partnership. Unlike security-based public investments, private investment structures are often created and tailored to a specific use, such as an acquisition company used for buyout equity or a special purpose entity formed to manage a project among investors and stakeholders in private real estate or infrastructure.
- While public markets typically use periodic income and asset appreciation performance measures based on observed prices, the relative illiquidity, uneven cash flows, and longer investment periods for private markets lead to the use of compounded return measures to gauge returns. For example, return multiples are often used to measure the proportion of realized and unrealized returns to a private fund investor relative to funds invested.
- The greater potential return and portfolio diversification often attributed to private market investments stems from both a longer, less liquid investment life cycle with greater uncertainty and a broader investment opportunity set across both the company life cycle and various asset types.

2 FEATURES OF PRIVATE AND PUBLIC INVESTMENTS AND MARKETS

☐ contrast the features of private and public investments, and discuss characteristics of private and public markets

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Public investments generally involve listed securities representing debt or equity claims that are regularly traded on an exchange or among dealers in an over-the-counter market. Public fund managers invest in non-controlling debt and equity positions of more mature issuers typically with stable cash flows. Public investments are characterized by an investor's ability to readily buy or sell positions and to observe current and historical prices for securities and relevant benchmarks, such as indexes.

Private investments are unlisted assets for which no organized exchange or over-the-counter market exists or involve companies that choose not to or cannot access public markets due to their size, stage of development, limited financial disclosure, or concentrated ownership. Private funds often acquire controlling or significant minority stakes held for longer periods over which value creation occurs, resulting in cash flow improvements, which are a primary driver of investor returns. Private debt and private equity claims are usually non-standardized contracts that are negotiated rather than exchanged on a regular basis. While private activities span a wide range of investments, including sole proprietorships, our focus here is limited to private investments of relevance to institutional investors. It is also important to distinguish between *alternative* investments and *private* investments, terms that are often used interchangeably. Alternative investments are those other than ownership of traditional public equity, public fixed-income, and cash instruments. While alternatives include most private markets, some alternative investments, such as exchange-traded commodities and hedge funds, use strategies involving public securities, which were addressed in detail in the Level II curriculum.

Some alternative investments are held in both public and private forms. For example, real estate investment trusts (REITs) hold income-producing properties and most often have publicly traded shares, while private real estate includes major refurbishment and development of commercial and residential properties, as well as timberland and farmland, which are covered in detail in a later learning module. In addition, some private companies issue public debt securities, such as high-yield bonds. The Private Markets Pathway covered in the following learning modules focuses on the following asset types:

- Private equity
- Private debt
- Private special situations
- Private real estate
- Private infrastructure

Key features that distinguish public and private investments are summarized in Exhibit 1 and are subsequently outlined in detail.

Exhibit 1: Features of Public vs. Private Investments

Feature	Public	Private
Asset prices	Traded, observable	Negotiated, estimated
Performance measurement	Periodic	Compounded over holding period
Liquidity	Mostly liquid, with few trading restrictions	Illiquid, with sale prohibited or restricted
Investment process	Open-end, security selection	Closed-end, with due diligence, value creation, and exit

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Feature	Public	Private
Investment manager skills	Industry, company, and financial analysis	Industry, management, and technical experience and expertise, legal and financial analysis
Portfolio diversification potential	Based on correlations of observed periodic returns	Based on different company and investment life cycle phases, as well as unique asset types

Asset Prices and Performance Measurement

Immediate access to current and historical price data for individual securities and relevant benchmarks supports a variety of public market investment approaches. For example, investors can easily measure returns, volatility, and correlations across time and construct portfolios with an efficient risk–return trade-off. Public market data are a critical input in judgement-based investment approaches seeking to capitalize on a market view, rule-based strategies using factor analysis, and index-based investment strategies.

Private market investors, in contrast, have little or no price transparency for prospective, existing, or comparable investments. As a result, investors rely on relative valuation techniques, discounted cash flow methods, and recent transactions among other approaches to estimate prices. Fund managers provide valuation estimates to investors with delays and at less frequent, often quarterly, time intervals, limiting the usefulness of such data for asset allocation purposes.

Periodic public market performance measures generally assume an initial cash outflow upon asset purchase and periodic inflows, including bond coupons, stock dividends, and net operating income for real estate. In contrast, private market investments involve far less predictable cash flows, with multiple cash outflows and inflows of uncertain timing. Performance metrics for private investments will be addressed in detail later in this reading.

Liquidity and Investment Process

Active trading of listed securities in public markets offers a high degree of liquidity and relatively low transaction costs. The purchase and sale of listed securities can be as simple as executing a market order, and short-term market developments may prompt a public fund manager to sell securities whose observed price exceeds what a manager considers to be fair market value or to purchase undervalued securities based on public market developments. Issuers of public equity and debt are usually in a mature phase of development with predictable, stable cash flows.

Privately held controlling or minority stakes in a firm, a project, or a real asset are inherently illiquid. Fund managers usually seek a larger capital commitment from investors and require a far longer investment time horizon than for public funds, sometimes up to 10 years or more. Private purchases and sales are often negotiated between two or very few potential buyers and sellers, leading private fund managers to prohibit or severely restrict investors from selling fund positions to avoid the need for early liquidation.

The different features of public and private investments also give rise to distinct investment processes. For example, the greater liquidity and price transparency of public investments allow for a more open-end investment approach and structure. Investments in illiquid private assets held for longer periods benefit from a closed-end approach in which investors align manager compensation with investment performance.

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We refer to the development or transformation of private assets over this longer investment holding period as the **private asset investment life cycle**, whose distinct phases are shown in Exhibit 2.

Exhibit 2: Private Asset Investment Life Cycle

The private asset investment life cycle common among investment types consists of capital commitment, deployment, distribution, and exit phases, which will be addressed in detail in later learning modules. The private asset investment life cycle is characterized by negative returns in early phases followed by cash flow and income growth in later phases, referred to as the **J-curve effect**.

Public market investors with non-controlling stakes have little influence over issuers beyond the exercise of voting rights. Private investment managers, in contrast, are actively engaged in managing and controlling assets throughout the investment life cycle. Tasks range from identifying ideal targets, conducting due diligence, and creating detailed business and financing plans to managing the value creation process from capital deployment until an investment is ultimately sold or exited and capital is returned to investors.

Manager Skills

Distinct investment processes, as well as roles and responsibilities, among public and private fund managers give rise to different skill sets required for success in managing portfolios in these respective markets. As public fund managers largely delegate the value creation process to company managers, much of the underlying investment research is conducted across securities, companies, and industries. For example, publicly available corporate financial statements and other data sources are used to create and compare financial ratios and other relevant metrics as a basis for investment analysis.

Private market investments often lack the market price transparency of public market securities and include investment opportunities ranging from new real estate developments to mature firms in financial distress to startup companies with little more than a business idea. The manager skill set required to successfully shepherd these investments from selection through exit goes well beyond security analysis. In the case of real estate, local market knowledge and project development and management experience are critical. Private equity fund managers often bring significant operational experience and industry expertise. In addition, they bring industry relationships and

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management experience in founding, growing, or restructuring businesses, as well as legal, accounting, tax, and other qualifications, to their role in managing such investments. Given the prevalence of less standardized contracts in private markets, both investors and managers must be prepared to conduct additional legal analysis when considering such investments.

Early-stage companies with little or no revenue often solicit private equity investments known as **venture capital**, which involve both high risk and a high rate of failure. A company's initial success is usually measured by non-financial milestones, such as establishing a product and go-to-market strategy, as well as identifying market potential well before the company generates revenue or profits. Therefore, in addition to capital, startup investors often bring relevant experience, contacts, and partnerships to young companies to help establish a successful business as demonstrated in the following example.

EXAMPLE 1

CRISPR Therapeutics AG's Startup Phase

In 2013, French professor and researcher Emmanuelle Charpentier co-founded CRISPR Therapeutics AG, together with Rodger Novak and Shaun Foy. Using genome editing and engineering discoveries for which Charpentier and Jennifer Doudna were later awarded the Nobel Prize in Chemistry, CRISPR Therapeutics was established in order to use these new gene-editing tools in biotechnology and biomedical applications.

In the following year, CRISPR Therapeutics raised USD25 million in Series A equity from Versant Ventures, a US-based venture capital firm focused on the health care and biotechnology industries. Given Versant's multidisciplinary team of scientists and researchers, the company announced a broader team of leading experts in various fields of science to capitalize on this new technology at the time of financing.

According to Crunchbase, a startup and early-stage financing data provider, CRISPR Therapeutics conducted three additional equity financing rounds with 16 investors, including established pharmaceutical companies, such as Celgene and Bayer AG, as well as other venture capital firms, such as New Enterprise Associates (NEA).

NEA is a US-based private investment firm focused on the technology and health care industries and one of the world's largest venture capital funds, with over USD25 billion in committed capital. NEA's health care industry team members include physicians, research scientists, pharmacists, and other experts with extensive experience in the areas of biotechnology, pharmaceutical drug trials and medical devices. NEA partner Ali Behbahani, MD, MBA was appointed to CRISPR Therapeutics AG's board of directors at the time of NEA's investment.

In October 2016, CRISPR Therapeutics became public in an IPO on the NASDAQ exchange, which valued the company at USD590 million. The company has since reached a market capitalization over five times that of its IPO valuation, establishing many partnerships and developing several drugs for blood diseases, cancer, diabetes, and other illnesses.

As the example suggests, both the equity capital and industry expertise provided by private fund managers often contribute to a startup's success. For example, NEA's board membership and its involvement, along with other investors, in establishing partnerships and helping establish drug trials were key factors in expanding CRISPR's business at an early stage.

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Portfolio Diversification Potential

The distinct features of private markets and investments are commonly assumed to result in relatively low correlations between private market returns and those of public market securities. While a public market security's correlation may be estimated easily relative to the existing public market portfolio because of observed market prices, private market illiquidity and longer investment periods preclude such a comparison. The diversification potential of private market investments is assessed differently. The following are key sources of potential diversification in private markets:

- Private company debt and equity exposures in life cycle phases, which are unavailable to public market investors, such as exposures to rapid growth or restructuring opportunities
- Private company debt and equity return dynamics over an investment life cycle, which vary from those of mature public companies
- Exposures other than private company debt or equity that exhibit return dynamics different from those of public securities

Successful firms emerge from a startup period via rapid expansion, with cash flows and profitability rising until they reach a mature, stable phase and subsequently facing decline, as shown in Exhibit 3.

Exhibit 3: Company Life Cycle Stages

While public markets and investments are concentrated among mature companies, private investments span the entire company life cycle.

The CRISPR example illustrates the first of these diversification sources. Startup and early-stage companies usually fail to meet public equity listing criteria, nor do they reach minimum profitability or interest coverage requirements of traditional debt providers. While startups such as CRISPR Therapeutics have a very high return potential, they also have a high failure rate. If successful, early-stage and young companies in an expansion phase tend to exhibit above-trend growth that is less driven by the business cycle, which generally impacts more established firms. Private investors play a role in the success of these companies by applying industry-specific and other skills in selecting and managing investments, as discussed in detail in later learning modules.

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A second potential source of diversification is more common among so-called **buyout equity** investments in existing public companies. Private equity buyouts often involve taking a mature public company private using debt and equity with the intent to transform, divest, or acquire businesses and sell the reorganized firm at a higher price. Given these steps taken by private fund managers over the investment life cycle, buyout company performance may diverge significantly from that of public equities. In some cases, private manager skill in selecting, acquiring, financing, restructuring, and selling companies may result in relative outperformance, while in other cases, timing differences of otherwise similar trends in private and public equity may result in reduced correlation.

A third area of potential variation among private and public market returns involves alternative asset classes, such as real estate or infrastructure. Private real estate often involves major refurbishment or new construction as opposed to more stable income-producing properties held by public REITs. Publicly traded infrastructure companies issue debt and equity securities with diversified exposure to a changing project portfolio as opposed to the large, single-use illiquid assets that characterize private infrastructure. Private real estate and private infrastructure are characterized by an investment life cycle, which distinguishes their risk and return features from those of public markets.

Many of the characteristics of private markets and investments that offer the possibility of attractive risk-adjusted and less correlated returns also historically represented barriers to entry for many institutional investors. For example, the relative lack of price transparency, illiquidity, large minimum investment size, and specialized knowledge necessary prevented all but the largest asset owners from taking advantage of private market investment opportunities. The following example describes one sovereign wealth fund's journey in investing in private market strategies.

EXAMPLE 2

GIC's Private Markets Investment Strategy

Government of Singapore Investment Corporation (GIC) is among the world's largest sovereign wealth funds, with an estimated USD700 billion in AUM. Established in 1981 with a mission to preserve and grow the global purchasing power of Singapore's strategic reserves, GIC gradually shifted from a conservative policy of 70% developed market bonds and cash to a greater equity and private market allocation similar to those of major endowments.

In conjunction with these changes, GIC disclosed a new investment framework in 2013:

- *Reference Portfolio:* A 65% global equity, 35% global bond benchmark representing the Government of Singapore's overall risk tolerance
- *Policy Portfolio:* GIC's asset allocation across six asset classes, which include real estate and private equity
- *Active Portfolio:* GIC has the flexibility to pursue what it refers to as skills-based and opportunistic investments within each asset class, as well as across and outside of the six primary asset class distinctions, within a predetermined risk budget set by the GIC board.

GIC rapidly adapted to this more active investment approach over the following decade, with a reported private equity allocation of 17% and real estate allocation of 13% as of 2022–2023. Despite its lack of disclosures of private investments outside of private equity, GIC's active role in private markets is evidenced by the growth in its investment team and in the number and size

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of private market transactions in which it participates. For example, GIC now employs over 2,000 investment professionals, 70 of whom are solely dedicated to infrastructure investments, in 11 global offices. According to a survey by Global SWF, a research firm, GIC participated in the largest number of private market transactions among state-owned investors in 2022, with 72 private market deals totaling USD39 billion.

Given its size, scope, and skilled management team, GIC can invest through private market funds, as well as acting as a direct investor or co-investor, to build a diversified private portfolio across vintage years, industries, and geographies. For example, in early 2023, GIC partnered with Oak Street, a US-based real estate private equity firm, to acquire STORE Capital Corporation, a publicly traded commercial REIT specializing in single-tenant operational real estate, for USD15 billion.

While most investors lack the size, scope, and in-house professional expertise of the sovereign wealth fund described in the previous case study, private market investments have evolved to become more widely accessible to a broad range of institutional investors and high-net-worth individuals. In what follows, we will review the various structures, forms of ownership, and investment methods that have made this situation possible.

QUESTION SET

1. Which one of the following skills is more essential to private market investment relative to public market investment?

   A. Company analysis

   B. Legal analysis

   C. Industry analysis

   Solution

   B is the correct response. While company and industry analyses are common in all investment analyses, both private and public, private investments involve taking large stakes in a company or asset. As such, a private investor should have the ability to conduct legal analysis as part of the due diligence process.

2. Which one of the following statements best describes a source of portfolio diversification potential from private market assets?

   A. Private markets offer potential access to higher-risk investments compared to public markets.

   B. Private markets offer potential access to investments in different company life cycle stages compared to public markets.

   C. Private markets offer the potential to invest in lower-risk companies in the mature phase of the company life cycle.

   Solution

   B is the correct response. Private company debt and equity investments create exposures in company life cycle phases that are unavailable to public market investors. A is not correct, because higher risk can always be achieved in public market investments by increasing leverage. C is not correct, because public markets also offer investors the potential to invest in lower-risk companies in their mature phase. The diversification benefits of

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private market investments stem from the fund manager's efforts to transform a mature business during the investment life cycle.

3. Discuss an important contrast between private and public market investments related to ownership stakes.

Solution

Private funds acquire controlling or significant minority stakes in companies or assets and hold these for longer periods. In contrast, public fund managers invest in non-controlling debt and equity positions of companies or assets and can readily liquidate them in traded markets.

3 PRIVATE VS. PUBLIC INVESTMENT STRUCTURES

☐ discuss private investment methods and structures and their uses

Public market investors typically face a relatively simple choice between direct selection of individual securities and an indirect approach in which security selection is delegated to a public fund manager. The longer investment holding period and more active manager engagement over the investment life cycle of private market investments give rise to more complex investment methods, including closed-end fund structures based on a **limited partnership** structure, as shown in Exhibit 4.

Exhibit 4: Limited Partnership Structure

These partnerships are used to align the interests of private market fund managers, or **general partners (GPs)**, and private market fund investors, or **limited partners (LPs)**, as described in greater detail later.

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Private Investment Methods

In private markets, the choice of a direct or indirect investment method depends on the investor's commitment size and the ability and willingness to commit the necessary resources to actively manage the position over the investment life cycle. Three common private market investment methods are shown in Exhibit 5.

Exhibit 5: Direct Investment, Co-Investment and Fund Investment Alternatives

Direct Investment

Direct investment involves the purchase of an equity ownership stake or private debt investment *without* the use of a partner or an investment intermediary. This investment method may, for example, involve a controlling stake in a buyout equity transaction. If acquiring a majority equity stake, a direct investor must not only negotiate the purchase price but also establish and execute a successful business plan to create value over the investment holding period. For this reason, as well as due to the potential portfolio concentration risk of large-scale acquisitions or projects, the largest asset owners, such as GIC in the earlier example, tend to be the primary users of the direct investment approach. With 17% of its roughly USD700 billion in investments committed to private equity, a new USD1 billion buyout investment would represent less than 1% of GIC's exposure to this asset class.

Co-investment occurs either as a **direct co-investment** or as a **limited partner co-investment**, as shown in Exhibit 5. Direct co-investment involves the *direct* purchase of an ownership stake or private debt investment with the use of one or more partners, one or more of whom may be a private fund manager. The earlier example described GIC's acquisition of STORE Capital with Oak Street, an example of an Asian sovereign wealth fund co-investing with a private equity firm with a focus on US real estate. Direct co-investment offers investors the opportunity to reduce the size of their private market portfolio positions, benefit from the expertise of investment partners, and reduce fees as compared to indirect investment approaches. A limited partner co-investment, in contrast, involves the purchase of an ownership stake or private debt investment in a single investment that is managed by a private fund manager. In some

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cases, LP investors with established GP relationships who are willing to invest large amounts in a fund may receive co-investment rights. Such co-investment rights provide investors the option to co-invest in an opportunity before it is offered more widely.

In the case of minority stakes in startup firms, founder-managed businesses often seek investments of less than USD10 million. While relatively accessible to smaller investors, investments of this size are often not large enough to meaningfully impact the portfolios of the largest investors. The very high failure rate of such firms underscores the necessity of industry expertise and experience in evaluating prospective investments. It is quite common for high-net-worth individuals who are also often successful entrepreneurs known as **angel investors** to provide early-stage financing to startup companies, as described next.

ANUPAM MITTAL, ANGEL INVESTOR

Anupam Mittal is an Indian angel investor who began his career as an entrepreneur in 1997 by founding an online wedding service for non-resident Indians, which became Shaadi.com, a leading matrimonial website for Asians that has since expanded to retail outlets providing related services.

After raising capital for his own startup in Silicon Valley, given the lack of venture capital firms in India at the time, Mittal became one of the leading angel investors in Indian startups, investing in over 200 early-stage companies, including such successful firms as the ridesharing business Ola Cabs and the leading online grocer BigBasket. In 2021, Mittal became one of the original panelists on Shark Tank India, an Indian franchise of the successful US business reality television series, in which startup companies present to a panel of investors or "sharks" who decide whether to invest in each business.

Indirect Investment

Indirect forms of private market investment include co-investment and fund-based alternatives. In the case of a so-called limited partner co-investment, an LP purchases an equity ownership stake or private debt investment in a single investment that is managed by a GP. This form of indirect investment allows LPs to take a larger stake in specific assets of interest in a portfolio under the direction of a more experienced private fund manager. LPs who are offered co-investments are able to gain deeper insight into their GPs because they are given access to a substantial amount of the GPs' due diligence materials and investment memos related to the investments. Such material is not available to typical LP private fund investors. In addition to tailoring a private portfolio beyond a set of fund stakes, this approach gives LPs the opportunity to engage in the investment process more actively in exchange for fee reductions. General partners, in contrast, use the co-investment method to share investment risk, expand access to investor capital, and in some cases attract new investors outside an existing partnership.

As described earlier and shown in Exhibit 4, indirect investments in private market funds are often organized as limited partnerships. In contrast to highly liquid public investment funds, which offer price transparency, limited partners face long and illiquid investment holding periods. LPs must also commit capital in advance of investment selection and face uncertain timing of both capital calls and the distribution of returns over time. (The effect of this key feature of limited partnerships on investment portfolios and returns is addressed later.) As a result, limited partnerships typically involve performance-based incentive compensation among other features

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designed to manage information asymmetry and align manager and investor interests. The next reading will address these GP and LP perspectives and the investment process in greater detail.

Private Investment Structures

Whether a private market participant is acting as a direct investor or investing indirectly via a limited partnership, the underlying structures of individual private investments are less standardized than public security–based investments. Corporate governance for private corporations and other legal entities often deviates from the simple one-vote-per-share and majority rule more common among public companies and is subject to negotiation. For example, an influential minority investor may negotiate such provisions as a seat on a private company's board of directors or a supermajority vote requirement for key business decisions, which can grant a minority owner an effective veto right on certain strategic decisions. New legal entities are frequently created for and tailored to a specific use, such as the management of roles, responsibilities, risks, and return over a project's investment life cycle or the purchase of a public company by private investors, referred to as a **take-private transaction**, after which the target company's shares are no longer publicly traded, as in the following case study.

CASE STUDY

Straploc Industries Acquisition

Glidestone Capital Partners, a private equity buyout firm general partner, has targeted Straploc Industries for a take-private transaction because of its recent underperformance versus industry peers. Straploc is a manufacturer and distributor of specialty fasteners, adhesives, and seals used in numerous industrial applications that is publicly traded on the Toronto Stock Exchange. Glidestone intends to restructure Straploc's operations and sell the company in several years.

Since Glidestone plans to fund 70% of the expected CAD1.25 billion purchase price with debt and the remainder with committed equity capital, it has asked a group of banks also serving in an advisory role on the acquisition to arrange a temporary acquisition financing of CAD875 million to support its bid, pledging the Straploc shares it will acquire as loan collateral to the lenders.

In a take-private transaction such as the one in the prior case study, also referred to as a **leveraged buyout (LBO)** because of the high proportion of debt financing used to make the acquisition, a new legal entity is often created to facilitate the process. For example, as shown in Exhibit 6, a separately funded new acquisition company (AcquisitionCo) is often created for the sole purpose of acquiring a specific target company (TargetCo). If the bid is successful, its assets will consist of TargetCo shares and its liabilities will be short-term acquisition debt, with the equity contributed by the buyout firm.

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Exhibit 6: Take-Private Acquisition Structure—Initial Phase

Take-private transactions, as well as other mergers and acquisitions, typically trigger the refinancing of a target company's existing debt. This situation occurs because existing lenders and bondholders are commonly protected by a **change of control clause**, a provision requiring the issuer to offer to repurchase outstanding debt if certain changes occur in a company's ownership or management.

In the second stage of the buyout, long-term financing is negotiated as the deal is closed. In some cases, an acquiror may have arranged to simultaneously sell certain divisions of TargetCo or combine the target with another company it already owns. In other cases, such actions may take place in a later restructuring phase. At this time, AcquisitionCo and TargetCo are combined in a merger (MergeCo), and the acquisition financing is replaced with medium- and long-term debt issued by the new legal entity, as shown in Exhibit 7.

Exhibit 7: Take-Private Acquisition Structure—Second Phase

Private market strategies often involve debt structures that are less standardized than the non-callable fixed-coupon bonds common in public investment-grade debt markets. For example, the debt profile of leveraged buyouts typically involves a flexible structure to meet evolving issuer needs and the lender demands as illustrated in the following Straploc Industries case study.

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CASE STUDY

Straploc Industries' New Debt Profile

Straploc Industries' management would like the ability to repay debt early as it restructures, balance both fixed and floating interest rate exposure, stagger debt maturities, and use its fixed assets as security to reduce borrowing costs.

The underwriting banks for Glidestone's acquisition loan have offered to arrange a **leveraged loan** for Straploc. This type of senior secured loan has a floating-rate coupon based on market reference rates, includes several restrictive debt covenants, and is prepayable.

As the buyout equity financial sponsor, Glidestone has directly solicited private investors to purchase Straploc debt and found the greatest investor interest in a **mezzanine loan**, or a debt claim serviced after senior debt claims but before common shares. This subordinated debt has a longer tenor and a higher fixed coupon than the floating coupon on a leveraged loan, is not prepayable, and has fewer restrictive covenants.

After considering both its goals and the associated trade-offs of different debt structures, Straploc management chooses to borrow using a larger (CAD600 million) leveraged loan tranche and a smaller (CAD275 million) mezzanine facility.

As in the case of equity, private debt investors may directly contract with a borrower or invest indirectly as a limited partner in a private credit fund to gain exposure to the senior secured debt or the mezzanine loans created in this transaction. Exhibit 8 shows the post-acquisition structure from the previous case study.

Exhibit 8: Post-Acquisition Private Debt Structure

As in the case of the buyout equity transactions, project-based private investments in the areas of real estate or infrastructure also often involve the establishment of what is often referred to as a **special purpose entity (SPE)** or special purpose vehicle.

In the case of a project SPE, the entity's sole purpose is to facilitate the construction, operation, and financing of a real estate or infrastructure asset. Use of a separate, new legal entity isolates the assets, liabilities, cash flows, and income, as well as associated contractual obligations, from the balance sheets of investors and other stakeholders. This structure serves to segregate the claims and obligations of a project's sponsor from the project itself. For example, a new private real estate development usually involves the establishment of a project company. This company receives an equity contribution from a private real estate GP, purchasing undeveloped land, which is financed using this equity and debt secured by the property.

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In the case of private infrastructure investment, an SPE structure is often used among various public and private entities as parties to a **concession agreement**, or a contractual arrangement under which an entity's terms and conditions are established with a developer or operator to plan, build, operate, finance, and maintain an infrastructure asset for a finite period (see Exhibit 9).

Exhibit 9: Infrastructure Special Purpose Entity

As shown in Exhibit 9, the SPE or in some cases a fully owned operating company is the focal point and often the contracting entity for many stakeholders, including regulators, debtholders, and equityholders.

QUESTION SET

1. Which of the following investment methods applies to private market investment but not public market investment?

   A. Direct investment

   B. Co-investment

   C. Fund investment

   Solution

   B is the correct response. Co-investment refers to either a direct investment in private equity or debt with one or more partners or an indirect investment as a single investment in private equity or debt with a fund general partner managing the investment. Both A and C are incorrect because direct investment and fund investment are approaches in either public or private market investment.

2. Discuss two reasons why direct investment in private market investments is typically limited to very large investors, such as sovereign wealth funds.

   Solution

   First, investors must control sufficient assets such that they can adequately manage the potential for portfolio concentration risk associated with large-scale acquisitions or project investments.

   Second, a direct investor must not only negotiate the purchase price and legal terms of an investment but also establish and execute on a successful business plan to create value over the investment holding period. Thus, the

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investor needs to have access to sufficient resources to have a team with the necessary expertise, which is likely only for very large investors.

3. Which one of the following private market investments is structured to address a change of control clause?

   A. Leveraged buyout

   B. Venture debt

   C. Leveraged loan

   Solution

   A is the correct response. Leveraged buyouts, as well as other mergers and acquisitions, typically trigger the refinancing of a target company's existing debt. This situation occurs because existing lenders and bondholders are commonly protected by a change of control clause, a provision requiring the issuer to offer to repurchase outstanding debt if certain changes occur in a company's ownership or management. B is incorrect because venture debt does not create any change of control issues. C is incorrect for the same reason, although a leveraged loan is likely part of the longer-term financing that is an outcome of the change of control clause in an LBO.

4. Which of the following is the most correct statement as to why private real estate and infrastructure projects are typically governed through a SPE?

   A. To limit the liability of investors for assumption of risks to those associated with the project

   B. To ensure that investors capture their share of returns from the project

   C. To protect the value of the investment at the end of the concession agreement

   Solution

   A is the correct response. An SPE creates a separate, new legal entity, which isolates the assets, liabilities, cash flows, and income of the project, as well as its associated contractual obligations, from the balance sheets of investors and other stakeholders. In this way, the SPE limits investor liability to only risks associated with the project. B is incorrect because the SPE does not govern the specific allocation of cash flows. Rather, the equity and debt investments specify these terms. C is incorrect because the value (if any) of the project reverts to the grantor at the end of the project.

PRIVATE VS. PUBLIC INVESTMENTS AND RETURN METRICS

4

☐ discuss the difference between public and private market performance, and calculate, interpret, and discuss the use of performance metrics including distributed to paid-in, residual value to paid-in, and total value to paid-in

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The distinct features of public and private markets lead not only to differences in liquidity and price transparency but also to different performance dynamics and approaches to performance measurement.

Public vs. Private Market Performance

Public markets include listed equity and debt securities from mature issuers with stable cash flows. While most large public equity issuers pay periodic dividends to shareholders, public debt securities are usually non-callable bonds that pay periodic fixed coupons to debtholders. As a result, public security analysts typically rely on measures of income and asset appreciation calculated on a consistent periodic basis as the most appropriate measure to compare returns and performance. Exhibit 10 illustrates the comparison of return over different periods as shown in the CFA Program Level I fixed-income curriculum for the case of bonds.

Exhibit 10: Periodic Yield Measures for Fixed-Rate Bonds

It is important to note that a high degree of price transparency and liquidity that is present in many public markets is necessary for such measures to be calculated, compared, and acted on in the case of arbitrage opportunities.

Private market investments, including private equity and debt from various stages over the company life cycle, as well as private real estate and infrastructure, face valuation challenges that complicate performance measurement. Their illiquidity, lack of price transparency, and dissimilarity among investments in the same private asset class preclude analysts from applying the same periodic and relative performance measures as for public markets.

In contrast to the stable cash flows of public market investments, the private asset investment life cycle shown in Exhibit 2, combining periods of positive and negative cash flow, implies that private market performance is best measured over a multiyear holding period. A common measure applied in such a case is the **internal rate of return (IRR)**, or the uniform discount rate for a series of cash flows (CF) over n periods that returns a net present value (NPV) of zero, as shown in Equation 1 and Exhibit 11:

$$\text{NPV} = 0 = \frac{\text{CF}_1}{(1+\text{IRR})^1} + \frac{\text{CF}_2}{(1+\text{IRR})^2} + \ldots + \frac{\text{CF}_n}{(1+\text{IRR})^n}. \quad (1)$$

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Exhibit 11: IRR over the Private Asset Investment Life Cycle

An important consideration when using IRR is that this calculation assumes interim cash flows may be invested at the IRR rate. While this assumption may hold in highly liquid public fixed-income markets, it is less realistic in the case of private market cash flows. For example, lower reinvestment rates of interim cash flows will reduce an investment's return.

Another cash flow–based performance measure commonly applied in private markets is the **return on investment (ROI)**, equal to the ratio or multiple of cash flows received versus those invested:

$$\text{ROI} = \frac{\sum(\text{Cash flows received})}{\sum(\text{Cash flows invested})}. \tag{2}$$

Although simple to apply and widely used, note that the ROI measure ignores the time value of money and the investment holding period.

In the special case in which a single investment (cash outflow) occurs at the beginning of an investment holding period and a one-time payoff occurs at the end, we may convert the ROI over an investment time horizon to an equivalent IRR of an n-year investment holding period, as follows:

$$\text{ROI} = (1 + \text{IRR})^n. \tag{3}$$

These performance measures are shown using the prior case study.

CASE STUDY

Straploc Industries' ROI and IRR

After a five-year restructuring period, assume that Glidestone Partners can sell its initial CAD375 million (equal to 30% of the original CAD1.25 billion purchase price) equity stake in Straploc Industries for CAD1.45 billion.

1. If we assume that Glidestone makes a single initial investment and received no dividends or distributions over the five years prior to sale, calculate the ROI on the Straploc equity position.

   Solution

   Using Equation 2, we can solve for ROI using the initial purchase price in the denominator and the sales price in the numerator:

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$$\text{ROI} = 3.867\times = \frac{\text{CAD1.45 billion}}{\text{CAD375 million}}.$$

2. Glidestone Partners has a target return of 30% over a five-year holding horizon on its buyout equity portfolio. Discuss whether the Straploc take-private transaction meets Glidestone's target and how the investment return would be affected if the investment were realized for the same amount and proceeds distributed earlier.

Solution

Because a single cash outflow occurs upon purchase and a single cash inflow occurs at the end, we can use Equation 3 to convert the ROI from Question 1 to an equivalent IRR over five years:

$$3.867\times = (1 + \text{IRR})^5.$$

$$\text{IRR} = 31.06\%.$$

The IRR of 31.06% exceeds Glidestone's return target of 30%. An earlier distribution of proceeds is a benefit to Glidestone's return. For example, a sale of Straploc at the end of four years results in an IRR of 40.23%. However, it is worth noting that this higher IRR assumes that the sale proceeds can be reinvested at 40.23% for an additional year. The earlier receipt results in the same five-year return of 31.06% only if these cash flows are not reinvested at all.

The private market investment life cycle involves the added complexity of extended upfront capital commitments, which do not exist in public markets. Investors must typically commit funds to a limited partnership months or years in advance of capital deployment, with little certainty regarding the timing or magnitude of capital calls. As a result, investors must often hold these commitments in more liquid public investments with possibly lower expected returns.

This feature adds to the challenge of assessing private market performance across all LPs in two ways: (1) the comparability of the return horizon between private and public markets and (2) the effects of public market conditions on capital call timing. The following example illustrates the comparison of public and private market performance.

CASE STUDY

Public vs. Private Market Return over an Investment Holding Period

Claire Thompson is an investment management consultant leading a conference workshop for public pension fund investment managers on comparing public and private market performance. She introduces a purely hypothetical example of a public pension manager with the following investment opportunities:

- Purchase shares in a public company for USD500,000 today, or
- Commit USD500,000 to a private equity fund today to be invested in a similar company in two years.

The manager expects public and private equity investment values to generate ROI of 2× over seven years, with the private company taken public at that time. Neither equity investment is expected to make interim distributions, and all calculations ignore investment fees and any other costs.

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1. Calculate the IRR of the public investment opportunity over the seven-year holding period.

   Solution

   Given the doubling of investment value (ROI = 2×) with no interim cash flows, use Equation 3 to calculate the IRR:

   $2\times = (1 + \text{IRR})^7$; IRR = 10.41% [$= 2^{(1/7)} - 1$].

2. Assume the private equity fund makes a single capital call in two years—that is, the USD500,000 will be deployed in the second year. Discuss why an investor cannot simply solve for expected private investment return using a five-year time horizon, an initial cash outflow of USD500,000, and a future inflow of USD1,000,000.

   Solution

   The assumption that the private market company will double in value over seven years might mistakenly lead a manager to believe that she will pay USD500,000 in two years and receive USD1,000,000 in seven years, resulting in an IRR of 14.87% [$= 2^{(1/5)} - 1$]. However, this approach ignores the opportunity cost of committed capital, which is not invested for the first two years. If we instead assume the private investment generates the same 10.41% IRR as the public investment with *no* return on committed capital for the first two years, then USD500,000 in capital committed today and deployed in two years will return just USD820,374 [$= \text{USD500,000} \times (1 + 0.1041)^5$] at the end of seven years, or an ROI of 1.641× (= USD820,374/USD500,000). We may substitute this ROI into Equation 3 for seven years to solve for private equity IRR of 7.33%:

   $1.641\times = (1 + \text{IRR})^7$; IRR = 7.33% [$= 1.641^{(1/7)} - 1$].

3. Given the uncertainty surrounding the timing and magnitude of capital calls for the private equity fund, the manager decides to invest committed capital in a liquid short-term fixed-income fund that returns 3.00% per annum. Discuss the effect of this decision on the IRR of the private equity fund allocation over the seven-year time horizon.

   Solution

   The manager's decision to invest committed capital in a short-term fixed-income fund will *reduce* but not fully offset the opportunity cost of committed capital that is eventually invested in private equity in two years. We would therefore expect the IRR of this allocation to be *above* the 7.33% in Question 2 given the assumption of zero return on committed capital but *below* the 10.41% IRR of the public investment that is fully deployed in shares for seven years.

   We may demonstrate this outcome by calculating the revised IRR of the private equity fund under this assumption based on the following three steps:

   Step 1 Solve for the future value of today's USD500,000 commitment.

   The future value of USD500,000 at a 3% rate of return in two years can be determined using a simple time-value-of-money calculation:

   $\text{USD530,450} = \text{USD500,000} \times (1 + 0.03)^2$.

   Step 2 Use the result to solve for investment value in seven years.

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The same approach applies for the future value of USD530,450 at a 10.41% rate of return for five years:

$$\text{USD870,355} = \text{USD530,450} \times (1 + 0.1041)^5.$$

Step 3 Calculate ROI over the full seven years, and solve for IRR.

ROI is simply the ratio of the USD870,355 future value and the USD500,000 original value, or 1.741×. Solve for IRR using Equation 3:

$$1.741\times = (1 + \text{IRR})^7 \quad \text{IRR} = 8.24\% \; [= 1.741^{(1/7)} - 1].$$

The prior example highlights the challenges associated with private market performance and public market comparisons when capital is not immediately deployed. Delayed cash *outflows* in the form of committed capital invested in more liquid investments with lower expected return will reduce IRR. Greater uncertainty surrounding the timing of capital calls makes the comparison of expected returns more challenging. Key factors affecting the timing of capital calls include the economic outlook and public market conditions, among other factors. For example, private buyout GPs deploy capital more rapidly in an environment where borrowing costs are low and expectations of solid economic growth support numerous restructuring opportunities. Under adverse market conditions, such as rising interest rates and greater risk aversion, capital deployment slows or pauses until GPs can find investment opportunities expected to meet or exceed target rates of return. For this reason, the **vintage year**, or year in which capital is initially deployed to a specific investment or project or more generally by a private market fund, is an important private investment characteristic that is closely tracked for comparing similar investments made at the same time and for seeking diversification over time across investment life cycles within a private market allocation.

Cash Flow and J-Curve Effects in Private Market Portfolios

The timing and return dynamics of individual private investments are also important drivers of private market *fund* performance. The J-curve effect shown in Exhibit 2 applies not only to individual investments but also to investment portfolios in private closed-end limited partnerships. As a fund is initiated, GPs solicit investors and obtain capital commitments. Once investment targets are identified, cash outflows occur successively as capital is deployed with no offsetting inflows. The negative cash flows of a fund's early years are expected to be offset by inflows from early investments as the fund becomes closer to fully invested. Once commitments are fully deployed, cash inflows from investments include exit values from specific investments. The following case study illustrates this process and its effect on performance.

CASE STUDY

Tenderledge Investment Fund VIII Performance

Tenderledge Partners, a private equity firm, has successfully generated capital commitments of USD100 million for its new private market investment fund. The fund's GP plans to deploy capital among four assets in three years, with an immediate USD20 million invested, followed by investments of USD40 million, USD30 million, and USD10 million at the end of each of the next three years. Each investment produces three years of uniform cash inflows in the years following investment with a sale four years after initial investment. The following table shows the expected cash flows (in millions of US dollars) and IRRs for each investment asset over their respective four-year time frames.

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Cash flows by asset	Initial investment	First cash inflow	Second cash inflow	Third cash inflow	Final cash inflow	Asset IRR
Asset 1	–20	5	5	5	30	29.1%
Asset 2	–40	8	8	8	45	18.6%
Asset 3	–30	3	3	3	42	15.9%
Asset 4	–10	2	2	2	20	32.5%

Tenderledge is screening candidates for an analyst position and shows the previous table along with the previous description of the fund as part of its process for eliminating applicants. In addition to the information about the asset cash flows and IRRs, the following statements are shown:

Statement 1 The arithmetic average of the project IRRs is 24.0%.

Statement 2 The weighted average of the project IRRs is 21.3%.

Statement 3 The sum of the four project cash flows produces an IRR of 21.5%.

1. Discuss one reason why each statement is incorrect regarding the Tenderledge fund IRR.

Solution

Arithmetically averaging across project IRRs shown or simply adding the project cash flows by the year following investment is not a correct methodology. The cash flows of the four projects do not occur within the same time horizons. Thus, neither individual project IRRs nor project cash flows should be aggregated, because doing so ignores the time value of money. Instead, each year's cash flow must be calculated from the individual projects. For example, in Year 3, the sum of the cash flows is USD6 million, consisting of the asset's initial USD10 million cash outflow and cash inflows from the first three assets of USD5 million, USD8 million, and USD3 million, respectively.

The following shows the expected net cash flows for the Tenderledge fund.

USD millions	CF_0	CF_1	CF_2	CF_3	CF_4	CF_5	CF_6	CF_7	Asset IRR
Asset 1	–20	5	5	5	30				29.1%
Asset 2		–40	8	8	8	45			18.6%
Asset 3			–30	3	3	3	42		15.9%
Asset 4				–10	2	2	2	20	32.5%
Net cash flow	**–20**	**–35**	**–17**	**6**	**43**	**50**	**44**	**20**	**21.7%**

Negative net cash flows associated with initial investments dominate through the second year, while cash inflows from exiting investments and asset sale proceeds dominate in Years 4–6. The resulting IRR may be calculated using the IRR spreadsheet function, IRR({*values*},*guess*), as 21.7% [= IRR({–20,–35,–17,6,43,50,44,20},0)].

Private market fund investment IRRs reflect uneven timing of cash flows across the private asset investment life cycle. This timing issue creates challenges for benchmarking IRRs relative to public market returns measured over specific time periods. **Public market equivalent** (PME) methodologies are therefore commonly used to compare returns of private market fund returns with those of public market returns. This approach seeks to translate the uneven cash flows generated by private market

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funds into comparable public market returns. A basic PME methodology creates a theoretical public market investment in which private fund cash outflows are invested in a public market index while cash inflows are sold from a public market index. A terminal value is calculated from this hypothetical cash flow stream at the end of the private fund's life. The PME IRR is calculated based on the private fund's cash flows, with the PME terminal value replacing the fund's exit value. The following case study illustrates the PME approach.

CASE STUDY

Glidestone Partners Public Market Equivalent

Glidestone Partners recently closed a CAD70 million private equity fund with a four-year life. The fund's year-end cash flows, a comparable public market index, and its annual returns are shown in the following table.

Year	Glidestone Fund Cash Flow (CAD millions)	Public Market Index	Public Market Return
0	–40	100	NA
1	–30	120	20.00%
2	0	105	–12.50%
3	20	140	33.33%
4	78	150	7.14%

The fund's IRR is 10.50%, and the public market index compound annual return is 10.67%.

1. Discuss why Glidestone should not benchmark its fund's IRR against the public market index compound annual return of 10.67% to assess fund performance.

   Solution

   The public market return is computed as an annual return that ignores the uneven cash flow timing of Glidestone's fund. As a result, Glidestone cannot make a proper comparison to a public benchmark by simply using compound annual return.

2. The following table shows the year-end asset values of a PME for Glidestone's fund. Demonstrate how these amounts are derived using fund cash flows and the annual public market index returns. (Consider any beginning-of-year flows to be received at the end of the previous year.)

Year	Glidestone Fund PME Asset Values (CAD millions)
0	40
1	78
2	68.25
3	71
4	76.07

Solution

In Year 0, Glidestone invests CAD40 million in the public market index. During Year 1, Glidestone earns 20% on its CAD40 million initial investment for a return of CAD8 million (8 = 0.2 × 40).

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At the beginning of Year 2, Glidestone invests CAD30 million, bringing total portfolio value to CAD78 million (78 = 48 + 30). In Year 2, public market return of –12.5% causes Glidestone's portfolio value to fall to CAD68.25 million [68.25 = 78 × (1 – 0.125)].

In Year 3, Glidestone has no cash inflow, with a 33.33% public market return and a CAD20 million cash outflow to investors at year-end. Thus, its asset value at the end of Year 3 is CAD71 million (= 68.25 × 1.33 – 20).

In Year 4, Glidestone has no cash inflow, and its asset value is assumed to earn the public market return of 7.14%, leading to a PME terminal value of CAD76.07 million (76.07 = 71 × 1.0714).

3. Evaluate whether Glidestone's fund exceeds its benchmark.

Solution

The IRR of the PME based on Glidestone's fund cash flows in Years 0–3 and the PME Year 4 asset value is 9.86% [= IRR({–40,–30,0,20,76.07},0)]. Thus, Glidestone's fund IRR of 10.50% exceeds the PME IRR of 9.86%. By accounting for the timing of Glidestone's cash flows in the context of public market returns, we find the opposite result of the earlier comparison against the public market's compound annual return.

Using a PME methodology provides a theoretically correct mechanism to account for the timing differences when comparing private and public market returns. The PME methodology has evolved over time to account for a variety of difficulties that can occur using the simple approach demonstrated previously. A more significant issue is associated with the choice of public market index. The previous Glidestone case study does not consider whether the public market index chosen reflects a proper public market comparable. For example, the best comparable public market index for a buyout equity fund might be a mid-cap or small-cap index rather than a large-cap index if the fund targets portfolio companies of smaller size. Furthermore, other factors may need to be considered in index selection, such as value versus growth, leverage differences, and other possible differences.

The cash flow stream from the previous case study example illustrates the importance of estimating overall fund returns based on *net* cash outflows and inflows over the life of the fund. The longer investment holding periods associated with investment selection, capital deployment, distribution of returns, and the investment exit processes can vary widely among GPs and private asset classes. As such, fund manager return calculations for limited partners at the overall fund level always incorporate cash flows across the time horizon. However, individual investments made by the fund manager can be assessed by their project IRR, which in some cases may only be computed using initial investments and exit values. For example, venture capital investments typically involve early-stage equity stakes in firms with little or no revenue that are usually sold before any distribution to shareholders takes place. Infrastructure investments, in contrast, frequently include an asset transfer to a public entity at the end of an operating period, where all shareholder returns are in the form of distributions prior to the end of the investment period.

To capture these and other differences in capital deployment, as well as returns over time and across investments, GPs commonly provide several return multiples to LPs to quantify and compare performance, which are introduced next.

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Private Market Fund Multiples

In addition to IRR, GPs communicate performance to LPs using various return multiples, which offer more detail than the simple return on investment measure over the entire investment life cycle. Although these multiples also ignore the time value of money and the investment holding period, their ease of calculation and ability to differentiate between realized proceeds and the unrealized portfolio, as well as different types of return, make these ratios popular among limited partners.

The first of these multiples, **paid-in capital (PIC)**, addresses the proportion of total capital committed that has been deployed to date, as shown in Exhibit 12 and Equation 4.

Exhibit 12: Paid-In Capital

$$\text{PIC} = \frac{\text{Capital invested}}{\text{Total capital committed}}. \tag{4}$$

As Exhibit 12 suggests, PIC measures the degree to which the drawdown phase of the investment life cycle is complete, allowing LPs to compare similar investments across both GPs and vintage years, as well as across private asset classes. For example, an LP may expect an initial lower PIC for vintage years with adverse market conditions, as GPs become more selective and find fewer attractive investment opportunities. PIC is also used as an indicator for when the GP may return to market to raise a new fund. For example, GPs may raise a new fund when PIC reaches 75%.

The remaining multiples evaluate investor returns in the form of realized distributions and the net asset value, or *unrealized* value of investment, as compared to capital invested. Exhibit 13 illustrates these realized and unrealized returns in the context of the investment life cycle shown earlier.

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Exhibit 13: Distributed, Residual, and Total Value to Capital Invested

The first return measure is **distributed to paid-in (DPI)**, or the ratio of cumulative distributions to LPs to the capital invested. This measure indicates an investor's realized return on investment, often called the cash-on-cash return:

$$\text{DPI} = \frac{\text{Cumulative distributions}}{\text{Total capital invested}}. \tag{5}$$

Residual value to paid-in (RVPI) is the fund's net asset value (NAV) as a proportion of the total invested capital. Because the NAV reflects the value of the fund's remaining portfolio, this ratio is a measure of the investor's unrealized return on investment.

$$\text{RVPI} = \frac{\text{Net asset value}}{\text{Total capital invested}}. \tag{6}$$

The overall investment value to the LP, **total value to paid-in (TVPI)**, incorporates both the cumulative distributions received and the NAV as a proportion of invested capital. TVPI is the sum of DPI and RVPI.

$$\text{TVPI} = \frac{\text{Cumulative distributions} + \text{Net asset value}}{\text{Total capital invested}}. \tag{7}$$

$$\text{TVPI} = \text{DPI} + \text{RVPI}. \tag{8}$$

Average TVPIs of close to 3× are common in emerging, high-growth industries, such as information technology, and TVPIs near 2× are common in more mature industries, such as consumer goods. When considered gross of fees, which are addressed later, the TVPI is sometimes referred to as the **multiple of invested capital (MOIC)** or **multiple of money (MOM)**.

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CASE STUDY

Tenderledge Investment Return Multiples

Tenderledge Investment Fund VIII has successfully generated capital commitments of USD100 million. The fund's GP plans to deploy capital in four stages during the next three years, with an initial USD20 million investment followed by subsequent annual investments of USD40 million, USD30 million, and USD10 million, respectively. Based on the expected cash inflows from the four capital deployments, Tenderledge has created the following table showing fund NAV, capital called, and distributions to LPs over the next seven years.

Years	0	1	2	3	4	5	6	7
Net asset value		65	108	134	147	132	106	56
Capital called	–20	–40	–30	–10				
Distributed capital		0	0	0	10	25	40	60

1. Calculate the fund's PIC as of the end of Year 2.

   Solution

   Using Equation 4, we can show the fund's paid-in capital to be 90% at the end of Year 2:

   PIC = 0.9 = (20,000,000 + 30,000,000 + 40,000,000)/100,000,000.

   By the end of Year 2, Tenderledge called USD90 million of capital in three stages. This amount represents 90% of the USD100 million of capital committed, an indication that it is near the end of the drawdown phase.

2. Calculate and interpret the fund's DPI as of the end of Year 7.

   Solution

   Using Equation 5, we can show distributed to paid-in as follows:

   DPI = 1.35

   = (10,000,000 + 25,000,000 + 40,000,000 + 60,000,000)/100,000,000.

   The fund's DPI is 135% at the end of Year 7. This result implies that LPs have realized cash distributions 35% greater than the cash invested in the fund.

3. Calculate and interpret the fund's TVPI as of the end of Year 4.

   Solution

   Use Equation 7 to solve for fund TVPI at the end of Year 4 with USD10 million in cumulative distributions and a year-end fund NAV of USD147 million:

   $$\text{TVPI} = \frac{10,000,000 + 147,000,000}{100,000,000}.$$

   This result implies that the sum of the realized and unrealized returns to LPs is 57% above the initial amount invested into the fund. Note that this implies a DPI of 10% (= USD10 million/USD100 million) and an RVPI of 147% (= USD147 million/USD100 million), indicating that most of the fund's value is unrealized.

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The previous Tenderledge case study shows how the return multiples introduced earlier can be used to gauge drawdown progress and the proportion of realized and unrealized returns to an LP's original investment over time.

QUESTION SET

1. Which of the following statements is most correct?

   Private market performance is best measured:

   A. over consistent time periods to benchmark against public market performance.

   B. over a multiyear holding period to assess the periodic effects of price appreciation.

   C. over a multiyear holding period because of periods of negative and positive cash flows.

   Solution

   C is correct. In contrast to the stable cash flows of public market investments, the investment life cycle of private market investments, which combines periods of positive and negative cash flows, implies that private market performance is best measured over a multiyear holding period. A is not correct, because the lack of traded market prices or stable cash flows negates the ability to estimate returns over shorter time periods that are common for public market investments. B is not correct, because the lack of traded market prices or other reliable estimates of asset values negates the ability to estimate price appreciation over shorter time periods.

2. Discuss why the vintage year is an important characteristic of a private market fund.

   Solution

   A private market fund's vintage year, or the first year in which the fund deploys capital, is an important private investment characteristic that is closely tracked for comparing similar investments made at the same time and seeking diversification over time across investment life cycles within a private market allocation. Managers of funds of the same vintage year with similar strategies faced the same economic outlook and public market conditions, so performance may be more easily compared.

3. In private market investing, the J-curve effect applies to:

   A. both individual investments and funds.

   B. only individual investment.

   C. only funds.

   Solution

   A is correct. The J-curve effect applies not only to individual investments but also to investment portfolios in private closed-end limited partnerships. As a fund is initiated, GPs solicit investors and obtain capital commitments. Once investment targets are identified, cash outflows occur successively as capital is deployed with no offsetting inflows. The negative cash flows of a fund's early years are eventually offset by inflows from early investments as the fund becomes closer to fully invested. Once commitments are fully

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deployed, cash inflows from investments include exit values from specific investments.

4. Which of the following ratios is a measure of the investor's unrealized return on investment?

   A. TVPI

   B. RVPI

   C. DPI

   Solution

   B is correct. Residual value to paid-in is the fund's NAV as a proportion of the total invested capital. Because the NAV reflects the value of the fund's remaining portfolio, this ratio is a measure of the investor's unrealized return on investment. A is not correct, because total value to paid-in incorporates both unrealized and realized gains on the fund. C is not correct, because distributed to paid-in includes only the cash distributions to the fund's investors.

5 PRIVATE VS. PUBLIC RISK AND RETURN

☐ compare the risk and return of investing in private markets and public markets as part of a strategic asset allocation

Given the favorable market conditions over the decade following the Global Financial Crisis (GFC) of 2008–2009, including very low interest rates and rising valuations and risk appetite, private markets outpaced their public counterparts both in generating returns and in attracting capital.

For example, according to McKinsey, a global management consulting firm, median net IRR for global private equity funds with vintage years from 2009 to 2019 averaged 20.1% from inception through late 2022, while the S&P 500 Index returned an annual average of 11.8% over roughly the same period. Global private market fundraising reached an annual high of over USD1.35 trillion in 2021, approximately double the amount raised in 2007, the year prior to the GFC.

In addition to rising allocations by institutional investors to private market asset classes, such as private equity, debt, real estate, and infrastructure, policymakers in Europe and North America have taken steps to facilitate private market access for smaller investors. Subsequent Private Markets Pathway learning modules will address the performance characteristics of specific private market asset classes; here, we focus on an investor's overall allocation to private versus public markets.

The specialized manager skills and broader range of investments and life cycle phases give rise to a high degree of variability among private market returns. For example, private equity returns are not only volatile over time but also much more variable among fund managers as compared to both public markets and other private market categories. For the private equity funds with vintage years from 2009 to 2019 from inception through late 2022, the manager performance differential between the top (29.8%) and bottom (11.4%) quartiles was 18.4%, implying that managers in the bottom quartile slightly underperformed the S&P 500 on average over the period. Other private asset classes, such as private debt, reflected smaller performance differences among managers.

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Effects of Private Market Features on Risk and Return

As investors consider expanding their asset allocation to private markets, it is important to consider how the features of private markets affect risk and expected returns.

A key distinction between public and private markets is the longer investment holding period and associated J-curve effects in private markets shown in the investment life cycle in Exhibit 2. While the prior section addressed compound measures of return over the *full* investment cycle, Exhibit 14 highlights three key drivers of *periodic* return over the investment period.

Exhibit 14: Capital Calls, Deployment, and Returns over the Private Asset Investment Life Cycle

- *Commitment.* capital that is *committed* but not yet *called* is not yet invested in private market assets. Investors often hold these commitments in liquid public investments with lower expected returns.
- *Deployment.* In the early years of capital drawdown, committed funds are contributed before any returns are realized while being assessed fees, resulting in *negative* periodic returns. Over this period, GPs provide periodic fund valuations to investors. Prior to the distribution of returns, these valuations often include illiquid and unrealized capital gains that will only be received upon exit.
- *Return distribution.* Once returns reach the amount of capital contributed, the fund reaches an IRR of zero. Over time, the IRR converges to the true compounded return at the end of its life.

The combination of the long investment horizon and J-curve effects causes private market returns to be more reliant on price appreciation over the investment life cycle versus returns for public market investments, which are more likely to involve companies or assets that generate consistent, stable cash flow streams. Investors expect greater return in exchange for both the greater uncertainty and the illiquidity associated with private market strategies.

Private market debt and equity investments also provide investors access to a broader range of companies that expand the risk and return potential beyond available public investments. For example, early-stage venture capital investments target

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companies with exponential growth potential in emerging industries. These startup firms have a very high risk of failure but when successful also have a very high return potential, as shown in the following example.

THE STORY OF NUTANIX'S IPO

In 2009, Nutanix was founded by Dheeraj Pandey and Mohit Aron. As an early entrant in the rapidly growing area of cloud computing, the company was able to attract venture capital (VC) investor interest shortly after it was established, attracting such VCs as Khosla Ventures and Lightspeed Venture Partners. The company continued to expand and filed for an IPO in late 2015, finally going public in September 2016.

Lightspeed initially invested USD10 million in Nutanix and subsequently provided an additional USD30 million in equity financing for a total of USD40 million. When the company's stock rose 66% on its first day of public trading, Lightspeed's interest in the company was valued at USD1.035 billion, or more than 25× its initial investment.

Although Nutanix has continued to grow, with a market capitalization nearly quadruple that of its IPO price seven years later, public investors in Nutanix have not been able to match the returns of the company's pre-IPO private investors.

While well above the 20%–30% IRR commonly targeted by venture capital investors, the previous example is consistent with potential exit returns for startups with exponential growth potential. The exclusion of such very small or pregrowth companies from public listings reduces the potential return but also the risk associated with public equities. Venture capital investments in startup companies with little or no revenue and negative cash flow have a very high failure risk, as will be shown in a later learning module.

Risk and Return across Asset Classes

As investors consider strategic allocations to private market asset classes, it is instructive to contrast the relative risk and return of each type of investment with its more standardized, liquid equivalent in the public markets. Exhibit 15 provides a summary of these public and private asset class counterparts, which are expanded on in detail in later learning modules.

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Exhibit 15: Public vs. Private Market Investments

Equity

Whereas public equities involve larger companies in a mature life cycle phase with stable cash flows, private equity funds typically invest in early-stage venture capital or **growth equity** opportunities, as well as mature buyout opportunities whose investment thesis consists of purchasing a controlling stake in a firm to improve operations and target a higher exit price. Growth equity is a minority investment in a young company with a business model and rising revenue seeking to rapidly scale its operations.

Private equity strategies seek to achieve high risk-adjusted returns and portfolio diversification relative to public equities by targeting earlier company life cycle phases than those prevalent among listed companies and using high leverage over a restructuring period in the case of LBOs. Early-stage private investments are concentrated in emerging industries, such as information technology or biotechnology, or have new business models whose growth is often fueled by innovation rather than the economic cycle. Although private market investments may outperform listed equities in some periods, linkages between these markets remain in the form of entry and exit prices, market-based valuation multiples, and the cost of debt.

Debt

Public fixed-income investments consist largely of non-callable sovereign or investment-grade bonds from mature issuers with stable cash flows and little default risk. In contrast, private debt may involve early-stage startup borrowers with greater default risk, as in the case of **venture debt**; be sourced from non-bank lenders in the form of **direct lending**; or involve subordinated mezzanine debt with equity-like or other contingency features. Private debt return and risk dynamics often diverge from those of public debt due to different issuer life cycle stages, default risk, distinctive debt features, and a high degree of illiquidity.

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Real Estate

Publicly traded securities typically involve real estate investment trusts, which directly own and operate income-producing properties with relatively stable cash flows. Private investments usually entail major renovations or new development projects with more equity-like features, including an investment cycle with negative cash flows and less certain future income prospects. Investors typically expect greater returns as compensation for the longer investment period and greater market risk and illiquidity associated with these strategies, as well as the generally higher idiosyncratic risk of private real estate funds versus more diversified REITS.

Infrastructure

Publicly traded corporations active in infrastructure are typically well-established, mature companies with a pipeline of projects at various stages that generate consistent cash flows. Private infrastructure investments, in contrast, often involve so-called **greenfield investments**, or new "to-be-built" projects with a long investment period and a high degree of execution risk. While private investors expect greater compensation in exchange for assuming these risks, they may also realize portfolio diversification benefits during a project's operating phase in the form of cash flows that are less correlated with the economic cycle.

An additional private market strategy that does not directly correspond to a similar public market asset class involves **special situations**. These investments target returns by investing in stressed, distressed, or event-driven opportunities, which may involve either public securities or private assets. The prevalence of greater financial distress in an economic downturn gives rise to the opportunity to generate high returns using these strategies under otherwise adverse market conditions.

Asset Allocation with Private Markets

Given the more complex investments and structures associated with private market strategies versus public markets, limited partners must appropriately plan and stage their private investments and engage with GPs at regular intervals to maximize the risk-adjusted return potential of a private market allocation.

First, the need to commit uncalled capital for an extended period and hold investments over a multiyear investment cycle with uncertain distribution size and timing gives rise to an enhanced need for liquidity planning. For example, investors must establish a plan for investing committed, uncalled capital and factor this plan into portfolio return expectations. Given the limited pricing transparency and high degree of illiquidity over an investment holding period, limited partners must factor the lagged performance reporting for these assets into their governance framework and maintain sufficient portfolio liquidity to minimize the potential of incurring secondary market costs associated with early liquidation.

As investors expand beyond an initial allocation to private markets, it is important to consider a pacing strategy to commit a certain proportion of assets to an asset class or strategy each period, regardless of market performance. In some instances, limited partners may establish limited discretion to accelerate or decelerate the pace of investment depending on relative market conditions. In cases where specific vintage years or strategies are more challenging to access, the investor must weigh the diversification benefit with the cost. Finally, it is important to maintain and develop relationships with GPs as private capital commitments are deployed and distributions begin, to roll a consistent proportion of uncommitted capital into new funds each period. The following case study addresses these considerations faced by an institutional investor seeking to increase its allocation to private markets.

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CASE STUDY

Mid States University Endowment Strategic Asset Allocation Review

Mid States University is a growing regional university with a USD400 million endowment managed by Mid States University Management Company (MSUMC). Mid States University uses its endowment as a perpetual asset designed to provide for a real 4% rate of annual spending to support a variety of academic programs across the institution. Mid States University hired a new president who has introduced ambitious growth plans. In an effort to provide improved financial support to its programs, MSUMC launched a fundraising effort a year ago with a goal to grow the endowment to USD1 billion in three years. After its first year, the endowment growth plan is on track to meet its goal. The board of trustees of MSUMC is now reviewing the endowment's asset allocation to assess whether they should authorize material changes to the portfolio's strategic allocation.

Audrey Lake, CFA, serves as MSUMC's chief investment officer and compiles the following asset allocation information in preparation for a board meeting.

Asset class	Large university (>USD1,000 million) endowment allocations	MSUMC current allocation
Public equity	25%	45%
Public debt	20%	30%
Cash	4%	4%
Private equity	33%	15%
Private debt	1%	0%
Private RE	5%	3%
Private infra.	5%	0%
Other assets	7%	3%

As she begins to make her key points, Lake first highlights that MSUMC has 75% of its portfolio allocated to traditional public market assets, while the typical large endowment's public market allocation is only 45%. Private market assets constitute only 18% of MSUMC's portfolio, compared to 44% of large endowment portfolios. Lake argues that MSUMC should strive to reallocate its investments as the endowment grows to better match the allocation targets observed for large endowments.

One of the board members notes that MSUMC's total allocation of 60% to equity investments is not particularly different from the typical large endowment's 58% total allocation to equity investments. Lake uses this comment to discuss MSUMC's current private equity allocation to funds focused solely on buyout equity strategies. She mentions that MSUMC's allocation to this strategy is like that of large endowments. The major difference is that large endowments also allocate significant amounts to private equity funds investing in venture capital and growth equity strategies while MSUMC has no such allocations. As a result, the equity portfolio lacks exposure to startup and high-growth companies, sacrificing the higher expected returns and any potential diversification effects associated with these strategies.

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QUESTION SET

1. Which of the following is the most correct statement about returns over a private market investment life cycle?

   A. Private market returns are typically less reliant on price appreciation over the investment life cycle versus public market returns.

   B. Once a fund's investment returns reach the amount of capital contributed, the fund reaches an IRR of zero.

   C. Fund returns are typically positive during a fund's capital deployment phase.

   Solution

   B is correct. Once fund returns reach the amount of capital contributed, cash inflows equal cash outflows. Mathematically, this leads to an IRR equal to zero. Any additional returns beyond this point then result in positive IRR for the fund. A is incorrect because private market returns are typically more reliant on asset price appreciation compared to public market returns. C is incorrect because the negative cash outflow occurring during capital deployment is consistent with negative periodic returns.

2. Discuss two factors for why a private market investor should typically expect higher returns than a public market investor in the same asset class, such as private equity versus public equity.

   Solution

   One factor is greater uncertainty associated with private market investments because of less stable cash flows and greater reliance on price appreciation. Another factor is the greater illiquidity associated with private market investments compared to public markets.

3. Discuss one fundamental asset characteristic that cause private real estate and infrastructure investments to usually be riskier than public investments in these asset classes.

   Solution

   Private investments in both real estate and infrastructure are likely to be new or significant redevelopments, which contrasts with public investments in these asset classes, which tend to reflect portfolios of already-built assets that generate stable cash flow. As a result, private investments have long investment life cycles with uncertain cash flows and high illiquidity.

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PRACTICE PROBLEMS

The following information relates to questions 1-4

YYR Public Fund (YYRPF) is a large sovereign wealth fund managing a Southeast Asian country's monetary reserves with a long-term goal of maintaining and growing purchasing power through the fund's investment program. Earlier in its existence, YYRPF's strategic allocation was heavily weighted toward publicly traded government and corporate bonds generating fixed-coupon income with a secondary focus on publicly traded international equities along with a minor allocation toward domestic real estate. Over time, YYRPF has evolved its strategic asset allocation to be widely diversified across private asset classes in addition to continuing to allocate to publicly traded asset classes.

As part of its goal to maximize return performance while mitigating risk, YYRPF currently allocates approximately 20% of its portfolio to private equity investments and 25% to public equities. The fund diversifies across a range of private equity strategies, including venture capital, growth equity, and buyout equity. Its public equity strategy focuses on maintaining balanced allocations across global equity markets.

YYRPF has been expanding its internal private equity team over the years to build its expertise in this private market asset class. YYRPF plans to use direct investment for 100% of its private equity portfolio investments in the next five years. The resulting fee reduction from direct investing in private equity is expected to add a non-trivial amount to the fund's performance.

YYRPF includes allocations to private real estate and private infrastructure that amount to less than 10% of its total portfolio. As a result, YYRPF plans to invest in these asset classes strictly through limited partnerships. The available performance data suggest that YYRPF can expect returns of 10%–12% annually from investing in these asset classes. In conversations with a GP of a private real estate fund invested in by YYRPF, she specifically states that attractive investment opportunities appear infrequently, resulting in capital deployment periods possibly being as long as four years.

1. Discuss how YYRPF's approach to investment process and liquidity have likely changed as its strategic asset allocation has changed.

2. Discuss how YYRPF likely assesses diversification potential when adding a new public equity position versus a new private equity position to its equity portfolio.

3. Which of the following private market investment methods is most likely to be used by YYRPF to help the fund move toward pursuing its private investment goals?

   A. Limited partner co-investment

   B. Direct co-investment

   C. Angel investment

4. Discuss how YYRPF may consider incorporating potentially long capital deployment periods in private asset classes such as real estate and infrastructure into its

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expectations of return performance for these types of investments.

The following information relates to questions 5-8

Mid States University Management Company (MSUMC), which manages a USD400 million endowment for Mid States University, is evaluating the potential for investment with Glidestone Partners, a firm running a variety of private market funds. As part of its due diligence process on Glidestone, MSUMC examines historical performance records of Glidestone's funds and selected investments made by these funds.

MSUMC notes the following basic facts about Glidestone's Fund 1. The fund invested EUR15 million per year at the beginning of each of Years 1–4, followed by cash inflows of EUR30 million per year at the ends of each of Years 4–7.

Glidestone's Fund 1 distributed EUR100 million to its investors during the last four years of the fund, as shown in the following table, which also shows net asset values at the end of each of the last five years of the fund's existence.

Years	3	4	5	6	7
Net asset value	60	65	50	35	20
Distributed capital	0	10	30	30	30

MSUMC personnel note that Fund 1 distributed EUR100 million to its investors over time while the fund generated EUR120 million of cash inflows.

During its due diligence, MSUMC discovers that Fund 1's portfolio consisted of four distinct asset investments of EUR15 million per year. Fund 1's IRR over the seven-year investment cycle was 300 bps greater than a public market benchmark with risk similar to that of Fund 1's investments.

5. Which of the following most closely approximates the ROI and IRR of Glidestone's Fund 1 over its seven-year life?

   A. ROI = 2×; IRR = 10.4%.

   B. ROI = 2×; IRR = 18.9%.

   C. ROI = 3×; IRR = 18.9%.

6. Which of the following most closely approximates Fund 1's TVPI at the end of the fund's life?

   A. 0.83

   B. 1.67

   C. 2.00

7. Discuss why Glidestone's NAV increases by EUR5 million between the ends of Years 3 and 4 using observations about fund distributions.

8. Which of the following statements most likely reflects the return earned by Fund 1 investors?

   A. Fund 1's ROI

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B. Fund 1's IRR

C. A blend of Fund 1's IRR and the public market benchmark return

The following information relates to questions 9-12

Mid States University's USD400 million endowment is managed by Mid States University Management Company (MSUMC). The endowment targets real annual spending of 4% to support its programs. MSUMC is considering material changes to the portfolio's strategic asset allocation.

Audrey Lake, CFA, serves as MSUMC's chief investment officer and compiles the following information for a board meeting.

Asset class	Large university (>USD1,000 million) endowment allocations	MSUF current allocation
Public equity	25%	45%
Public debt	20%	30%
Cash	4%	4%
Private equity	33%	15%
Private debt	1%	0%
Private RE	5%	3%
Private infra.	5%	0%
Other assets	7%	3%

Lake first highlights that MSUMC has 75% of its portfolio allocated to traditional public market assets while the typical large endowment's public market allocation is only 45%. Private market assets are just 18% of MSUMC's portfolio, compared to 44% of large endowment portfolios. Lake argues that MSUMC should strive to reallocate its investments to better match the targets observed for large endowments.

One board member notes that MSUMC's total allocation of 60% to equity investments is not far from the average large endowment's equity allocation of 58%. Lake responds that MSUMC's current private equity allocation is solely focused on buyout equity strategies. She mentions that MSUMC's allocation to this type of strategy is similar to that of large endowments. However, other endowments also invest in venture capital and growth equity strategies while MSUMC does not, forgoing exposure to startup and high-growth phase companies.

Another board member questions Lake about her strategy for allocating to venture capital investments because it will effectively be a new asset class for the endowment. Lake's response focuses on a number of issues learned in working with buyout equity funds: (1) Identify VC general partners with top-quartile return histories, build relationships, and commit capital as opportunities develop; (2) have a well-defined plan for investing committed funds in liquid equities from industries similar to those of VC investments while awaiting capital calls; (3) accept the realities associated with lagged performance feedback from the fund; and (4) plan ahead in order to bear the illiquidity risk associated with the 7- to 10-year holding period of the fund.

The final question posed relates to the proposed roles for smaller asset class-

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es, such as private debt. Lake mentions opportunities to improve returns from the debt portion of the portfolio by reallocating up to 5% from the public debt allocation. Specifically, Lake mentions the ability to invest in senior floating-rate notes as one way to gain yield along with inflation protection while ensuring high degrees of capital preservation from that portion of the portfolio.

9. Discuss why Lake believes that MSUMC should reallocate such that its portfolio is weighted more toward private market investments.

10. Contrast how the features of the MSUMC endowment portfolio likely differ from those of large endowments with a focus on risk and diversification.

11. Evaluate Lake's plan to invest VC committed capital in public equities from industries similar to those included in VC investments.

12. Identify and discuss a spending-related reason why Lake may be attracted to investing 5% of the endowment's portfolio in private debt.

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SOLUTIONS

1. As YYRPF has shifted from public market to private market investments, its investment process has likely changed from identifying underpriced and overpriced liquid securities to buy or sell over a short- to medium-term horizon. The private investment process involves identifying and committing capital over a private asset investment life cycle in which illiquid closed-end investments are purchased and held for as long as 7–10 years.

2. Public equity positions have easily measured correlations with other public equity positions. As such, a lower correlation of a new public equity position may be viewed as providing better diversification potential. In contrast, the lack of observable market prices at regular intervals for private equity positions makes using correlations less plausible. Rather, the diversification potential of a private equity position may be a function of adding a company life cycle stage that is not typically available to public market equity investors, such as startup companies. Alternatively, private equity investments in buyout equity provide investors with the potential for benefiting from the transformation of a company's business model over a longer investment life cycle, thus providing a return stream that is different from what may be available from mature public market investments.

3. B is the correct response. YYRPF is attempting to build its expertise in private equity investing to achieve 100% direct investment in a quest to improve its net-of-fee performance. As it pursue this goal, it can best achieve expertise improvements along with lower fees by direct co-investment. YYRPF does not incur fees from a GP on its direct co-investments. A is incorrect because limited partner co-investment allows for expertise improvement, but the GP still collects a reduced fee from YYRPF. C is incorrect because angel investing is unlikely to provide the access to improved expertise across private equity since this method covers only the startup investing environment.

4. YYRPF must commit funds to a GP months or years in advance of capital deployment, with little certainty regarding the timing or magnitude of capital calls. As a result, investors must often hold these commitments in more liquid public investments possibly with lower expected returns. Therefore, YYRPF's overall return from the time of capital commitment through the investment life cycle will reflect a blended rate of return that includes both public and private market investment returns. If capital commitments are invested in lower-yielding public securities while waiting for capital to be deployed, the 10%–12% return estimates should be adjusted to reflect this situation.

5. B is correct. Glidestone's Fund 1 invested EUR60 (= 15 × 4 years) million and received EUR120 (= 30 × 4 years) million, so ROI is 2× (= 120 ÷ 60). The IRR is solved using either a spreadsheet or financial calculator IRR function as =IRR({–15,–15,–15,–15,30,30,30,30},0), which yields a solution of 18.9%. A is incorrect because the IRR of 10.4% assumes that all the cash outflows of EUR60 million occur at the beginning of the investment life cycle and that all the cash inflows of EUR120 million occur at the end of the investment life cycle. C is incorrect because ROI of 3× is incorrect.

6. C is correct. TVPI is equal to the sum of DPI and RVPI. DPI is the cumulative distributions paid divided by the total investment. Cumulative distributions are EUR100 million, and total investment is EUR60 million, so DPI is 1.67 (= 100 ÷ 60). RVPI is equal to net asset value divided by total investment, or 0.33 (= 20 ÷ 60). Thus, TVPI is equal to 2.00 (= 1.67 + 0.33). A is incorrect because it assumes

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DPI of 0.5 (= 30 ÷ 60) plus the correct RVPI. B is incorrect because it assumes RVPI of 1.0, which implies NAV of EUR60 at the end of Year 7, plus the correct DPI.

7. Because Glidestone distributes only EUR10 million in Year 4 rather than the EUR30 million of cash flow generated, the extra EUR20 million is added to the fund's NAV. However, the exit of the original EUR15 million investment reduces the NAV such that the overall value increases by EUR5 million.

8. C is correct. Because of the time lag between the dates of LP's capital commitment and GP's capital call, the LP should not expect to earn the rate of return of the private market fund. Rather, the LP invests capital in a liquid public market investment until capital is called. Thus, the LP's overall return is a blended rate that reflects both the private market fund's IRR and the return earned from the liquid public market investment. A is incorrect because the ROI multiple does not account for time value of money or the time lag between capital commitment and call. B is incorrect because the fund's IRR does not account for the time lag between capital commitment and call.

9. Private market investments typically are expected to earn higher rates of return than their public market counterparts. Lake believes that the endowment, as a portfolio with a perpetual time horizon, is in a position to incur the higher risks posed by private market investments, such as illiquidity, as long as these extra risks generate sufficient additional returns to support the spending needs of the university.

10. With respect to risk differences, MSUMC's total equity portfolio is likely less risky compared to a large endowment portfolio. While both MSUMC and large endowments invest similar percentages of their overall portfolios in equities, MSUMC's equity portfolio is more heavily weighted toward public equities compared to those of large endowments. As a result, MSUMC has less exposure to riskier equity assets in private equity, especially given its lack of exposure to startup company equity.

    With respect to diversification differences, as mentioned for the risk differences, MSUMC may be lacking equity diversification across company life cycles in its equity portfolio. Additionally, MSUMC is more heavily weighted in public debt securities relative to large endowments that spread the non-equity portion of their portfolio across not only public but also private debt, as well as private real estate and infrastructure.

11. Lake is seeking to create a liquid portfolio with risk to that of the eventual VC investment by matching its industry exposure to target a similar return during the capital commitment period. Favorable market conditions may create more investment opportunities for the GP to call capital, and these may coincide with favorable returns on Lake's liquid equity portfolio. However, less favorable market conditions may cause declines in the value of this liquid portfolio during the time lag between capital commitment and call, thus creating a risk of being unable to meet a capital call in an extreme market downturn.

12. Private debt investments typically provide higher expected returns compared to those usually available in public debt investments and may provide inflation protection to assist MSUMC in its annual spending needs. MSUMC's spending needs are at a real rate of 4%, so the endowment's annual nominal spending reflects the effects of inflation. The discussion of private debt specifically mentions investing in floating-rate notes that provide potential for inflation protection.

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LEARNING MODULE

2

General Partner and Investor Perspectives and the Investment Process

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	discuss a general partner's roles and responsibilities in managing private investment funds
☐	discuss how private investment firms align their interests with those of their investors, and calculate, interpret, and discuss private market fund performance from an investor perspective, including management fees and carried interest
☐	discuss favorable characteristics of private investment targets and sources of value creation in private markets
☐	discuss the role of conducting due diligence and establishing a business plan in the private investment process
☐	discuss alternative exit routes in private investments and their impact on value

INTRODUCTION

1

Traditional fund managers analyze investments based on publicly available information, readily buy and sell publicly traded securities in a portfolio, and are usually compensated by investors based on a fixed percentage of assets under management (AUM). Public fund investors can easily compare relative risk and return among similar fund choices and trade these positions with few transaction costs. In private markets, underlying investments, as well as the methods and structures used to attract capital, manage assets, and distribute returns, give rise to very different interactions between private fund managers or general partners (GPs) and private market investors or limited partners (LPs). This reading addresses the unique relationship between GPs and LPs over the investment life cycle and the private market investment process.

According to Preqin, an alternative data provider, private market AUM globally are expected to rise to USD18 trillion by 2027, or more than triple their level from a decade earlier, due to higher potential returns and diversification opportunities. Private markets, such as private equity, private real estate, and unlisted infrastructure, are

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characterized by an investment life cycle with negative cash flows and/or high leverage during an initial period of development or transformation. This process requires more active manager engagement and specialized knowledge to evaluate cash flows and risks. Investors often must commit capital well in advance of deployment, hold investments for several years, and receive returns with distributions of uncertain magnitude and timing over a multiyear holding period.

In this reading, we first examine how the features of private markets define the roles and responsibilities of general partners of private funds. Differences in private manager compensation approaches and risk and return measures are two important investor considerations addressed in the following section. We then focus our attention for the remainder of the reading on the private investment process itself, including the following elements:

- Alignment of GP and LP interests over the investment life cycle and private market fund performance from an investor perspective
- Features of attractive private investment targets, economic value drivers, and sources of value creation in private markets
- Key components of due diligence and the business plan applicable over the period of development or transformation of a new or existing property, asset, or privately held company
- Determining the appropriate exit timing and method of a private investment to maximize return to investors over the holding period

The private market features and structures from the first reading combined with the GP and LP perspectives and investment process from this second reading create the foundation for a more detailed survey of individual private market asset classes and their role in strategic asset allocation in subsequent Private Markets Pathway readings.

LEARNING MODULE OVERVIEW

- As controlling or significant minority shareholders, general partners of private market funds are actively engaged throughout the investment life cycle in analyzing targets, acquiring firms or assets, and creating and implementing value creation strategies.
- GPs seek to align their interests with LPs by combining management fees levied on committed capital with performance-based compensation in the form of carried interest.
- Attractive characteristics of private investment targets involve the potential for value creation over the investment period, such as establishing a product and market for early-stage companies or improving the profitability of mature firms. GPs apply value drivers in the form of strategic, operational, organizational, and financial changes to companies or projects to achieve targeted returns.
- Due diligence activities in the private investment process involve a more in-depth and detailed analysis of a company or project than in public markets given the long holding period over which value creation takes place. GPs use this analysis to establish an action plan prioritizing investments and other changes needed to reach targeted returns.
- Private fund exit strategies include a public sale via an initial public offering (IPO), a private sale to a strategic or financial buyer, or liquidation. While a public sale achieves the broadest distribution and

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access to capital, its impact on value is highly dependent on public market conditions. A private sale may be executed more quickly and flexibly, with value highly dependent on the competitive nature of the bidding process and types of potential buyers involved.

GENERAL PARTNER ROLES AND RESPONSIBILITIES 2

☐ discuss a general partner's roles and responsibilities in managing private investment funds

The nature of private market investments gives rise to specific roles and responsibilities for the general partners of closed-end private market funds. Public market fund managers primarily engage in security or index selection across or within markets based on public information, as either non-controlling shareholders with management decisions limited to voting rights for public shares or bondholders who lack the power to renegotiate terms of outstanding bonds prior to maturity. These public funds are generally open-ended, with an indefinite life and continuous inflows and outflows of investor capital. Public investments are in standardized equity or debt contracts for mature companies or ownership of income-producing assets, as in the case of listed real estate investment trusts (REITs).

Private funds, in contrast, are usually closed-end, illiquid limited partnerships with a fixed contractual term. These partnerships usually require an upfront capital commitment from investors. This capital is deployed over time in longer-term, illiquid investments that mature in the case of debt or are exited near the end of the partnership's contractual life. Examples include early-stage or mature companies with high potential and undervalued or undeveloped assets. Private investments focus on adding value and generating returns over the life cycle shown in Exhibit 1.

Exhibit 1: Private Asset Investment Life Cycle

An earlier reading distinguished between private fund GPs more actively engaged in value creation strategies with fewer targeted investments held over a longer, multiyear private asset investment life cycle and public fund managers buying and selling fractional, non-controlling positions in numerous debt and equity securities with greater

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frequency. Public fund managers use financial statement analysis among other means as a basis for these decisions. Public markets also allow fund performance comparisons with available benchmarks. GPs operating in private markets, in contrast, typically have either control of or significant influence over fewer investments, with little or no price transparency or reliable benchmarking available during the life of an investment.

These differences in the public and private markets give rise to distinct roles and responsibilities among private market GPs. The following subsections discuss the duties of a private market GP over the private asset investment life cycle.

Pre-Commitment

In advance of seeking capital commitments from investors, private fund GPs establish an investment strategy or thesis reflecting the fund's focus. Specialized GP knowledge and experience are primary determinants of private market fund strategy given the greater degree of control exercised for these investments. For example, biotech venture capital fund GPs are often led and staffed by researchers and scientists with extensive experience and expertise in conducting basic research and clinical trials and bringing new drugs to market. A Southeast Asia–based real estate GP focused on new development, in contrast, will usually involve local expertise and experience in construction, contracting, and operations as important prerequisites for taking on opportunistic new development projects.

Identifying areas of investment focus prior to conducting and completing due diligence on a select few candidates is an important pre-commitment step. Potential for value creation over the investment life cycle is a common feature among prospective private investments, which occurs in different ways over the company life cycle. For venture capital, this may involve a new product going to market or targeting exponential growth, while for buyout equity, it often entails restructuring and streamlining established operations. Each of these areas is expanded on later.

Capital Commitment

Once a private fund GP has identified its area of primary focus and is ready to dedicate resources to initiate due diligence and create business and financing plans for targeted investments, it solicits unfunded capital commitments from limited partners. Prospective LPs engage in manager selection by conducting due diligence and analysis of the GP's track record and prospective investment opportunities, making unfunded debt or equity capital commitments to a fund by entering into a limited partnership agreement. The limited partnership agreement is a negotiated document that specifies fees, rights, terms, and conditions of the partnership. These fees, rights, terms, and conditions may vary among individual LPs based on the timing and size of commitment to a fund. The following case study further contrasts public and private fund commitments.

CASE STUDY

Private Real Estate Investment in Malaysia

Investors seeking to gain exposure to commercial real estate in Malaysia must choose between a publicly traded REIT or a private real estate fund. One possible area of private development focus might involve multifamily residential real estate projects near planned mass transit lines in urban areas such as Kuala Lumpur. This type of development follows a multiyear investment cycle starting with GPs seeking commitments from LPs. The GP then identifies an appropriate parcel of land for purchase, conducts necessary due diligence, and establishes

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the feasibility of the site to support the planned development, including proper permits and zoning requirements. Next, the GP forms a special purpose company to purchase the property using committed equity and debt in the form of acquisition and construction loans secured by the property. Once the property is completed and generates sufficient lease income upon completion, the GP often sells the property and distributes proceeds to LP equity investors.

Capital Deployment

Private fund GPs finalize due diligence on top targets, creating both a detailed business plan as a blueprint for new managers and a comprehensive financing plan to achieve expected returns prior to bidding on investments. Once a public or private company bid or project proposal is accepted, private market GPs draw down equity and debt capital pledged by investors to purchase individual portfolio investments. Additional drawdowns may be needed to fund successive investment stages for an existing project or asset. The initial year in which capital is deployed in a private market transaction is referred to as a fund's **vintage year**, an important benchmarking statistic that facilitates performance comparisons among investments made in different periods. A GP deploying capital over multiple years for a single fund has one vintage year, defined as the first year in which capital is deployed.

In the case of private equity, a GP may deploy buyout capital by purchasing a business for restructuring purposes. This may be an acquisition of a public company in a **take-private transaction**, which involves the purchase of the entire company, after which the target firm's shares cease trading; the purchase of a public company division; or an acquisition of a private firm. The initial phase of a buyout equity transaction, also referred to as a **leveraged buyout (LBO)**, and the roles of GPs and LPs in the transaction are shown in Exhibit 2.

Exhibit 2: GP and LP Roles in the Initial Take-Private Transaction Phase

Both the initial financing phase shown in Exhibit 2 and subsequent refinancing stages are the primary responsibility of a general partner, which includes the following actions:

- Negotiate the target company (TargetCo) purchase price.
- Negotiate legal terms of the acquisition.
- Establish an acquiring entity (AcquisitionCo).
- Arrange short-term debt financing to complete the TargetCo purchase.

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- Combine AcquisitionCo and TargetCo into a merged company.
- Raise an optimal combination of medium- and long-term debt instruments for the new entity.

While GPs retain primary responsibility for these and associated steps and in some cases also place the debt with private debt GPs, they often employ advisers in financing, legal, tax, and other areas to complete a transaction.

Once an acquisition and associated initial financing are in place, GPs play a critical role in initiating management changes, spinning off non-strategic business divisions, or combining entities to create potential synergies and driving the value creation process by monitoring progress as set out in the business plan. Because the timing and size of capital drawdowns is uncertain, in some cases GPs take advantage of credit facilities known as **subscription lines**, which are short-term lines of credit secured by investor fund commitments rather than the underlying assets themselves.

In the case of real estate or infrastructure development projects, the deployment phase often involves managing and monitoring progress over phases, including land or property acquisition, land improvement, and construction. Periodic drawdown of additional debt and equity are contingent on meeting specific milestones, as shown in the following case study.

CASE STUDY

Malaysian Real Estate Capital Deployment Based on Project Milestones

Private market investments in new real estate or infrastructure development are usually financed in phases corresponding to project completion. As an example, consider the Malaysian real estate case introduced earlier. A developer establishes a project plan to build 1,200 new residential units on vacant land near Kuala Lumpur near a proposed new mass transit hub. The project is expected to cost MYR275 million and take 24 months to complete.

Line Item	MYR
Land	25,000,000
On-site land improvements	10,000,000
Construction costs	240,000,000
Project cost	**275,000,000**

The private real estate GP developer determines that the project will be 75% (or MYR206,250,000) debt financed with the remainder (MYR68,750,000) financed in the form of equity. Equity is drawn in three phases with the following milestones:

Milestone	Month	Equity Drawn (MYR)	Equity Outstanding (MYR)
Land purchase	0	25,000,000	25,000,000
Certification of structural completion	12	25,000,000	50,000,000
Certificate of occupancy issued	24	18,750,000	68,750,000

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Construction debt is slated to be drawn monthly based on more detailed milestones to purchase materials, lease equipment, and cover other contractor and construction costs. The proposed capital deployment schedule for the project is summarized in Exhibit 3.

Exhibit 3: Real Estate Capital Deployment

Capital Distribution and Exit

In contrast to more stable dividend and interest cash flows from listed securities in public funds, the timing and magnitude of private market fund distributions are uncertain, leading to the use of compound versus periodic measures of return, as shown in an earlier reading. These distributions consist of both dividends and divestments in the case of private equity funds and interest and principal payments in the case of private debt funds. GPs often exercise control over portfolio company dividend policies and divestments. As for private debt, issuer contingencies, such as debt prepayability, callability, or interest paid in kind or accrued with an increase in principal outstanding and repaid at maturity, contribute to greater cash flow uncertainty of private debt.

Despite the long-term contractual nature of limited partnerships, private market GPs also frequently play a role in offering LPs the ability to purchase or sell existing partnership stakes in the secondary market, which are referred to as **secondaries**. Secondaries trade at much wider spreads as a percentage of net asset value (NAV) than public securities exchanged at a bid–offer spread of a few basis points. Private market secondary spreads vary widely among private asset types and in different market conditions. For example, while buyout equity stakes have historically traded near 95% of NAV, venture capital stakes often trade closer to 80% of NAV.

The secondary market provides new investors the opportunity to purchase seasoned, mid-cycle investments, allowing diversification across managers, partnerships, and vintage years and granting LPs access to transactions in which they may not have had an opportunity to invest at inception. A secondary purchase of mid-cycle investments also avoids investment delays given the lack of a commitment phase. LPs selling secondaries, however, may also wish to reduce exposure to an existing investment and free up capital for new partnerships. By acting as an intermediary in secondary

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market transactions, GPs can provide investors the chance to buy or sell otherwise illiquid positions, offer a broader array of opportunities at different stages for varying periods, and expand and diversify their investor base for future transactions.

Private fund GPs are also primarily responsible for the sale or exit of an investment, asset, or project at the end of a holding period and return of capital to investors. In the case of private equity, this may involve the sale of a company to a private buyer or an initial public offering to public market investors. GP skills in executing a business plan that creates value and then identifying potential buyer synergies or preparing and executing a public offering under favorable market conditions are critical factors affecting LP returns. The alternative exit routes available within and across private investment classes and their impact on investment value will be addressed in detail later in this reading.

In addition to monitoring investments closely over the entire life of a fund to protect investor capital and maximize returns, GPs also provide periodic fund valuations to investors. Unlike public fund investments whose net asset value is based on observed market prices, private asset values rely on valuation techniques, such as discounted cash flows, the use of comparable transactions, and market-based multiples, as shown for each asset class in later readings. These private asset valuations are far less transparent, with their potential realization dependent on a GP's ability to realize illiquid capital gains in the company, project, or asset since inception.

QUESTION SET

1. Which one of the following is most likely to be conducted by a GP during the pre-commitment phase of the private market fund investment life cycle?

   A. Implementing a strategic financing plan

   B. Identifying target investments

   C. Deployment of capital.

   Solution

   B is the correct response. Along with establishing an investment strategy, a GP is most likely to begin identifying target investments fitting the strategy prior to soliciting capital commitments from LPs. A is not correct, because the fund's financing plan may be formulated in the pre-commitment stage but not implemented until the commitment or deployment stage. C is not correct, because capital is deployed later in the investment process.

2. Which one of the following statements is most accurate about vintage years in private market funds?

   A. A GP deploying capital over multiple years for a single fund has multiple vintage years for the fund.

   B. A GP deploying capital over multiple years for a single fund has one vintage year, defined as the final year in which capital is deployed.

   C. A GP deploying capital over multiple years for a single fund has one vintage year, defined as the first year in which capital is deployed.

   Solution

   C is the correct response. The initial year in which fund capital is deployed in a private market transaction is referred to as a fund's vintage year. A is not correct, because this statement implies that a single fund has multiple vintage years. B is not correct, because it identifies the last year of capital deployment rather than the first.

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3. Identify two benefits of secondaries for buyers in private markets.

Solution

Secondaries provide new investors the opportunity to purchase seasoned, mid-cycle private market investments, providing such benefits as

- allowing diversification across managers, partnerships, and vintage years and
- granting LPs access to transactions in which they may not have had an opportunity to invest at inception.

INVESTOR (LP) PERSPECTIVES, FEES AND PERFORMANCE MEASUREMENT

3

☐ discuss how private investment firms align their interests with those of their investors, and calculate, interpret, and discuss private market fund performance from an investor perspective, including management fees and carried interest

Private fund GPs exercise greater control over illiquid investments for a longer holding period than public fund managers. These investments in unlisted assets with little or no publicly available information about portfolio investments or comparable funds offer investors little transparency. This information asymmetry limits an LP's ability to independently assess and benchmark private market GP performance, while long required holding periods prevent LPs from selling partnerships of underperforming managers without incurring significant bid–offer costs in the secondary market.

Private investment firms seek to bridge the information gap and align GP and LP interests by levying a combination of fees that include management fees to cover operating costs and performance-based incentive fees (referred to as **carried interest**) to incentivize and reward successful GPs.

Management Fees

Private fund GPs usually charge a higher management fee than public funds charge to cover operational costs, with average fees of around 1% for private debt and 2% for private equity. However, management fees can vary depending on the type and nature of the fund. In contrast to public fund fees levied as a percentage of AUM, private fund management fees are most often calculated as a percentage of total *committed* capital, which includes both drawn and undrawn portions. Once capital is fully deployed, these fees are levied on the amount of committed capital less the cumulative cost basis of investments exited and written off during the fund's life.

In some cases, additional transaction fees are paid to GPs when they provide advisory services for transactions such as mergers, acquisitions, or IPOs that benefit the fund. These fees may be split with LPs, and if such fee-sharing agreements apply, they are generally deducted from management fees and such deductions may be full or partial.

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CASE STUDY

Management Fees for the Estragon SA Fund

Estragon SA, a French venture capital fund, seeks a EUR10 million equity commitment from Straddleton, a local UK government pension scheme, as a limited partner. Over a seven-year time span, Estragon draws down equity from Straddleton over the first two years, half each in Years 1 and 2; writes off two investments with a cost basis of 10% of committed capital each in Years 3 and 4; and exits investments with a cost basis of 20%, 25%, and 35% of committed capital in Years 5, 6, and 7, respectively.

1. Calculate Straddleton's annual management fee based on the assumptions provided.

   Solution

   Straddleton pays fees on the full capital commitment starting in Year 1 despite a delayed drawdown, which decline as the cost basis of investments is written off in Years 3 and 4 and exited in Years 5–7. Management fees over the seven-year period are shown in the last row of the table below:

Management Fees

Year/ Amount (EUR)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Invested capital	5,000,000	5,000,000					
Cost basis of exits + write-offs			1,000,000	1,000,000	2,000,000	2,500,000	3,500,000
Committed capital minus exits and write-offs	10,000,000	10,000,000	9,000,000	8,000,000	6,000,000	3,500,000	0
Management fee (2%)	200,000	200,000	180,000	160,000	120,000	70,000	0

2. Discuss how Straddleton's management fees would change if drawdown were delayed.

   Solution

   Management fees are charged on the basis of the total amount of committed capital until capital is fully deployed. Thus, a delay in capital drawdowns will not change management fees.

The use of committed, rather than invested, capital as the calculation basis for management fees serves two primary purposes. It both compensates GPs for the significant upfront cost of due diligence and other GP responsibilities prior to capital deployment and reduces the incentive to deploy capital as quickly as possible in less attractive investments simply to generate fees. Also, the use of the cost basis reduces the potential conflict of interest associated with fund valuations, as GPs may otherwise have an incentive to inflate values over the life of a private investment to generate higher management fees.

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Carried Interest

Carried interest is a critical component of private market fund compensation. Sharing in investment returns directly aligns GP and LP interests over a long holding period, although several terms and related contractual contingencies are subject to negotiation in a limited partner agreement that may benefit either GPs or LPs. In the case of highly sought-after, new closed-end private investments by managers with a strong performance record, GPs have a great deal of bargaining power to set terms. LPs who commit significant capital early to a new fund, however, may also be able to extract more favorable terms than those of LP investors who commit smaller amounts later to the same fund.

Carried interest is usually applied to investment returns above a **hurdle rate**, or a predetermined minimum target rate of return per period. GPs usually receive a 15%–20% share of returns above the hurdle. Limited partner agreements sometimes specify this threshold as being a **hard hurdle rate**, which means the GP earns incentive fees only on annual returns that exceed the hurdle rate. As an example, assume we exclude management fees and designate the one-period fund rate of return as r, with a hard hurdle rate of r_h and a GP performance fee percentage (p) of total return. The GP rate of return (r_{GP}) is

$$r_{GP} = \max[0, p(r - r_h)]. \tag{1}$$

While some alternative investment fund general partners charge performance fees annually, common practice in private market funds is to defer payment of carried interest until 100% of committed capital has been returned to limited partners through distributions or in some cases until the end of the fund's term, as in the following case study.

CASE STUDY

Bardstown Partners Carried Interest

Bardstown Partners is a general partner of a USD300 million private market fund focused on buyout equity transactions. As part of its fund terms, Bardstown includes carried interest to be paid by limited partners at the end of the fund's term in 10 years. Bardstown receives 20% of fund returns above a hard hurdle rate of 8% annually with no compounding. Over the fund's life, its investments return USD360 million in addition to the USD300 million of invested capital.

1. Calculate the amount of carried interest to be paid by limited partners to Bardstown after 10 years?

   Solution

   Carried interest will be paid only if total fund returns exceed USD240 million (= 8% × 10 years × USD300 million). Because the fund's returns exceed this amount, carried interest is calculated as USD24 million [= 20% × (USD360 million – USD240 million)].

While hard hurdle rates are a satisfactory approach when returns follow a steady path over an investment holding period or if performance fees are paid at the end of the fund's life, as in the previous example, both GPs and LPs seek to protect their interests for cases of expected volatile or uneven returns when carried interest is paid over multiple years of a fund's life.

One such approach is the use of a **soft hurdle rate**, or a return threshold above which the entire return is subject to an incentive fee once the hurdle is exceeded. Soft hurdle arrangements benefit GPs by ensuring their performance compensation

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"catches up" once a hurdle threshold is exceeded. Under a so-called **catch-up clause**, once the hurdle is exceeded, the GP often earns 100% of distributions (or a catch-up return of r_{cu}) until total return reaches a share of p for the GP and $(1 - p)$ for the LP. Remaining distributions are split on the same basis. As a result, the GP's performance fee (r_{GP}) from Equation 1 with a catch-up clause becomes

$$r_{GP} = \max[0, r_{cu} + p(r - r_h - r_{cu})]. \quad (2)$$

The incorporation of a soft hurdle rate may result in a higher carried interest *amount* earned by a private fund general partner even in the case of a lower carried interest *rate*, as discussed next.

CASE STUDY

Bardstown Partners' Use of a Soft vs. Hard Hurdle Rate

Bardstown Partners is reviewing its fund policies regarding carried interest. Rather than incorporating an 8% hard hurdle rate with a carried interest percentage of 20%, Bardstown is considering changing fund terms to include a soft hurdle rate of 9% and a carried interest percentage of 10%.

1. Assuming Bardstown's USD300 million fund generates USD360 million in returns over a 10-year fund life, discuss how the proposed new carried interest policy compares to the original carried interest approach using a hard hurdle rate.

   Solution

   Bardstown receives 10% (= USD36 million ÷ USD360 million) of the fund's total returns as carried interest under the new soft hurdle policy, compared to only 6.7% (= USD24 million ÷ USD360 million) in the hard hurdle rate scenario.

   With the soft hurdle rate of 9%, Bardstown's fund must generate more than USD270 million (= 9% × USD300 million × 10 years) in total return before carried interest may be paid. Bardstown Partners receives the next USD30 million from the fund's returns after the USD270 million return threshold is reached as the "catch-up" to reach its 10% carried interest percentage. The remaining USD60 million (= USD360 million – USD300 million) in returns is split between Bardstown and its limited partners according to a 10% versus 90% split, so Bardstown receives USD6 million in additional carried interest. Overall, Bardstown earns USD36 million in carried interest, or 10% of the fund's total returns. This represents a USD12 million improvement compared to the USD24 million from the 8% hard hurdle rate.

2. Discuss the potential downside risk to Bardstown of changing its carried interest compensation structure from the hard hurdle rate of 8% and carried interest rate of 20% to a higher soft hurdle rate and lower carried interest rate.

   Solution

   Under the new soft hurdle policy, Bardstown faces the potential downside risk of forgoing additional carried interest if the fund generates significantly higher returns. While carried interest is lower at the current return projection of USD360 million with the higher carry rate, carried interest increases by USD10 million for each additional USD50 million in fund return. With

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the 10% carried interest rate, Bardstown receives only an additional USD5 million for each additional USD50 million in fund return.

As shown in the prior example, the use of a soft hurdle rate, instead of a hard hurdle rate, makes the carried interest rate a reasonable approximation of the GP's ultimate share of total fund returns if the hurdle is cleared.

LPs also seek to limit or recoup fees paid to GPs for performance that fluctuates or declines over time. Earlier in the curriculum, a common strategy among hedge funds applied to some limited partnerships was described; it involves the use of a **high-water mark**, a measure that reflects the fund's maximum value as of a performance fee payment date net of fees. For example, if a private fund's value subsequently declines below its peak since inception adjusted by the hurdle rate over time, the GP may not levy performance fees until the fund value exceeds the previous high-water mark. High-water marks are generally applicable to investment vehicles that mark to market for purposes of calculating fees, such as hedge funds, rather than other private investment structures. **Clawback provisions**, in contrast, involve a return of GP performance fees to LPs in cases where returns from successful transactions earlier in a fund's life are offset by weaker returns later.

CASE STUDY

Tenderledge Investment Fund Fees and Performance

Tenderledge Investment Fund VIII has successfully exited its USD100 million private fund investments after seven years. The fund made one investment per year at the beginning of each of the first four years and exited each investment four years after capital deployment. The following table provides a summary of the fund's committed capital, capital deployment, cost basis of exited investments, and cash inflows by year over the fund's life.

USD millions	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Committed capital	100	100	100	100				
Capital drawdown	–20	–40	–30	–10				
Cost basis of exits returned					20	40	30	10
Additional cash inflows from investments	0	5	13	16	23	10	14	10
Net cash flows	–20	–35	–17	6	43	50	44	20

Tenderledge assessed LP fees as follows:

Management fee:

- 2% of committed capital during the period in which the fund deployed capital (Years 1–3)
- 2% of committed capital less the cumulative cost basis of exited investments following the capital deployment phase (Years 4–7)

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Carried interest:

- 20% of return net of management fees, over an 8% hard hurdle rate payable at the end of the fund's life. The annual hurdle rate is applied to each individual investment, so the total hurdle is based on a four-year investment horizon. Assume no compounding of returns.

1. Calculate the fund's management fees over its seven-year life.

Solution

Total management fees over the fund's life equal USD8.6 million:

- Years 1–3: USD2 million per year, for a total of USD6 million
  - USD2 million = 2% × USD100 million of committed capital.
- Years 4–7: USD2.6 million total
  - Multiply 2% by year-end committed capital minus cumulative cost basis of exited investments for each year:
    - Year 4: USD1.6 million = 2% × USD80 million.
    - Year 5: USD0.8 million = 2% × USD40 million.
    - Year 6: USD0.2 million = 2% × USD10 million.
    - Year 7: USD0 million = 2% × USD0 million.

USD2.6 million = 1.6 million + 0.8 million + 0.2 million + 0 million.

2. Contrast the fund's internal rate of return (IRR) *gross* of management fees with the IRR *net* of management fees.

Solution

Cash flow streams by year before fees and after payment of the management fees previously listed are as follows:

USD millions	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Net cash flows before fees	–20	–35	–17	6	43	50	44	20
Net cash flows after management fees	–20	–37	–19	4	41.4	49.2	43.8	20

Using the IRR function in a spreadsheet or financial calculator gives a *gross* IRR of 21.7% and a 19.2% IRR *net* of management fees. The payment of USD8.6 million in fees spread over time reduces the estimated rate of return to LPs by approximately 250 bps.

3. Estimate the carried interest received by Tenderledge, and discuss the relative size of this performance fee as compared to management fees in terms of its effect on fund performance net of all fees.

Solution

Based on no compounding, an estimate of Tenderledge's carried interest payable at the end of the fund's life is USD10.08 million, calculated using the following simplified process.

The fund's return with no compounding is estimated as the sum of its yearly cash inflows plus the return of cash from exited investments less the original

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capital totaling USD91 million [= (5 + 13 + 16 + 43 + 50 + 44 + 20 – 100) × 1 million]. Total fund returns of USD91 million less management fees of USD8.6 million (calculated previously) give us returns after management fees of USD82.4 million (= USD91 million – USD8.6 million).

The 8% hurdle rate with no compounding implies annual required cash inflows of USD8 million per year. Multiplying this amount by four years gives USD32 million as the return hurdle. Finally, we calculate the carried interest by applying Equation 1:

USD10.08 million = max[0, 0.2 × (USD82.4 million – USD32 million)].

The total magnitude of the performance fee of USD10.08 million is somewhat higher than the total management fee of USD8.6 million. However, we have assumed the carried interest is paid entirely at the end of the fund's life, so its effect on the fund's IRR is much less significant. Tenderledge's net cash flow stream by year after deduction of performance fees and management fees is as follows:

USD millions	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
After-fee cash flows	–20	–37	–19	4	41.4	49.2	43.8	9.92

Using the IRR function in a spreadsheet or financial calculator on this yearly cash flow stream gives a result of 17.8%. The effect of carried interest on IRR to LPs is an additional reduction of approximately 140 bps.

4. Estimate the revised carried interest received by Tenderledge if we change our assumption to a soft hurdle rate of 10% and a carried interest rate of 15%, and discuss the revised carried interest amount relative to the earlier estimate.

Solution

Tenderledge earns USD12.36 million as carried interest in this scenario, and this amount equals 15% of the fund's returns net of management fees of USD82.4 million. The solution process can be described as follows.

Changing the hurdle rate to a soft hurdle of 10% implies that the fund must reach at least USD40 million of returns, or USD10 million per year over four years, in return for Tenderledge to receive any carried interest.

The first USD40 million of returns is paid to LPs given the soft hurdle rate of 10%. Tenderledge then earns catch-up carried interest on the returns above USD40 million until it has earned 15% of total returns; thus it receives all returns earned between USD40 million and USD47.06 million (i.e., USD7.06 million) as catch-up carried interest. USD47.06 million can be computed by dividing the USD40 million hurdle by 1 minus the carried interest rate (i.e., 47.06 = 40 ÷ 0.85).

After achieving USD47.06 million in returns, all additional returns are shared between Tenderledge and its LPs based on a 15%/85% split. Thus, Tenderledge's additional carried interest is USD5.30 million [= (82.4 – 47.06) × 0.15]. Tenderledge's total carried interest is the sum of the catch-up carried interest of USD7.06 million and the USD5.30 million calculated previously.

Tenderledge's carried interest is 15% of its total returns net of management fees of USD82.4 million. Despite the higher soft hurdle rate and the lower

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carried interest rate, Tenderledge earns a greater carried interest amount in this scenario compared to the earlier hard hurdle rate scenario.

The prior case study demonstrates the significant impact of management fees and carried interest on investor returns. In addition, carried interest structure and terms can provide considerable advantages to either GPs or LPs depending on fund performance. Finally, in contrast to the simplified case study, carried interest is typically structured such that the GP can begin receiving performance fees years before the end of the fund's life, provided that committed capital has been distributed in full. In such instances, clauses and provisions such as clawbacks may become important elements of the limited partnership agreement with LPs to ensure that the GP's share of returns over time does not become biased upward due to the timing of returns, as in the following case study.

CASE STUDY

Estragon SA Fund's Clawback Provision

Estragon SA, a French venture capital fund manager, recently exited its latest EUR100 million fund after seven years. The fund consisted of four investments of EUR25 million made at the beginning of the first four years of the fund's life. At the end of Year 4, Estragon exited its first investment, selling its stake for EUR200 million. Unfortunately, Estragon's subsequent three investments all failed, with exit values of zero. Estragon collected a carried interest charge from its LPs of 20% on returns in excess of a hurdle amount of EUR60 million at the end of Year 4. Estragon's LPs negotiated a clawback provision in the limited partnership agreement that total carried interest over the life of the fund could not exceed 20% of returns over a hurdle of EUR105 million.

1. Discuss how Estragon's LPs benefited from the inclusion of a clawback provision in the fund's terms.

   Solution

   The fund's excess returns in Year 4 were EUR140 million (= EUR200 million – EUR60 million), and Estragon collected EUR28 million (= EUR140 million × 0.20) in carried interest at the end of Year 4. However, the fund earned no additional return in the three subsequent years. The total carried interest at the end of fund's life could be no more than EUR19 million [= 0.20 × (EUR200 million – EUR105 million)]. So, the clawback provision mandates that Estragon must return EUR9 million (= EUR28 million – EUR19 million) to its LPs given the overpayment of carried interest early in the fund's life, since one highly successful investment was followed by three failures.

In addition to the attraction of unlimited upside potential, the relatively favorable tax attributes of carried interest, given both its deferral until the end of an investment period and its treatment as a long-term capital gain as opposed to ordinary income in some jurisdictions, provide an added incentive for GPs receiving this form of compensation.

TAX TREATMENT OF CARRIED INTEREST

Carried interest helps align incentives between GPs and LPs through efficient sharing of returns. That said, treatment of GP carried interest from a tax perspective can vary by jurisdiction and is a frequently debated topic. Does carried interest reflect a payment to GPs for services or a tax on gains for capital

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at risk on an investment? Because the distinction is not always clear, it is not surprising to observe that tax policies differ across jurisdictions as to whether carried interest should be taxed at a higher ordinary income rate or at a lower capital gains income rate.

The US and UK tax jurisdictions are examples in which carried interest is typically treated as capital gains income and are therefore more tax friendly for private fund managers. Nevertheless, the tax treatment of carried interest is often subject to change. For example, the United States has applied longer holding periods for carried interest to be eligible for capital gains income tax treatment. In the United Kingdom, there is considerable concern about double taxation issues associated with carried interest received in other jurisdictions with differing tax treatments. So, while the United Kingdom provides capital gains treatment on domestic carried interest, GPs also must monitor other relevant tax jurisdictions to avoid being taxed twice on the same return.

Germany offers a different historical perspective on its tax treatment of carried interest. Prior to 2004, German tax law viewed carried interest as capital gains income and its effective tax rate on carried interest was effectively zero. In 2004, Germany reversed its view on carried interest and began interpreting these payments as ordinary income to fund GPs. However, recognizing that such tax treatment could create a private capital exodus, a compromise was struck to tax 50% of the carried interest as ordinary income, with the remainder exempt from income tax. This hybrid approach to taxation prevented German GPs from immediately seeking more desirable tax jurisdictions. In 2009, Germany increased the 50% taxable portion to 60%, along with other new conditions. Overall, the German experience and legislative initiatives elsewhere to change tax treatment highlights the uncertainty regarding carried interest taxation.

Beyond the carried interest and management fees outlined previously, limited partnerships often face additional fees and potential conflicts of interest that must be considered when investing in a private fund. For example, general partners may receive fee payments from firms whose boards they control. While these fees are rebated in many cases, in other instances, restrictions or other complications reduce the rebated amount. Management service agreements may allow GPs to claim a wide range of discretionary expenses and in some cases may allow them to withhold fees to lenders, such as arrangement fees. Also, a GP's fee arrangements with the suppliers to portfolio companies represent an additional potential for conflicts of interest to arise.

In addition to fees, the performance of private market funds from an investor perspective must also take into consideration the liquidity risk associated with future capital calls of uncertain size and timing. Investors may incur an opportunity cost by holding committed capital in relatively liquid assets with return below that of private markets with higher correlation with public markets.

CASE STUDY

Northern States' Public vs. Private Investment Performance

Northern States, a large US state pension fund, commits USD50 million to Bardstown Partners' latest buyout equity fund with a term of 10 years. Based on its experience in private equity investing, Northern States believes that its capital will not be called for two years. During this period, Northern States invests in a public equity index. Northern States expects compound annual private equity returns of 16% and public equity returns of 10%, while US Treasury securities are expected to return 5% per year.

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1. Discuss the extent to which Northern States' expectations of investment performance over 10 years may differ from the forecast private equity expectations of 16%.

   Solution

   If we assume that Bardstown calls capital in exactly two years and Northern States invests in public equities, Northern States expects to earn 10% per year during the first two years of the fund's life and 16% for the remaining eight years. The overall expected compounded return over 10 years is therefore approximately 14.8%:

   $$14.8\% = [(1.10)^2 \times (1.16)^8]^{(1/10)} - 1.$$

   As a result, assuming no volatility in returns and capital call timing certainty, the inability to earn private equity returns during the first two years of the fund's life is expected to cost Northern States 120 bps of expected return.

2. Discuss how Northern States might address the shortfall risk associated with its capital commitment.

   Solution

   Northern States has committed to investing USD50 million at an unknown future time. As mentioned earlier, Northern States may earn equity returns during the time lag between commitment and call by investing in liquid public equities. However, because of the uncertainty of public equity returns, this strategy creates substantial risk that Northern States may suffer a loss of principal, resulting in a capital shortfall when required to meet its commitment to Bardstown Partners. To reduce this risk, Bardstown may choose investments with lower volatility, reducing its overall return over the fund's life below the 14.8% calculated in the prior question. In an extreme case, Northern States may consider investing in securities with 5% expected annual return and no risk of loss of principal. The effect of such a strategy on the expected compounded return for Northern States over the 10-year horizon would be a further reduction to 13.7%:

   $$13.7\% = [(1.05)^2 \times (1.16)^8]^{(1/10)} - 1.$$

The ability to benchmark and adequately diversify private market portfolios is an additional consideration when evaluating performance from an LP perspective. While public equity fund investors have a wide array of investible index-based alternatives, private market LPs face several barriers in matching the aggregate reported returns for a particular private asset class. First, the need to hold liquid investments for committed capital that is not yet deployed creates a drag on returns, as shown earlier. Second, an investor's ability to diversify across specific GPs is limited, and a high dispersion of realized returns often exists between the top and bottom quartiles of performance for private asset classes. Third, given the illiquidity of private investments and limited secondary markets, vintage year diversification is also difficult to achieve for investors seeking to increase private market allocations.

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QUESTION SET

1. Discuss two reasons why private market investment fund management fees are typically paid to the GP by LPs based on committed capital as opposed to invested capital.

Solution

First, payment based on committed rather than invested capital compensates GPs for the significant upfront cost of due diligence and other GP responsibilities performed prior to capital deployment (because committed capital is greater than or equal to invested capital). Second, payment based on committed capital reduces the incentive to deploy capital as quickly as possible in less attractive investments simply to generate management fees.

2. Which of the following fund returns and carried interest structures is most likely to generate the highest amount of performance fees for a GP?

A. Fund 1: 20% return after management fees, 20% carried interest rate, 8% hard hurdle rate

B. Fund 2: 14% return after management fees, 20% carried interest rate, 10% soft hurdle rate

C. Fund 3: 18% return after management fees, 15% carried interest rate, 8% soft hurdle rate

Solution

B is the correct response. Given that the 14% return exceeds the 10% soft hurdle rate, the GP receives 2.8% as carried interest (= 20% × 14%). This amount includes 2.5% of catch-up and 0.3% as the 20% share of the final 1.5% of return. The LP earns 11.2% (= 80% × 14%). Response A is not correct, because this return and structure generate only 2.4% as carried interest [= 20% × (20% – 8%)]. Response C is not correct, because this return and structure generate 2.7% carried interest (= 15% × 18%).

3. The LPs of a venture capital fund with high expected volatility of exit values of its portfolio companies following 100% distribution are most likely to seek which one of the following elements in the agreement with the fund's GP?

A. Soft hurdle rate

B. Clawback provision

C. High-water mark

Solution

B is the correct response. The imposition of a clawback provision prevents LPs from paying performance fees on volatile returns that are not sustained over the full investment life cycle. A is not correct, because a soft hurdle rate benefits the GP by ensuring that volatile returns allow for the GP's carried interest to catch up whenever the fund return exceeds the soft hurdle rate. Response C is not correct, because high-water mark provisions are commonly used by hedge funds that mark to market transactions for purposes of calculating fees but are less likely to be observed in other private market structures.

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4 PRIVATE INVESTMENT SELECTION AND VALUE CREATION

- discuss favorable characteristics of private investment targets and sources of value creation in private markets

Prioritizing private investment targets is a process that extends beyond the domain of security selection common among public fund managers. The active engagement of GPs over the investment life cycle requires not only the identification of companies and assets that may be undervalued but also narrowing of investment targets to those in which a controlling stake or significant minority position may be used to drive significant value creation over a longer investment period.

Potential for value creation over the investment life cycle is a common feature among prospective investments, which occurs in different ways among startup, growth, and mature companies in the company life cycle shown in Exhibit 4.

Exhibit 4: Company Life-Cycle Stages

Among startup companies without an established product or revenue base, investors target firms with high growth potential in a new or emerging industry or one that seeks to disrupt an established industry with a new product or business model. Companies whose founders have patents, other intellectual property, or business ideas and industry expertise and/or a successful record of creating new companies represent the most sought-after investments. Value creation for startups involves non-financial milestones, such as new product prototypes and testing, validating a business concept, and setting a go-to-market strategy, as described in the following case study.

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CASE STUDY

Kumartest LLP Venture Capital Funding

A biomedical engineering research group at a major Indian research university developed a revolutionary process to conduct instantaneous testing of complex assays (or laboratory analysis to determine the presence of substances) using mobile technology under laboratory conditions. The lead researcher, Dr. Sana Kumar, believes that this new technology has significant potential in the fields of mining, environmental protection, and medicine and establishes a new limited liability company (Kumartest LLP) to commercialize this technology. Dr. Kumar's first investors are herself and several family members, and the funds are used to develop prototypes to demonstrate the commercial applications to additional investors.

Growth companies are those with an existing product, customer base, and business model that have the potential for above-trend growth as measured by a firm's revenue relative to its **total addressable market**, or total revenue opportunity for a product. Optimal investment targets include well-managed young firms that have experienced initial success with a product in high demand but face capacity constraints in attaining their potential future size and level of profitability. Capital investments at this stage are needed to create the scale necessary to realize this opportunity for rapid growth.

Mature companies, in contrast, are often targeted by **buyout equity** investors, or those seeking to unlock an established firm's growth and profitability potential by acquiring a business to transform or streamline its existing operations. Targets include large firms with strong market share, consistent cash flows, and a substantial fixed asset base in a less competitive industry due to regulation or entry barriers. Firms meeting these criteria that face lagging performance or management issues are likely to reap the greatest benefit from a buyout transaction. In this case, value creation involves the use of debt financing to acquire and transform operations by adding management talent, increasing efficiency, and shedding non-strategic businesses. Subsequent debt reduction and higher profitability are the key elements necessary for reaching a higher market valuation upon exit that represents the bulk of buyout equity returns.

CASE STUDY

Bardstown Partners Chemical Industry Targets

Bardstown Partners, a private equity firm specializing in buyout equity, is considering a target company in the chemical industry to take private in a leveraged buyout transaction. Bardstown has a track record of success in taking industrial companies private and has built up considerable expertise and a strong network in the chemicals sector. Bardstown has identified the three following possible candidates for further due diligence:

- Blanckton Incorporated is the second-largest global company in chemicals, with approximately USD40 billion in revenue. Blanckton operates in a wide array of product markets and is geographically diversified with a significant number of joint ventures and other strategic partnerships. The company has consistently generated the best returns on capital in the chemicals industry.
- Maudville Corporation is a mature participant in the chemicals industry with approximately USD5 billion in revenues and USD1 billion in EBITDA. The company has carved out a competitive niche in a

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specialized area of the industry. Despite its ability to generate stable cash flows, its margins and returns on capital are mediocre in comparison to its peers in the chemicals industry. The company has a long-time CEO, with no clear successor identified.

- Zbornak Incorporated is an emerging company in the industry with approximately USD500 million in revenues. Zbornak has been growing more rapidly than its more mature industry peers. The company has achieved success in identifying revenue opportunities with double-digit growth rates but has not yet found the scale necessary to realize consistent profitability.

After considering these three companies, Bardstown concludes that Maudville is the most appropriate choice to consider further in its due diligence process. The company exhibits several attributes of a promising buyout candidate, including its mature stage in the company life cycle, generation of stable cash flows, and potential for improvements by increasing efficiencies. Furthermore, because of the company's potential need for management succession, Bardstown may be able to find new leadership to drive change in the organization through its network of contacts.

Private equity targets and their value creation potential are affected by company- and industry-specific forces, as well as macroeconomic conditions, in different ways. Exhibit 5 summarizes some of the key sources of value creation used by private equity firms.

Exhibit 5: Sources of Value Creation in Private Equity

The application of strategic, operational, organizational, and financial value drivers shown in Exhibit 5 varies greatly among targeted investments based on a company's stage in the life cycle, its industry and competitive position. For example, a buyout equity firm targeting a mature manufacturing company with high operational leverage and significant fixed assets is most likely to focus on operational areas for improvement; however, a retailer with high financial leverage may find balance sheet optimization and inventory management of greater importance when seeking areas of improvement. The prospective future trajectory of an industry as well as the overall economic outlook are important factors affecting the performance of private equity strategies.

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For example, rapid technological change in such industries as biotechnology and information technology often fuel startup growth, which is less sensitive to the economic cycle, while buyout targets in mature, cyclical industries with value creation strategies that rely on the availability of less costly debt financing face a greater adverse impact from rising interest rates or a cyclical downturn.

For private markets, such as real estate and infrastructure, which are usually project based, GPs follow capital commitment, deployment, and distribution phases over a common development life cycle, as shown in Exhibit 6.

Exhibit 6: Real Estate Development Life Cycle

Exhibit 6 shows the phases involved in a newly developed real estate project or so-called **greenfield investment**, which involves "to be built" projects and assets earmarked to provide an essential service or public good.

Real estate investment values stem from a property's current and expected future economic use. Opportunistic private real estate projects are like startup companies in that they face cash outflows in an initial capital deployment phase. The real estate equivalent of mature companies with stable cash flows are existing, well-leased income-producing properties usually held in publicly traded REITs, although these types of core properties are also available in private markets through what are known as **open-end diversified core equity (ODCE) funds**.

Real estate development targets typically involve raw or developed land parcels, with a relative attractiveness for opportunistic investment driven by

- location and suitability for the proposed project versus other uses,
- existing supply and expected future nearby development, and
- local, regional, and global economic conditions.

Underlying property use is the most important feature to consider when evaluating target investments. As an example, while local industry conditions, transport links, and the proximity of customers and suppliers are key priorities in selecting an industrial warehouse location, a strong local job market and local educational and recreational opportunities are far more important when selecting among residential rental and owner-occupied housing projects.

The value creation process in real estate development hinges on a developer's ability to complete a project on time, reach full occupancy, and generate a stable future income stream whose expected terminal value exceeds project cost plus a required rate of return. In addition to such risks as project delays, changing economic conditions, and

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real estate cycle timing, real estate investors are exposed to technological change and other structural factors that can have a significant and lasting impact on real estate demand, as described in the following example.

HYBRID WORK AND THE COMMERCIAL REAL ESTATE MARKET

The trend toward hybrid office work, referring to the practice of combining in-office with remote work, took hold following the COVID-19 pandemic. The changing behaviors associated with this trend have profound structural implications for the commercial real estate market globally. With office workers spending less time in urban centers, visitors to urban retail stores near office-dense regions have declined.

These behavioral shifts have negative implications for demand for office and retail space in urban centers. As fewer workers are in the office, increasing office vacancy rates internationally are typically accompanied by declines in the asking price for rents. According to global management consulting firm McKinsey, demand for retail space in "superstar" global cities is projected to be 9% lower than pre-pandemic levels by 2030.

Market values of office and retail properties have fallen because of the remote work trend. Lower office and retail rents and declining occupancy reduce operating income for commercial investors, creating downward pressure on property values. An additional negative valuation factor comes from upward pressure on property discount rates. Cap rates, the common metric for discount rates in commercial real estate, increase as potential buyers see more risk associated with future cash flows in these property types. The value declines in urban office and retail properties are likely to make investments in such properties less attractive in the near to medium term.

While commercial real estate developers and owners of existing assets have some flexibility to adapt projects and properties to changing real estate demand, this is not true for most single-use, long-lived infrastructure assets.

In contrast to real estate, infrastructure assets derive their value from underlying long-term contracts known as **concession agreements**, or regulations that govern their economic use and income generation potential. Under a concession agreement, a granting entity, such as a public authority, contracts with a developer or operator on a long-term basis to build, operate, and eventually transfer asset ownership back to the so-called **grantor** at the end of a prespecified period. The final transfer of ownership under this **build–operate–transfer (BOT) project** requires GPs to generate all investor returns prior to the transfer of asset ownership to the grantor at zero terminal value. Attractive opportunistic infrastructure projects include those that provide essential services with relatively inelastic demand, less exposure to market cyclicality or economic shocks, and the ability to increase user fees along with inflation.

As in the case of real estate, the underlying economic use, industry, and business model under which a proposed new infrastructure project will operate are of primary importance in prioritizing target investments. For example, many developed countries have introduced subsidies and regulation-based payment schemes, among other incentives, to promote investment in renewable energy. GPs must factor the economic impact of these schemes across jurisdictions into their decision-making process when evaluating target investments.

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WIND FARM SUBSIDIES IN EUROPE

Nine northern European countries expect to spend approximately EUR800 billion to dramatically expand offshore wind farm capacity in the North Sea to 300 gigawatts (1 GW equals 1,000 MW) by the year 2050. This comes as part of an urgent global push to reduce fossil fuel use as part of climate change initiatives and in response to regional energy security concerns—for example, following the outbreak of war in Ukraine in 2022.

While European policymakers seek to coordinate efforts to increase renewable energy generation, individual countries are taking the initiative to improve their capacity. For example, France plans to contribute over 13% of the 2050 goal with emphasis on offshore wind farms, while Great Britain aims to approximately triple offshore wind farm capacity by 2030. According to a consulting report commissioned by a variety of stakeholders, Norway alone has the potential to develop over 300 GW of offshore wind farm capacity, which is 10 times greater than the country's 2040 target.

One example of a government-supported program to support low-carbon electricity production is the United Kingdom's Contracts for Difference (CfD) scheme. These contracts are structured as swaps in which a renewable energy developer exchanges periodic payments with the Low Carbon Contracts Company, a UK government-owned entity, which effectively lock in a fixed unit price on a specific volume of a developer's electricity production for 15 years. As more renewable electricity comes to market, developers face the risk that future CfD price opportunities will reflect lower electricity prices and reduce the longer-term value of renewable energy generation projects.

As for other private market assets, GPs in private infrastructure seek to create value over a transformational life cycle. However, the greater size and illiquidity and a general inability to repurpose investments impose additional constraints on managers in pursuing this objective. With a development cycle involving sizable sunk costs and a finite holding period, which sometimes involves an asset transfer with no exit value, as in the case of BOT projects, GPs often focus on mitigating project risks, maximizing operating efficiency when facing fixed-price contracts (or extracting inflation-adjusted payments over time), and capitalizing on ancillary commercial opportunities when evaluating target infrastructure investments as described below.

AIRPORT PROJECT COMMERCIAL REVENUE OPPORTUNITY

Airport development is an infrastructure project example in which commercial payments from the concession contract associated with the build–operate–transfer plan may be augmented by other sources of return. While an airport concession typically provides for revenue on a per-passenger basis for travel-related services, the inclusion of duty-free and other shopping opportunities, restaurants, airport hotels, and other passenger amenities, such as parking, expands the potential for GPs to diversify and expand cash flow over the concession period.

The approximately USD30 billion global airport retailing market, dominated by the Asia-Pacific region, is expected to grow by over 12% annually through 2030, concentrated among mid-sized airports. As a result, a key driver of potential returns for infrastructure funds with airport development opportunities in the Asia-Pacific region involves maximizing the retailing potential within an airport over the concession period.

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In what follows, we turn our attention to the remaining investment cycle phases of deployment, distribution, and exit; detailed evaluation of target investments; and the preparation and execution of the value creation process through the end of the partnership investment period when an asset is sold, exited, or transferred to a granting entity.

QUESTION SET

1. A primary value creation focus of private equity managers investing in companies in the startup phase of the company life cycle is most likely to be:

   A. achievement of non-financial outcomes, such as validating a business concept.

   B. achievement of company revenue growth greater than growth in the company's total addressable market.

   C. achievement of company efficiency gains.

   Solution

   A is the correct response. Value creation for startups involves non-financial milestones, such as new product prototypes and testing, validating a business concept, and setting a go-to-market strategy, as the first steps on a growth trajectory. B is not correct, because this sort of revenue growth focus is most likely in the growth phase of the life cycle. C is not correct, because this goal is more likely for companies in the mature phase.

2. Which of the following is a unique valuation component of the build–operate–transfer project model that is typically not used to value other categories of private market assets?

   A. BOT projects rely on a significant amount of debt financing.

   B. BOT projects have zero terminal value at the end of the concession agreement.

   C. BOT projects are valued based on the economic use of the asset.

   Solution

   B is the correct response. A unique component of valuing infrastructure assets operating with a BOT model is that the asset has zero terminal value at the time of transfer back to the concession grantor. A is not correct, because significant amounts of debt financing are also used in private real estate and buyout equity transactions. C is not correct, because private real estate value is also determined based on its economic use.

3. Which of the following is likely not a critical value creation strategy of a private real estate general partner?

   A. Ability to complete projects on schedule

   B. Ability to ensure that a new building is (close to) fully occupied on schedule

   C. Ability to anticipate changing economic conditions in development plans

   Solution

   C is the correct response. While private real estate fund general partners should be cognizant of the real estate cycle in their development plans, the

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ability to anticipate changes in economic conditions is not a critical part of the GP's value creation strategy. A and B reflect items that the GP can better manage in terms of generating value through real estate development. Finishing projects on schedule and ensuring that a building has paying tenants are both directly related to the cash inflows being reflective of the business plan.

DUE DILIGENCE AND STRATEGY EXECUTION

5

- discuss the role of conducting due diligence and establishing a business plan in the private investment process

GPs considering an illiquid, long-term investment in private equity, private debt, or a private asset or project in real estate or infrastructure conduct very thorough due diligence on targeted investments. The purpose of this process in private markets goes beyond identifying intrinsic versus fair market value or potential growth opportunities for a specific asset or investment as in public markets; it also extends to establishing a business and financing plan to meet or exceed targeted return over a multiyear investment life cycle.

The information available to GPs conducting due diligence for private market strategies varies when pursuing *company* due diligence versus *project* or *asset* due diligence. In the case of the former, early-stage companies have little more than a business idea or prototype with few customers, minimal revenue, and no profits, while mature buyout targets involve both business and accounting due diligence to evaluate a firm's prospective performance in established products and markets. The latter form of due diligence often involves initial construction and development phases, creating a real estate or infrastructure asset that produces future income. Private real estate GPs consider real estate market conditions upon project completion when assessing future income, while infrastructure investors focus attention on market and regulatory factors related to the provision of contractual, essential services as a primary future revenue source.

Given the lack of transparent performance benchmarking, upfront capital commitment, and long illiquid investment period of a typical limited partnership, LP due diligence on prospective fund managers differs from that in public markets, as described later in this learning module.

Company Due Diligence and Business Plans

The industry and competitive analysis tools and approaches introduced in Level I of the CFA Program curriculum also apply when conducting due diligence on private equity or private debt opportunities. Past and future company performance is driven by macroeconomic or industry-wide factors, such as economic growth, and company-specific factors, such as increased market share.

As non-controlling investors in established, mature companies, public fund managers rely on economic and industry analysis, publicly available information, and the financial statements of a company and its competitors, clients, and suppliers to forecast financial statements and assess a firm's intrinsic value versus its recently traded price.

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Private fund GPs seeking significant minority or controlling stakes include these techniques in their analysis of investment targets but usually conduct a more exploratory, in-depth, dynamic process that varies greatly based on a company's life-cycle stage.

For example, prospective analysis of early-stage companies by potential investors often focuses on technical aspects of a prospective product or service and a founder's ability to rapidly go to market and reach scale, as shown in the following example.

CASE STUDY

Estragon SA's Kumartest LLP Due Diligence

Upon learning of Dr. Sana Kumar's research and new process to rapidly test complex assays using mobile technology, partners in the French venture capital firm Estragon SA initiate due diligence to consider a minority stake in her firm. Estragon's health care team is specifically focused on the new device's commercialization potential among European medical providers.

Estragon starts with an independent scientific verification of the new approach, believing it to be potentially far faster and more accurate than existing methods. In addition to its technical superiority, the team also draws the preliminary conclusion that the use of Kumartest's new technology could dramatically improve patient outcomes for several common diseases. Estragon uses this information as a basis to assess Kumartest's potential market size and identifies several major European medical centers as early adopters for its use. Finally, Estragon confers with experts on the time and resources required to clear the European Union's stringent conformity assessment process, ensuring Kumartest's new product meets safety and performance guidelines. Once Estragon has satisfied these preliminary criteria, it moves on to weigh the financial terms and timing of an investment, as well as possible partners and co-investors with similar expertise in entering the US health care market.

Note the importance of scientific and technical factors in the due diligence process for the previous startup example. The non-financial aspects of a company's initial development phase are more important than traditional financial statement analysis in evaluating prospective investments.

Private equity buyout investors in mature companies, in contrast, can conduct more thorough due diligence on the operating history of established companies, which includes but is not limited to financial statement analysis. Private equity GPs typically seek access to far more detailed non-public company information when bidding to purchase a public or private company. GPs usually must sign a **non-disclosure agreement**, or a legal contract specifying that confidential information received is only for the purposes of evaluating a possible transaction. Potential buyers are typically granted access to what is referred to as a **data room**, or a repository for confidential company documents and data that usually include the following areas:

- Legal and organizational: Key legal commitments, partnerships, and joint ventures, as well as company entities and organizational structure
- Commercial: Key client data, sales projections, new product pipelines, and existing pricing and supply arrangements with clients and suppliers
- Financial: Company cash flow projections, cost analyses, loan and other financing agreements, and the status of owned and leased real estate, fixed assets, equipment, and facilities
- Human resources: Organizational chart, employee biographical information, compensation levels and history, policies, and benefits
- Intellectual property: Trademark, patent, and copyright ownership and licensing

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- Information technology: Creation, use, and licensing of software used to manage operations, sales, and other firm activities
- Compliance and litigation: Company records and data on meeting health and safety requirements, regulations, or privacy rules and on past or existing pending litigation or sanctions
- Environmental, social, and governance (ESG) issues
- Taxation: Tax history, tax liens, policies, and losses carried forward

THE RISE OF VIRTUAL DATA ROOMS

As part of the due diligence process, potential company investors or acquirers typically access privileged target company information from a secure data room. The data room used to be a physical repository, but it has increasingly become a virtual solution in recent years to address cost, efficiency, and security concerns. The digitization of business records combined with the advent of cloud computing created natural conditions for growth in virtual data rooms, and this trend accelerated because of the COVID-19 pandemic.

Firms raising private capital can gain insights by tracking permissioned user views of specific documents, demonstrate a commitment to data security to prospective investors, and contribute to a more efficient due diligence process. The rise in virtual data rooms has expanded the ability for private market GPs to evaluate target companies and collaborate across investment teams. As a result, the global revenue of virtual data room firms had a compound average growth rate in excess of 10% compounded annually, with global revenue forecasted to approach USD5 billion by 2028.

Private market due diligence is often an exploratory process in which GPs seek to both assess a company's prospects versus competitors and prioritize opportunities for improvement over a multiyear investment period that form the basis for a business plan.

CASE STUDY

Bardstown's Due Diligence Process for Maudville Corporation

As Bardstown searches for a take-private opportunity in the chemicals industry, it has narrowed its focus to conducting detailed due diligence on Maudville Corporation and comparing it to several industry peers in the commodity chemicals industry. Growth in commodity chemicals is relatively slow and highly exposed to the economic cycle, with the greatest potential opportunities for improved performance in the areas of greater asset efficiency and expense management. Although the basic technology used and underlying production costs among firms appear to be similar, the Bardstown team takes a deep dive into the supply chain, logistics, and distribution of the firm's products. As is common in the industry, Maudville is heavily reliant on freight rail to transport raw petroleum and natural gas material inputs, as well as outputs to intermediaries and customers. However, in contrast to most industry competitors, Maudville continues to own and operate many of its own rail tanker cars, whose average age exceeds the industry average of 20 years by roughly a decade. In addition to the aging cars' shorter remaining useful life, Maudville faces the prospective cost of retrofitting them in the near future to meet new environmental standards.

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Maudville's top competitors have gradually outsourced their rail tanker fleets over the past several years. With long-term lease contracts and service agreements in place with existing logistics providers, most competitors have little or no opportunity for cost improvements in this area.

The Bardstown team sees an opportunity to increase Maudville's asset efficiency by selling its existing railcars and redeploying capital to upgrade and expand its production capacity to improve margins and return on capital.

Once private equity GPs have identified opportunities for value creation, they must take further steps to craft a plan of action when deploying investor capital to achieve targeted returns over an investment holding period. An important first step in devising a business plan is to define an industry, its barriers to entry, the competitive forces, and the sources of return, as well as the target company's existing and potential position in the industry sector. For example, as a new entrant in the established health care devices industry, the startup firm Kumartest introduced earlier must overcome regulatory and other barriers to entry to disrupt existing market providers and capture significant market share.

As a next step, it is important to quantify the potential of a new or existing market and the target company's potential given the gap between current and potential future performance. Once the size of an opportunity is established, GPs must prioritize the strategies, investments, and other changes necessary to reach the target's potential size, scale, and level of profitability. In the earlier case of Maudville, the GP pinpointed a shift from owned to leased fixed assets (in this case, railcars) common among competitors as a catalyst for unlocking the opportunity to increase asset efficiency and reduce costs.

Finally, it is important to put any proposed business plan into a market context to understand key risk factors and the performance sensitivity to changes in primary drivers. For example, while the health care industry tends to face less cyclicality, with inelastic demand for diagnostic testing, regulatory or technological changes may have a significant effect on performance.

Project Due Diligence

In contrast to private *company* analysis, *project* or *asset* due diligence in such areas as real estate and infrastructure usually makes a clear distinction between the construction and development phase over which an asset is built and the operational phase upon completion over which returns are generated.

The initial property and project plan review addresses the risks and mitigants associated with whether a project can be built on time, within its expected budget, and to the specifications necessary for its expected future economic use. Due diligence for this initial phase involves both the location and physical attributes of the land or property itself, as well as architects, developers, contractors, and suppliers involved in the construction phase.

Analysis of the post-completion operational phase seeks to ensure that expected payments from an asset's economic use adequately compensate investors for bearing the associated risks over the investment holding period. The nature and level of future asset income depend on the strategy and property type, as well as any contractual commitments in place upon completion. For example, a real estate development may be initiated on a purely speculative basis without prior commitments or built to suit a specific commercial tenant based on pre-agreed terms and a multiyear lease. Infrastructure assets, in contrast, often rely on concession agreement details as to whether future cash flows are fixed or inflation adjusted or depend on commercial or regulatory factors. For example, the earlier case study on European wind power

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subsidies underscored the potential impact of national regulatory schemes on the relative performance of energy infrastructure projects, whether powered by renewables or traditional energy sources.

As is true for private companies, project due diligence also incorporates different economic and market scenarios to evaluate key drivers of return. The following example of a major property refurbishment project addressed in further detail in a later reading illustrates several considerations that may arise during project due diligence.

CASE STUDY

Due Diligence for Kingston Tower

Kingston Tower is an old office building outside Toronto with few amenities and declining occupancy. A private real estate fund manager is considering a purchase of the tower to complete a major refurbishment project. Given the expected persistence of remote work following the COVID-19 pandemic, the prospective project involves a more costly conversion from full office usage to a mixed-use, amenity-rich coworking and luxury apartment complex.

The GP's initial property and project plan review considers both the location and physical attributes of the existing structure. The manager assesses the attractiveness of the location for residential use, including proximity to amenities and recreational opportunities, as well as the building's suitability for conversion in terms of access, floor plan layouts, and the reconfiguration of plumbing, heating, and electricity, among other changes. The GP confers with developers and architects with major refurbishment experience to reach the preliminary conclusion that the project is technically feasible and could be completed over a three-year period. As a next step, the GP also assesses how the project could be sequenced to retain existing office tenants and cash flow over as much of the renovation phase as possible.

The fund partners then turn their attention to the economic feasibility of the project, which depends on the building's net operating income once it becomes fully operational and leased to both commercial and residential tenants. While the project appears to exceed the GP's expected hurdle rate of return under a base-case scenario, she notes that the more costly coworking rental market tends to be more cyclical than the residential real estate market is and, therefore, decides to analyze the project using a downside case in which coworking rents and occupancy face a greater decline than the residential market faces.

As the prior case study suggests, a *project* business plan often differs in that the explicit development steps and associated milestones drive success in reaching the operational, income-producing phase that generates returns for investors. While the business plan of a private real estate project often involves the sale of a property once it is completed and fully occupied, in the case of infrastructure, a project or concession may have a finite life and be turned over to a public authority at the end at a price of zero or a low terminal value.

LP Due Diligence

Extended capital commitments, illiquidity, and lengthy investment periods compel limited partners to conduct a thorough investigation of GPs prior to committing to a new fund. Whereas detailed portfolio comparisons and frequent performance benchmarking versus other fund managers and indexes are common among public fund investors, private market investors use a combination of qualitative and quantitative

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factors to assess private fund GPs. The following case study illustrates the approach taken by a public pension fund to evaluate private equity GPs prior to committing capital.

CASE STUDY

Northern States Due Diligence of Tenderledge Investment Fund X

Northern States Pension Plan is a large US-based public pension fund with a 15% allocation target to private equity. Strategic objectives in growing its allocation include diversification across strategies and engagement to promote sound environmental practices.

Northern States is considering a USD25 million allocation to Tenderledge Investment's new Fund X. Northern States has previously invested with Tenderledge in both its recently completed Fund VIII and its existing Fund IX. Fund X is a growth equity fund seeking to raise capital of USD200 million with a cap of USD225 million, a source of potential diversification given Northern States' current allocation focused on venture capital and LBO investments.

Tenderledge has a track record of transforming small- and mid-cap companies through innovations in process improvements. Fund X will target similar companies to grow revenue and reduce costs via enhanced environmental processes.

Tenderledge was founded 25 years ago by Miranda Tender and Johan Ledge after 10 years in merger and acquisition advisory, and both remain senior partners. The firm has three other partners, with a total of 50 years in investment experience, and 10 additional staff with combined experience of 90 years.

Tenderledge has solid historical returns, generating an average net IRR after fees across all closed Funds I–VIII of 12.5%. For example, Fund VIII generated net total value to paid-in (TVPI) of 2.03 and a net IRR of 13.5%. Fund IX currently has a gross TVPI of 1.30, gross IRR of 15.0%, and an expected exit in four years. To date, Fund IX has made only small distributions to investors, with a distributed to paid-in of 0.20.

While Northern States views Tenderledge's strengths to be its experienced and growing team and continued focus on process improvements, it has two areas of concern related to Fund X. First, because of the growing popularity of ESG strategies, Northern States investigates whether Fund X's targets may attract many bidders, forcing it to overpay. However, its due diligence suggests that Tenderledge's plan to target smaller companies is unlikely to attract excessive bidding interest from other funds. Second, Northern States investigates whether the delays in Fund IX distributions are a sign that Tenderledge may fail to deliver expected returns by the fund's exit date. After careful analysis of Tenderledge's track record from completed funds, it becomes clear that distribution delays do not correlate with lower fund performance.

Finally, Northern States examines the firm's legal, ESG, and workplace diversity track record. Tenderledge has no pending or past lawsuits and recently became a signatory to the UN Principles of Responsible Investment. The firm has a robust due diligence and investment process that incorporates ESG considerations. Tenderledge's diversity statement includes statistics regarding current employment and its efforts to improve diversity among its management and employee ranks.

After evaluating all this evidence, Northern States concludes that Tenderledge Investment Fund X meets all its due diligence requirements.

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QUESTION SET

1. An early-stage company is seeking private capital to provide sufficient funding for hiring a team to get its product to market. Which one aspect of company due diligence is likely to be least heavily weighted by the private market fund?

   A. Thorough examination and analysis of technical aspects of the company's product

   B. Thorough examination and analysis of the company's financial statements

   C. Thorough assessment of the company's founder and his or her ability to guide the new product to market

   Solution

   B is the correct response. The non-financial aspects of a company's initial development phase are more important than traditional financial statement analysis in evaluating prospective investments in early-stage companies. A is not correct, because analyzing technical aspects of an early-stage company's product is a critical part of company due diligence. C is not correct, because thorough assessment of the company's founder is also a critical component of company due diligence for early-stage companies.

2. Identify two resources used by companies that are potential acquisition targets of private equity firms, and briefly explain why these resources are used.

   Solution

   Non-disclosure agreements and data rooms are two resources used by companies that are potential targets of private equity firms or any other possible acquiror. Both resources help ensure that confidential information accessed by the potential buyer can be used only for the purpose of a possible transaction. A non-disclosure agreement is a legal document protecting confidentiality, and data rooms provide a secure location for confidential information to be stored.

3. Identify the next step for a private market fund following a positive due diligence process on a company target.

   Solution

   The next step following a positive due diligence process is to formulate a business plan to create value. Private market due diligence is an exploratory process in which GPs seek to both assess a company's prospects versus competitors and prioritize opportunities for improvement over a multiyear investment period that form the basis for a business plan or a plan for value creation.

4. Which one of the following most correctly reflects a contrast between project due diligence and company due diligence?

   A. Technical factors are more important for project due diligence than for company due diligence.

   B. A clear distinction in asset life-cycle phases (e.g., greenfield versus brownfield) creates distinct focus for project due diligence.

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C. A financial outcome from a project due diligence process includes a cash flow forecast.

Solution

B is the correct response. In contrast to private company analysis, project or asset due diligence in such areas as real estate and infrastructure usually makes a clear distinction between the construction and development phase over which an asset is built and the operational phase upon completion over which returns are generated. A is incorrect because technical factors are also important in company due diligence for early-stage companies. C is incorrect because a cash flow forecast is an outcome of all due diligence processes, regardless of whether the due diligence is for a company or project.

6 PRIVATE INVESTMENT EXIT STRATEGIES

- discuss alternative exit routes in private investments and their impact on value

The final stage of the private investment life cycle is the eventual sale or exit of the investment, as shown in Exhibit 1. For many private investments, the sale price is a key driver of LP returns and GP performance-related compensation in the form of carried interest over the investment holding period. In other cases, such as private debt or an equity stake in a BOT infrastructure project, the maturity or transfer date is predetermined or contractual, with minimal impact on return. We will, therefore, focus attention on the impact of exit alternatives on value in private equity and real estate.

Whether investing in early-stage companies or buyout opportunities, private equity GPs conduct due diligence and establish a business plan fully intending to eventually sell the investment in several years' time. Broadly speaking, private funds exit investments by selling to the public via an IPO, selling to one or more private buyers through different approaches, or liquidating the firm, as shown in Exhibit 7.

Exhibit 7: Typical Venture Capital, Buyout, and Growth Exit Strategies

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Most private equity firms consider their exit options well in advance of a planned exit, frequently engaging external advisers, such as investment banks, merger and acquisition advisory firms, and other consultants, in the process. These firms are often engaged to source interested buyers, prepare materials for public or private sales, and assist in negotiations.

Private market GPs generally select an exit route that maximizes LP returns and GP performance fees, and the choice of a particular approach is highly dependent on both top-down macroeconomic and market conditions and industry- and company-specific dynamics.

Public Sale

Going public via an initial public offering involves the issuance of publicly traded shares on an exchange, which greatly increases the liquidity of ownership and access to large amounts of capital from the broadest possible range of investors. A private company's initial share issuance may represent the reintroduction of a restructured firm that was taken private or the first opportunity to access the investment, as in the case of a successful startup company in the following example.

EXAMPLE 1

Tencent's IPO

Tencent, the Chinese technology giant behind WeChat, was founded in 1998. The company had early success with a communication application but quickly encountered cash flow and legal challenges as the company's user base grew rapidly. After failing to find a buyer for the company, Tencent was able to raise USD2.2 million from two Chinese venture capital funds in exchange for a 40% stake in the startup company in April 2000.

About one year later, Naspers, a South African technology investor, purchased a 46.5% stake in Tencent for approximately USD32 million. One of Tencent's early venture investors exited its initial investment at a return on investment (ROI) of 11×.

In June 2004, Tencent issued public shares on the Hong Kong Stock Exchange at a price valuing the company at approximately USD800 million, representing a 10× ROI for Nasper over a three-year holding period. After the IPO, Nasper retained a sizable stake in Tencent, and by February 2021, its 29% stake was worth approximately USD200 billion. Nasper's Tencent investment produced not only a sizable pre-IPO return but also an ROI of approximately 875× over the 17-year period on its continued holdings in the company.

The primary advantages of an IPO include the ability to maximize valuation multiples under favorable public equity market conditions and stage a controlled exit process in multiple phases with continuity of management and business strategy. For example, a primary issuer may capitalize on strong market conditions and growth following an IPO by executing one or more secondary share offerings. While this route is not available to all private companies, the ideal IPO candidate involves larger companies with an established operating history and excellent growth prospects.

That said, the IPO process is cumbersome, time consuming, and costly, with an outcome that is highly dependent on public market conditions. For example, smaller companies may pay as much as 7% of gross IPO proceeds in fees. The value upon exit from the IPO process to private investors depends not only on the initial price achieved in the primary offering but also on continued strong share performance, for two key reasons. First, GPs often sell their controlling stake in a firm in stages and,

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therefore, rely on continued strong market demand for shares. Second, private equity firms are typically subject to a **lockup agreement**, or sale restriction, at the time of issuance that prevents the GP from fully liquidating its interest in newly issued stock for a predetermined period, often up to 180 days. IPO markets have also shut down during periods of financial stress, such as the Global Financial Crisis of 2008–2009 and the COVID-19 pandemic.

For these reasons, IPOs are generally not the most common exit route, although this alternative often factors into a GP's preparation for monetizing an investment as a negotiating strategy. Given that the IPO process also involves the preparation of materials that support potential purchaser due diligence, in many instances, the prospect of a future IPO may accelerate the private sale of the company to an interested buyer without incurring underwriting fees.

Private Sale

The monetization of an existing investment via a sale to another private buyer can involve different parties and take multiple forms, as shown in Exhibit 8.

Exhibit 8: Private Sale Strategies

Key advantages of private sale include the relative speed and flexibility with which a transaction may take place, typically with fewer restrictions and at a lower cost compared with a public sale. Also, private sale prices do not directly depend on favorable public equity market prices, although such factors as the cost of debt, investor risk appetite, and the public market valuation multiples of comparable public companies used by buyers and sellers in negotiations have an indirect effect on the value a GP is able to realize upon sale.

In some instances, private sale dynamics involve a buyer willing to pay far more than what might be achieved in a public sale due to a unique strategic opportunity, and in other cases, a private buyer may be available despite unfavorable market conditions that preclude a public sale. The most common forms of private sale are outlined next.

Private Sale to a Strategic Buyer

In many cases, the highest bidder for a company is likely to be a **strategic buyer**, as described in a Level II CFA Program learning module on private company valuation. A strategic buyer is a buyer that seeks to capitalize on synergies by extending the value creation process initiated by the GP, combine the business with another portfolio company, or take other actions as a controlling investor to increase the firm's value. Strategic investors often see the greatest potential and are also able and willing to

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assume associated execution risk. A strategic buyer is often another private equity fund manager, but in some cases, such as in the following case study, the strategic buyer is a publicly traded company.

EXAMPLE 2

Facebook's Acquisition of WhatsApp

In October 2014, Facebook, now known as Meta Platforms, completed its USD19 billion acquisition of WhatsApp. The deal had been announced eight months earlier and was the largest acquisition of a venture-backed company at the time.

WhatsApp was founded in 2009 by two former Yahoo! employees as an instant messaging service for smartphones. WhatsApp's initial venture funding source was Sequoia Capital, which provided USD8 million of Series A financing in 2011. Sequoia made subsequent investments in WhatsApp, and its total investment before the Facebook acquisition grew to USD60 million. Sequoia's estimated ROI on its WhatsApp investment was close to 50×.

Given WhatsApp's minimal revenue at the time of purchase, Facebook's acquisition price suggested that the company saw huge potential in the company's technology, its user base, and their data, as well as a perceived threat to its own platform. WhatsApp had a user base of 600 million monthly active users, with significant growth in developing markets.

The strategic acquisition in the previous case study was paid for using the publicly traded shares of the acquiror, but in other cases, these transactions are conducted in the form of a leveraged buyout, where a public or private company acquires the target using a combination of debt and equity.

A special case of the private sale to a strategic buyer is the situation in which the acquiror involves the company's existing management in what is referred to as a **management buyout**. In a management buyout, the existing leadership team commits its own equity capital as an incentive to grow the firm's cash flows and value together with one or more private equity GPs. Management buyouts are frequently structured as an LBO, with debt forming a significant proportion of the purchase price.

Private Sale to a Financial Buyer

A **financial buyer**, in contrast, may in some cases be the highest bidder for a controlling interest for a private firm. A financial buyer is an owner that seeks to earn investment returns from an existing company without identifying or capitalizing on synergies from a controlling interest. A financial buyer may involve an investor seeking a strategic buyer or a private equity GP planning to hold the company in a limited partnership structure. Given the finite life of closed-end partnerships and growing demand for private market investments, GPs are increasingly selling assets from an existing portfolio into a new fund in what is referred to as the **GP-led secondary** market.

EXAMPLE 3

The Rise of GP-Led Secondaries

GP-led secondaries, also referred to as **continuation funds** or fund recapitalizations, have become common exit strategies for private fund sponsors. GP-led secondaries involve a private fund manager sale of assets from an existing fund to a new fund. This continuation fund is led by the same GP with capital from secondary investors. Pricing and terms are often negotiated with secondary

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investors, while existing fund investors are granted the opportunity to sell underlying assets, retain an investment interest in the new fund with similar terms as the existing fund, or re-invest in the continuation fund based on new terms.

According to Preqin, an alternative investment data company, the market for GP-led secondary transactions rose from just under a quarter of all secondaries in 2016 to over half the volume of secondaries five years later, with single-asset continuation funds experiencing the highest growth among secondaries.

The exit strategy of a private real estate fund GP is typically the sale of a property to a REIT once it has established consistent occupancy and cash flows. A private real estate fund GP may choose to retain stable income-producing properties if the fund's investment strategy provides latitude for inclusion of these types of assets. Additionally, real estate market conditions are an important factor in the exit timing of property investments.

Liquidation

Controlling shareholders have the power to sell the assets of a company if it is no longer viable as a going concern. In the case of startup companies funded by venture capital equity investments, the failure rate is extremely high, although these companies have very few fixed assets and little liquidation value.

For large, established companies in a declining phase of the company life cycle facing financial distress, the market value of the firm's fixed assets, real estate, inventory, and intellectual property may well exceed the value of its liabilities. In some cases, the firm may be able to receive protection from its creditors, restructure its assets and obligations, and maintain solvency, but in other cases, bankruptcy and liquidation are the best approach. In this case, while equityholders will typically face a loss of their entire investment, asset sales offer debtholders the highest recovery for their fixed claims. This topic will be addressed in greater detail in a subsequent reading on special situations.

QUESTION SET

1. Exit value realized from the sale of an operating property is a key driver of investor returns for which one of the following private market investments?

   A. Private debt

   B. Private infrastructure

   C. Private real estate

   Solution

   C is the correct response. The return to private real estate investments is largely a function of the sale of the operating property at the end of the fund's life. A and B are incorrect. For private debt investments or an equity investment in a BOT infrastructure project, the maturity or transfer date is predetermined or contractual, with minimal impact on return.

2. Identify and discuss three reasons why volatility of public equity prices may cause IPOs to not be more commonly used as an exit strategy for private equity investments.

   Solution

   - Unfavorable public market conditions at the time of IPO

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- The existence of lockup agreements
- The need for a continued period of strong demand for company shares

Public market conditions may be unfavorable at any given point in the future, so it becomes difficult to plan for an IPO, especially given the long process required to prepare IPO filing materials.

Lockup agreements delay the date at which shares can be sold after an IPO, so any price declines after the IPO date become costly to the GP in terms of its exit value.

GPs often sell their controlling stake in a firm in stages and, therefore, rely on continued strong market demand for shares. Because post-IPO returns on individual company stocks may fall below equity benchmarks over longer time horizons, this may be an impediment to using an IPO as an exit strategy.

3. Which one of the following least likely describes a management buyout transaction?

A. Private sale by a financial buyer

B. Leveraged buyout

C. Private sale by a strategic buyer

Solution

A is the correct response because the company's management is not a financial buyer. A special case of the private sale to a strategic buyer is the situation in which the acquiror involves the company's existing management in what is referred to as a management buyout. In a management buyout, the existing leadership team commits its own equity capital as an incentive to grow the firm's cash flows and value together with one or more private equity GPs. Management buyouts are frequently structured as an LBO. Thus, both B and C are incorrect.

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PRACTICE PROBLEMS

The following information relates to questions 1-4

Estragon SA is a growing French venture capital firm with five completed funds, with another fund nearing 100% capital deployment, and in planning stages for its seventh fund. As a result of its success and the growing capital base of each successive fund, the firm is seeking to hire a new associate. Suzette Dubois, senior partner of Estragon, is interviewing several candidates for the position. To introduce candidates to the fee structure of the firm's funds, Dubois makes the following statement to the job candidates to start a conversation:

Statement 1 The firm's management fees are typically calculated as 2% of the firm's valuation of total fund stakes in portfolio companies.

Following the discussion of management fees, Dubois asks candidates about carried interest. She discusses the common approach of a carried interest rate on fund returns with hurdle rates once 100% of committed capital has been returned to LPs. She comments that Estragon has been experiencing very strong interest from investors and that some continuing investors from its earlier funds are willing to commit large proportions of the fund's target upon the fund's opening to commitments. Estragon reserves some space to accommodate a limited amount of committed capital from LPs with no prior history investing in Estragon funds, but only later in the commitment phase.

Dubois continues a discussion of aspects of Estragon's fee structure. For earlier funds, Estragon included a clawback provision as part of its carried interest terms, but it recently changed its carried interest terms to no longer include this provision.

Dubois finishes the interview process with some discussion of how Estragon handles investment exit strategy. Estragon has been able to successfully take a small portion of its portfolio companies public; however, its preferred exit strategy is to find a strategic buyer for successful portfolio companies.

1. Evaluate the accuracy of Dubois' Statement 1.

2. Discuss Estragon's possible approaches to setting carried interest terms with continuing investors and new investors.

3. Which one of the following statements most accurately describes a reason for LPs to desire a clawback provision in carried interest terms?

   A. Clawback provisions prevent LPs from overpaying performance fees because of volatile returns that are not sustained over the full investment life cycle.

   B. Clawback provisions protect LPs from overpaying performance fees when early fund investments are exited successfully followed by much less successful investment exits.

   C. Clawback provisions protect LPs from overpaying performance fees when carried interest is fully paid at the end of the fund's life.

4. Identify and briefly discuss the most likely investment exit strategies used by

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Estragon.

The following information relates to questions 5-8

Bardstown Partners is a global private equity firm based in the United States with a focus on take-private transactions. Jack Spear is a managing director at Bardstown and specializes in deals in consumer-oriented businesses. His most recent investment transaction for Bardstown was a EUR1.5 billion purchase of E and F Grocery financed with EUR900 million of debt.

Spear is currently researching opportunities in food retailing industries as potential investment targets. He has settled on three possible companies in the quick-service restaurant industry. Each of the three targets exhibits strong market share, consistent cash flows, and valuable assets. Other attributes are as follows:

Target 1: Returns on capital over the last three years below industry average and a CEO with majority ownership of company shares

Target 2: Returns on capital over the last three years below industry average and significant senior management turnover

Target 3: Returns on capital over the last three years above industry average and strong management team

Bardstown negotiated a EUR900 million purchase of Target 2 as a new fund investment. As part of its plans to transform the company, Bardstown plans to sell one non-core division of the company, focus on improving labor efficiency, and use more technology in the company's retail outlets.

During a recent Bardstown Partners investment committee meeting, a discussion about the possibility of moving the partnership's location occurred. Increasingly, Bardstown is finding a greater proportion of its investments in Europe, and as a result, more of its senior employees reside in Europe. However, all the partners reside in the United States.

5. Explain the two-part sequence of financing for Bardstown's purchase of E and F Grocery.

6. Which one of the target companies is likely the best opportunity for a take-private transaction?

   A. Target 1

   B. Target 2

   C. Target 3

7. Which one of the following categories of value creation sources is Bardstown least likely pursuing in its transformation plan?

   A. Operational

   B. Organizational

   C. Strategic

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8. Discuss one potential area of concern related to taxation that Bardstown would want to research before proceeding with any plans for moving from the United States to a European country.

The following information relates to questions 9-12

Asiastruct is a private real estate firm based in Singapore. Its latest fund recently purchased a parcel of land in Thailand outside Bangkok for THB6 million, on which it plans to construct a residential development with planned completion in two years. The expected total cost of the development is THB54 million, to be drawn down from both debt and equity sources over the next 24 months.

Asiastruct's new development location was the result of careful due diligence regarding site selection. Specifically, the new property is located adjacent to a new section of a mass transit line with direct access to Bangkok and its airport. The region's economy is currently doing well, with strong job projections and other favorable developments to support residential housing development. Asiastruct believes that the returns on the project will be excellent because of its value creation abilities in residential real estate development and operations.

Asiastruct's investors are primarily pension plans, sovereign wealth funds, and ultra-high-net-worth investors who commit capital to the fund as limited partners at the beginning of the fund's life of about 10 years, and these investors are attracted to returns that are up to 400 bps greater than typical returns on liquid public real estate securities, such as REITs, which expect to yield approximately 6% annually. Asiastruct's capital deployment phase usually lasts four years, and the typical lag between capital commitment and deployment is two years.

Asiastruct is exploring the possibility of starting a private infrastructure fund. The fund's partners believe there are potential opportunities in certain types of Asian infrastructure projects, such as airport development, in which the firm may be able to capitalize on its construction network throughout the region. It has begun reaching out to certain individuals who may be good candidates to help start an infrastructure fund. During discussions with a few candidates, Asiastruct discovers a variety of commonalities and differences between private real estate and infrastructure investments, especially with respect to build–operate–transfer projects.

9. Which of the following most likely describes the capital drawdown during the initial two-year capital deployment phase of Asiastruct's Bangkok residential project?

   A. Drawdown is contingent on meeting defined project milestones.

   B. Drawdown occurs evenly over the 24 months.

   C. Drawdown occurs at the time of land purchase.

10. Identify three goals that Asiastruct should ideally aim to achieve as part of the value creation process on the Bangkok project.

11. Which of the following is closest to the LPs' annual expected rate of return over the 10-year fund cycle?

   A. 8.4%

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B. 9.2%

C. 10%

12. Discuss one important exit strategy difference between private real estate and private BOT infrastructure investments.

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SOLUTIONS

1. While 2% may be a typical rate for management fees, the portion of the statement that suggests the fee is calculated based on the firm's valuation of its portfolio companies is not correct. Such a fee scheme would provide incentives for the firm to inflate its valuations of its portfolio companies. Rather, management fees typically use the fund's committed capital during the capital deployment phase and committed capital less cost basis of exits during years following full capital deployment.

2. Estragon is in a strong bargaining position because the firm has a strong performance record and its funds are highly sought after. As a result, the firm is likely to set terms more in its favor. However, it may provide the least generous term to new investors committing late in the phase, whereas continuing LPs making larger and earlier commitments may receive somewhat more generous terms.

3. B is the correct response. In the case of a venture capital fund, successful exits of early investments could create distributions to LPs such that 100% of capital commitment has been distributed. Failure of later investments may reduce the fund's overall returns such that carried interest paid early in the fund's life cycle may reflect overpayments to the GP. A clawback provision allows for the excess carried interest to be returned to LPs. A is not correct, because this response describes a high-water mark. Response C is not correct, because carried interest paid entirely at the end of the fund's life will reflect the fund's final return. Clawbacks apply only if carried interest is paid prior to the end of the fund's life.

4. Estragon's most likely exit strategy for its portfolio companies is liquidation or private sale at a loss. Estragon is a venture capital fund investing in startup companies, and these companies are extremely likely to fail. As such, only a minority of Estragon's investments are likely to go public or be sold in a profitable private sale.

5. First, Bardstown contributes EUR600 million of equity to form a new acquiring business entity (AcquisitionCo) and arranges EUR900 million of short-term financing to purchase the target, E and F (TargetCo).

   Second, AcquisitionCo and TargetCo are merged into a new combined business entity, and this new entity arranges for longer-term debt financing of EUR900 million to refinance the short-term financing from the first stage.

6. B is the correct response. All three targets have attractive attributes noted, but companies facing lagging performance or management issues are likely to reap the greatest benefit from a buyout transaction, and Target 2 most closely aligns with this description. A is not correct, because Target 1 has lagging performance, but the CEO with majority ownership is likely to demand a high selling price. C is not correct, because Target 3 has neither lagging performance nor management issues.

7. B is the correct response. Bardstown does not seem to be focusing on any organizational sources of value creation, such as replacing management or improving processes. A is not correct, because both improving labor efficiency and using more technology are operational sources of value creation. C is not correct, because selling a non-core division is a strategic source of value creation.

8. Carried interest is a key component of the income generated by a private market fund partnership. Currently, the United States provides favorable tax treatment

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to carried interest given both its deferral until the end of an investment period and its treatment as a long-term capital gain as opposed to ordinary income. Bardstown should research tax treatment of carried interest in other possible locations and continue to monitor the US tax environment for the possibility of future changes to the tax treatment of carried interest.

9. A is the correct response. Asiastruct draws down enough equity initially to pay for the land purchase, and later equity drawdowns occur at specific milestones in the development process, such as certifications of completion of the structure and occupancy. Debt capital is drawn down according to construction and development needs throughout the development process. B is not correct, because the development process cash flow needs are unlikely to occur evenly over the 24 months. C is not correct, because Asiastruct does not require the full amount of capital at the time of land purchase.

10.

- Complete the project on its planned two-year schedule.
- As the project is completed, ensure that the building is occupied at rates that are consistent with or greater than those planned.
- Ensure that the building's units are rented at prices consistent with or greater than those planned.

11. B is the correct response. An LP loses approximately 40 (= 400/10) bps per year during time lag between capital commitment and deployment if funds are invested in liquid REITs. The time lag is two years, so the loss compared to the private real estate return expectation is 80 bps. Thus, the approximate rate of return is 9.2% (= 10% – 0.8%). A is not correct; it would be true if the time lag were four years. C is not correct, because the LP does not earn the 10% private market return for 10 years.

12. Private real estate investments are likely to generate significant value from a GP's ability to sell the developed project at a price consistent with or greater than expectations when the project was initially developed. Thus, the exit strategy is an important consideration for a private real estate GP, such as Asiastruct. In contrast, a private BOT infrastructure project is transferred to the concession grantor at the end of the contract term at zero or minimal terminal value. Thus, the exit strategy for this type of project is predetermined by the contract.

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LEARNING MODULE

3

Private Equity

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	discuss private equity strategies over the company life cycle
☐	discuss characteristics of venture capital and growth equity investments
☐	discuss characteristics of buyout equity investments
☐	estimate and interpret key inputs and calculate the value of a private equity investment for venture capital, growth equity, and buyout situations
☐	discuss the risk and return among private equity investments as well as versus other investments as part of a strategic asset allocation

INTRODUCTION

1

Private equity remains the dominant form of private market investment. According to the global management consultant firm McKinsey, nearly two-thirds of the almost USD12 trillion in private market assets under management globally are held in private equity. While the classification of private equity investments varies among markets and participants, our focus will be on three distinct areas across the company life cycle, namely, venture capital used to launch high-potential startups, growth equity to assist young companies during periods of rapid growth, and buyouts in which investors take control of and restructure mature underperforming companies, which are also referred to as leveraged buyouts (or LBOs). Later readings address the use of debt financing in private market strategies and special situations such as distressed debt investing.

This reading first addresses different private equity strategies across the company life cycle, from new firms attracting minority shareholders to develop a business idea to the full takeover of an established firm seeking to add value by streamlining operations for an eventual sale. We address the distinct characteristics of these three private equity areas, including forms of investment and economic drivers as well as common features and differences in valuation methods applied to venture capital, growth, and buyout situations. Differences among private equity investments and with other markets contribute to distinctive risk and return features that influence their role in strategic asset allocation.

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LEARNING MODULE OVERVIEW

- Private equity strategies over the company life cycle include venture capital for startups and their initial development, growth equity to expand operations, and buyout equity, which is used to acquire, control, and transform mature companies later sold to private or public investors.
- Venture capital is deployed in a company's initial, pre-revenue phase when cash flow is usually negative to launch a business, create a product, and establish a market.
- Growth equity is used by later-stage firms with a proven market to fund expansion with established products.
- Buyout equity investments, or leveraged buyouts, involve the purchase of a controlling stake in a mature company by investors who see an opportunity to increase valuation and improve cash flow. A company is usually purchased with equity and debt and then restructured with incremental cash flow used to repay debt, followed by a sale to generate returns.
- Investment valuation across private equity uses entry and exit values to determine return on investment (ROI) and internal rate of return (IRR). The venture capital (VC) method uses the exit value of equity and ROI to determine firm value before new equity is sold, whereas the growth equity method includes cash flow projections for profitable growth over an investment horizon. LBO model inputs, on the other hand, are derived from financial statement analysis for both the entry and exit value of equity with significant debt usage over the investment period, which is paid down over time.
- The role of private equity in a strategic asset allocation is to achieve high-risk-adjusted returns and diversification benefits relative to holding public market equities among other investments that more than adequately compensate investors for the added risks and costs of venture capital, growth equity, and buyout equity investments.

2 PRIVATE EQUITY STRATEGIES

☐ discuss private equity strategies over the company life cycle

In Level 1 of the CFA Program, we described how a successful company evolves from a startup period to a phase of rapid expansion with rising cash flows and profitability, followed by a more stable, mature development period, after which the company may enter a phase of decline as seen in Exhibit 1.

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Exhibit 1: Company Life Cycle Stages

Standardized public stock exchanges impose listing rules such as a minimum number of shareholders, asset size, and net worth, and they mandate the periodic release of audited financial reports. Many companies unable or unwilling to meet these and other public market requirements choose instead to access private capital for various reasons at different stages in their life cycle. For many small- and medium-sized private firms, personal or family capital contributions prove sufficient to sustain business capital needs throughout their life cycles. However, institutional private equity investors can and often do play a critical role for companies at both earlier and later life cycle stages.

Startup companies have little to no revenue, negative cash flow, and few assets and are typically established with an equity contribution from a founding owner, friends, or family. As the new company develops, founders often seek active institutional investors willing to assume very high risk as it validates a business concept, determines market size and fit for its product, and initiates and grows operations. These **venture capital** investments typically involve minority equity positions held by more than one investor and often occur in stages. Venture capital investors are highly selective, targeting firms with the highest growth potential and seeking some form of control, such as a board or advisory role in a new company. While many well-known, large global firms such as Apple, Starbucks, and Tesla were successful beneficiaries of venture capital funding at their earliest stage of development, many more startup firms eventually fail, as in the following example.

ANATOMY OF A STARTUP FAILURE: AIRWARE

Founded in 2011, Airware was established as a pioneer in enterprise drone analytics, seeking to deliver high-quality data to enterprise clients in the insurance, mining, and construction industries. The company raised a total of nearly USD120 million over several financing rounds, starting in 2013 from top VC investors including Andreessen Horowitz and Kleiner Perkins.

As the commercial drone market rapidly evolved, Airware grew to over 100 employees and initially sought to create an enterprise operating system for drones. Later, the company began to manufacture its own hardware but found itself unable to compete with industry giants such as Shenzhen-based DJI, which at the time produced over two-thirds of drones sold globally. As competition forced Airware out of the hardware business, it shifted toward providing software for drone data collection and analysis, receiving an investment from Caterpillar

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Ventures, whose parent sought to offer drone services to its heavy equipment customers. However, Airware's new strategy was not sufficient to provide enough cash flow to survive, and it ceased operations in late 2018.

Once a young company has a proven business model, initial customer relationships, and rising revenue—often despite low or negative profitability—it enters an expansion phase during which it seeks to capitalize on the company's **total addressable market**, a measure of the industry-wide revenue potential for the company's product or service. In some cases, the firm is acquired or seeks public investors via an initial public offering (IPO). If the company chooses to remain private instead, private investors contribute what is referred to as **growth equity** during this life cycle phase.

Growth equity provides capital specifically targeting profitable expansion well above the rate of growth of a particular industry and the overall economy by increasing the company's scale of production, marketing, and distribution. This growth may also occur via acquisition, new distribution channels, or new markets. In most cases, this new equity reduces the ownership concentration of founders and initial investors. Private firms in the expansion phase usually rely primarily on a minority equity capital stake as a source of funding, avoiding the periodic interest expense associated with debt funding due to the uncertain trajectory of cash flow and profitability growth. Firms are more likely to use hybrid instruments such as preferred shares or convertible instruments at this stage of development.

The majority of firms that are listed on global public equity exchanges and issue widely held fixed-income securities are in a more mature phase of the life cycle. Mature public firms tend to offer investors more stability than startup or growth companies, are more likely to pay periodic dividends to shareholders, and can support debt service payments from steady cash flows.

However, mature companies operating in dynamic markets are also subject to structural changes that impact growth, contraction, and enhanced profitability, as shown below in Exhibit 2.

Exhibit 2: Corporate Structural Changes

Earlier in the curriculum, it was shown that corporate restructuring is usually driven by company-specific factors, competitive industry pressures, or macroeconomic changes. In many cases, public company managers initiate such changes in response to declining market share or a falling share price.

Listed companies with widely dispersed ownership are often slower to restructure in response to competitive pressures or opportunities than closely held firms managed by private owners due in large part to the **agency cost of equity**. The agency cost of equity is a type of principal-agent problem arising when company managers have more information about the firm than its shareholders, limiting the owners' ability to assess performance and dismiss ineffective managers. In contrast to public companies, private equity ownership and management allows for more direct control over strategic decisions. In the case of so-called **buyout equity** investments, private equity firms acquire a controlling equity stake in underperforming public companies to transform, divest, or acquire businesses. These investors take steps to improve cash

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flow and profitability with the intent to sell the reorganized firm at a higher price to a private investor, existing public company, or the public via an IPO. Buyout equity transactions are also referred to as **leveraged buyouts** due to the high proportion of debt financing used to make the acquisition. The interaction between private and public sources of equity capital is typically not a one-time event but rather reflects a constant dynamic in many industries, such as the following example in the health care industry.

THE EVOLUTION OF WALGREENS BOOTS ALLIANCE

In mid-2007, private equity firm Kohlberg Kravis Roberts & Co. (KKR) partnered with a group of co-investors on a GBP11.1 billion deal to acquire European pharmacy chain Alliance Boots in a leveraged buyout funded with GBP9 billion of debt. KKR's equity stake in the LBO was equivalent to approximately GBP1.2 billion. The Alliance Boots LBO was the largest in Europe at the time and one of the last large leveraged buyouts closed during the boom years preceding the Global Financial Crisis of 2008–2009.

In August 2012, Walgreens, a leading US pharmacy chain, agreed to buy a 45% equity stake in Alliance Boots with an option to buy the remaining 55% of the equity within three years. As part of the first stage of the deal, KKR received cash along with seven million Walgreens shares. By the end of 2014, Walgreen completed the second stage of its Alliance Boots purchase. Between the two stages of the transaction, KKR had received GBP4.7 billion on its initial investment of GBP1.2 billion. The combined company, now known as Walgreens Boots Alliance, became a global health care giant with over 12,800 retail stores and 340 pharmaceutical distribution centers. After the sale, KKR retained a 4.6% public equity stake in Walgreens Boots Alliance.

While its stock performed exceptionally well between 2012 and 2015, Walgreens Boots Alliance's share price peaked in mid-2015 at over USD90 per share. As the stock price fell more than 30% from its peak during the latter half of the decade, discussions of a new LBO managed by KKR surrounded Walgreens Boots Alliance. However, no new buyout came to fruition.

In the 2020s, Walgreens Boots Alliance shares continued to languish. By late 2021, the company was exploring options to potentially spin off its Boots pharmacy business with a greater focus on its US operations. However, in mid-2022, Walgreens Boots Alliance decided to retain the Boots pharmacy business.

At some point, most companies eventually enter a phase of decline as competitive pressures, technological change, or other factors cause a firm's revenues and cash flow to fall, and this may result in financial distress. Private market investors often play a role in these so-called **special situations**—areas of investment that seek to generate return through investments in stressed, distressed, or event-driven opportunities—which are covered in detail in a later reading. Exhibit 3 summarizes these uses of private equity over the life cycle.

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Exhibit 3: Uses of Private Equity Over the Company Life Cycle

Note that these uses vary widely by company, industry, and market conditions, among other factors, as will be demonstrated as we examine the characteristics of these private equity investment forms in more detail in the following sections.

QUESTION SET

1. Which of the following characteristics most correctly reflects a company seeking growth equity?

   A. A company that has recently gone public via an IPO

   B. A private company seeking to enter new markets to increase revenues and profits

   C. A mature public company seeking to enter new markets to increase revenues and profits

   Solution

   Response B is correct. Growth equity is a form of private equity focused on private companies seeking profitable earning growth by entering new markets, increasing sales and distribution efforts, or pursuing a variety of other possible earnings growth strategies. Response A is not correct as a recent IPO company will seek new funding sources in the public equity and debt markets. Response C is not correct as a mature public company will most likely tap public markets rather than private equity funding to achieve these goals.

2. A typical portfolio of venture capital investments is characterized by which of the following?

   A. Financial investments with no governance or advisory role

   B. A diversified set of companies with varying growth prospects

   C. Companies receiving funding only after a highly selective process

   Solution

   Response C is correct. Venture capital investors are highly selective. Response A is not correct as the general partner takes on either board or advisory roles to assist the portfolio company. Response B is not correct

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as venture capital funds focus only on companies in specific industries in which the highest growth potential is possible.

3. Which form of private equity capital does the most to mitigate the problem of agency costs of equity?

   A. Buyout equity

   B. Growth equity

   C. Venture capital

   Solution

   Response A is correct. The agency costs of equity are a problem for mature publicly traded companies in which ineffective managers are less likely to be replaced because widely dispersed shareholders are not able to properly assess management's inability to respond to competitive pressures. Buyout equity provides a solution by taking the company private, which allows private equity owners to have more direct control over strategic decisions. Responses B and C are both incorrect as growth equity and venture capital are provided to private companies that do not face the same agency costs of equity.

VENTURE CAPITAL AND GROWTH EQUITY 3

☐ discuss characteristics of venture capital and growth equity investments

Buyout equity transactions among mature companies comprise roughly half of all private equity volume, with approximately one-third of total investment volume consisting of venture capital and a sixth involving growth equity. These two latter areas of private equity usually involve much smaller deals but entail greater risk as they occur in the early stages of a company's life cycle; however, they also offer investors higher potential returns in most economic scenarios.

Venture Capital

Venture capital investments are widely seen as a catalyst for new and emerging technologies and industries. These high-growth, high-risk investments in new companies are concentrated in a few industries, such as information technology or health care, and typically target startups seeking to either transform an existing market or establish a new one.

While new ventures were historically funded directly by wealthy individuals and families, among others, the most common approach today is for a VC general partner to solicit limited partner (LP) investors such as pensions, endowments, family offices, or high-net-worth individuals in a closed-end fund. These funds are usually composed of a portfolio of minority investments in startups with a drawdown, investment, and return harvesting. Exhibit 4 shows a typical distribution cycle.

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Exhibit 4: Venture Capital Fund Life Cycle

The typical drawdown or initial capital deployment phase of a VC fund usually starts with what is referred to as **seed capital**, which is used to launch new businesses. This committed capital is called over time. As new firms proceed to launch a new business idea, some fail, whereas others reach the next stage of development and require additional capital. This investment phase is often characterized by several follow-on equity injections or so-called **series financings** that are often staggered in phases over the next few years. Losses remain elevated over this period as firms often prove to be unable to commercialize what was originally deemed to be a sound business idea, as in the earlier case of Airware. Given the high failure rate among new companies, VC investors often refer to **100/10/1 rule of thumb**, which involves reviewing 100 startup pitches, conducting due diligence on just ten of the 100 reviewed and selecting only one of the ten as an investment. Despite the high degree of selectivity, VC investors still expect most investments to fail and very few to earn an outsized return, as shown below.

KNOWLEDGE CHECK

1. Estragon SA is a French VC fund whose investments have a 75% failure rate, with an average 15× capital growth rate among its remaining startup equity positions over a five-year period. If we assume no follow-on financing takes place over the period and ignore all fees and other costs, what is Estragon's expected IRR over this period?

   Solution

   Assuming an initial investment of EUR100 and a terminal value in five years of EUR375 (= 0.75 × EUR0 + 0.25 × EUR100 × 15), we may solve for an IRR of 30.26% by either discounting the terminal cash flow over five years,

$$\text{EUR100} = \frac{\text{EUR375}}{(1+\text{IRR})^5}; \text{IRR} = 30.26\%,$$

   or, alternatively, using the Excel IRR function (= *IRR*(*Values, Guess*)) to solve for 30.26% = IRR({-100,0,0,0,0,375}).

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The investment and payoff period of a VC fund is rarely as predictable as suggested in the prior numerical example. Since newly established firms face a very high failure rate with few to no assets or operating history, the initial focus of VC investors is often on founders and their credentials; their business, product ideas, and intellectual property; and the potential total addressable market, competitors, and barriers to entry. The stages of venture capital funding that startup firms may follow are shown in greater detail in Exhibit 5.

Exhibit 5: Venture Capital Funding Stages

While individual cases can vary widely, the initial capital deployment phase of a new firm often occurs in two phases, namely, **pre-seed capital** funding and seed funding, as follows.

- *Pre-seed funding.* The initial source of equity capital is often simply the founder, family members, or friends. In addition to establishing a legal entity and other startup costs, pre-seed capital is typically used to determine the feasibility of a product and market need. This phase targets milestones such as establishing proof of concept and creating a product prototype over a brief period, usually less than a year.
- *Seed funding.* Once a startup firm has a proven idea and can demonstrate how a product prototype could meet that need, it may attract institutional investors as well as one or more high-net-worth individuals known as **angel investors**, who are also often entrepreneurs. This cash received from issuance of equity capital—typically in the form of common shares—is deployed over a longer period to achieve a product-market fit with key milestones, such as the creation of a minimum viable product to show to potential clients and a go-to-market strategy to generate initial revenue.

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CASE STUDY

Kumartest LLP Seed Financing

Scientists at the Kumar Lab, a biomedical engineering research group with a focus on computer-based technology at a major Indian research university, developed a revolutionary process to conduct instantaneous testing of complex assays using mobile technology under laboratory conditions. Given the potential applicability of this new process in the fields of mining, environmental protection, and medicine, Dr. Sana Kumar establishes a new limited liability company (Kumartest LLP) to commercialize this technology.

As a first step, she raises USD1 million in pre-seed common equity capital from family members to replicate her team's lab results. Her goal is to detect trace amounts of chemical compounds on a timely and accurate basis using a handheld device and demonstrate the practical applications of this new technology.

Next, Kumar raises an additional USD2 million in seed capital to hire her first employees and approach environmental service firms and prospective investors with her prototype used to detect hazardous substances for environmental remediation projects. These funds will enable the company to gauge market receptivity for its product and also explore other applications in developing a go-to-market strategy.

Given the critical importance of non-financial milestones in the early stages of a company's development, venture capital general partners (GPs) typically apply more specific technical expertise and knowledge of industries and markets than financial analysis in evaluating prospective investments.

Once a new idea, technology, or product clears the initial hurdle of potentially addressing a customer need, young businesses shift to execution mode in seeking rapid growth by investing in resources necessary to establish markets for their new product.

In contrast to seed financing, investors in later stages of follow-on or series financing (often referred to alphabetically as Series A, B, or C financing) face lower risk than at the pure startup phase, given that the company generates some revenue, but also expect to pay a higher price per share than initial investors. These new investors often include, but may not be limited to, the original VC or angel investors from a prior funding phase, who often face ownership dilution in the event of follow-on financing. Uses of series funding differ markedly from startup phase financing as companies hire staff, purchase fixed assets, build inventory, and create capacity to meet initial market demand. Investor focus shifts from non-financial milestones to revenue, new customers, and other financial criteria to track company progress in reaching its market potential.

CASE STUDY

Kumartest LLP Series Financing

During its first year, Kumartest spends six months developing a product prototype and engages several pilot customers in environmental services. Initial user feedback on the functionality of Kumartest's handheld device is very positive, but Kumar believes the commercial potential in health care is far greater. She uses the remaining seed capital to test and pilot a second prototype to conduct on-demand diagnostic medical tests, which is initially well received but will require more client feedback and approval for use in major markets.

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Kumartest approaches VC investors with a health care focus, seeking funding to clear regulatory hurdles, establish production capacity, and hire a sales manager. After successful testing of its health care prototype, the company raises USD2 million in Series A financing from two investors, USD1 million each in common equity from the French VC firm Estragon SA and the privately held US medical device maker Sevastek Limited.

Two years later, as product receptivity and sales continue to grow, Kumartest raises an additional USD2 million in Series B financing from its Series A investors.

While most series financing is provided as common equity as in the case study, in other cases, it is a hybrid involving the upside potential of equities and downside protection of debt-like fixed claims as shown below.

Growth Equity

As described earlier, growth equity is a distinct asset class within private equity that targets profitable earnings growth, most commonly via a minority equity investment. In contrast to venture capital focus on startups in few industries expected to expand very rapidly, growth equity is less industry focused and targets later-stage companies for expansion with established products and business models. While such firms may be profitable, they typically lack the cash flow necessary to fund major growth initiatives. This expansion may occur by increasing a company's scale of production, marketing, and distribution in an existing product or market, or to grow via business acquisition, new channels, or new markets, as in the case of last mile logistics.

Investors in growth equity often contribute capital in the form of **convertible preferred shares (CPS)** rather than ordinary shares due to several attractive features. As described earlier in the curriculum, convertible preferred shares are a form of preferred stock that may pay a dividend and be converted into common shares at a fixed **conversion ratio**, or number of common shares received for each preferred share, after a specific period. As a result, these shares have both debt- and equity-like features. Like debt, they represent claims senior to those of common shareholders and may receive a fixed dividend and/or a **liquidation preference payout**, or predefined cash distribution to preferred shareholders made in full before any payment to common shareholders. The conversion right to exchange preferred shares for ordinary shares in the future represents an equity-like return. Exhibit 6 shows the payoff profile of convertible preferred versus common shareholders as a function of exit value at the time of conversion.

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Exhibit 6: Convertible Preferred and Common Share Payoff Versus Exit Value

As shown in Exhibit 6, if the exit value remains below the liquidation value of convertible preferred shares, convertible shareholders receive a payoff equivalent to the exit value, whereas common shareholders receive nothing. As the exit value rises above the liquidation preference value, but remains below the conversion price, the payoff to convertible preferred investors is constant, whereas the value to common shareholders rises because common shareholders receive 100% of the incremental gains in exit value (i.e., the slope of the payoff line is equal to one). Once the exit value exceeds an implied equity price at which convertible preferred shares reach the conversion price, shown in Exhibit 6 as the **optimal conversion point**, preferred shareholders may be better off converting to common shares. The convertible preferred payoff rises with exit value beyond this point, while the slope of the common shareholder payoff line falls below one, given the conversion dilution. The relative slope of the two lines beyond the optimal conversion point reflects the fractional ownership of the original common shareholders and the shareholders converting their preferred shares. Fractional ownership is covered later in this reading.

The optimal conversion point may be determined as follows:

$$\text{Optimal Conversion Point} = \frac{\text{Total Liquidation Preference Value}}{\text{Conversion Ratio} \times \text{Number of Preferred Shares}}. \qquad (1)$$

For example, given a USD100 million preferred share issuance at USD20 per share, 5 million preferred shares are outstanding (= USD100 million ÷ USD20). Given a liquidation preference value of 2.5× and a conversion ratio of 1.5×, we may solve for the optimal conversation point using Equation 1 as follows:

$$\text{USD33.33 per share} = \frac{2.5 \times 100 \text{ million}}{1.5 \times 5 \text{ million}}$$
$$= \frac{\text{Total Liquidation Preference Value}}{\text{Conversion Ratio} \times \text{Number of Preferred Shares}}.$$

Convertible preferred shares may include other investor rights such as **redemption rights**, **participation rights**, and **governance rights** in lieu of a conversion to common shares. Redemption rights grant an investor the ability to redeem preferred shares for cash, a form of downside protection that may be desirable when an early-stage

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company faces event risk such as regulatory or other approvals. Participation rights, on the other hand, offer preferred shareholders greater upside via similar distributions as common shareholders without a full conversion to common equity. Governance rights may be extended broadly among investors, or in the case of some private transactions, negotiated by convertible preferred investors who can convert their holdings into large (i.e., greater than 10%) common stock positions. Governance rights may include board seats, special voting rights, or simply the ability to observe board meetings. Finally, convertible preferred investors may be able to negotiate for the ability to force company liquidation within a predefined time frame.

Growth equity investments are not limited to private equity but may also take place in other private markets such as the real estate sector, as evidenced by the following case.

BLACKSTONE MILEWAY RECAPITALIZATION

One of the world's largest alternative asset managers, Blackstone, announced in 2019 the creation of Mileway, a private last mile logistics company composed of 1,000 European properties from its existing real estate portfolio. Given the rise of e-commerce as a fraction of total sales, the speed and efficiency of package delivery from local warehouses to their destination is of primary importance in scaling online businesses and ensuring customer satisfaction.

Three years later, as the company continued to expand in size and geographic scope across European countries, Mileway announced a capital raise, offering existing investors the chance to retain their investments, increase their share position, or sell for cash. The EUR21 billion recapitalization was also subject to a 75-day **go-shop process**, in which Blackstone solicited bids from potential third-party buyers after extending the offer to its current investors. However, most of the recapitalization was provided by existing investors, with Blackstone extending the remainder of the investment to other Blackstone funds. The growth equity from Mileway's recapitalization supported the company's expansion to over 1,700 properties including fulfillment centers, wholesalers, and air freight logistics providers.

Beyond an investment focus on profitable expansion, additional features that distinguish growth equity include investor dynamics and relative risk and return. While founders and venture capital investors have relatively concentrated stakes in startups with high failure rates and an unproven business model, the transition to growth once a business model is established allows early investors and founders to reduce their stake in a business and maintain control by attracting new private investors without selling the entire company or going public. Unlike venture capital, growth deals occur only once a firm's business model, market, and product fit are established, with equity proceeds used to scale the firm's production, sales, and distribution to achieve profitable growth. As a result, both the risk and return of growth equity is below that of venture capital.

CASE STUDY

Kumartest LLP Growth Equity Financing

Six years after it was founded and five years after its first series financing, Kumartest reaches USD70 million in annual sales and is close to earning a profit. That said, the company faces capacity limitations associated with manufacturing its testing devices and therefore has a limited ability to expand beyond a single region.

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In seeking to capitalize on the company's growth potential while remaining private, Kumartest's senior management and existing investors agreed to raise USD30 million from a growth equity investor to be invested in manufacturing capacity as well as sales and distribution to achieve targeted earnings of just under USD50 million in five years.

Given the clearer financial targets involved versus the non-financial milestones associated with venture capital financing, growth equity financing is typically associated with a more detailed business plan mapping out a company's projected revenue and income and cash flow as well as balance sheet assets over the investment horizon. Growth equity investors typically target a specific return in money and percentage terms and then solve for incremental share capital necessary to achieve the young firm's profitability objective, as will be shown later in this reading.

QUESTION SET

1. The most common approach for a venture capital general partner to fund startup companies is:

   A. solicit limited partner investors to invest directly.

   B. solicit limited partner investors to invest in an open-end fund.

   C. solicit limited partner investors to invest in a closed-end fund.

   Solution

   Response C is correct. The general partner of the VC fund creates a closed-end fund and solicits capital commitments from institutional investors such as pension funds, endowment funds, family offices, and high-net-worth individuals as limited partners in the fund.

2. The French VC fund, Estragon SA, hopes to have four successful startups eventually emerge from its latest funding round. The typical failure rate of Estragon's investments is 75%, and Estragon adheres to the 100/10/1 rule of thumb. Which of the following is closest to the number of startup pitches Estragon must review?

   A. 400

   B. 1,600

   C. 2,000

   Solution

   Response B is correct. Estragon's failure rate is 75%, so 16 investments must be selected to have 4 successful ones. With 16 investments, the 100/10/1 rule of thumb implies that Estragon must review 1,600 startup pitches (= 16 × 100).

3. Which type of investor is most likely to provide pre-seed funding?

   A. Founder, family members, or friends

   B. Angel investors

   C. Venture capital funds

   Solution

   Response A is correct. Pre-seed funding is the earliest stage of capital deployment. As startups at this stage have not yet established a feasible business concept, the most likely investors are the founder and those closest relationally, such as family members or friends. Responses B and C are not

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correct as angel investors and VC funds provide seed funding after basic business feasibility milestones have been achieved following pre-seed funding.

4. Contrast the critical analytical roles played by the general partners of venture capital funds versus growth equity funds in analyzing potential investments.

Solution

Venture capital general partners are seeking investments with massive growth potential. Thus, general partners of VC funds typically apply more specific technical expertise and knowledge of industries when analyzing startup companies with less focus on financial analysis because of the high degree of uncertainty regarding the size of a market and the company's ability to capture market share. On the other hand, growth equity funds are focused on profitable growth potential of their investment opportunities, so general partners of these funds will create a detailed business plan with projected revenues, income, balance sheets, and cash flows over the investment horizon.

BUYOUT EQUITY

4

☐ discuss characteristics of buyout equity investments

In contrast to venture capital and growth equity, buyout equity investments involve the purchase of company or a company division with the intent to transform and improve existing operations and maximize return from the sale of the restructured firm upon exit.

Buyout equity targets are typically larger, profitable companies that might be publicly listed prior to a buyout equity transaction. Controlling private versus public ownership is an advantageous corporate governance structure in the case of rapid transformation, better aligning incentives to execute the targeted business plan within the prospective investment timeframe. Unlike early-stage equity investments, buyout transactions usually involve an initial high proportion of debt financing to fund the transformation over this period.

Buyout equity transactions may occur as a direct purchase, a co-investment, or through a private equity fund referred to as a **financial sponsor**, which takes a controlling stake in one or more companies distributed to investors in the form of limited partnerships. Company managers typically have some form of direct share-based compensation to closely align performance incentives to the business plan under a buyout scenario.

Firms that are likely targets for an equity buyout investment are distinguished by three key features:

- mature phase in the company life cycle,
- larger company size relative to industry peers and strong competitive market position, and
- management perceived as not maximizing company value.

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Given the availability of historical financial statements, prospective investors in mature companies are able to engage in more thorough accounting due diligence, among other forms of assessment not available for startups or private firms with limited operating history. For example, prospective buyers are likely to conduct detailed comparisons between a targeted firm's revenue recognition and inventory management policies, depreciation methods, and the frequency and size of non-recurring items in operating profit versus industry peers. Unlike pre-revenue or pre-profit early-stage companies, buyout targets offer financial analysts the means to use more conventional valuation techniques, such as the method of comparables approach using market multiples when establishing a purchase price.

Larger firms with a stronger market position are more frequent targets for leveraged buyouts and financial sponsors. Company features associated with more predictable cash flows also include more regulated industries, those with higher barriers to entry, as well as firms with recurring, subscription-based revenues from a broad group of stable customers. In addition to consistent cash flows, firms with a significant asset base, which can be available as collateral for secured debt, or which can be undervalued versus replacement cost, are also attractive LBO targets.

LBOs typically involve either the purchase of a publicly held company by private investors known as a **take-private transaction**—the sale of a public company division to a buyout investor—or a divestiture or a private company sale. Buyers often target distinct features based upon a specific LBO scenario, such as the following.

Take-private (stock) transaction:

- A target company has an attractive public market value based on comparison to multiples of public company peers
- An acquirer has the ability to purchase outstanding public shares of the target company at a modest premium to the market price
- There is little to no company ownership among existing company managers
- There is potential for expense reductions and/or asset efficiencies that can produce meaningful improvements in profit margins and returns on capital

Corporate divestiture (stock or asset transaction):

- Target has few synergies with remainder of existing parent company
- High parent overhead costs or lack of manager focus and internal funding
- May be preferable to IPO, spinoff, or leveraged recapitalization

Private company sale:

- Opportunities for efficiency gains versus current owner-manager
- Ability to negotiate purchase price and obtain specific assets
- Address manager succession issues or insufficient access to funding

The change in ownership and capital structure of an LBO transaction typically takes place in two phases, as shown in Exhibit 7.

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Exhibit 7: Mechanics of a Buyout Transaction

As shown in Exhibit 7, the financial sponsor or equity buyout fund first creates a new legal entity (AcquisitionCo) for the purpose of acquiring the target (TargetCo). AcquisitionCo receives equity from the sponsor and a short-term acquisition or bridge loan from lenders and uses the proceeds to pay the seller for TargetCo shares and fees to advisors. Change of control provisions, covenants, and other pre-existing TargetCo debt terms usually trigger debt repayment and therefore require full refinancing under the new ownership. The target will therefore often seek temporary debt financing to bridge the period over which the deal closes. This is followed by deal closure and refinancing, in which AcquisitionCo and TargetCo are combined in a merger, and the short-term bridge financing is replaced with medium- and long-term debt issued by the new legal entity.

It is important to distinguish the private buyout investment strategy illustrated above from those activities within an existing corporate issuer such as a **dividend recapitalization**, introduced earlier in the curriculum. Under a dividend recapitalization, also referred to as a leveraged recapitalization, a corporate issuer changes the mix of debt and equity outstanding by increasing leverage via debt-financed dividends or share repurchases. As an increase in debt and reduction in shares outstanding reduce the firm's **weighted average cost of capital (WACC)**, or the expected cost of debt and equity in the capital structure, with no change to the corporation's value, these transactions may be used to benefit existing shareholders.

In contrast, the investment focus of buyout equity is to purchase a controlling stake in a company where an acquirer sees an opportunity for significant return by *restructuring and improving operations* using debt financing over a specific period and then selling the company at a higher multiple upon exit. In contrast to the use of price-based multiples more common among equity-financed venture capital and growth equity investments, buyout equity multiples typically involve enterprise

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value-based valuation metrics, which consider the value of a firm to both debt and equity holders. Execution of the TargetCo business plan is typically entrusted with a proven management team with industry experience in integrating businesses and achieving operational efficiencies as well as aligning manager incentives in the form of equity-based compensation.

CASE STUDY

Maudville Corporation Take-Private Transaction

Maudville is a mature US public chemical company with current year EBITDA of close to USD1 billion. In contrast to the chemical industry average EV/EBITA of 6×, Maudville is trading closer to a 5× multiple due to a higher cost structure versus its competitors and fractious management.

Bardstown Partners, a private equity firm specializing in industrial buyout equity transactions, is considering a take-private purchase of Maudville and a restructuring plan under new management to make strategic changes to Maudville's operating model. Under this plan, Bardstown believes it could improve cash flows and profitability to bring Maudville's EV/EBITDA multiple in line with industry peers over a five-year investment period.

In its proposal, Bardstown is considering a Maudville purchase price of USD5 billion, with 20% of the purchase price contributed by Bardstown Partners via common equity, a 5% equity stake contributed by a limited partner buying convertible preferred shares, and the remaining 75% financed with debt.

Given the larger size, established market position and stable cash flows of LBO targets, buyout equity investors expect to face lower risk and return as compared to venture capital investments and growth equity. In contrast to the high failure rate of startups and execution risk of growth equity in achieving profitable expansion, buyout capital seeks to unlock the potential of an existing business by creating efficiencies, shedding non-core activities, and/or combining a company with others to build scale and synergies across similar lines of business. The evolution of a personal computer sales startup founded by Michael Dell to a multinational technology corporation illustrates the role of private buyout capital in the transformation of a mature business.

FROM DELL COMPUTER TO DELL TECHNOLOGIES

Michael Dell began building personal computers while a student at the University of Texas in 1984. He went on to found Dell Computer Corporation, which was part of the personal computer (PC) revolution during the 1980s and 1990s. However, by the early 2010s, PCs fell out of favor as the market moved toward smartphones and tablets. Dell Computer repeatedly missed its revenue projections during this time, and Dell reached the conclusion that taking the company private would help the company focus on a long-term strategy of customer-centric innovation.

Together with Silver Lake Partners, a private equity firm, Michael Dell took the company private in a USD25 billion transaction in early 2013. At the time of the LBO, Dell owned company shares worth USD3.6 billion. During the next three years, the company focused on using its cash flow to pay down debt of USD15 billion incurred in the buyout.

In 2016, Dell purchased the data management firm EMC in a USD67 billion transaction, giving the company a more diversified business profile across PCs, servers, and storage. Michael Dell contributed more cash and stock into the deal,

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reaching a total investment of about USD7.5 billion. Following the transaction, Dell was able to sell off selected divisions of the combined companies and begin paying down the USD46 billion in debt issued to fund the acquisition.

A key source of future value creation from the deal was EMC's 81% ownership of VMWare, a cloud computing company. Dell and Silver Lake listed a publicly traded tracking stock for VMWare, which proved to be a success as the shares soared in value. In 2018, the VMWare tracking stock was retired with a special dividend to its shareholders. Dell used his share of the special dividend, along with a portion of equity in the private company and USD5 billion in debt, to bring Dell back to the public market as Dell Technologies.

By early 2021, Dell was preparing to spin off VMWare as a publicly traded company and use some of the proceeds to continue to pay down the debt of Dell Technologies. The value of Michael Dell's shares in Dell Technologies had grown to USD39 billion. While Dell's core businesses remain slow in growth with limited profitability, the LBO of Dell Computers in 2013 allowed for a business trajectory that launched a major player in cloud computing, an area with far more growth potential.

A comparison of the features of venture capital, growth equity, and buyout equity investments are summarized in Exhibit 8.

Exhibit 8: Venture Capital, Growth, and Buyout Equity Characteristics

Feature	Venture Capital	Growth Equity	Buyout Equity
Life cycle stage	Startup	Growth	Mature
Industry	New, emerging, or disruptive to existing business models	Various	Various
Company size	Very small	Varies	Varies
Market position	None, small, or new market	Proven with significant growth potential	Established
Investment focus	Company launch, proof of concept, establish product, and market fit	Profitable expansion of established product	Purchase of undervalued asset, add value, and sell at higher multiple upon exit
Form of investment	Equity based	Equity and convertible instruments	Equity, convertible and debt instruments
Stake	Minority	Minority	Controlling
Relative risk and return	Highest	Higher	High
Investment size	USD1–10 million	Varies	Greater than USD10 million
Time horizon	5–10 years	3–7 years	3–7 years

In what follows, we revisit the valuation of private versus publicly owned companies introduced earlier in the curriculum with a distinct focus on each of these forms of private equity across the company life cycle.

QUESTION SET

1. Which of the following features is likely apparent in both growth equity and private buyout equity deals?

   A. High levels of debt used by the private equity firm to fund the deal

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B. Potential for improved profitability of the firm being funded

C. Potential for significant revenue growth of the firm being funded

Solution

Response B is correct. Firms financed with growth equity funding are typically those with potential for significant improvements in both revenue and profit margin growth, and firms financed with buyout equity funding are typically firms with slower revenue growth but with potential for improved profitability growth. Response A is incorrect as high debt is a feature of buyout equity but not a feature of growth equity. Response C is incorrect as significant revenue growth is a feature of growth equity but not buyout equity.

2. Compare the financial leverage strategies and outcomes of a dividend recapitalization versus a take-private buyout equity transaction.

Solution

Both dividend recapitalization and buyout equity reflect strategies that increase the proportion of debt in a company's capital structure.

A dividend recapitalization strategy issues new debt to finance the reduction of a company's equity through a special dividend or share repurchases, and the outcome of the strategy is focused on optimizing the company's capital structure by reducing weighted average cost of capital.

A take-private equity buyout equity transaction is typically funded with high levels of debt, so the short-term outcome of the transaction may be similar to that of a dividend recapitalization. However, the buyout equity transaction aims to pay off significant amounts of debt over the private equity firm's investment time horizon. Thus, a company taken private in a buyout equity deal should eventually revert to a lower proportion of financial leverage in its capital structure in the long term.

3. Discuss the rationale for a two-stage process in the change of ownership and capital structure of a target company in a leveraged buyout (LBO) transaction.

Solution

The two-stage process is often necessary to repay existing debt in the first stage and then optimize the capital structure in the second stage. The target company's debt terms likely include change of control provisions, covenants, and other pre-existing debt terms, and these terms trigger debt repayment under the new ownership. In the first stage, both the target company and the financial sponsor (i.e., the private equity firm) will often need temporary debt financing to bridge the period over which the deal closes. In the second stage, the acquisition company created by the financial sponsor and the target company are combined in a merger, and the short-term bridge financing is replaced with medium- and long-term debt issued by the new legal entity.

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PRIVATE EQUITY VALUATION

5

- estimate and interpret key inputs and calculate the value of a private equity investment for venture capital, growth equity, and buyout situations

In an earlier Level II Private Company Valuation reading, we considered the similarities and differences in the valuation of stable, mature private versus public companies. For example, common features under an income-based approach include the discounting of expected free cash flow to both debt and equity holders, or **free cash flow to the firm (FCFF)**, shown in Equation 2.

$$\text{FCFF} = \text{EBITDA}(1 - t) + \text{Depreciation}\ (t) - \text{Change in Long-Term Assets} - \text{Change in Capital} \tag{2}$$

where t is the firm's tax rate. Cash flows are projected over several periods, after which a terminal value or exit value, typically based on either constant growth or an expected market multiple, is assumed. The life cycle implications for company valuation in venture capital, growth equity, buyout, and special situations give rise to distinct approaches for these forms of private equity, as shown in Exhibit 9.

Exhibit 9: Private Equity Valuation Approaches Across the Life Cycle

Phase / Characteristic	Venture Capital	Growth Equity	Buyout Equity	Special Situations
Life cycle stage	Startup	Growth	Mature	Decline
Valuation approach	VC Method	Growth equity method	LBO model	Various
Primary valuation input	Revenue forecast	Income statement forecast	Three-statement financial model forecast	Three-statement model, asset values

Valuation approaches for special situations involving stressed, distressed, or event-driven investments will be covered in detail in a later reading.

Venture Capital and the VC Method

Venture capital investors face uncertain prospects given the lack of operating history and high failure rate of startup companies. The income, market, and asset-based valuation approaches common among mature firms are of little to no use for these early-stage companies. Instead, the so-called **VC method** is typically used to establish the current value of a young company in conjunction with new financing. Under the VC method, the initial or so-called **pre-money valuation**, or implied firm value prior to an incremental new equity investment, is determined using the expected terminal value of the firm (or **exit value of equity**) and the required ROI, as shown in Exhibit 10.

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Exhibit 10: VC Method Inputs and Output

As shown in Exhibit 10, the **post-money valuation** is a combination of the pre-money valuation and new equity invested. Since startups are usually fully equity financed and make no distributions to shareholders over the investment time horizon, the post-money valuation is a function of the expected exit value of equity divided by the required return on investment, as shown in Equation 3.

$$\text{Post-Money Valuation} = \frac{\text{Exit Value of Equity}}{\text{ROI}} \tag{3}$$

VC-required rates of return on investment are communicated to the limited partners of the fund, thus the ROI presented in Equation 3 reflects the effective cost of capital to the VC general partner. In venture capital, typical ROIs range from 10× to 30× over a five- to eight-year period.

If we assume no intermediate investment returns and a single inflow upon exit, we may convert the ROI return over an investment time horizon to an equivalent internal rate of return for an n-year investment period in Equation 4.

$$\text{ROI} = (1 + \text{IRR})^n \tag{4}$$

While the path to revenue and profitability is highly uncertain for most startups, performance metrics such as the method of comparables, introduced earlier in the curriculum, are commonly used to gauge commercial success at the end of the investment horizon. For example, while a price to earnings ratio or multiple may be used if the firm is expected to generate significant profits by the time of exit value, price to sales or price to cash flow multiples are most appropriate for estimation of equity exit value of early-stage companies with no profits and no leverage, as shown in the following case.

CASE STUDY

Kumartest Series A Financing—Exit Value

Prior to its Series A financing, Kumartest successfully launched a new prototype for on-demand medical diagnostics. Given expected swift regulatory approval, Kumartest believes it can achieve USD75 million in annual sales in seven years following Series A financing. The price-to-sales ratio for medical devices is 3×.

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1. Calculate the estimated exit value for Kumartest in seven years.

   Solution

   Given Kumartest's estimate of USD75 million in future annual revenue and an expected price-to-sales ratio of 3×, the company value upon exit in seven years may be estimated as USD225 million (= 75 million × 3).

2. Estimate a range of exit value possibilities for Kumartest in seven years if its annual sales may fall between USD50 million and USD100 million and the price-to-sales ratio for medical devices may fall between 2.5× and 3.5×.

   Solution

   At the low end of the range, with USD50 million in future annual revenue and a price-to-sales ratio of 2.5×, Kumartest's exit value is estimated at USD125 million (= 50 million × 2.5). At the high end of the range, with USD100 million in annual revenue and a price-to-sales ratio of 3.5×, Kumartest's exit value is estimated at USD350 million (= 100 million × 3.5). Thus, Kumartest's exit value may lie in a range of USD125 million to USD350 million.

Because of the high uncertainty associated with future revenue potential for startups and the variability of sales-based multiples over time, an important aspect of valuing companies with the VC method is to consider a range of potential scenarios in exit value estimation.

Recall that under the VC method, we are solving for the pre-money valuation, which is simply equal to the post-money valuation less new equity:

$$\text{Pre-Money Valuation} = \text{Post-money Valuation} - \text{New Equity}. \tag{5}$$

The fractional ownership stake of new investors is equal to the new equity contribution divided by the post-money valuation:

$$\text{Fractional Ownership} = \frac{\text{New Equity}}{\text{Post-Money Valuation}}. \tag{6}$$

Note that while these calculations are in money terms, we may express post-money valuation and ownership in terms of shares outstanding as follows.

$$\text{Post-Money Valuation} = \text{Total Shares Outstanding (Old and New)} \times \text{Share Price} \tag{7}$$

$$\text{Fractional Ownership} = \frac{\text{New Shares Issued}}{\text{Post-Money Shares Outstanding}} \tag{8}$$

We illustrate these concepts by revisiting Kumartest's Series A financing.

CASE STUDY

Kumartest Series A Financing, Fractional Ownership and Expected Return

Recall from earlier that Kumartest LLC began by raising USD3 million in seed financing from 1 million shares and subsequently raised USD2 million in Series A common equity, with USD1 million each from Estragon SA and Sevastek Limited.

Prior to Series A financing, Kumartest successfully launched a new prototype for on-demand medical diagnostics. Kumartest's management is projecting an exit value of USD225 million in seven years. Estragon SA and Sevastek Limited have a target ROI of 20× over the seven-year investment time horizon.

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1. Calculate Kumartest LLC's post-money valuation based upon the information provided.

   Solution

   We may solve for Kumartest's post-money valuation using Equation 3:

   $$\text{Post-Money Valuation} = \frac{\text{Exit Value of Equity}}{\text{ROI}}.$$

   Given Kumartest's estimated exit value of USD225 million and the stated target ROI of 20×, we may solve for post-money valuation as USD11.25 million (= 225 million ÷ 20).

2. As a medical device company with strategic investments in startup companies within its sector, Sevastek's CEO has a stated objective to target VC investments with at least a 50% IRR. Evaluate whether the Kumartest Series A financing meets the CEO's objective.

   Solution

   Use Equation 4 to determine the equivalent internal rate of return, which reflects a 20× ROI over seven years:

   $$\text{ROI} = 20\times = (1 + \text{IRR})^7;\ \text{IRR} = 53.4\% > 50\%.$$

   The Kumartest Series A financing therefore meets the CEO's target ROI of 50%.

3. Calculate the value of Kumartest to its initial investors at the time of Series A financing in both money terms and price per share.

   Solution

   The value of Kumartest to its initial investors is the pre-money valuation, which, based on Equation 5, is simply equal to the post-money valuation less new equity:

   $$\text{Pre-Money Valuation} = \text{Post-Money Valuation} - \text{New Equity}.$$

   From Question 1, post-money valuation is USD11.25 million and new equity is USD2 million, so pre-money valuation is equal to USD9.25 million (= 11.25 million – 2 million). Given the original issuance of 1 million shares, the per share price is USD9.25.

4. Calculate Estragon's fractional ownership of Kumartest and the number of shares it receives.

   Solution

   Estragon's fractional ownership stake is equal to its USD1 million Series A equity contribution divided by the post-money valuation of USD11.25 million from Question 1 as per Equation 6, which amounts to 8.89%:

   $$\text{Fractional Ownership} = \frac{\text{New Equity}}{\text{Post-Money Valuation}};$$

   $$8.89\% = \frac{\text{USD1 million}}{\text{USD11.25 million}}.$$

   We can solve for the number of total (old and new) shares outstanding by rearranging Equation 7:

   $$\text{Total Shares Outstanding (Old and New)}$$
   $$= \text{Post-Money Valuation} \div \text{Share Price};$$

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1,216,216 = USD11.25 million ÷ USD9.25.

Recall that the initial investors hold 1 million shares and the incremental financing is split between Sevastek and Estragon. Estragon will therefore receive half of the new shares, or 108,108 shares (= (1,216,216 – 1,000,000) ÷ 2) in Series A.

In addition to the absence of debt and equity distributions, the VC method as shown above also assumes no equity dilution takes place over the remaining investment time horizon once the Series A financing is complete. The potential for equity dilution arises from three primary sources.

1. *Incentive-Based Equity Compensation.* In order to attract, retain, and incentivize employees, startup firms frequently offer employees equity options granting the right to purchase common shares at a fixed price in the future. As option exercises increase shares outstanding, VC firms typically calculate ownership and per-share price on a fully diluted basis.
2. *Follow-on Equity Financing.* New common equity issuance in a subsequent financing round as well as mergers and acquisitions where shares are used instead of cash also increase the number of shares outstanding and therefore reduce fractional ownership of earlier investors.
3. *Financing with Contingent Future Share Issuance.* Use of instruments such as convertible preferred shares may result in additional share issuance if converted. This dilution must be taken into consideration when determining fractional ownership for new investors.

Consider the following versions of the original Kumartest case, which include the first and second of these sources of dilution, with the third covered later under a growth equity scenario.

CASE STUDY

Kumartest Series A Financing with Option Pool and Price Per Share

Kumartest LLC began by issuing 1 million shares at USD3 each for USD3 million in seed financing. Kumartest subsequently raised USD2 million in Series A common equity, or USD1 million each from Estragon SA and Sevastek Limited.

Prior to the Series A financing, Kumartest granted its employees the option to purchase a total of 100,000 Kumartest shares at a strike price of USD6 starting in five years if they remain employed at the company. Exit value assumptions remain as in the earlier case study, with USD75 million in annual sales expected in seven years and a comparable price-to-sales ratio of 3×, with an investor target ROI of 20× over seven years. For the purposes of answering the following questions, ignore any potential effects of option valuation on Kumartest's company value as well as investor proportional ownership.

1. Recall that the intrinsic or exercise value of an option is the amount by which the option is in the money. Discuss the implications of the intrinsic value of Kumartest employee options after Series A financing.

Solution

From Question 3 above, Kumartest's share price at the time of Series A financing is USD9.25. Given the USD6 option strike price, the intrinsic value of the 100,000 options is USD325,000. As they cannot be exercised for

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several years, the intrinsic option value is an incentive for option holders to remain employed with the company.

2. Calculate the fractional ownership of Kumartest's management and the impact on firm value if the company reaches its expected annual sales target in Year 7 and all options are exercised.

Solution

When Kumartest's managers exercise 100,000 employee options, total shares outstanding increase by 100,000 and we may use Equation 8 to solve for Kumartest management's fractional ownership:

$$\text{Fractional Ownership} = 7.6\% = \frac{100,000}{1,000,000 + 216,216 + 100,000}.$$

Projected Kumartest exit value in Year 7 is USD225 million. When Kumartest's managers exercise 100,000 employee options at a strike price of USD6, the firm receives USD600,000 (= 100,000 × USD6), increasing firm value to USD225,600,000.

3. Calculate the fractional ownership of Sevastek Limited under the Series A financing on a fully diluted basis.

Solution

Recall from Question 4 above that Estragon was issued 108,108 shares in the Series A financing. Use Equation 8 to determine Estragon's fractional ownership on a fully diluted basis by adding the 100,000 employee options granted to the post-money shares outstanding:

$$\text{Fractional Ownership} = 8.21\% = \frac{108,108}{1,000,000 + 216,216 + 100,000}.$$

Estragon's fractional ownership falls from 8.89% to 8.21% on a diluted basis.

As early-stage companies engage in multiple equity rounds, it is important to track the *cumulative* fractional ownership of a private equity fund or investor as the ownership structure evolves. An investor's postfinancing fractional ownership (or FO_{post}) is equal to its prior cumulative stake (FO_{prior}) multiplied by the percentage of dilution in the current round, plus the percentage of the firm it acquires in the new equity round as shown in Equation 9.

$$\begin{aligned} FO_{\text{post}} &= \left[FO_{\text{prior}} \times \frac{\text{Pre-Money Valuation}}{\text{Post-Money Valuation}}\right] + \frac{\text{New Investor Equity}}{\text{Post-Money Valuation}} \\ &= \frac{\text{Pre-Money Valuation of Investor's Stake} + \text{Investor's Incremental Investment}}{\text{Post-Money Valuation}} \end{aligned} \tag{9}$$

Consider the following extension of the Kumartest case to a new Series B financing.

CASE STUDY

Kumartest Series B Financing with No Option Pool

Kumartest decides to raise a total of USD2 million in Series B common equity funding, USD1 million each from Estragon and Sevastek, two years after its USD2 million Series A funding, in order to continue to build its capacity to serve the health care industry. In this second series financing, both Estragon and Sevastek have a 10× ROI target over five years, and the expected sales at the time of exit remains USD75 million with a price to sales multiple of 3×. We assume no employee options for the purpose of this example.

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1. Calculate the share price at the time of Series B financing.

Solution

The exit value of Kumartest equity is USD225 million (= 75 million × 3) as shown earlier, while the new post-money valuation may be solved using Equation 3 (recall that the ROI target is 10×):

$$\text{Post-Money Valuation} = \text{USD22.5 million} = \frac{\text{USD225,000,000}}{10}.$$

Solve for pre-money valuation using Equation 7 and new financing of USD2 million:

$$\text{Pre-Money Valuation} = \text{USD20.5 million} = 22.5 \text{ million} - 2 \text{ million}.$$

Solve for the share price by dividing pre-money valuation by shares outstanding:

$$\text{USD16.86} = \frac{\text{USD20,500,000}}{\text{1,216,216 shares outstanding}}.$$

2. Calculate Estragon's fractional ownership following Series B financing.

Solution

Determine Estragon's post–Series B financing fractional ownership using Equation 9.

$$\text{FO}_{\text{post}} = \text{FO}_{\text{prior}} \times \frac{\text{Pre-Money Valuation}}{\text{Post-Money Valuation}} + \frac{\text{New Investor Equity}}{\text{Post-Money Valuation}}$$

$$FO_{\text{post}} = 8.89\% \times \frac{\text{USD20,500,000}}{\text{USD22,500,000}} + \frac{\text{USD1,000,000}}{\text{USD22,500,000}}$$

$$FO_{\text{post}} = 12.54\% = 8.10\% + 4.44\%$$

Current and prospective investors in early-stage companies often make use of a **capitalization table** to summarize changes in firm value and fractional ownership over the course of multiple equity rounds on a fully diluted basis. Exhibit 11 shows this evolution for the three Kumartest financing rounds. Readers should note that the calculations are conducted in a spreadsheet and numbers presented throughout reflect rounding.

Exhibit 11: Kumartest Capitalization Table

Panel A: Shares and Fractional Ownership (FO)

Investor	Seed Shares	Seed FO %	Post Series A	Post Series A FO %	Post Series B	Post Series B FO %
Estragon Series A			108,108	8.89%	108,108	8.10%
Estragon Series B					59,328	4.44%
Sevastek Series A			108,108	8.89%	108,108	8.10%
Sevastek Series B					59,328	4.44%
Subtotals			216,216	17.78%	334,871	25.09%
Founder	1,000,000	100%	1,000,000	82.22%	1,000,000	74.91%
Totals	1,000,000	100%	1,216,216	100.00%	1,334,874	100.00%

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The fractional ownership shown in Panel A is often accompanied by changes in valuation over a series of financings. The higher share price at the time of Kumartest's Series B financing is referred to as the **price step-up**, either in multiple or percentage terms:

$$\text{Step-Up (multiple)} = \frac{\text{New Round Share Price}}{\text{Prior Round Share Price}}; \tag{10}$$

$$\text{Step-Up (percentage)} = \left(\frac{\text{New Round Share Price}}{\text{Prior Round Share Price}} - 1\right) \times 100. \tag{11}$$

The Kumartest Series B step-up is 1.822 (= $\frac{\text{USD16.86}}{\text{USD9.25}}$), or 82.2% in percentage terms. Higher share prices in subsequent funding rounds indicate an early-stage company's progress in achieving targeted growth, as shown in Panel B.

Panel B: Valuation across Financing Series

	Seed Financing	Series A Financing	Series B Financing
Share price (USD)	3.00	9.25	16.86
Price step-up		3.08	1.82
Pre-money valuation (USD)	0	9,250,000	20,500,000
New equity (USD)	3,000,000	2,000,000	2,000,000
Post-money valuation (USD)	3,000,000	11,250,000	22,500,000

On the other hand, lagging company performance in reaching milestones or an adverse market environment may result in new financing at a share price below that of the prior financing round, which is referred to as a **down round**. To protect themselves against dilution at a lower share price at new issuance, private equity investors often seek to negotiate a so-called **ratchet provision**, which partially or fully reduces the conversion price of existing options or preferred shares to the new lower share issue price for a later financing.

Valuing Growth Equity

Recall that under the VC method, we derived the pre-money valuation using the exit value of equity and the ROI as inputs. In contrast to startups with a high failure rate, proof of concept risk, and undefined capital needs, growth equity involves scaling more developed and profitable, or near profitable, companies with known products and market opportunities over a defined investment time horizon. As a result, the **growth equity method** includes revenue and profit projections over the investment horizon necessary to achieve the desired financial results and quantifies the initial capital necessary to realize the plan.

Growth equity funds seek to invest as little capital as possible at the lowest pre-money valuation and sell at the highest valuation as soon as possible. Given the path to profitability as laid out in the business plan, the primary risk to these investors is the execution of the growth strategy within the forecast period.

CASE STUDY

Kumartest Growth Equity Using Common Shares

In its sixth year of operations, Kumartest is nearing its Series B revenue target of USD75 million but remains unprofitable, with the income statement below.

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Kumartest Income Statement, Year 6

Position	Year 6 (USD)
Sales	70,000,000
COGS	60,000,000
Gross profit	10,000,000
SGA	10,000,000
Depreciation	2,000,000
EBITDA	2,000,000
Profit before tax	0
Net income	0

Kumartest identifies production and distribution capacity constraints as the key impediments to its further growth. To capitalize on Kumartest's high potential while remaining private, senior management and existing investors agree to approach Ventmax Partners, a growth equity fund, to finance expansion of its manufacturing capacity, sales, and distribution.

Ventmax typically seeks to invest in a minority common or convertible preferred equity stake for a five-year period with a minimum IRR of 35%. The Ventmax team conducts thorough due diligence on Kumartest, concluding that new equity of USD30 million is necessary to meet property, plant, and equipment; sales and distribution; and working capital needs to achieve targeted EBITDA in excess of USD65 million in five years.

In its detailed five-year business plan, Ventmax forecasts 30% annual sales growth; a 23% rise per year in both cost of goods sold (COGS) and sales, general, and administrative expenses (SGA). Depreciation expense is embedded within COGS and is added back to calculate EBIDTA, as shown below. We assume a 20% corporate tax rate. Readers should note that the following calculations are conducted in a spreadsheet, and rounding may occur throughout the case study.

Ventmax Partners Forecast of Kumartest Income Statement (Years 7 to 11)

Position	Year 7	Year 8	Year 9	Year 10	Year 11
Sales	91,000,000	118,300,000	153,790,000	199,927,000	259,905,100
COGS	73,800,000	90,774,000	111,652,020	137,331,985	168,918,341
Gross profit	17,200,000	27,526,000	42,137,980	62,595,015	90,986,759
SGA	12,300,000	15,129,000	18,608,670	22,888,664	28,153,057
EBITDA	7,900,000	16,397,000	27,529,310	43,706,351	66,833,702
Depreciation	3,000,000	4,000,000	4,000,000	4,000,000	4,000,000
Profit before tax	4,900,000	12,397,000	23,529,310	39,706,351	62,833,702
Net income	3,920,000	9,917,600	18,823,448	31,765,081	50,266,962

The Ventmax team has accepted the earlier 3× price to sales multiple to be used to establish the pre-money valuation and estimates an 18× price to EBITDA exit multiple after five years based on similar medical device firms.

Kumartest's pre-money valuation may be estimated as USD210 million given the current year (Year 6) revenue of USD70 million and a 3× price-to-sales ratio.

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1. Calculate the price per share paid by Ventmax and its fractional ownership once the new financing is completed.

Solution

In order to establish the price per share, divide the pre-money valuation of USD210 million by the pre-financing number of shares outstanding (1,334,871) to solve for a share price of USD157.32 (= 210,000,000 ÷ 1,334,871). Recall that the post-money valuation is the sum of the pre-money valuation plus new financing:

USD240 million = USD210 million + USD30 million.

Since Ventmax Partners has no prior fractional ownership ($FO_{\text{prior}} = 0$), we may solve for its ownership stake using a simplified version of Equation 8.

$$FO_{\text{post}} = \frac{\text{New Investor Equity}}{\text{Post-Money Valuation}}$$

$$12.5\% = \frac{30,000,000}{240,000,000}$$

2. Discuss how the IRR calculation changes if we assume net income is distributed to shareholders on a pro rata basis and determine whether Ventmax is able to reach its minimum 35% target under the proposed five-year business plan under this assumption.

Solution

Unlike the initial investment and single exit cash flow to equity holders assumed under the VC method and in Equation 2, here we must take *all* cash flows to equity holders over the investment period into account when calculating the IRR.

First, we consider both the USD240 million from Year 6 and net income for Years 7 to 11. Next, we solve for the terminal value in five years by multiplying Year 11 EBITDA of USD66,833,702 by the 18× price to EBITDA multiple to arrive at an estimated exit value of equity of USD1,203,006,638 (= USD66,833,702 × 18).

Cash flows used to calculate IRR may be summarized as follows.

Position	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Net cash flow	(240,000,000)	3,920,000	9,917,600	18,823,448	31,765,081	50,266,962
Terminal value						1,203,006,636
Total cash flow	(240,000,000)	3,920,000	9,917,600	18,823,448	31,765,081	1,253,273,599

We may solve for an IRR of 41.89% using a spreadsheet IRR function:

ROI = IRR({-240000000,3920000,9917600,18823448,31765081,1253273599})
= 41.89%.

Recall that ROI is the ratio of received cash flows to investments:

$$\text{ROI} = \frac{1}{240,000,000} \times [3,920,000 + 9,917,600 + \ldots + 1,253,273,599]X$$
$$= 5.49X.$$

Ventmax Partners is therefore able to reach its minimum 35% IRR target. The inputs and outputs under the growth equity method for Kumartest are summarized in Exhibit 12.

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Exhibit 12: Kumartest Growth Equity Method Inputs and Output

As the prior case study shows, the growth equity capital method has a few similarities with the VC method, with several key differences. For example, growth equity investments tend to be larger than those in venture capital, with a lower expected ROI over a shorter investment time horizon. A detailed financial plan focused on earnings growth replaces broad revenue expectations, and earnings-based multiples are preferred over sales-based measures used for early-stage pre-profit firms in establishing the exit value of equity. However, once the pre- and post-money valuations and exit value of equity are determined, the calculation of ROI and the corresponding internal rate of return are often the same.

However, complicating factors include the existence of employee options and other forms of potential dilution. For example, growth equity investors are more likely to provide capital in the form of convertible preferred shares, which result in additional share issuance upon conversion. We now turn our attention to this form of growth equity capital to finance Kumartest's expansion.

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CASE STUDY

Kumartest Growth Equity with Convertible Preferred Shares

Here we modify the prior case of Ventmax Partners' USD30 million growth equity investment to capital contributed as convertible preferred shares rather than common equity. Brief terms of the convertible preferred shares are as follows:

Preferred Dividend: 5% per annum

Liquidation Preference Payout: 2× upon exit in five years

Conversion Ratio: 2× upon exit in five years

Convertible Preferred Share Price: USD400.00.

The 2× liquidation preference payout entitles preferred shareholders to receive a cash payment equal to double the preferred share price upon issuance (or USD800), while the 2× conversion ratio reflects that a preferred shareholder may convert each preferred share into two common shares in five years. Note that in this modified case, we have excluded employee options. Readers should also note that the calculations shown in the solutions to the questions below are conducted in a spreadsheet and numbers presented throughout reflect rounding.

1. Discuss the payoff profile of a Kumartest convertible preferred shareholder under different possible scenarios at the time of exit assuming no additional financing occurs.

Solution

The USD30 million financing involves the issuance of 75,000 (= USD30 million ÷ 400) convertible preferred shares. The payoff profile of a preferred shareholder involves three general outcomes as shown earlier in Exhibit 6 and described below.

Equity Value at Exit < Liquidation Preference. If the equity value upon exit is equal to or below the total liquidation preference payout due to preferred shareholders upon exit of USD60 million (= 2 × 30,000,000), then preferred shareholders will receive the entire firm value on a proportional per-share basis and common shareholders will receive zero. For example, if the firm value upon exit is USD52.5 million, then preferred shareholders will receive USD700 each upon liquidation (= 52,500,000 ÷ 75,000).

Liquidation Preference ≤ Equity Value at Exit ≤ Conversion Value. If the equity value upon exit is greater than the liquidation preference payout of USD60 million, but at or below the common share price of USD400, at which the 2× conversion right of preferred shares has a positive value, then preferred shareholders will receive the full liquidation preference payout of USD800 per share. Note that the common share price of USD 400 corresponds to an equity value upon exit of USD533,948,583 (or USD400 × 1,334,871 pre-money common shares outstanding) for the prior case.

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Equity Value at Exit > Conversion Value. If the per unit equity value upon exit exceeds USD400, then the entire firm value upon exit is divided among pre-existing common shareholders and preferred shareholders (who have converted from one preferred to two common shares each). We may solve for the total number of shares outstanding post dilution as 1,484,871 (or 1,334,871 pre-money common shares + 2 × 75,000 preferred shares). For example, if the equity value upon exit is USD750 million, then the fully diluted share price is USD505.09 (= 750,000,000 ÷ 1,484,871) and the preferred shareholder payoff is USD1,010.18 (= 505.09 × 2).

2. Discuss the fractional ownership of Kumartest preferred shareholders.

Solution

Use of instruments such as convertible preferred shares was described earlier as financing with *contingent* future share issuance. As shown in Question 1, the fractional ownership of preferred shareholders therefore depends upon whether additional shares are issued upon conversion from preferred to common shares. We may solve for fully diluted share ownership issuance by solving for the number of new common shares upon conversion divided by post dilution shares outstanding. New common shares are 150,000 (or 75,000 original preferred shares × 2, the conversion ratio), and total shares outstanding post dilution is 1,484,871 (or 1,334,871 pre-money common shares + 150,000 new common shares). Solve for Ventmax's fractional ownership upon conversion as:

$$10.1\% = \frac{150,000}{1,484,871}.$$

3. Describe how Ventmax Partners might best seek to protect its interests as a preferred shareholder in the event of a future down round financing.

Solution

Antidilution or ratchet provisions may be negotiated by growth equity investors to reduce the conversion price of the new convertible preferred shares to the new, lower price at which down round shares are issued in a subsequent offering.

Use of the LBO Model to Establish Buyout Firm Value

Whether initiated as a take-private transaction, the purchase of a public company division, or the purchase of a private company, buyout targets have an established operating history and historical financial statements that support a distinct valuation approach. As buyout investors consider the relative attractiveness of one or more acquisition targets, they must establish a simplified means of evaluating not only the cash flow projections of the targeted company under the proposed business plan but also the capital structure composition and cost involved in generating a sufficient return for equity investors.

The so-called **LBO model** uses these parameters to establish the maximum price that can be paid to a seller while satisfying the targeted returns of financing providers. Exhibit 13 illustrates these inputs and outputs for the case with no interim distributions to shareholders.

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Exhibit 13: LBO Method Inputs and Output

Unlike the simplified ROI approximation used under the VC method or the sole focus on profitable top-line growth financed by equity as in the growth equity method, the LBO model frequently uses an income- or relative value–based approach to establish a company's initial value, project the improved performance over the investment period, and consider expected changes in leverage until the time of exit. As Exhibit 13 showed, the value creation of an LBO transaction typically involves three elements, as follows.

EBITDA Expansion. Like growth equity, increasing profitability over the investment period is an important element of value creation. In a buyout scenario, this is usually the result of increased efficiency or realizing synergies rather than simple expansion of scale or markets as in growth equity.

Debt Reduction. While the initial high level of debt contributes to elevated expected equity returns because of the leverage effect, the high debt creates high risk for both debt and equity investors in the transaction. As the company generates improved cash flows consistent with the EBITDA expansion projections, this cash flow should be projected to reduce financial leverage over the investment period, reducing the risk to equity investors. Note that the use of debt in private market strategies will be covered in detail in a later reading.

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Multiple Expansion. As the acquired company transforms from an undervalued target to a more profitable firm with declining leverage, its market multiple is expected to rise as future prospects improve. This form of value creation is typically validated using a method of comparables analysis of a peer group of comparable publicly traded companies.

We may use a simplified example to illustrate the effect of these three elements on the IRR of a proposed buyout transaction using the LBO method.

KNOWLEDGE CHECK

Saugerton Partners is considering the purchase of a controlling stake in Clevington Corporation to take the company private. Clevington is a publicly traded manufacturing firm currently trading at a 6× EV/EBITDA multiple.

Based upon thorough due diligence and a valuation analysis versus its publicly traded peers, a senior investment analyst at Saugerton draws the following conclusions about the Clevington buyout opportunity:

- A controlling stake in Clevington shares may be purchased at a share price close to the current market and financed with 75% debt and 25% equity;
- Under the proposed restructuring plan, Clevington can achieve 5% annual EBITDA growth and pay down a quarter of debt outstanding in five years, assuming no interim distributions to shareholders;
- Clevington may be sold in five years to a private or public buyer at an 8× EV/EBITDA multiple in line with industry peers.

1. Assuming current year Clevington EBITDA of USD100,000,000, calculate the purchase price and entry value of equity required for the buyout transaction.

   Solution

   Given Clevington's current EBITDA of USD100,000,000, an EV/EBITDA of 6× and no share price premium to the current market, the purchase price is USD600,000,000 (= 6 × 100,000,000) and the entry value of equity is USD150,000,000 (= 0.25 × 600,000,000), with the remaining USD450,000,000 as debt financing.

2. Calculate Clevington's enterprise value and equity value of exit in five years, under the assumption that outstanding debt will be valued at par.

   Solution

   We must first determine Clevington's expected EBITDA in five years' time. Given an assumed annual growth rate of 5%, we may calculate this to be USD127,628,156 (= 100,000,000 × $(1.05)^5$). Given the assumption of a future sale in five years at a price equal to 8× EV/EBITDA, we may estimate the future sale price to be USD1,021,025,250 (= 127,628,156 × 8).

   This price is equal to *enterprise value*, or the value of the firm to *both* debt and equity holders. If we assume that Clevington has the ability to pay down debt by 25% in five years without significant penalty, the par value of Clevington's debt becomes USD337,500,000 (= 0.75 × 450,000,000). Solve for the exit value of equity of USD683,525,250 by subtracting remaining debt from enterprise value (= 1,021,025,250 – 337,500,000).

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3. Discuss whether Saugerton can reach its targeted 30% IRR on the proposed Clevington transaction based upon the analyst's calculations, under the assumption that shareholders receive no distributions prior to exit. Assume that no interim cash flows are made to equity holders over the period.

Solution

Given the USD150,000,000 entry value of equity from Question 1 and the estimated exit value of equity of USD683,525,250 from Question 2, we may use Equation 2 to calculate the ROI:

$$\text{ROI} = 4.56\times = \frac{\text{USD}683,525,250}{\text{USD}150\text{ million}}.$$

Convert ROI to an equivalent IRR using Equation 4:

$$\text{ROI} = (1 + \text{IRR})^n;$$

$$4.56\times = (1+\text{IRR})^5;\ \text{IRR} = 35.44\%.$$

The Clevington opportunity therefore exceeds the expected 30% IRR hurdle.

Note that while the determination of LBO model inputs is far more complex due to the target company's mature stage in the life cycle, the use of financial statement analysis to determine the entry and exit value of equity as well as the complicating factor of changes in financial leverage, all three forms of private equity investments take a similar approach in determining the internal rate of return to investors.

We now return to the earlier Maudville Corporation case study to illustrate the valuation of buyout equity in greater detail. Earlier in the curriculum, three-statement model forecasts were used to value public equity and debt, and we take a similar approach below to create an income statement and balance sheet forecast for Maudville. Consistent with the focus on EBITDA expansion, debt reduction, and multiple expansion as outlined earlier, income statement and balance sheet forecasts are used to show the expected impact of Bardstown's restructuring plan as well as cash flow available from increases in expected profit due to margin expansion and use of cash to reduce Maudville's debt burden over the investment horizon. The financing structure includes multiple debt tranches and common and preferred shares; it also incorporates the potential dilution from stock options used to incentivize new management.

CASE STUDY

Maudville Corporation Valuation

Maudville Corporation is a mature US chemical company that generated nearly USD5 billion in revenues and USD1 billion in EBITDA in its most recent fiscal year. Bardstown Partners, a private equity firm specializing in buyout equity, is considering a go-private transaction at a purchase price of USD5 billion, of which Bardstown would contribute 20% as common equity, with 5% sourced from an LP as convertible preferred shares and 75% in three debt tranches. Bardstown targets a 35% IRR on buyout deals over five years, and the purchase is assumed to occur at the end of Maudville's current fiscal year.

Bardstown's managing partner has asked you, as an experienced analyst, to build a three-statement financial model for a five-year time horizon. Starting from Year 0 of Maudville's income statement, you are asked to assume a 5% annual sales growth rate. The managing partner believes that improved cost efficiencies can reduce COGS as a percentage of sales by one percentage point per year, from the current 55% to 50% of sales in Year 5. Additionally, the managing partner expects to achieve one percentage point annual SGA reductions as a percentage of sales (currently 25%) starting in Year 3 to 22% in Year 5.

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Corporate taxes are assumed to be 25% of net income. The resulting five-year income statement forecast is shown below. Readers should note that the calculations shown in the case study are conducted in a spreadsheet and numbers presented throughout reflect rounding.

Income Statement (USD million)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	4,988	5,237	5,499	5,774	6,062	6,365
COGS	–2,743	–2,828	–2,914	–3,002	–3,092	–3,183
SGA	–1,247	–1,309	–1,375	–1,386	–1,394	–1,400
EBITDA	**998**	**1,100**	**1,210**	**1,386**	**1,576**	**1,782**
Depreciation	–401	–421	–443	–465	–488	–512
Net interest	–17	–269	–262	–250	–231	–201
Profit before tax	**579**	**409**	505	671	857	1,069
Taxes	–145	–102	–126	–168	–214	–267
Net income	**434**	307	379	503	643	802
Dividends	–87	–25	–25	–25	–25	–25

The managing partner states that the cost efficiency assumptions are expected to improve Maudville's cash flow, which will be used to repay a portion of debt taken on at the time of the buyout transaction. Debt consists of three tranches, as follows.

Senior Debt. USD2.65 billion in seven-year senior secured debt at a 6.50% annual interest rate that may be prepaid at par starting in one year.

Junior Debt. USD600 million in seven-year junior subordinated debt at an 8.00% annual interest rate that amortizes in four equal installments, starting in Year 4.

Mezzanine Debt. USD500 million in ten-year mezzanine debt at a 12.2% annual interest rate that is fully repaid at maturity.

As the senior secured tranche has the greatest repayment flexibility, the managing partner asks you to prioritize pay down of this tranche until junior debt amortization begins in Year 4. Based on these instructions, you prepare the following balance sheet forecast for Maudville. Readers should note that the sales growth rate mentioned earlier is also assumed for growth in current and net fixed assets as well as for current liabilities.

Balance Sheet (USD million)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Panel A: Assets						
Cash	400	400	400	400	400	400
Current assets	599	628	660	693	727	764
Net fixed assets	3,242	3,404	3,574	3,753	3,941	4,138
Goodwill	1,258	1,258	1,258	1,258	1,258	1,258
Total assets	**5,499**	**5,691**	**5,892**	**6,104**	**6,326**	**6,560**
Panel B: Liabilities and Equity						
Current liabilities	499	524	550	577	606	637
Debt	3,750	3,635	3,457	3,163	2,738	2,165
Stock	1,250	1,250	1,250	1,250	1,250	1,250

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Balance Sheet (USD million)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Retained earnings	0	282	636	1,114	1,732	2,509
Total liabilities and equity	**5,499**	**5,691**	**5,892**	**6,104**	**6,326**	**6,560**

The managing partner reminds you that the equity of USD1,250 million consists of not only the USD1 billion Bardstown common stock contribution (or 100 million shares at USD10 per share) but also the LP convertible preferred stock purchase of USD250 million (2,500,000 shares at USD100 per share). While Bardstown plans to forego dividends on common shares, convertible preferred share terms are as follows:

Preferred share dividend: 10% (USD10 per share);

Liquidation preference payout: 2.5× upon exit in five years;

Conversion ratio: 2× upon exit in five years.

Finally, as a management incentive, Bardstown introduces a plan to grant Maudville stock options to the new senior management team. These options grant managers the right to buy 5 million Maudville common shares at a strike price of USD10 per share at the end of the five-year investment horizon.

1. Calculate exit value of equity assuming 6× EV/EBITDA multiple and discuss whether equity value improvement meets Bardstown's required return goals. Assume outstanding debt may be repaid at its par value and ignore any potential dilution and exit payoff effects from convertible preferred or management options.

Solution

Based upon the income statement forecast, we see that Maudville's expected EBITDA in five years' time is equal to USD1,782 million. Given the assumption of a future sale in five years at a price equal to 6× EV/EBITDA, we may estimate the future sale price to be USD10,694,000,000 (= 1,728 million × 6).

Recall that this is the *enterprise value*, from which we must subtract the forecasted carrying value of debt to arrive at the expected firm value. Given the debt paydown forecast from USD3,750 million to USD2,165 million in Year 5, solve for the exit value of equity of USD8,529 million by subtracting remaining debt from enterprise value (= USD10,694 million − USD2,165 million).

The forecasted equity value improvement from the initial USD1,250 million (note that we include the convertible preferred shares in equity here as a simplifying assumption) to USD8,529 million easily meets Bardstown's required return goals of 35% IRR, assuming no interim dividend payments. Use Equation 3 to calculate the ROI:

$$\text{ROI} = 6.82\times = \frac{8,529}{1,250}.$$

Convert ROI to an equivalent IRR using Equation 4:

$$\text{ROI} = (1 + \text{IRR})^n;$$

$$6.82\times = (1+\text{IRR})^5;\ \text{IRR} = 46.8\%.$$

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2. Discuss factors contributing to forecasted equity returns in the Maudville buyout transaction.

Solution

The 46.8% equity return forecasted from this model is an outcome of three primary factors assumed as part of the model. First, Maudville is expected to realize significant EBITDA margin expansion. Given the decline in assumed COGS and SGA expenses as percentages of sales, EBITDA margin increases from 20% (=100% – 55% – 25%) to 28% (=100% – 50% – 22%) in five years. Second, the improvement in EBITDA is further magnified in computing exit value by a higher assumed exit multiple of 6×, compared to Bardstown's 5× EV/EBITDA entry multiple (= 5,000 ÷ 998) calculated from the purchase price divided by Year 0 EBITDA. Finally, debt reduction from USD3,750 million to USD2,165 million over five years allows for a greater proportion of enterprise value to flow to equity holders.

3. Calculate the forecasted payoff to the convertible preferred shareholders at exit under the income statement and exit value assumptions presented earlier.

Solution

The forecasted payoff to convertible preferred shareholders upon exit is USD625 million, and the solution process is described below. Specifically, we use the critical points shown earlier in Exhibit 6 to analyze the payoff to the convertible preferred shares.

The maximum firm value at which the liquidation preference amount applies in this situation is equal to USD625 million (= USD250 million × 2.5× liquidation preference ratio), or the total capital from convertible preferred shareholders (i.e., USD250 million) multiplied by the liquidation preference payout. Note that the estimated firm value computed earlier is well above this threshold of USD625 million.

If the equity share price exceeds USD125 (= USD625 million ÷ (2 × 2.5 million shares)), then convertible preferred shareholders will choose to exercise their conversion option. The USD125 equity share price corresponds to the optimal conversion point from Exhibit 6. The corresponding firm value at the optimal conversion point is USD13,125 million (= 100 million × USD125 + USD625 million). Maudville's equity exit value under Bardstown's restructuring plan is estimated to be USD8,529 million, which lies between the USD625 million liquidation value of convertible preferred shares and the USD13,125 million optimal conversion point. Therefore, the forecasted payoff to convertible preferred shareholders upon exit is USD625 million.

4. Calculate Bardstown Partners' fractional ownership of Bardstown incorporating the dilution effects of both the convertible preferred stock and the management options.

Solution

Equity dilution of Bardstown's common shares may result from the possible conversion of convertible preferred shares and exercise of management options. Consider the following modified version of Equation 8, which shows Bardstown's fractional ownership under full dilution:

$$\text{Fractional Ownership} = \frac{\text{Common Shares}}{\text{Common + Newly Issued to Preferred + Option Exercise}};$$

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$$90.91\% = \frac{100,000,000}{100,000,000 + 5,000,000 + 5,000,000}.$$

The 2× conversion ratio for convertible preferred shares implies the potential issuance of 5 million shares (= 2.5 × 2) upon conversion, while management options may be exercised into 5 million shares of common stock.

While the Maudville case study shows the basic structure of a buyout equity analysis, investors usually assess potential deals under varying assumptions of potential revenue growth, cost improvements, paydown of debt, and margin expansion to identify the key risks affecting an investment's exit value. Scenario analyses often include sensitivity tables showing investment return given deviations from key base case assumptions. In addition, specific downside scenarios that may result in lower returns or the loss of capital may be worth considering in detail as shown below.

CASE STUDY

Maudville Corporation Valuation: A Downside Scenario

In an earlier case study, Bardstown Partners estimated a 47% IRR on a buyout equity investment in Maudville Corporation, a mature US chemical company. In addition to base case results and underlying assumptions, Bardstown's investment committee has requested a downside scenario analysis given concerns that a sharp economic downturn next year will significantly reduce demand for Maudville's products over the five-year investment period. In addition to lower revenue, senior management believes that significant profit margin pressures would lead to negative net income and EBITDA of approximately half of recent levels. While the investment committee believes that such a scenario has a low probability, they would like to understand its impact on Bardstown's estimated equity return. Given your familiarity with the Maudville base case forecast, the managing director asks you to create a forecast consistent with the recession scenario raised by the investment committee. After some changes to the model, you produce the following summary income statement and balance sheet five-year forecasts.

Income Statement (USD million)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	4,988	4,589	4,359	4,272	4,315	4,444
COGS	(2,743)	(2,753)	(2,703)	(2,563)	(2,589)	(2,666)
SGA	(1,247)	(1,285)	(1,264)	-1153	-1165	(1,200)
EBITDA	998	551	392	555	561	578
Depreciation	(401)	(421)	(388)	(368)	(361)	(365)
Net interest	(17)	(269)	(260)	(260)	(260)	(248)
Profit before tax	579	(140)	(256)	(73)	(60)	(35)
Taxes	(145)	35	64	18	15	9
Net income	434	(105)	(192)	(55)	(45)	(26)
Dividends	(87)	(25)	(25)	(25)	(25)	(25)

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Balance Sheet (USD million)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Panel A: Assets						
Cash	400	400	400	400	400	400
Current assets	599	551	523	513	518	533
Net fixed assets	3,242	2,983	2,833	2,777	2,804	2,889
Goodwill	1,258	1,258	1,258	1,258	1,258	1,258
Total assets	5,499	5,192	5,015	4,948	4,981	5,080
Panel B: Liabilities and Equity						
Current liabilities	499	459	436	427	431	444
Debt	3,750	3,613	3,613	3,613	3,463	3,313
Stock	1,250	1,250	1,313	1,335	1,584	1,872
Retained earnings	0	(130)	(347)	(427)	(497)	(549)
Total liabilities and equity	5,499	5,192	5,015	4,948	4,981	5,080

The managing director asks for a brief review of the key assumptions underlying the forecast. You assume 8% and 5% revenue declines during the first and second years of the forecast, consistent with a sharp economic contraction. Maudville's revenue ends the forecast horizon at a level approximately USD540 million below that of the base year. As revenues fall, you assume that Maudville's operations would generate close to current expense levels for COGS and SGA expenses. As a result, Maudville's EBITDA margin declines from 20% in the base year to a low of 9% in the second year of the forecast, before recovering to 13% in the final three years of the investment period. The profitability decline severely diminishes Maudville's ability to reduce its debt load.

Under these adverse economic conditions, you suggest that an EV/EBITDA exit multiple of 6× is unrealistic, assuming instead that no multiple expansion occurs over the five-year horizon and the EV/EBITDA exit multiple remains 5×. Based on a final year EBITDA forecast of USD578 million, the exit value of Maudville's enterprise value is USD2,889 million. As this amount is exceeded by Maudville's forecasted debt outstanding at the end of Year 5, it implies that the firm would be insolvent by the end of the forecast period and Bardstown's equity investment would therefore have a value of zero.

While this case ignores the possibility of asset sales, debt restructuring, or other measures taken in the case of financial distress, which are addressed in a later reading, it illustrates both the importance of macroeconomic conditions as well as their impact on key drivers of potential value creation in buyout equity strategies.

As both the case studies and real-world examples suggest, private equity strategies across venture capital, growth equity, and buyout situations often play a critical role outside of the public capital markets for startups launching a business, young firms pursuing rapid growth, or mature companies reaching their potential following a period of transformation.

Although the general valuation principles of these strategies across the investment life cycle have similarities, venture capital investments typically require more specific industry and technical knowledge given the initial importance of non-financial milestones associated with success. Growth equity often requires financial analysis to demonstrate the feasibility of EBITDA growth, which is usually financed with equity, while buyout equity transactions involve more detailed financial modeling and analysis given both the maturity of the companies involved and the combination of debt and

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equity more commonly used in these transactions. In what follows, we will consider the relative return and risk of all three forms of private equity as well as their strategic role in an investment portfolio.

QUESTION SET

1. Which of the following statements most correctly describes the estimation of exit value in the VC method of valuation?

   A. Exit value is estimated by using a single estimate of revenue potential and a single estimate of price-to-sales.

   B. Exit value is estimated in the context of a range of revenue potential and price-to-sales.

   C. Exit value is estimated by using a single estimate of forecasted earnings and a single estimate of price-to-earnings.

   Solution

   Response B is the most correct description of exit value estimation in the VC method. Because of high uncertainty of future revenue potential of a startup, a range of revenue estimates is desirable. Additionally, a range of price-to-sales also reflects the high degree of future uncertainty associated with the valuation environment of startups. Response A is less correct as this statement does not account for the high uncertainty of the startup environment. Response C is less correct as startups are less likely to have positive and stable earnings necessary to apply a price-to-earnings multiple.

2. Calculate the missing figures (indicated by "?") in the Series A Financing column to complete the capitalization table using the following information and the simple, incomplete capitalization table shown below.

   Scenario: A startup founder, Heinz Fernandez, invests USD450,000 into Nuca Group as its sole equity owner, and receives 90,000 shares in the startup. One year later, Fernandez attracts USD2,000,000 in new equity capital from an outside investor in Series A financing in exchange for a 10% ownership stake in Nuca Group.

Capitalization Table

Panel A: Shares and Fractional Ownership

Investor	Seed Shares	Seed FO %	Series A shares	Series A FO %
Outside investor			?	10%
Founder	90,000	100%	90,000	90%
Totals	90,000	100%	?	100%

Panel B: Valuation across Financing Series

	Seed Financing	Series A Financing
Share price (USD)	5.00	?
Pre-money valuation (USD)	0	?

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Panel B: Valuation across Financing Series		
	Seed Financing	**Series A Financing**
New equity (USD)	450,000	2,000,000
Post-money valuation (USD)	450,000	?

Solution

The missing figures may be solved for, sequentially, as follows.

First, use the 10% equity stake and the USD2 million investment to calculate post-money valuation.

Post-money valuation: USD20,000,000 (= 2,000,000 ÷ 0.10)

Second, calculate pre-money valuation taking the post-money valuation minus the new equity investment amount of USD2 million.

Pre-money valuation: USD18,000,000 (= 20,000,000 − 2,000,000)

At any point in the process, we can use the 10% equity stake and the founder's shares of 90,000 to calculate the outside investor's number of shares and the total shares by solving for x below.

$10\% = x \div (90{,}000 + x)$

Outside investor number of shares = 10,000

Total shares =100,000 (= 90,000 + 10,000)

Finally, share price can be calculated by dividing pre-money valuation by the number of shares from the founder round.

Share price: USD200 (= 18,000,000 ÷ 90,000)

Panel A: Shares and Fractional Ownership				
Investor	**Seed Shares**	**Seed FO %**	**Series A shares**	**Series A FO %**
Outside investor			10,000	10%
Founder	90,000	100%	90,000	90%
Totals	90,000	100%	100,000	100%

Panel B: Valuation across Financing Series		
	Seed Financing	**Series A Financing**
Share Price (USD)	5.00	200.00
Pre-money valuation (USD)	0	18,000,000
New equity (USD)	450,000	2,000,000
Post-money valuation (USD)	450,000	20,000,000

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3. Assuming that the liquidation preference multiple and conversion ratios are equal, convertible preferred shareholders are most likely to convert their shares if:

   A. aggregate common equity value at exit is greater than preferred stock price per share multiplied by the number of common shares outstanding post dilution.

   B. aggregate common equity value at exit is greater than common stock price per share multiplied by the number of common shares outstanding before dilution.

   C. aggregate common equity value at exit is greater than preferred stock price per share multiplied by the number of common shares outstanding before dilution.

   Solution

   C is the correct response. Using the equation below, total liquidation preference value equals the liquidation preference multiple times the number of preferred shares times the preferred stock price.

$$\text{Optimal Conversion Point} = \frac{\text{Total Liquidation Preference Value}}{\text{Conversion Ratio} \times \text{Number of Preferred Shares}}$$

   If the liquidation preference multiple and conversion ratios are equal, then the above equation simplifies to be equal to the preferred stock price. The preferred stock price is fixed based on the issuance price while the equity value is based on a variable stock price. Equity value exceeds the term in response C if the common stock price exceeds the fixed preferred stock price, and at this point, convertible preferred stockholders will convert their preferred shares to common shares. Response A is incorrect because the equity value reflects the value of common shares before dilution. Response B is incorrect because equity value is always equal to this term.

4. Saugerton Partners, a private equity firm, considers a take-private transaction with the following assumptions:

   - 6× current EV/EBITDA multiple
   - Deal financed with 25% equity and 75% debt
   - 5% annual EBITDA growth
   - 25% of the debt is paid off during the investment horizon
   - 8× EV/EBITDA multiple at exit
   - 35.44% IRR > 30% required return

   Which one of the following factors important to LBO success seem least important in this example?

   A. Margin expansion

   B. Improved asset efficiencies

   C. Debt repayment

   Solution

   B is the most likely correct response. Both responses A and C are very clearly outlined in the assumptions. Assumed EV/EBITDA multiples increase from 6× to 8× between the deal closing and the exit date, so margin expansion is very clear. Twenty-five percent of debt is expected to be repaid over the investment horizon, so this aspect of equity value improvement is also clearly assumed. The EBITDA growth rate is relatively slow, so may reflect

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very modest margin expansion if sales growth rates are below 5%. Nevertheless, improvements in cost efficiencies are not clear as a driver to the high IRR of the example.

PRIVATE EQUITY RISK AND RETURN

6

☐ discuss the risk and return among private equity investments as well as versus other investments as part of a strategic asset allocation

Unlike some other private asset classes such as unlisted infrastructure projects, private equity investors have public equity market indexes at their disposal to gauge the relative risk and return of these investments. The role of private equity in a strategic asset allocation is to achieve high risk-adjusted returns that provide some degree of diversification benefits relative to public equity holdings due to the more specific investment focus of venture capital, growth equity, and buyout equity strategies. Investors also seek diversification within private equity strategies by allocating investments across different vintage years and various investment managers.

The diversification benefits of private equity versus public equity occur because private equity investments provide exposure to specialized areas of the economy. Early-stage VC targets are in new industries or have disruptive business models with an expected rapid growth trajectory often driven more by technological change rather than macroeconomic conditions. Similarly, growth equity investors seek above-trend profitable expansion by gaining market share or new markets, while buyout equity uses a controlling stake to drive a firm's relative performance improvement versus peers.

However, aggregate private equity returns are unlikely to diverge too far from those of public equity. Private equity returns can diverge from public markets under normal market conditions, particularly if the entry involves a take-private transaction and they exit an IPO. That said, in the case of a public market downturn, private equity markets face similar effects of adverse market conditions, which tends to increase correlation between public and private markets. For example, greater risk aversion among investors generally leads to a reduction in VC activity and value of startups, while higher interest rates dampen buyout activity given the higher cost of financial leverage.

High and less correlated expected returns of private equity investments across VC, growth, and buyout equity must be sufficient to offset the higher risks and higher costs of these investments, which include the following.

Liquidity Risk. Long investment periods of up to 10 years with limited sale opportunities versus public markets give rise to liquidity risk. While general partners and other investors increasingly offer secondaries for sale or purchase, the bid-offer spread on such transactions lacks the transparency of exchange-traded instruments and may widen substantially under adverse public market conditions.

Valuation Risk. Private market valuations for partnerships and co-investments are affected by the chosen methodology, inputs, and judgement of a general partner rather than an independent third party or as observed in public market prices. For example, private valuations often use income-based discounted cash flow (DCF) analysis based on risk free rates, public credit spreads, public market multiples, and recent public transactions. When interest rates rise or market multiples fall, private funds may avoid

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overreacting to adverse public market changes by limiting markdowns, thus reducing apparent correlation to public markets. Valuation risk arises not only due to this potential bias but also the delayed timing of private market valuations received by investors. Public market investors typically receive same-day valuations based upon net asset value (NAV) at the end of each trading day, whereas private equity investors commonly receive valuations with a quarterly time lag. This delays an investor's ability to weigh tactical rebalancing and other decisions versus public market allocations.

Agency Risk. While private equity ownership is a means of addressing the principal-agent issue between company managers and shareholders as described earlier, asymmetric information between a general partner and limited partners also gives rise to a potential misalignment of interests. Performance and other incentive-based fee structures for GPs and share-based compensation for private company managers are potential mitigants to this risk. However, private firms lack the corporate transparency of publicly traded firms, and investors are often unable to exercise voting rights similar to public company investments. Also, in earlier-stage deals under management control, owners may continue to enjoy private benefits of majority ownership versus minority investors. For example, private equity investors may have limited information on whether portfolio company investments meet similar environmental, social, and governance (ESG) criteria to their public company equity investments as described below.

PRIVATE EQUITY GOVERNANCE CONSIDERATIONS FOR PUBLIC INVESTORS

Public sector investors such as public pension funds are not only focused on maximizing risk-adjusted returns and generating a surplus for beneficiaries and stakeholders but are also keenly focused on environmental, social, and governance issues as they cast votes for publicly held shares and interact with investment managers. For example, public pension plans are significantly more likely to support ESG proposals as compared to general shareholders, according to a 2022 Morningstar report.

However, investing in private equity through a fund structure introduces an additional layer between these investors and the companies in which they invest. Specifically, private market investors have less influence and often lack the ability to vote on important ESG issues related to problems of investor concern such as climate change, pay equity, and board gender diversity, as well as a wide array of other ESG-related topics. Pension plans may lack the ability to sufficiently ensure that their private equity investments are consistent with mandates established by the plans. To mitigate this concern, in some cases large public pension plans implement policies in an effort to ensure that their specific goals are achieved through private equity investing.

As one example, CalPERS has a policy restricting investment in private equity funds holding portfolio companies connected to the outsourcing of US public sector jobs. As the largest public pension plan in the US, CalPERS likely has greater influence over private equity fund managers than many other plans to encourage compliance, but with investments in over 300 different private equity funds, the ongoing monitoring of such a policy may impose significant additional costs on both the plan and its managers.

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Extraordinary Operating and Business Risks. The investment focus of venture capital, growth equity, and buyout situations may involve exceptional operating and business risks, which may result in a substantial loss of capital. Unrealized assumptions in the ex-ante financial analysis may have large impacts on realized returns.

Interest Rate and Leverage Risk. In the case of buyout equity where significant leverage is used, rising interest rates and credit spreads increase the cost of debt and potentially impair the ability to realize financing on attractive terms.

Macroeconomic and Public Market Risks. Private equity investments face unique risks related to the entry and exit value of equity. For example, in a strong market environment, competition for undervalued assets may be high and drive up the cost of investments, while in an adverse market scenario, depressed market multiples may reduce the potential return on investment for a planned exit.

Dilution Risk. As highlighted in earlier examples, the potential for dilution is also a consideration for investors, whether that includes later-stage series financing for early-stage companies or the dilution arising from share-based compensation to company managers in the case of buyout equity.

As described earlier in the curriculum, the costs and fees associated with private equity investments are substantially higher than those of public markets and must be factored into expected investor returns. In addition to higher management fees and performance-based compensation, these include the following.

Transaction Fees. Fees arising from extensive due diligence, bank financing costs, legal fees for arranging an acquisition, and the direct or indirect costs of arranging the sale of an investee company.

Fund Setup Costs. These mainly involve the legal costs of setting up an investment vehicle and marketing roadshows during fundraising, which are typically amortized over the life of the investment vehicle.

Administrative Costs. Custodian, accounting, and transfer-agent costs are generally charged as additional annual fixed fees, often as a fraction of the investment vehicle's NAV.

Investors seek to manage private equity risks via both thorough due diligence of fund managers for co-investment and limited partnership investments as well as diversification by geography, industry, vintage year, and investment strategy. Given the higher costs of these investments, investors often adjust expected return targets as shown in the following example.

CASE STUDY

Northern States Private Equity Investment Strategy

Northern States Pension Plan is a large US-based public pension plan with a long history of allocating to private equity as an asset class. The plan has an allocation target range of 10%–20% for private equity investment. Its current allocation to private equity investments is 19.3%. Northern States has established the following investment policy for its investments in private equity funds.

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Private Equity Investments—Strategic Objectives:

- Achieve significant outperformance relative to a broad equity benchmark over a long (i.e., 10 year) time horizon
- Diversify among fund types and strategies
- Diversify across development stages, investment size, industry sectors, geographies, and vintage years
- Engage as a responsible investor to promote sound environmental practices
- Leverage manufacturing industry experience by strategically co-investing in this industry sector

Private Equity Performance Target:

The Plan has a performance target of exceeding a return on a broad equity benchmark plus 2.5% per annum net of fees.

Within the private equity asset class, Northern States has established the following policy ranges for the different categories:

- Venture capital: 30%–50%
- Growth equity: 20%–30%
- Buyout equity: 25%–45%

Recent declines in the valuation of venture capital investments have caused the value of Northern States' venture investment to decline, and its allocation to this category is currently at 32%. Both growth equity and buyout equity have shown stronger performance and the allocations are at 28% and 40%, respectively. The main economic drivers causing recent performance in private equity include (1) a concentration of venture capital money into startups focused on artificial intelligence applications at the expense of other types of industries that typically rely on venture funding and (2) a renewed emphasis on investments generating improved cash flow. The consensus among Northern States' senior management is a continuation of these two trends for at least the next year.

Brianna Jenkins, Head of Alternative Investments at Northern States, has asked you, as an analyst in her team, to prepare a memo related to a possible co-investment in Clevington Corporation alongside Saugerton Partners equity for the Investment Committee. Details of the potential Clevington LBO are shown below:

- Clevington Corporation is a manufacturing company.
- A controlling stake in Clevington shares may be purchased at a share price consistent with a 6× EV/EBITDA multiple and financed with 75% debt and 25% equity;
- Under the proposed restructuring plan, Clevington can achieve 5% annual EBITDA growth and pay down a quarter of debt outstanding in five years;
- Clevington may be sold in five years to a private or public buyer at an 8× EV/EBITDA multiple in line with industry peers.
- The expected IRR to equity investors of Clevington is 35.4%.
- The expected IRR of the public equity benchmark is 30.0% over the expected investment period.

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1. Discuss two challenges faced by Northern States with respect to rebalancing its private equity portfolio in preparation for the next year.

   Solution

   One challenge relates to Northern States' overall allocation to private equity as it is currently at 19.3%, near the top of the allowable range of 10%–20%. While still within the allowable range, any further upward adjustments in private equity valuations may cause its allocation to go above the upper bound of its allocation range. Given that private equity investments are not liquid, Northern States may need to sell one or more of its investments using a secondary market transaction with wide bid-ask spreads.

   A second challenge relates to its allocation to venture capital, with 32% of its overall private equity investment being at the low end of its allowable range of 30%–50%. While being close to underweight may allow for a buying opportunity in venture capital, the need to potentially sell private equity investments in the other subclasses once again may require the use of a secondary market transaction.

   A related challenge in the venture capital space relates to lack of diversification by focusing new investments in artificial intelligence–related ventures at potentially inflated valuations versus allocating to underfunded VC opportunities in other venture-eligible industries. One other valuation-related challenge is whether Northern States should look to liquidate (or not reinvest distributions) in the cash flow generating areas of growth equity and buyout equity when those areas are forecast to perform well.

2. Evaluate a possible equity investment by Northern States into the Clevington Corporation take-private opportunity with respect to the pension fund's strategic objectives, performance target and allocation ranges.

   Solution

   The potential Clevington investment is consistent with the final bullet point of Northern States' strategic objectives. Specifically, Clevington operates in a line of business in which Northern States has expertise and they may be able to co-invest (thus avoiding the fees associated with investing through a private equity fund).

   The expected IRR of the Clevington equity investment is approximately 35%, and this appears consistent with the performance target of outperforming the broad equity benchmark by 2.5%.

   Finally, the Northern States' allocation to buyout equity is currently at 40% of its private equity portfolio. This allocation is at the higher end of its allowable range of 25%–45%. If the proposed investment size is sufficiently small in the scope of its overall private equity portfolio, the Clevington investment may be consistent with Northern States' allocation targets.

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QUESTION SET

1. Which of the following statements about private equity investment compared to other private market investments, such as private infrastructure, is most correct?

   A. Private equity investment differs from other private market investments in that performance may often be benchmarked against a public market index.

   B. Private equity investments offer higher risk-adjusted returns with low correlations to other asset classes.

   C. Private equity investments are less prone to economic conditions affecting other private market investments.

   Solution

   A is the most correct response. As opposed to private market investments such as real estate or infrastructure, private equity returns can reasonably be compared against a public equity benchmark. Response B is not correct because this statement is likely true for multiple private market asset classes. Response C is not correct as private equity is affected by economic conditions, especially adverse conditions that broadly impact both public and private markets.

2. Secondaries offered by general partners or other private equity investors address which of the following risk factors?

   A. Valuation risk

   B. Macroeconomic risk

   C. Liquidity risk

   Solution

   C is the correct response. Investments in private equity have very long holding periods, sometimes as long as ten years. The market for secondaries provides opportunities for investors to liquidate their holdings although secondaries likely are offered at high bid-ask spreads. Response A is incorrect as valuation risks are associated with any aspect surrounding how a private equity investment is valued. Response B is incorrect because macroeconomic risk (also known as public market risk) relates to the economic environment affecting entry and exit multiples of private equity transactions.

3. Which of the following risk management objectives is least likely to be implementable for an investor allocating 100% of funds to venture capital?

   A. Diversification across geographic regions

   B. Diversification across industries

   C. Diversification across vintage years

   Solution

   B is the correct response. Venture capital investment is focused on a small set of emerging industries characterized by the potential for very high growth. As a result, industry diversification is not likely if investing only in venture capital. Responses A and C are not correct as startup opportunities are available for investment in many parts of the world and investment in

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venture capital can be diversified across time (i.e., investing in funds with different vintage years).

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PRACTICE PROBLEMS

The following information relates to questions 1-4

Brianna Jenkins, Head of Alternative Investments at Northern States Pension Plan, has recently hired a new analyst, Cheng Zhu, to assist on its private equity allocations within its overall alternatives portfolio. Zhu has worked as a buy-side analyst in public equities for the last three years, and Jenkins hopes to find out what her new hire knows about private equity markets.

Jenkins begins by discussing the Northern States investment approach to identifying quality fund managers in the private equity market. Jenkins makes the following two statements.

Statement 1 "Northern States prefers fund managers that rely less on assumptions about multiple expansion in identifying good portfolio companies."

Statement 2 "Northern States prefers fund managers that apply more realistic assumptions about the potential for paying off the debt of a portfolio company over the investment horizon."

Zhu asks Jenkins about the ability of Northern States to liquidate portions of its private equity portfolio following periods of strong performance. Specifically, Zhu is curious as to what degree Northern States is able to liquidate a holding in an illiquid private equity fund.

Zhu discusses the increasing importance of voting rights in public equity markets and asks Jenkins how governance issues work when investing in private equity markets. In response to Zhu's question, Jenkins makes the following statements.

Statement 3 "Northern States participates as a co-investor in private equity investments in industries in which it believes it has strong experience."

Statement 4 "Northern States has included investment policy mandates associated with board diversity that restrict investment in private equity funds that own portfolio companies which are not compliant with Northern States' policy on board diversity."

1. Which of the following risks associated with private equity investing is most consistent with Statement 1 made by Jenkins?

   A. Liquidity risk

   B. Valuation risk

   C. Agency risk

2. Which of the following private equity strategies is most likely being discussed in Statement 2 made by Jenkins?

   A. Venture capital

   B. Growth equity

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C. Buyout equity

3. Which of the following poses the least direct liquidity risk associated with owning a position in a private equity fund?

   A. A secondary market for private equity holdings created by a general partner

   B. The long holding period required by the private equity fund

   C. Adverse conditions in public markets

4. Discuss how Statements 3 and 4 address Northern States' response to agency risks associated with private equity investment.

The following information relates to questions 5-9

Suzette Moreau is a managing director of Estragon SA, a French private equity firm focused on venture capital investment. Moreau is working on strategies to improve the firm's overall rate of return (of approximately 30%) on its venture portfolio of 20 companies. The fund's current failure rate is 75% and its portfolio of successful investments earns 15× capital, on average, over a five-year investment horizon. Moreau believes that Estragon can improve its failure rate sufficiently without a material decline in its investment returns on its portfolio of successful investments.

Moreau meets with a new analyst beginning work on Estragon's venture capital portfolio. Moreau discusses some of the different financing mechanisms used in private equity and introduces convertible preferred shares. She shows the analyst Exhibit 1.

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Exhibit 1

Moreau provides her new analyst with the following scenario to assess: Estragon is considering investing EUR2.5 million in Series A financing of a startup venture having seed capital already invested of EUR1 million. Estragon's estimated exit value of the startup's equity in five years is EUR150 million, and its target ROI is 8×.

Moreau continues her example as follows: Estragon makes its Series A financing investment of EUR2.5 million in a startup venture with a post-money valuation at the time of financing of EUR18.75 million. One year later, the startup seeks another EUR5 million in Series B financing and Estragon is willing to contribute an additional EUR2.5 million. The updated post-money valuation is EUR50 million.

As a final question, the new analyst asks Moreau about Estragon's participation in growth equity deals in the private equity market. Moreau responds that the firm will occasionally consider investing in growth equity, but only on a limited basis because the differences in analyzing venture capital and growth equity are sufficiently significant enough that Estragon believes that its expertise is better focused in the venture capital portion of the private equity market.

5. Demonstrate whether Estragon can reasonably improve its failure rate to increase its overall rate of return to 35%.

6. Discuss the economic reason for why the slope of the payoff to common shares declines at points greater than the conversion price on the x-axis of the chart.

7. Which of the following is closest to Estragon's expected fractional ownership of the startup if it makes this projected investment in the Series A financing?

   A. 13.3%

   B. 15.4%

   C. 71.4%

8. Which of the following is closest to Estragon's fractional ownership if it partici-

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pates in the Series B financing?

A. 10.0%

B. 17.7%

C. 62.5%

9. Discuss two aspects of differences between venture capital and growth equity that may reflect Moreau's comments about preferring to focus on investing in venture capital rather than growth equity.

The following information relates to questions 10-13

Benrich Inc. is a US-based food services corporation with a long history in the industry, but recently has struggled to generate adequate growth or profitability. However, despite its relatively low net profit margins, Benrich generates a stable EBITDA of USD150 million, EBITDA margins of about 20%, and revenue growth of approximately 1% per year. Bardstown Partners, a private equity firm specializing in buyout equity transactions, believes that Benrich may be a good investment candidate for inclusion in its latest buyout fund.

The Bardstown Partners analyst assigned to this deal concludes that an assumption of additional revenue growth may be unlikely for Benrich. However, the analyst believes that an assumption of 6% EBITDA growth per year over the investment horizon is plausible.

Bardstown believes that Benrich can be purchased at an EV multiple of 5× EBITDA of USD150 million with 30% common equity contributed by Bardstown and 70% debt financing. The Bardstown analyst forecasts that Benrich can reduce its debt load following the transaction by USD40 million per year over a five-year investment horizon.

At the end of the investment horizon, Bardstown views the potential for exiting its investment by selling Benrich at a 6× EV/EBITDA multiple due to increased efficiencies. Bardstown has a 35% IRR target for a buyout equity deal of this risk level.

10. Discuss two characteristics that may make Benrich a suitable candidate as a target of a buyout equity fund.

11. Discuss and estimate assumptions necessary for 1% revenue growth and 6% EBITDA growth.

12. Calculate Benrich's estimated debt outstanding at the end of the five-year investment horizon and evaluate whether the debt reduction goal is likely realistic in the context of other aspects of the forecast.

13. Analyze the investment potential of the proposed transaction to take Benrich private under Bardstown's assumptions with no interim cash flows distributed to equity investors.

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SOLUTIONS

1. B is correct. Both entry and exit multiples reflect valuation assumptions. Assumptions about multiple expansion reflect one path by which fund managers assume good returns from investment in a portfolio company. Multiples for private equity portfolio companies are likely to move less than benchmark public equity multiples. Less emphasis on margin expansion implies that Northern States prefers to avoid managers who may be overly influenced by increases in public market multiples in setting exit multiple assumptions. Responses A and C are incorrect as neither of these risks are related to assumptions about multiples.

2. C is correct. Buyout equity transactions typically involve significant debt as part of the initial purchase price of the portfolio company. In these types of deals, both the income statement and balance sheet are forecasted over the investment horizon. A key assumption made in the balance sheet forecast is the degree to which debt is repaid. Responses A and B are incorrect as neither venture capital nor growth equity include assumptions about balance sheet forecasts, so repayment of debt is unlikely to be a significant assumption in these types of private equity deals.

3. C is correct. Adverse conditions in markets do not, in isolation, create liquidity risk for private equity investors. Rather, an added element associated with private equity investments must be included to the statement to imply that adverse market conditions create liquidity risks. On the other hand, both Responses A and B reflect situations that are direct or indirect liquidity risks. Long required holding periods are the most direct form of liquidity risk of private equity. In response to investor demand for some liquidity, general partners may create a secondary market for fund investors to liquidate holdings, but they are likely to demand a wide bid-ask spread. This wide bid-ask spread properly reflects liquidity risk.

4. Statement 3 directly addresses agency risk. As a co-investor, Northern States has a direct ownership stake in a portfolio company rather than an indirect stake owned directly by a private equity fund. As a result, Northern States has the ability to interact directly with the portfolio company's management on areas of governance concern. Statement 4 addresses agency risk indirectly. By imposing a policy mandate on private equity funds, Northern States attempts to ensure that the funds will support board diversity proposals by only owning portfolio companies that comply with Northern States' policy. However, Northern States will face additional costs to ensure that its fund investments follow this policy.

5. Assuming an initial investment of EUR100, we would need to solve for the unknown failure rate to achieve an IRR of 35%. The unknown terminal value in five years may be expressed as follows: (= (EUR100 – EURX) × 15) and we use an IRR of 35% in the denominator, as shown below.

   $$\text{EUR100} = \frac{X}{(1 + 0.35)^5}$$

   Solving for X in the equation above gives a result of 448.4 (= $100(1.35)^5$). Substituting 448.4 into the following and solving for x gives a result of 70.1:

   $448.4 = (100 - x) \times 15.$

   Thus, the failure rate would have to improve to 70% (from its previous level of 75%).

   Applying the 100/10/1 rule of thumb and the failure rates above to Estragon's situation with 20 portfolio companies implies that currently five of these (i.e., (=

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1 – 0.75) × 20) are the drivers of Estragon's returns. If Estragon could improve its process to improve its portfolio to six successful companies (i.e., (= 1 – 0.70) × 20), then it could improve its IRR to 35%. NOTE: A simpler way to estimate this would be to note that the hoped-for IRR is 16.67% better than current (= (35 – 30) ÷ 30), so a 20% (= (6-5) ÷ 5) improvement in the number of successful firms in the portfolio would accomplish this if the additional successful firm can generate the 15× return.

6. The optimal conversion point is that at which the convertible preferred shareholders choose to convert their preferred shares to common shares. Above this point, the increase in firm value accrues to both the convertible holders who have converted preferred shares to common equity as well as existing common shareholders. The conversion of preferred shares into common shares causes the fractional ownership of the common shares to become diluted and the increase in value for common shareholders is reduced because of the dilution.

7. A is correct. The post-money valuation may be estimated as EUR18.75 million (= EUR150 million exit value ÷ 8× ROI). Estragon's fractional ownership is estimated at 13.3% (= 2.5 ÷ 18.75). Response B is incorrect as it uses the pre-money valuation of EUR 16.25 million (= 18.75 – 2.5) as the denominator in calculating fractional ownership. Response C is incorrect as it assumes EUR1 million as the pre-money valuation, so then assumes post-money valuation of EUR3.5 million.

8. B is correct. To calculate Estragon's fractional ownership, use Equation 1 shown below:

$$FO_{\text{post}} = FO_{\text{prior}} \times \frac{\text{Pre-Money Valuation}}{\text{Post-Money Valuation}} + \frac{\text{New Investor Equity}}{\text{Post-Money Valuation}}.$$

The prior fractional ownership is equal to 13.33% (= 2.5 ÷ 18.75). Post-money valuation is given as EUR50 million and pre-money valuation is equal to EUR47.5 million (= 50 – 2.5). New investor equity is given as Estragon's planned investment of EUR2.5 million. Thus, the fractional ownership is equal to approximately 17.7% (= 13.33% × $\left(\frac{47.5}{50}\right)$ + $\left(\frac{2.5}{50}\right)$).

9. In contrast to venture capital's focus on startups in the few industries expected to expand very rapidly, growth equity is less industry focused and targets later-stage companies for expansion with established products and business models. As such, Moreau may be concerned with the need to conduct due diligence across more industries and become more comfortable with researching companies later in their lifecycles. Additionally, the analysis required for modeling growth equity requires income statement modeling beyond the assessment of future revenue projections as is common in venture capital. Thus, investments in growth equity require more expertise in projecting feasible improvements in profit margins as well.

10. First, Benrich is a mature company in the late stages of its lifecycle in a slow-growth industry. Second, Benrich generates stable cash flows, and these are helpful in reducing debt typically taken on in buyout equity transactions.

11. To achieve 6% EBITDA growth with only 1% revenue growth, Benrich will need to achieve cost-cutting strategies related to the cost of goods sold and selling, general, and administrative expenses. The growth rates of both expense items must be below 1% to ensure improved EBITDA margins. To illustrate the margin assumptions necessary, assume Benrich's revenues grow from 1 to 1.01 (i.e., 1% growth). Benrich's EBITDA on revenue of 1 is 0.20, and 6% growth would reflect an increase in EBITDA from 0.20 to 0.212. Thus, the EBITDA margin required would be 20.99% (= 0.212 ÷ 1.01). Thus, the combined COGS and SGA expens-

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es would need to decline from 80% of revenues (i.e., 100%–20%) to 79.01% in the first year. The combined COGS and SGA would be equal to 0.798 (= 1.01 – 0.212), and this represents a 25-basis point decline in costs from year to year. This pattern of declining costs would need to continue at slightly increased rates during each subsequent year over a multi-year time horizon to achieve the goal.

12. Given the EV/EBITDA multiple of 5× and EBITDA of USD150 million, the proposed transaction price to buy Benrich is USD750 million (= 5 × 150). With a 70% debt and 30% equity financing structure, the initial debt level of Benrich will be USD525 million (= 0.7 × 750). With USD40 million in debt repaid per year, the expected debt level at the end of five years is USD325 million (= 525 – 5(40)).

    The debt reduction target appears realistic. Given Benrich's EBITDA base year value of USD150 million and growth at 6% per year, the company likely can fund debt repayments of USD40 million per year as long as its capital investment needs are relatively small. If the asset base stays constant at USD750 million, Benrich's debt ratio declines from 70% at the outset of the transaction to 43.3% (= 325 ÷ 750) by the end of five years.

13. The goal is to assess whether the IRR of the proposed buyout deal of Benrich is greater than Bardstown's required return of 35%. Of the USD750 million purchase, Bardstown will commit USD225 million of equity contribution (= 750 × 30%). To compute the expected exit value of equity, we must first calculate the expected enterprise value upon exit based on the projected EBITDA in year 5 and the expected EV/EBITDA multiple of 6×. Projected EBITDA is approximately USD200.7 million (= 150 $(1.06)^5$) and estimated enterprise value at exit is USD1,204.4 million (= 200.7 × 6). To obtain exit value of equity, we subtract the projected debt outstanding at the end of five years of USD325 million from the exit value of enterprise value. The exit value of equity is USD879.4 million (= 1204.4 – 325). Finally, we can obtain the IRR by dividing the exit value of equity by the initial equity contribution, taking this to the power of 0.2 (= 1 ÷ 5) to reflect the investment horizon, then subtract one. The resulting IRR is equal to 31.3% (= $(879.4 \div 225)^{0.2} - 1$). The expected IRR of the deal does not meet Bardstown's required return, so the Benrich deal does not show potential as a private equity investment.

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LEARNING MODULE

4

Private Debt

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	discuss the use of debt financing in private market strategies over the investment life cycle
☐	discuss the use of leveraged loans, high-yield bonds, and convertible bonds in private market strategies
☐	contrast the use of mezzanine debt and unitranche debt in private market strategies;
☐	analyze private debt profiles and calculate and interpret financial ratios used to value private debt investments
☐	discuss the risk and return among private debt investments as well as versus other private market investments as part of a strategic asset allocation

INTRODUCTION

1

Fixed-income instruments such as loans and bonds are not only the most common source of capital for public issuers, but also play an important role in private markets.

The source of debt financing in private markets has evolved from being largely the domain of banks, bank syndicates, and public markets to non-bank sources of lending known as private debt, which have experienced rapid growth.

According to Preqin, an alternative investment data company, private debt capital raised has more than doubled over the past decade, led by a sharp increase in direct lending, and is expected to reach USD2.2 trillion in global assets under management by 2027.

Debt financing used in private market strategies differs from the non-callable, unsecured fixed-coupon bonds commonly used by mature public corporations and sovereign issuers. Lenders and borrowers in private corporate, real estate, or infrastructure debt transactions often incorporate characteristics such as equity-like features (to attract lenders when cash flows are less stable),, or prepayment features to give borrowers flexibility over situations such as company restructuring or managing a project development life cycle. This may involve prepayable variable-rate debt with lower effective duration than fixed-rate bonds of similar maturity, or fixed-rate bonds

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with explicit call or conversion features. Non-bank private debt funds offer distinct strategies such as venture debt and direct lending to small and medium-sized companies. They also offer funds devoted to event-driven or special situations, such as distressed debt, which are covered in a separate learning module.

In this learning module, we discuss how and why debt financing is used in private markets, from startups to growth companies and buyout situations, as well as real estate and infrastructure financing. We also investigate the similarities and differences in debt instruments offered by banks and non-bank sources, as well as mezzanine debt and unitranche debt. Next, we examine the role these debt instruments play in a private company's debt profile, applying fixed-income risk and return measures introduced earlier in the curriculum to estimate their value. Differences in debt features, underlying uses, and borrower profiles offer the potential for higher return and diversification with less correlation to traditional public fixed-income securities. Private debt also offers investors exposure to private market strategies with more predictable cash flows than equity. Investors must weigh these possible benefits against the unique risks of private debt when considering their role in an investor's portfolio.

LEARNING MODULE OVERVIEW

- Debt financing used in private markets includes venture debt for startups and mezzanine debt for growth and mature companies. Leveraged loans and high-yield bonds are commonly used for larger buyout equity situations, while direct lending is more prevalent for small and medium-sized firms.
- Leveraged loans involve senior secured, floating-rate debt prepayable by the issuer. This compares to high-yield bonds which are fixed-rate, subordinated debt instruments with a fixed-price call feature. Convertible bonds combine features of debt with equity by allowing investors to exchange debt for shares at a predetermined price.
- Subordinated mezzanine debt and unitranche debt are less liquid compared to most other private forms of debt. Both offer more flexible terms to lenders. Subordinated mezzanine debt often incorporates equity-like features. Unitranche debt facilities combine senior and subordinated debt.
- Private issuer debt profiles seek to ensure sufficient operating flexibility with adequate borrower protections, including covenants and other contingencies. In addition to fixed-income risk and return measures, private debt valuation involves a larger credit component than investment grade debt, increased complexity due to the use of security and subordination, and a high degree of illiquidity.
- Differences in private debt characteristics, such as contingency features, higher yield spreads due to credit, and liquidity and its use in private market strategies, contribute to the potential for higher return and diversification from traditional fixed-income exposures.

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PRIVATE DEBT STRATEGIES

2

- discuss the use of debt financing in private market strategies over the investment life cycle

The investment life cycle for private markets, including private equity, real estate, and infrastructure, involves debt financing over a period of development or transformation. Private market debt use differs markedly from the use of commercial paper, unsecured revolving credit, and senior unsecured bonds among mature public companies with investment grade ratings.

Highly rated public companies with stable cash flows are considered far less likely to default, face few covenant or debt tenor restrictions, and enjoy a high degree of investor confidence that they will meet interest and principal payments from operating cash flow. Private equity strategies over the company life cycle, in contrast, involve either early-stage startup or growth firms with low or less predictable operating cash flow, or buyout companies where greater financial leverage increases the likelihood of default. To reduce the overall investment risk associated with debt financing, private equity borrowers must offer debt investors a higher return as well as protection in the form of restrictive covenants, security in the form of collateral, and/or equity-like returns to compensate lenders for greater risk.

Exhibit 1 shows common forms of debt used in conjunction with private equity strategies employed over the company life cycle.

Exhibit 1: Debt Financing in Private Equity Over the Company Life Cycle

Venture Debt

Startup companies with little to no revenue, negative cash flow, and few assets available as collateral are unattractive candidates for traditional loan or bond financing, but in select cases, they can access **venture debt**.

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When available, unsecured venture debt from non-bank lenders is typically offered to an early-stage, revenue-generating firm for up to three years at a relatively high interest rate given the lack of positive cash flow and high default potential. Venture borrowers usually have large cash balances, and their loan balances reflect low loan-to-value ratios, typically no greater than 10%. To minimize refinancing risk, venture debt is typically amortized over the loan period. Venture debt typically involves a loan plus a **warrant** granting a lender the right to purchase common equity shares issued by the company for a fraction (often 10–20%) of the loan amount at a predetermined price over a specific period.

Warrants have a similar payoff profile to equity call options but differ in two ways. First, they are usually outstanding for longer periods of up to several years. Second, warrants are issued directly by a company versus an exchange, and they result in dilution due to the issuance of new shares for settlement. This feature is used by borrowers to both reduce financing costs versus common shares and avoid the *immediate* dilution of equity while accepting *contingent* dilution if shares appreciate above the warrant exercise price.

As for lenders, despite the lack of revenue, cash flow, or tangible collateral, venture debt offers the potential for equity-like returns if shares appreciate, with potential additional equity series financing and in some cases a claim against intellectual property as additional default risk mitigants.

SILICON VALLEY BANK (SVB) AND THE VENTURE DEBT MARKET

Named after the Northern California region known as a global technology and innovation hub, Silicon Valley Bank was founded in the 1980s to serve the specific needs of technology startup companies.

SVB's business model deviated from that of more traditional cash flow–based and collateral-based bank lending, as it extended loans to early-stage companies and accepted founder shares as collateral while accumulating deposits from businesses financed through venture capital. As SVB pursued rapid growth over the next three decades, it began financing venture capital firms, expanding services, and connecting startups to legal and financial advisors.

At the end of 2022, SVB was estimated to hold nearly a quarter of the total US venture debt market estimated at approximately USD 30 billion, with over half of its loan portfolio comprised of loans to venture capital firms and private equity and used to invest in private firms.

The benefits of SVB's highly concentrated portfolio were sharply reversed amid the downturn in technology stocks and rising interest rates in 2022. In early 2023, social media posts based on rumors of substantial losses and risk management missteps resulted in a run on SVB's deposits. Both the sharp drop in deposits and the revelation of securities portfolio losses amid higher rates led SVB to be declared insolvent and was closed by regulators in March 2023.

Within a few weeks of SVB's failure, SVB filed for bankruptcy and First Citizens BancShares purchased SVB's loans, deposits, and branches. Notably, SVB's venture debt portfolio was included in this purchase, and the president of First Citizens confirmed that the company had hired the venture debt team from SVB in a statement of commitment to continuing the focus on venture lending.

The future of venture debt in the United States following SVB's failure remains uncertain. SVB's demise creates a new playing field in the venture debt market. While First Citizens BancShares' SVB acquisition may give it an early advantage in the event of a market rebound, this market faces a likely adjustment to new venture capital market conditions.

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A special form of venture debt applicable to early-stage firms with subscription-based revenue is **recurring revenue financing** (also known as receivables financing or factoring). Under this structure, a private lender offers a loan to a software firm, for example, with an established software license subscriber base and an established track record of monthly cash flows. The loan, which consists of a discounted upfront monthly payment of expected subscription revenue, is extended in exchange for some or all of the monthly subscriber cash flows as they are received. Key determinants of cost and availability include the size, growth rate, and quality of the underlying subscriber revenue.

Mezzanine Debt

Also referred to as hybrid debt, or more broadly as junior debt, **mezzanine debt** represents long-term claims to interest and principal which are met only once all senior debt claims are satisfied but before any distributions to common equity or other shareholders.

In contrast to both high-yield and convertible bonds as well as leveraged loans, mezzanine debt is often of smaller size and arranged privately with non-standardized terms. The **contractual subordination** of mezzanine debt is usually established via an agreement among borrowers linking senior secured and subordinated mezzanine debt claims at the company level.

Mezzanine debt may include equity-like features such as call options, conversion rights, or warrants. This debt may be offered on a fixed or variable rate basis, with interest paid in cash—or **payment in kind (PIK)**, that is, via accrual which increases principal outstanding and is paid at maturity. As shown in Exhibit 1, mezzanine debt is used across the growth and mature phase of the company life cycle.

Convertible Debt

Convertible debt is a fixed-income instrument which combines the features of debt with equity via a contingent feature allowing debtholders to exchange their claim for common shares at a predetermined fixed price in the future.

Since this equity call option-like feature is embedded in the convertible bond's price, these long-term bonds pay little to no periodic interest and are used in private market strategies where lenders are willing to accept the credit risk of issuers with less certain cash flows in exchange for equity appreciation potential. For example, early-stage companies which lack the level and stability of cash flows needed to support traditional forms of debt may issue convertible bonds to increase financial flexibility and lower the cost of capital, while issuers pursuing an acquisition may also find the contingent dilution preferable to an equity-financed purchase while also lowering the cost versus standard debt.

Leveraged Loans

Leveraged loans are term loans with a tenor of four to seven years extended to sub-investment grade borrowers. These floating-rate loans are typically issued to borrowers with a higher degree of financial leverage on a senior secured basis. The periodic debt coupon is usually based upon some market reference rate (MRR) plus an issuer-specific credit spread, with principal which is either fully repaid upon maturity or amortized based on a predetermined schedule. Leveraged loans are typically callable at par (plus any accrued interest) at any time starting several months after issuance, offering issuers a high degree of financing flexibility.

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The higher likelihood of financial distress among private buyout debt issuers usually leads leveraged loan investors to require a **first lien** or **second lien** on certain assets, an investor protection which increases the recovery rate in the event of default versus unsecured debt. A first or priority lien grants a lender the right to take possession of specific property from a borrower which fails to repay debt, while a second lien loan is secured by an asset with an existing lien and will only be repaid when the first lien creditor receives payment.

Additional constraints on issuers in the form of restrictive covenants are also common for leveraged loans. An issuer may face **maintenance covenants** requiring it to meet certain metrics for each financial reporting period, such as keeping debt outstanding *below* a certain total leverage ratio and operating cash flow *above* an interest coverage ratio. In competitive markets with strong demand for leveraged loans, these conditions may be loosened in what is known as a **covenant-lite** transaction. Note that the above maintenance covenants may instead be weakened when imposed as **incurrence covenants**, which are tested only when an issuer seeks to assume additional debt. For example, under a debt to EBITDA maintenance covenant, a borrower must remain below a given threshold in all reporting periods; however, under an incurrence covenant this test is only conducted if the borrower seeks to issue new debt.

Investors in leveraged loans face less duration risk due to changing benchmark interest rates than fixed-coupon bonds and will face higher or lower coupons as market reference rates rise or fall. It is important to note that many investors access the leveraged loan market by purchasing **collateralized loan obligations (CLOs)**, which were described earlier in the CFA Level I curriculum. CLOs raise capital to invest in a portfolio of leveraged loans and are separated into tranches with different priority claims on cash flow from the loan portfolio and exposure to losses based upon a waterfall.

High-Yield Bonds

High-yield bonds are fixed-income securities issued by sub-investment grade borrowers. These bonds represent more equity-like exposure as they are subordinated in the capital structure and therefore repaid after leveraged loans.

High-yield bonds have a fixed coupon and usually a longer tenor than leveraged loans of up to ten years, and include a call feature, available to issuers, allowing prepayment of the bond before maturity. In contrast to the prepayability of loans at par at almost any time, high-yield bonds typically offer investors a period of call protection, after which an issuer may call outstanding bonds at a fixed premium over par.

Although high-yield bonds are usually publicly traded debt instruments, they often play an important role in transactions involving private debt. For example, issuers in a buyout equity transaction assess borrower demand across markets and debt types when financing large, highly leveraged transactions as discussed below.

THYSSENKRUPP ELEVATOR'S 2020 LEVERAGED BUYOUT FINANCING

In February 2020, the publicly traded German conglomerate Thyssenkrupp agreed to sell its elevator unit to a private equity consortium, led by Advent International and Cinven, for EUR17.2 billion in Europe's largest leveraged buyout transaction since the Alliance Boots buyout in 2007. Thyssenkrupp Elevator was the world's fourth largest elevator manufacturer and the conglomerate's most profitable unit. Nevertheless, its profit margins lagged behind those of larger global competitors. The transaction closed in June 2020 and included EUR7.6 billion of debt financing.

Given the global nature of the division's cash flows, the private equity group was able to raise both secured and unsecured debt denominated in both USD and EUR, testing demand across private and public markets. The final deal raised

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EUR3.265 billion from European investors and approximately EUR4.36 billion from US markets. The US leveraged loan market provided the largest proportion of debt, equivalent to approximately EUR2.56 billion, while the European leveraged loan market contributed the smallest portion, with EUR1.015 billion. The remaining EUR4.05 billion of debt was contributed from high-yield bond markets in Europe (EUR2.25 billion) and the US (EUR1.8 billion).

Yields ranged from 4.375% for European secured high-yield notes (based on B/B1/B+ ratings) to 5.73% on the US leveraged loans. The European leveraged loans priced at a yield of 4.68% and the US high-yield notes at a yield of 5.25%. However, a part of the structure included PIK notes in both EUR and USD priced to yield 11% and 12%, respectively.

Early in the capital raising process, leveraged loans were expected to comprise a greater proportion of the overall financing package. Ultimately, greater investor demand for fixed rates and high-yield bonds led to growth in these tranches at the expense of secured floating-rate and privately held debt. Overall, the deal underscored strength in the public high-yield market, greater relative demand from the USD leveraged loan market versus Europe, and somewhat weaker demand from private market debt investors.

By distributing the debt tranches across currencies and debt types, the private equity buyers of Thyssenkrupp Elevator were able to establish a flexible debt profile at the lowest cost of capital for the acquisition financing.

Direct Lending

A growing alternative to traditional bank intermediation, **direct lending** involves leveraged loans issued to small- and medium-sized companies with limited access to banks or public markets by private non-bank lenders. The debt instruments used in direct lending, such as leveraged loans and unitranche debt, are addressed in detail later in this learning module.

The rapid growth in private credit as an asset class following the Global Financial Crisis of 2008–9 stemmed from both tighter bank regulation and near-zero central bank policy rates. Stricter capital standards for banks and rising minimum public debt market issuance sizes reduced bank and public debt market access for smaller firms. Quantitative easing spurred investors to seek fixed-income returns from new sources. Private non-bank lenders filled this funding gap among small- and medium-sized firms, whose relatively illiquid debt offered higher coupons and enjoyed strong demand, with institutional investors explicitly adding this asset class to their strategic allocations for the first time.

Direct lending may involve a single senior secured loan on a floating-rate basis similar to a syndicated leveraged loan, or a hybrid loan combining senior and subordinated debt in one facility known as **unitranche debt**, addressed later in this learning module. In either case, direct loans are typically issued at a higher coupon than standardized loans to borrowers of similar seniority and credit quality. The higher spread also reflects a greater liquidity premium associated with these borrowers. Underwriters of these loans may include private credit funds or **business development companies** in the US, a form of closed-end investment vehicle which is often a publicly traded company specializing in private debt.

Direct loans are sponsored or non-sponsored. **Sponsored loans** are those for which a private equity firm with a controlling ownership stake in the potential borrower directly seeks to access debt for a company. In the case of traditional bank lending, financial institutions conduct periodic credit assessments, maintain transactional banking services, and impose constraints such as covenants on a borrower. Under a sponsored loan, lenders are typically able to source firm information and

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due diligence from the sponsoring private equity firm. In addition, the private equity sponsor usually closely monitors firm performance and supports the borrower, also soliciting additional debt and equity funding as needed. Lenders forego the use of a financial intermediary, dealing either with the private equity sponsor or directly with the borrower company's management. Given the existing due diligence, monitoring, and controlling relationship of the private equity sponsor, prospective lenders tend to have less bargaining power in negotiating terms and pricing for sponsored loans. Additionally, sponsored loans may generate a potential conflict of interest between a general partner (GP) and limited partners (LPs), arising from loan arrangement fees charged by GPs but not shared with LPs.

Non-sponsored loans, or those which lack a controlling financial sponsor, involve greater search, due diligence, and monitoring costs, given the lack of a controlling financial sponsor. In this case, lenders deal directly with a potential borrower's management team. Given the greater costs associated with identifying non-sponsored borrowers and analyzing and monitoring their creditworthiness, investors often expect higher returns in the form of wider credit spreads compared to private, sponsored borrowers of similar credit quality. Given the lack of financial sponsor support, non-sponsored borrowers may face less bargaining power than sponsored lenders as they may be less sophisticated or have fewer resources to focus on negotiating debt financing.

Project-Related Debt (Real Estate and Infrastructure)

Forms of debt used in other private markets, such as real estate or infrastructure development, often involve a project which has an initial period of negative net income over an initial development phase, as shown in Exhibit 2.

Exhibit 2: Use of Debt in Private Real Estate Development

Debt and equity capital is committed prior to the initiation of a new real estate project and drawn from the time of site purchase through the construction period. Temporary debt in the form of a **construction and development (C&D) loan** shown in Exhibit 2 is disbursed in stages to finance building costs as specific project milestones are met, and the loan typically accrues interest over the construction period. The C&D loan is usually repaid upon project completion via a mortgage loan secured by the property and serviced by operating cash flows. While C&D loans are also typically secured by project assets, risks include the uncertain resale value of collateral during construction, as well as the potential for delays and cost overruns.

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The use of debt in infrastructure is shown in Exhibit 3 using the example of a so-called **build-operate-transfer (BOT) project** which is sponsored by a public entity and transferred to its control after a finite operating period.

Exhibit 3: Debt in the Private Infrastructure Build-Operate-Transfer Cycle

While similar to the real estate investment cycle at first glance, infrastructure debt use differs in several ways. As shown in Exhibit 3, in some instances debt financing may include public as well as private sources of debt. However, the key difference is that once in operation, real estate properties can support a high degree of financial leverage over time and may be held indefinitely or sold at the end of a targeted holding period. In the case of infrastructure projects with a finite operating period, such as a BOT project, the debt is paid down fully as operations begin, with cash flows accruing to equity holders until the asset is transferred to the public entity with a terminal value of zero. In both the case of private real estate and infrastructure, the use of loans over bonds is prevalent due to the greater flexibility of prepayment as described earlier.

Distressed Debt

Loans or bonds which face a high likelihood of non-payment or bankruptcy, known as **distressed debt**, will be covered in detail in a later learning module on Special Situations, while the use of debt financing in real estate and infrastructure will be shown in case studies in subsequent Private Real Estate and Infrastructure learning modules. The remainder of this learning module will primarily focus on debt used in private equity strategies across the company life cycle.

QUESTION SET

1. Which one of the following types of debt is least likely to be used as a source of funding a buyout transaction?

   A. Leveraged loan

   B. Convertible debt

   C. High-yield bond

   Solution

   B is the correct response. Convertible debt is unlikely to be used as a debt funding source in a buyout transaction but is more likely to be used in

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conjunction with a growth equity transaction. Responses A and C are both incorrect as these are both commonly used debt types in financing buyout transactions.

2. Which of the following is a typical feature of venture debt?

   A. Ability to convert the debt into common stock of the issuer

   B. Maturity ranging from five to ten years

   C. Inclusion of warrants to purchase common stock of the issuer

   Solution

   C is the correct response. Venture debt typically involves a loan plus a warrant granting the right to purchase additional common equity shares issued for a fraction (often 10–20%) of the loan amount at a predetermined price over a specific period. Warrants are issued directly by a company versus an exchange, and result in dilution due to the issuance of new shares for settlement. Response A is not correct as the statement refers to a conversion feature found in convertible debt, not venture debt. Response B is not correct as venture debt typically carries a shorter maturity of three years or less.

3. Discuss how the markets for leveraged loans and collateralized loan obligations are related to each other.

   Solution

   The market for leveraged loans is driven by the market for buyout equity transactions as these types of loans are a common source of funding buyout deals. Many investors in private debt markets access leveraged loans by investing in CLOs, which are created from pools of leveraged loans. Therefore, the markets for leveraged loans and CLOs are closely related as CLOs require pools of leveraged loans from which to create the CLO securities.

4. Consider two mature companies: one publicly traded and the other recently taken private in a buyout deal. Both companies have similar ratios of debt relative to assets. Discuss differences that are likely to be observed between these two companies with respect to their cash flows, credit ratings, debt covenants, and expected returns on debt securities.

   Solution

   Cash flows and credit ratings: The cash flow stability and predictability is likely superior for the publicly traded company compared to the newly private company. As a result, the publicly traded company may have a better credit rating and lower likelihood of default as compared to the newly private company.

   Debt covenants: The public company is more likely to face fewer covenant restrictions compared to the newly private company. As an example, the higher likelihood of financial distress among private buyout debt issuers usually leads leveraged loan investors to require a first or second lien on certain assets, an investor protection which increases the recovery rate in the event of default. Additional constraints on issuers in the form of restrictive covenants are also common for leveraged loans.

   Expected returns on debt securities: Investors in the debt of the newly private company likely face greater risk of default as well as more liquidity risk associated with their investment, and so they are likely to demand higher

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expected returns as compared to expected returns on the debt of the similar public company.

LEVERAGED LOANS, HIGH YIELD, AND CONVERTIBLE BONDS

3

☐ discuss the use of leveraged loans, high-yield bonds, and convertible bonds in private market strategies

The distinctive features of leveraged loans, high-yield bonds, and convertible bonds lead to specific benefits and risks of these fixed-income instruments to both private markets issuers as well as investors across the investment life cycle.

While these debt instruments are distinguished by either fixed or variable-rate coupons, as well as contingency features, all three incorporate spreads versus comparable risk-free government securities which compensate investors for the likelihood of issuer default, loss severity if a default occurs, and relative liquidity.

Credit spreads vary widely across issuers, seniority rank, and time periods, while liquidity tends to be higher for listed bonds than leveraged loans.

In contrast to investment grade loans and bonds, half or more of the total yield-to-maturity of high-yield bonds is often attributable to yield spread for private market issuers, which fall within the sub-investment grade category.

A comparison of the features of leveraged loans, high-yield bonds, and convertible bonds, as well as mezzanine debt introduced later in this learning module, is summarized in Exhibit 4.

Exhibit 4: Comparison of Private Market Debt Features

Feature	Leveraged Loans	High-Yield Bond	Convertible Debt	Venture Debt	Mezzanine Debt
Private equity phase	Buyout	Buyout	Early stage / acquisition	Early stage	Growth stage/ buyout
Tenor	4–7years	5–10 years	3–7 years	Up to 3 years	7–10 years
Debt coupon	Variable rate (MRR) plus credit spread	High fixed coupon	Zero or low fixed coupon	High fixed or floating coupon	High fixed or floating coupon
Seniority	Senior secured	Subordinated	Senior unsecured	Senior (usually)	Subordinated
Contingency	Callable by issuer at par shortly after issuance	Callable by issuer at a fixed price over par after a lockout period	Convertible to common shares at a fixed price	Warrants	Warrants and/or PIK coupon
Price appreciation potential	Often limited by issuer par call feature	Often capped by issuer fixed-price call feature	Often unlimited as issuer shares appreciate	Often unlimited if combined with warrants	Often unlimited if combined with warrants

Unitranche debt includes more than one of these debt types in a single facility.

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Note that while high-yield bonds and convertible bonds are used in private market strategies, most private debt professionals and investors do not consider them as part of the private debt asset class.

Leveraged Loans

Earlier Fixed Income lessons distinguished floating-rate loan features from fixed-rate bonds. Debt coupons fluctuate over time as the MRR changes, while the issuer-specific credit spread is usually fixed for the entire loan term. As base rates adjust to market conditions, the price of a leveraged loan remains close to par if market credit spreads and issuer credit quality are unchanged. This interest rate feature, in addition to the right to prepay loans at par, provide issuers greater flexibility than other term financing alternatives. Leveraged loans are commonly used in private buyout situations as well as for acquisition financing in which the loan is secured by target company assets, as in the following case study.

CASE STUDY

Everfloat Limited Acquisition and Leveraged Loan

Everfloat Ltd. is a UK-based firm owned by a private equity sponsor which manufactures, sells, and distributes marine-based navigation and logistics equipment. As part of its restructuring plan, Everfloat has established a holding company (Everfloat Holdings) which fully owns an operating subsidiary (Everfloat Products). Everfloat Products has acquired Boatswain Industries—the computer-based navigation technology division of a separate public company–for a purchase price of GBP500 million. Everfloat Products intends to integrate Boatswain into its operations over three to five years and has access to the leveraged loan market based upon the following terms in Exhibit 5.

Exhibit 5: Everfloat Products Leveraged Loan Summary of Terms

Issuer:	Everfloat Holdings ("Everfloat")
Settlement date:	[T + 3 Business Days]
Maturity date:	[Five Years from Settlement Date]
Principal amount:	GBP500 million
Interest:	MRR plus 300 bps per annum (p.a.) MRR is reset and interest is paid semiannually
Interest payment:	Commencing six months from [settlement date] to be paid semiannually with final payment on [maturity date]
Seniority:	The notes are secured and unsubordinated obligations of Everfloat Products and rank *pari passu* with all other secured and unsubordinated indebtedness.

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Maintenance covenant:	Issuer must maintain: (a) net interest bearing debt to EBITDA not greater than 5.50×, and (b) interest coverage ratio greater than 2.50× for each financial reporting period.
Business days:	London

The MRR on a leveraged loan often sets at the beginning of an interest period with payment at the end, which may be monthly, quarterly, or semiannually, as in the above case. For example, assuming an initial MRR in GBP terms of 4.40% and semiannual interest payable of MRR + 300 bps p.a., we may calculate Everfloat's initial interest coupon to be GBP18,500,000 (= GBP500 million × (4.40% + 3.00%)/2) if the interest period is exactly 0.5 years. Note that this payment will fluctuate with changes to MRR while the 300 bp spread is constant.

Consistent with the approach taken earlier in the curriculum, we consider the leveraged loan price (PV) without accrued interest on a given rate reset date. We further assume N evenly spaced periods to maturity, m equal periods per year, and a constant MRR for all cash flows. The 300 bp spread in the prior case is the **quoted margin (QM)** established at the time of loan issuance to compensate investors for issuer credit risk, while the **required margin** (or discount margin (DM)) is the market-determined yield spread over or under the MRR such that the leveraged loan is priced at par on a reset date.

Recall that the price of a fixed-rate, non-callable bond on a coupon date with the bond's future or par value of future value (FV), market discount rate r, and coupon payment PMT for N years is equal to:

$$\text{PV} = \frac{\text{PMT}}{(1+r)^1} + \frac{\text{PMT}}{(1+r)^2} + \ldots + \frac{\text{PMT} + \text{FV}}{(1+r)^N}. \tag{1}$$

The numerators in Equation 1 are constant, while the market discount rate r changes as the yield-to-maturity (comprising benchmark rates and credit spreads) changes. For a floating-rate loan in contrast, the *numerator* of the present value calculation changes each period as a function of the MRR and the *quoted* margin, while the market discount rate in the *denominator* depends on the MRR and the market-driven DM:

$$\text{PV} = \frac{\frac{(\text{MRR} + \text{QM}) \times \text{FV}}{m}}{\left(1 + \frac{\text{MRR} + \text{DM}}{m}\right)^1} + \frac{\frac{(\text{MRR} + \text{QM}) \times \text{FV}}{m}}{\left(1 + \frac{\text{MRR} + \text{DM}}{m}\right)^2} + \ldots + \frac{\frac{(\text{MRR} + \text{QM}) \times \text{FV}}{m} + \text{FV}}{\left(1 + \frac{\text{MRR} + \text{DM}}{m}\right)^N}. \tag{2}$$

We must divide by m periods per year in Equation 2, as MRR, QM, and DM are quoted as annual rates.

Note that an investor faces far less exposure to interest rate risk under a floating rate structure but remains exposed to credit spread risk.

Let us return to the earlier case of Everfloat to contrast the leveraged loan financing alternative with fixed, non-callable debt.

CASE STUDY

Everfloat Leveraged Loan vs. Bond Financing

Assume that Everfloat Holdings has a hypothetical choice between financing the Boatswain acquisition using the five-year leveraged loan shown earlier based upon MRR plus 300 bps p.a. and five-year, non-callable bonds at a fixed, semiannual coupon rate equal to 7.40%, comprising the five year gilt yield benchmark plus a 300 bp spread. Assuming a flat GBP yield curve (that is, both MRR and five

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year gilt yields at 4.40%) and similar changes to credit spreads across the two forms of debt with the same day count convention, consider the effect of the following scenarios on the leveraged loan and the fixed-rate bond.

1. Discuss the change in interest expense to Everfloat and value of the leveraged loan and non-callable bond debt outstanding if benchmark interest rates fall by 100 bps at the end of the first semiannual interest period and credit spreads remain unchanged.

   Solution

   Interest expense on the fixed-rate bond is a constant 7.40%, equal to GBP18,500,000 (= GBP500,000,000 × 0.074/2) at the initial 4.40% MRR regardless of interest rate changes. As for the leveraged loan, a 100 bps decrease in MRR to 3.40% reduces Everfloat's periodic interest expense to GBP16,000,000 (= GBP500 million × (3.40% + 3.00%)/2).

   We can solve for the value of fixed-coupon debt outstanding in six months using Equation 1 for the fixed-rate bond with nine periods remaining and a new yield-to-maturity of 6.40% (= 7.40% – 1.00%):

   $$\text{PV} = \frac{\text{GBP}18,500,000}{(1+0.064/2)^1} + \frac{\text{GBP}18,500,000}{(1+0.064/2)^2} + \ldots + \frac{\text{GBP}518,500,000}{(1+0.064/2)^9},$$

   or, alternatively, the PV spreadsheet function (= –PV(*rate,nper,pmt,fv,type*), or (= –PV(0.064/2,9,18500000,500000000,0) to arrive at a price of GBP519,284,988, or a 3.86% price increase (= (519,284,988 – 500,000,000)/500,000,000) due to the 100 bps fall in the benchmark yield.

   As for the leveraged loan, Equation 2 becomes:

   $$\text{PV} = \frac{\frac{(0.064)\times 500,000,000}{2}}{\left(1+\frac{0.064}{2}\right)^1} + \frac{\frac{(0.064)\times 500,000,000}{2}}{\left(1+\frac{0.064}{2}\right)^2} + \ldots + \frac{\frac{(0.064)\times 500,000,000}{2} + 500,000,000}{\left(1+\frac{0.064}{2}\right)^9}.$$

   We may solve for PV by first calculating the *PMT* of GBP16,000,000 (= (GBP500 million × (3.40% + 3.00%)/2) and then using a spreadsheet program or financial calculator to arrive at par, or GBP500,000,000, or no change in the price due to the benchmark yield change. Note the difference between the leveraged loan and the fixed-rate bond calculation is that while the denominators are identical, the leveraged loan numerator has also adjusted to the market rate, while the fixed-rate bond payment remains constant.

2. Discuss the relative change to Everfloat's interest expense and the value of debt outstanding at the end of the first semiannual interest period if Everfloat's required or discount margin were to rise 100 bps above the quoted margin, with benchmark rates unchanged.

   Solution

   Interest expense on the fixed-rate bond remains a constant 7.40% equal to GBP18,500,000 (= GBP500,000,000 × 0.074/2). While the *discount* margin has risen 100 bps, the *quoted* margin on which Everfloat's periodic leveraged loan debt coupon is still 300 bps and periodic interest expense remains at GBP18,500,000 (= GBP500 million × (4.40% + 3.00%)/2).

   The 100 bps increase in discount margin in six months is reflected in a higher yield-to-maturity of 8.40% (= 7.40% + 1.00%) for the remaining 4.5 years.

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Solve for the value of fixed-coupon debt outstanding in six months using Equation 1:

$$\text{PV} = \frac{\text{GBP}18,500,000}{(1+0.084/2)^1} + \frac{\text{GBP}18,500,000}{(1+0.084/2)^2} + \ldots + \frac{\text{GBP}518,500,000}{\left(1+\frac{0.084}{2}\right)^9},$$

or the PV spreadsheet function (= –PV(*rate,nper,pmt,fv,type*), or (= –PV(0.084/2,9,18500000,500000000,0) to arrive at a price of GBP481,579,922, or a 3.68% price *decrease* (= (481,579,922–500,000,000)/500,000,000) due to the 100 bps rise in the market credit spread.

In the case of the leveraged loan, the *quoted* margin used to calculate the periodic debt coupon in the numerator remains unchanged, while the *discount* margin in the denominator is higher due to the deterioration in the market's view of Everfloat credit risk. Equation 2 becomes:

$$\text{PV} = \frac{\frac{(0.074)\times 500,000,000}{2}}{\left(1+\frac{0.084}{2}\right)^1} + \frac{\frac{(0.074)\times 500,000,000}{2}}{\left(1+\frac{0.084}{2}\right)^2} + \ldots + \frac{\frac{(0.074)\times 500,000,000}{2} + 500,000,000}{\left(1+\frac{0.084}{2}\right)^9}.$$

We can solve for PV by first calculating *PMT* of GBP18,500,000 (= GBP500 million × (4.40% + 3.00%)/2) and then using a spreadsheet program or financial calculator to arrive at a PV of GBP481,579,922. Note the difference here is that the numerator of the leveraged loan and the fixed-rate bond calculations remain unchanged, while the denominators both rise to adjust to the market credit spread for Everfloat.

The case study above highlights key differences and similarities between interest rate exposure faced by issuers and investors for leveraged loans and non-callable fixed-rate bonds. For example, while changing short-term MRR rates result in adjusted debt coupons payable by leveraged loan issuers to investors, bond investors receive a constant coupon while facing capital gains (losses) in a lower (higher) benchmark rate environment.

The quoted versus discount margin on a leveraged loan on the other hand is an important determinant of its price on a reset date. As shown in the case study, a leveraged loan will be priced at par if the quoted margin and discount margin are equal, but at a discount if a higher margin required by investors under adverse credit conditions is not reflected in the loan coupon. In the earlier case, the GBP18,420,078 discount (= 500,000,000–481,579,922) equals the 100 bps annuity difference calculated for the remaining life of the Everfloat loan. The following exhibit summarizes the relationship between the quoted versus discount margin and a leveraged loan's price on any reset date.

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Exhibit 6: Leveraged Loan Discount, Premium, and Par Pricing

Leveraged loan price	Description	Quoted Versus Discount Margin
Par	Loan trades at a price (PV) equal to its future value	QM = DM
Discount	Loan trades at a price below its future value	QM < DM
Premium	Loan trades at a price above its future value	QM > DM

As Exhibit 6 shows, leveraged loan price deviations from par *on a reset date* are due entirely to market spread changes. On a non-reset date, the *following* coupon payments are subject to both interest rate and market spread changes as the current period payment was fixed on the prior reset date.

As rising margins and growing cash flows translate into lower market credit spreads over a buyout restructuring phase, issuers have an incentive to refinance or prepay debt trading at a premium. The structural flexibility of leveraged loans also allows borrowers under a private buyout strategy to tailor debt terms to match business plan milestones. Examples include the renegotiation of covenants, extension of loan tenor, or setting a variable credit spread based upon financial leverage or coverage criteria targets to increase debt capacity or in exchange for fewer restrictive covenants.

Fixed-rate bond terms are more standardized and difficult to amend, with bond indenture changes often requiring the consent of a majority of bondholders to make changes. Early bond repayment also generally requires issuers to hold a **tender process** in which a voluntary offer is extended to all bondholders to repurchase outstanding bonds prior to maturity date at a specified premium to the market price within a specific timeframe. Highly rated bonds often include a so-called make-whole call protection allowing an issuer to pay bondholders a call price determined using a market discount rate close to that of a sovereign bond yield-to-maturity of comparable maturity. However, as the make whole call price usually far exceeds a bond's market price, they are rarely executed and have little to no impact on bond pricing.

High-Yield Bonds

As described earlier, high-yield bonds are fixed-rate debt instruments issued by sub-investment grade borrowers for a term of five to ten years on a subordinated basis, often at a holding rather than operating company level. These registered debt securities are subject to greater issuer disclosures and increased standardization, which also generally contributes to their greater liquidity versus leveraged loans.

Like other bonds, high-yield bonds are issued under an indenture specifying terms, conditions, and constraints imposed upon issuers by investors in the form of covenants. Given the aim of balancing investors' desire for basic bondholder protections and private issuer needs for flexibility to operate a business, high-yield bonds typically lack the maintenance covenants common in leveraged loans but retain restrictive covenants such as a **change of control provision** and include incurrence covenants such as those noted below.

A change of control clause typically requires the issuer to offer to repurchase outstanding bonds at a fixed price at or above par if a new owner acquires a predetermined percentage of voting shares. This provision gives lenders and bondholders the ability to put or sell back bonds to an issuer or renegotiate terms if they believe that ownership and management changes may adversely affect their ability to collect

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future interest and principal payments. Common high-yield incurrence covenants include those which limit certain borrower actions such as paying dividends, taking on additional debt, or selling assets under certain conditions.

An important distinguishing feature of high-yield bonds impacting their value is the fixed-price call feature. After a period of investor call protection of up to half of a bond's time to maturity, an issuer may call outstanding bonds at a fixed price over par starting at a premium equal to half of the coupon (which steps down over time). Since the issuer call feature is embedded in the price of the bond, an issuer pays a higher coupon than would be expected for a non-callable bond of the same maturity. We can compare leveraged loan and high-yield bond financing alternatives based upon the earlier Everfloat case.

CASE STUDY

Everfloat High-Yield Bond Financing for the Boatswain Acquisition

As Everfloat weighs financing alternatives for the Boatswain acquisition, it considers high-yield bonds issued at the holding company level (Everfloat Holdings) to increase its flexibility to sell non-strategic assets within Boatswain during the integration period and reduce reliance on secured leveraged loan financing. In addition, Everfloat believes it may achieve a lower credit spread on its secured leveraged loan financing backed by pledged assets given the smaller debt tranche size. To ensure the best execution of its new high-yield bond issuance, Everfloat's advisors recommend a GBP300 million minimum size transaction. Everfloat solicits investor interest based upon the terms in Exhibit 7.

Exhibit 7: Everfloat High-Yield Bond Issue Summary of Terms

Issuer:	Everfloat Holdings ("Everfloat")
Settlement date:	[T + 5 Business Days]
Maturity date:	[Seven years from settlement date]
Principal amount:	GBP300 million
Interest:	9.00% p.a. paid semiannually
Interest payment:	Commencing six months from [settlement date] to be paid semiannually with final payment on [maturity date]
Seniority:	The notes are unsecured subordinated obligations of Everfloat Holdings and rank *pari passu* with all other subordinated indebtedness.
Call provision:	Everfloat Holdings may redeem some or all of the notes on any business day before [maturity] starting three years after [settlement] based upon the call price schedule as a percentage of the principal amount plus accrued interest.
Call price schedule (% of par):	104.5% [3–4 years after settlement] 103% [4–5 years after settlement] 101.5% [5–6 years after settlement] 100% [6–7 years after settlement]

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Incurrence test:	Test is met if issuer has (a) net interest bearing debt to EBITDA not greater than 5.00X and (b) an interest coverage ratio greater than 2.75× for each financial reporting period.
Change of control provision:	Bondholder has the right to sell bond to issuer at a price of 101 if (a) any person other than current holders or permitted holders become the beneficial owner of over 50% of issuer voting shares, or (b) all or substantially all of the assets of the restricted group are sold to any person other than to current or permitted holders.
Business days:	London

Similar to the prepayability of Everfloat's proposed leveraged loan, the high-yield bond grants the investor three years of call protection, after which the issuer may repurchase the bonds at a predetermined fixed premium.

Recall from earlier in the curriculum that the investor is long the bond and short the call option. Therefore, the call option value lowers the value of the high-yield bond relative to the value of a non-callable bond of similar tenor:

$$\text{Callable bond price} = \text{Value of straight bond} - \text{Value of issuer call option.} \quad (3)$$

The value of the non-callable bond may be obtained by discounting the bond's future cash flows at the appropriate rate (yield-to-maturity) or periodic discount rates as shown in Equation 1. For a high-yield bond, the call exercise is contingent upon future interest rates, and the issuer's decision to call depends upon its ability to refinance debt in the future at a lower cost.

In contrast to leveraged loans, the contingent call feature for a high-yield bond depends on the relationship between the bond's yield-to-maturity (comprising both benchmark rates and credit spreads) and its coupon rather than simply the difference between the quoted and discount margin. We illustrate the relationship between the callable high-yield bond and a hypothetical non-callable bond in the case of Everfloat.

CASE STUDY

Everfloat's High-Yield Bond Versus Non-Callable Fixed-Rate Debt

Consider Everfloat's proposed 9% seven year high-yield bond as of the first call date in three years. Under a simplified binomial interest rate tree approach adapted from earlier learning modules, we assume a flat yield curve, fixed interest rate volatility for the bond's yield for its remaining term, and annual interest rate changes based on a lognormal random walk to calculate the price of an identical, non-callable, fixed-rate bond.

That is, in one year, the remaining six-year bond's yield will either rise to a higher rate ($r_{1,H}$) or fall to a lower rate ($r_{1,L}$) with equal probability. Earlier in the curriculum, the relationship between these two rates was shown to be:

$$r_{1,H} = r_{1,L}e^{2\sigma}, \quad (4)$$

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where σ is the standard deviation and e is Euler's number (i.e., the base of natural logarithms, which is a constant 2.7183). If we start with r_0 equal to the 9.00% bond coupon and σ = 10%, then we may solve for the higher and lower rate in one period, or $r_{1,H}$ and $r_{1,L}$, respectively, as follows:

$$r_{1,H} = r_0 e^{\left(\sigma - \frac{\sigma^2}{2}\right)}, \tag{5}$$

$$9.897\% = 9.00\% e^{(0.1 - 0.005)},$$

$$r_{1,L} = r_0 e^{\left(-\sigma - \frac{\sigma^2}{2}\right)}, \tag{6}$$

$$8.103\% = 9.00\% e^{(-0.1 - 0.005)}.$$

We may solve for the bond's price under each rate scenario ($PV_{1,H}$ and $PV_{1,L}$, respectively) assuming a par value of 100 by substituting the rate on a financial calculator or the PV spreadsheet function (= –PV(*rate,nper,pmt,fv,type*)):

$PV_{1,H}$ = 96.014 = –PV(0.09897/2,12,4.5,100,0),

$PV_{1,L}$ = 104.197 =–PV(0.08103/2,12,4.5,100,0).

We may show this relationship using the following one-period framework in Exhibit 8.

Exhibit 8: One-Year Binomial Tree Framework

This analysis may be extended for another year by solving for $r_{2,HH}$, $r_{2,HL}$, $r_{2,LH}$, and $r_{2,LL}$ using a similar approach, noting that $r_{2,HL} = r_{2,LH}$ and the dispersion between the highest to lowest rates rises each period:

$$r_{2,HH} = r_{2,LL} e^{4\sigma}. \tag{7}$$

Exhibit 9 shows an example of possible bond yield and price scenarios in three years based upon a bond with four years remaining to maturity.

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Exhibit 9: Three-Year Binomial Tree Framework

1. Discuss how the bond price and yield outcomes shown in Exhibit 9 would differ in the case of Everfloat's high-yield bond.

   Solution

   According to Everfloat's high-yield bond terms, the issuer has the right to repurchase the bond three years after settlement at a price of 104.5 per 100. Note that three consecutive rate declines in the binomial tree ($r_{3,LLL}$ = 6.5681%) results in a price which exceeds the call price by 3.9342 (= 108.4342−104.5). Since a high-yield bond investor foregoes the full price appreciation of the non-callable equivalent if the bond is called, we expect the high-yield bond to trade at a higher yield, lower price than a similar non-callable bond. Using the same non-callable bond price and yield scenarios from above, Exhibit 10 illustrates the scenario in which the bond would be called in three years.

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Exhibit 10: Three-Year Binomial Tree Framework for Callable Bond

2. Evaluate the effect of higher interest rate volatility on the price and yield outcomes in Exhibit 9 for the case of Everfloat's high-yield bond.

Solution

As for any embedded or stand-alone option transaction, the value of the call option in Everfloat's high-yield bond increases in value as interest rate volatility rises. This is reflected in both a greater dispersion of bond yields and prices and an increased likelihood that the bond is called. We can show this effect by taking the same approach as in solution 1, using non-callable bond prices to illustrate the price and yield scenarios in which the bond would be called in three years under the assumption of 15% interest rate volatility. In this example with higher volatility, the bond would be called in the two lowest-yield outcomes as shown in Exhibit 11.

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Exhibit 11: Three-Year Binomial Tree Framework for Callable Bond (15% Volatility)

While the above case takes a simplified approach to comparing callable high-yield to non-callable bonds, practitioners typically evaluate risky bonds using either an issuer-specific yield curve with borrowing rates over different tenors, or a series of default risk-free zero rates plus a constant spread estimated using the market prices of comparable bonds for issuers of similar credit quality, known as the **zero-volatility spread (Z-spread)**, while also taking credit spread volatility into account. The **option-adjusted spread (OAS)** is a generalization of the Z-spread calculation that incorporates bond option pricing based on assumed interest rate volatility. The OAS measure is the constant yield spread over the zero curve, which makes the arbitrage-free value of a bond equal to its market price, allowing comparisons across callable, putable, and non-callable bonds.

Characteristics of the price–yield relationship for both leveraged loans and high-yield bonds are noteworthy for both private market issuers and investors. For fixed-rate bonds, it was established earlier in the CFA Level I curriculum under an analytical duration approach that the change in a bond's price for a given change in benchmark yield is the combination of a negative, linear first-order **duration** component and a usually positive, non-linear second-order **convexity** component, as shown in Exhibit 12.

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Exhibit 12: Price–Yield Relationship for an Option-Free Bond

The price–yield relationship for default risk-free, non-callable government bonds and investment grade bonds with highly certain cash flows differs from that of leveraged loans and high-yield bonds. When future cash flows are less certain, the use of an effective duration measure is the relevant statistic to measure a bond price's interest rate sensitivity:

$$\text{Effective Duration (EffDur)} = \frac{(PV_{-}) - (PV_{+})}{2 \times (\Delta\ \text{Curve})(PV_0)}. \tag{8}$$

This measure involves pricing the underlying bond or loan given an instantaneous parallel shift in the issuer-specific yield curve (ΔCurve), with a price increase (PV_+) or decrease (PV_-) from the initial price (PV_0).

For a high-yield bond, its non-callable equivalent will always have a higher price due to the call option value as shown in Equation 3. In the Everfloat case, it was shown that when interest rates are low relative to the bond coupon, the issuer is more likely to exercise the option to refinance its debt at lower prevailing rates. Exhibit 13 shows how this affects the price–yield relationship versus an option-free bond.

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Exhibit 13: Price–Yield Relationship for a Callable High-Yield Bond

The price–yield sensitivity of floating-rate leveraged loans is a different story. Changing short-term MRRs result in adjusted debt coupons for floating-rate loans and notes, which is why leveraged loans demonstrate little to no price change for a given *benchmark* yield change. As noted earlier, leveraged loan price changes are largely driven by yield spread changes, with the **effective spread duration** (EffSpreadDur) being the appropriate measure:

$$\text{EffSpreadDur} = \frac{(PV_{-}) - (PV_{+})}{2 \times (\Delta\text{Spread})(PV_0)} \tag{9}$$

Note the difference between Equation 7 and Equation 8 is that ΔSpread has replaced ΔCurve in the denominator for leveraged loans.

CASE STUDY

Effective Duration of Everfloat's Acquisition Financing Alternatives

Sue Park is a research analyst at a private debt fund considering an investment in Everfloat's acquisition debt financing. Although the leveraged loan and high-yield bond alternatives have features which differ from non-callable bonds, as a starting point she calculates the effective duration for both the non-callable, 7.40%, five-year bond and the 9.00% seven-year bonds priced at par for *ΔCurve* = 0.0005 using Equation 8:

$$\text{EffDur} = \frac{(PV_{-}) - (PV_{+})}{2 \times (0.0005)(100)}.$$

7.40% Five Year:

PV_0 = 100 with a yield of 7.40%

PV_{-} = 100.206 with a yield of 7.35% (= −PV(0.0735/2,10,0.074/2×100,100,0))

PV_{+} = 99.794 with a yield of 7.45% (= −PV(0.0745/2,10,0.074/2×100,100,0))

$$\text{EffDur} = 4.117 = \frac{(100.206) - (99.794)}{2 \times (0.0005)(100)}.$$

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9.00% Seven Year:

$PV_0 = 100$ with a yield of 9.00%

$PV_- = 100.256$ with a yield of 8.95% (= −PV(0.0895/2,14,0.09/2×100,100,0))

$PV_+ = 99.745$ with a yield of 9.05% (= −PV(0.0905/2,14,0.09/2×100,100,0))

$$\text{EffDur} = 5.111 = \frac{(100.256) - (99.745)}{2 \times (0.0005)(100)}.$$

1. Discuss the relationship between the interest rate sensitivity of the non-callable, five-year bond and the proposed leveraged loan for the Boatswain acquisition.

   Solution

   This is a comparison between a non-callable, five-year, fixed-rate bond and a prepayable, five-year, floating-rate loan. Changing short-term MRR rates result in adjusted debt coupons for the floating-rate leveraged loans. The leveraged loan exhibits little to no price change for a given benchmark yield change, but the loan price changes when market credit spreads change as measured by effective spread duration. The non-callable bond price will change given changes in benchmark yields and spreads, so we would expect it to be more sensitive to overall interest rate changes than the leveraged loan.

2. Discuss the relationship between the effective duration of the non-callable, seven-year bond and that of the proposed Everfloat seven-year, high-yield bond.

   Solution

   Consider the interest rate sensitivity of a non-callable bond versus an otherwise identical callable bond. Interest rate changes will have a smaller effect on the callable bond price because at lower yields, price appreciation is limited by the possibility that the bond will be called by the issuer at the predetermined call price.

In general, as the prior case study shows, the effective duration of a non-callable fixed-rate bond always exceeds that of a high-yield bond of the same maturity due to the issuer call option, which increases in value as yields fall. In addition, the interest rate sensitivity of a leveraged loan's price is directly tied to yield spread changes only given the periodic MRR reset based upon market conditions. Note that this limited *price* sensitivity to yield changes does not shield issuers or investors from the risk of short-term yield or MRR fluctuations, which directly affect periodic coupons and therefore the interest expense of issuers and interest income of investors.

Under certain market conditions, the actual price movements of high-yield bonds may differ substantially from what analytical models based on benchmark rates and credit spreads would suggest. For example, issuer financial distress will have a much greater impact on a high-yield bond's price than benchmark rate movements. Also, under a "flight to quality" market stress scenario, investors shun risky assets, causing higher risk, lower rated bonds to fall in price as the price of default risk-free government bonds rises. This observed negative correlation between high-yield spreads and benchmark yields leads practitioners to apply statistical models and historical market data to estimate **empirical duration** as opposed to relying on analytical duration estimates.

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The following case study from the COVID-19 pandemic illustrates the divergence between analytical and empirical duration for the high-yield bond market.

HIGH-YIELD BOND MARKET DURING THE COVID-19 PANDEMIC

Global flight restrictions in February of 2020 and the World Health Organization's declaration of a global pandemic in early March led to economic shutdowns in mid-March, a selloff in risk assets, and a sharp decline in both equity markets and US Treasury yields.

A strictly analytical duration approach would imply that a decline in benchmark yields leads to a lower all-in yield to maturity for a fixed-coupon corporate bond and therefore a higher price. Exhibit 14 shows the actual change in high-yield corporate credit spreads rated BB versus US Treasury yields.

Exhibit 14: US Treasury Yields Versus US Corporate BB Spreads, 2020

Source: Bloomberg

As investors rapidly shed risk in the wake of the COVID-19 pandemic in early 2020, macroeconomic factors driving government bond yields-to-maturity *lower* caused high-yield bond credit spreads to *rise* due to an expectation of a greater likelihood and higher severity of financial distress.

Convertible Bonds

Convertible bonds are long-term fixed-income instruments which allow investors to exchange debt into equity at a predetermined **conversion price** per share during a **conversion period** in the future. Exhibit 15 shows the payoff profile for a convertible bond introduced earlier in the curriculum as a function of the issuer's share price.

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Exhibit 15: Convertible Bond Price Versus Share Price

In contrast to Equation 3 for high-yield bonds, a convertible bond value is:

Convertible bond value

= Value of straight bond + Value of call option on issuer stock. (10)

Convertible bond prices exhibit fixed income characteristics when the conversion feature is unlikely to be exercised and have equity-like features as shares rise to near or above the price at which conversion occurs. From left to right in Exhibit 15, the first quadrant (*A*) reflects a distressed case as convertible and straight bond values are nearly equal and equity value is close to zero. Quadrant *B* shows the case in which the convertible bond's value is more closely aligned with expected interest and principal payments, while Quadrant *C* involves the hybrid case in which the share price is near the conversion price. As the issuer share price rises above the conversion price, the convertible bond price approaches the equity value as shown in Quadrant *D*.

Convertible bonds are more common in early-stage and growth strategies for private companies, where issuers may raise debt as a low-cost alternative to common shares. These bonds offer equity upside in the form of conversion rights to investors otherwise unwilling to lend to firms with less stable cash flows and few assets to secure debt. In contrast to both leveraged loans and high-yield bonds, convertible debt is typically senior unsecured with no financial covenants and a debt coupon well below that of non-callable debt. Given the lack of a publicly traded underlying share price, convertible debt issued by private companies is less liquid and typically in the form of privately placed convertible notes. Common convertible bond indenture terms include change of control protection as well as the right to trigger conversion at a discounted price to capture the effects of dilution in the case of new equity financing. Consider the startup company Kumartest LLC introduced in an earlier lesson module and its convertible note financing alternative to new equity issuance.

CASE STUDY

Kumartest LLC Convertible Note Offering

Six years after it was founded, the private medical device startup firm Kumartest LLC reached USD70 million in annual sales and is close to earning a profit. As the company lacks the manufacturing capacity to grow its business and expand to new markets, Kumartest is considering a USD30 million convertible

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debt offering as an alternative to common equity or convertible preferred shares. Given an estimated 3× price-to-sales ratio for comparable companies, Kumartest's pre-money valuation was estimated to be USD210 million, which, when divided by the 1,334,871 pre-financing shares outstanding, resulted in a current share price of USD157.32 (= 210,000,000/1,334,871). A private debt fund has provided Kumartest senior management with the following proposed convertible note terms in Exhibit 16.

Exhibit 16: Kumartest LLC Proposed Convertible Bond Terms

Issuer:	Kumartest LLC
Settlement Date:	[T + 3 business days]
Maturity Date:	Five years from settlement date unless the notes are redeemed earlier in a conversion.
Principal Amount:	USD30 million
Interest:	0% p.a.
Seniority:	The notes are a senior unsecured obligation of Kumartest and rank *pari passu* with any other unsecured debt.
Conversion Provision:	At its sole option, an investor has the right to convert a portion or the full sum of the principal amount, or any part outstanding at any time at the conversion price during the conversion period.
Current Price:	USD157.32 per common equity share
Conversion Price:	USD275.00 per common equity share
Conversion Period:	Any business day starting one year from the settlement date through the maturity date
Covenants:	Negative pledge of assets
Business Days:	London

Kumartest convertible debt investors are willing to forego a debt coupon in exchange for conversion rights. These investors have the right to exchange debt for Kumartest common stock at a price of USD275 per share, a 74.8% premium over the current Kumartest price of USD157.32 per share (= (275.00 – 157.32) / 157.32). The **conversion ratio** represents the number of common shares a bond may be converted into for a specific par value:

$$\text{Conversion ratio} = \text{Convertible bond par value} / \text{Conversion Price}. \tag{11}$$

For example, if the Kumartest note has a USD1,000 face value:

- The conversion ratio is equal to USD1,000 / USD275 or 3.64.
- An owner of one USD1,000 Kumartest bond may redeem the bond for 3.64 shares of common stock during the conversion period.

The **conversion value** is derived by comparing the convertible bond's price with its value if the bondholder were to exchange bonds for shares today:

$$\text{Conversion value} = \text{Conversion ratio} \times \text{Current share price}. \tag{12}$$

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For example, if we assume that Kumartest is valued at a share price of USD350 in five years' time, a convertible noteholder could convert one USD1,000 bond to shares with a conversion value of USD1,274 (= 3.64 × USD350). While this value is used frequently when comparing a publicly traded issuer share price with the market price of a convertible bond, in the case of illiquid private convertible notes exchanged for non-traded private shares, conversion values are more difficult to estimate except at the time of an IPO of issuer shares, a private sale of the company, or a new equity financing.

CASE STUDY

Kumartest Growth Financing with Convertible Notes

As Kumartest's senior management weighs the convertible note proposal in order to finance its proposed growth strategy, it decides to consider both potential outcomes of the strategy as well as possible future equity dilution.

1. Discuss the payoff profile of Kumartest convertible bond under different possible scenarios at the time of maturity assuming no additional financing occurs.

   Solution

   The payoff profile of a preferred shareholder involves two possible outcomes:

   - Share price < Conversion price: If Kumartest's share price remains below the conversion price of USD275 per share, then Kumartest bondholders will receive the bond's face value equal to USD30 million at the time of maturity, assuming no default.
   - Share price > Conversion price: If Kumartest shares appreciate beyond the USD275 conversion price, then the debtholders will exchange the convertible note for shares and receive the conversion value as per Equation 12:

   $$\text{Conversion value} = \text{Conversion ratio} \times \text{Current share price}.$$

   For example, if Kumartest's share price is USD400, then a USD1,000 par value noteholder will receive shares valued at USD1,456 (= 3.64 × USD400).

2. Discuss the fractional ownership of Kumartest convertible noteholders if the notes are fully exchanged for newly issued shares.

   Solution

   Exchange of all convertible notes for newly issued Kumartest shares will lead to the issuance of 109,200 additional shares (= 30,000 × 3.64), or 30,000 USD1,000 bonds at a conversion ratio of 3.64. Given that Kumartest has 1,334,871 existing shares outstanding, post-conversion ownership by convertible noteholders is 7.56% calculated as follows:

   $$7.56\% = \frac{109,200}{(109,200 + 1,334,871)}.$$

   The convertible noteholders' fractional ownership dilutes the ownership stake of the existing equity holders such that their ownership has declined by 7.56%, from 100% to 92.44%.

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Standard measures of interest rate sensitivity are not applicable to convertible bonds given their sensitivity to the issuer's stock price over time. In the next section, we will explore forms of debt financing, which are predominantly offered by non-bank lenders.

QUESTION SET

1. Which one of the following statements describes a typical contingency feature of a leveraged loan?

   A. Loan is callable at par.

   B. Loan is callable at a fixed price above par.

   C. Loan interest may be paid in kind.

   Solution

   A is the correct response. Leveraged loans typically have floating coupons with changing MRRs, which cause prices to remain close to par. A common contingency of leveraged loans allows for callability at a price of par, providing a borrower the flexibility to pay down debt. For example, if the issuer's credit quality improves, they may be able to access more favorable financing terms. Response B is incorrect as this contingency is typically associated with a high-yield bond. Response C is incorrect as this feature is associated with mezzanine debt.

2. An issuer has decided it makes the most sense to prepay an outstanding leveraged loan versus other outstanding debt obligations. Which of the following is the most likely reason?

   A. Decrease in the market reference rate

   B. Decrease in the quoted margin

   C. Decrease in the discount margin

   Solution

   C is the correct response. A decline in the discount margin occurs because the issuer's credit quality has improved. A leveraged loan's price increases with a decline in the market discount rate below the quoted margin (i.e., QM > DM), and the issuer is more likely to call the leveraged loan. Response A is incorrect as the coupon on the leveraged loan is floating at MRR plus QM. A decline in MRR causes the coupon to decrease, keeping the loan's price at par as the market discount rate declines. Response B is incorrect as the QM is fixed at the time the loan is made and is less likely to be changed unless the change in credit quality can be tied to achievement of a specified business milestone.

3. Suppose we observe two bonds that are identical other than two characteristics: bond value or coupon. Which one of the following statements best describes the likely relationship between a callable high-yield bond and an otherwise identical bond without a call feature?

   A. Callable bond has higher value or higher coupon.

   B. Callable bond has higher value or lower coupon.

   C. Callable bond has lower value or higher coupon.

   Solution

   C is the correct response. Suppose the two bonds have identical coupons. In this case, the value of a callable bond is equal to the value of an other-

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wise identical non-callable bond minus the value of the call feature to the bond's issuer. Given that the call feature is an option, its value is most likely greater than zero. Thus, the callable bond has a lower value than its identical non-callable bond. If we instead assume that the two bonds have equal value, then the issuer call feature is embedded in the price of the bond, an issuer pays a higher coupon than would be expected for a non-callable bond of the same maturity. Response A is incorrect as the call feature would have to add value to the non-callable bond for either higher value or higher coupon on the callable to be possible. Response B is incorrect as this statement is the exact opposite of the correct response. With the same coupon, the non-callable must have lower value because of the value of the issuer's call feature.

4. The price–yield sensitivities of leveraged loans and high-yield bonds are usually best measured by which of the following duration measures, respectively?

   A. Effective duration for leveraged loans and effective spread duration for high-yield bonds

   B. Effective spread duration for leveraged loans and effective duration for high-yield bonds

   C. Effective duration for both leveraged loans and high-yield bonds

   Solution

   Response B is correct. Leveraged loans are usually floating-rate notes, so their prices do not change with benchmark yields. Rather, their prices are only sensitive to changes in issuer-specific credit spreads. Therefore, an effective spread duration measure is more appropriate. The price–yield sensitivity of high-yield bonds, on the other hand, are reflective of changes in issuer-specific discount rates, so effective duration is a better measure.

5. Discuss features of convertible debt that make it an attractive financing choice for early-stage growth companies as compared to leveraged loans or high-yield bonds.

   Solution

   Issuers of early-stage growth companies may choose to raise debt as a low-cost alternative to common shares. Convertible bonds offer equity upside in the form of conversion rights to investors otherwise unwilling to lend to firms with less stable cash flows and few assets to secure debt. In contrast to both leveraged loans and high-yield bonds, convertible debt is typically senior unsecured with no financial covenants and a debt coupon well below that of non-callable debt.

MEZZANINE AND UNITRANCHE DEBT

4

☐ contrast the use of mezzanine debt and unitranche debt in private market strategies;

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As described earlier, private market strategies often use mezzanine structures for subordinated borrowing while offering equity-like returns, or unitranche debt, which combines senior and subordinated debt components into a single facility. Leveraged loans, high-yield bonds, and convertible debt described earlier typically involve either traded public securities or loans underwritten by bank syndicates with standardized terms and disclosures.

In contrast, mezzanine and unitranche debt are highly flexible and tailored to specific issuer and investor needs. As they involve non-standard terms as well as private, confidential reporting, they are often unrated and highly illiquid. These debt forms are primarily the domain of non-bank lenders, with general partners frequently holding a large proportion of a single facility, which increases the ability to directly negotiate initial debt terms and make modifications over time as needed with a private borrower.

Mezzanine Debt

Mezzanine debt is generally subordinated and of a longer tenor than other forms of borrowed capital. Terms vary widely across transactions and regions, with North American structures often more bond-like in nature—that is, unsecured with fixed debt coupons—while European mezzanine debt tends to involve floating rates and often holds a second lien or subordinated claim to company assets, as in the case of leveraged loans. In each case, given its longer time to maturity with no amortization, deferred debt service in the form of paid in kind interest or the inclusion of warrants, mezzanine debt is commonly used to ease initial cash flow pressures in growth or buyout equity transactions as well as acquisitions.

The positioning of mezzanine debt claims after senior secured debt may occur in the forms of either contractual subordination or **structural subordination**.

Exhibit 17: Contractual Subordination

As shown in Exhibit 17, under contractual subordination, senior secured and mezzanine debtholders lend to the same OpCo and sign a contract known as an **intercreditor agreement**. The intercreditor agreement specifies priority of claims, details between lenders, and other key terms among debt tranches.

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Exhibit 18: Structural Subordination

Structural subordination as shown in Exhibit 18 involves debt issued at the HoldCo level as in the case of high-yield bonds, or one step removed from direct access to the operating company cash flows and pledged assets.

Note that in the case of contractual subordination, OpCo lenders have a claim against the assets of OpCo, while under structural subordination, lenders to the HoldCo parent company only have an *equity* claim to OpCo assets as the owner of its common stock. If OpCo were to issue preferred stock to any party other than the parent, then the claims of those preferred stockholders rank ahead of the issuer's common stock claims. Mezzanine debtholders are excluded from the OpCo security agreement governing pledged assets but have a residual HoldCo debt which is satisfied once OpCo senior secured claims are met.

We now revisit the Everfloat case to evaluate a possible role for mezzanine debt in the Boatswain acquisition.

CASE STUDY

Everfloat Mezzanine Financing for the Boatswain Acquisition

Everfloat management has weighed two acquisition financing plans so far:

- Scenario 1: GBP500 million in five-year, senior secured leveraged loan financing at a yield of MRR + 300 bps (with initial MRR of 4.40%).
- Scenario 2: GBP300 million in 9.00%, seven-year, callable high-yield bonds, combined with GBP200 million in five-year, leveraged loans (with initial yield of MRR + 2.75%).

Given the smaller secured loan tranche, Everfloat believes it can realize a lower yield spread of 275 bps p.a. on its floating-rate loan under the second scenario. However, a third scenario emerges.

- Scenario 3: Initial discussions with Spleenwood Capital, a private debt fund, raise a third option, namely a longer term GBP100 million mezzanine debt tranche privately placed with the latest vintage Spleenwood Capital private credit fund and a GBP400 million senior

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secured leveraged loan (yielding MRR + 2.90%). Everfloat's management has received the following preliminary term sheet from Spleenwood in Exhibit 19.

Exhibit 19: Everfloat Holdings Mezzanine Debt Summary of Terms

Issuer:	Everfloat Holdings
Settlement Date:	[T + 5 business days]
Maturity Date:	[Ten years from settlement date]
Principal Amount:	GBP100 million
Interest:	10.00% p.a. paid semiannually
Interest Payment:	Commencing six months from [settlement date] to be paid semiannually with final payment on [maturity date]
Seniority:	The notes are unsecured subordinated obligations of Everfloat Holdings and rank *pari passu* with all other subordinated indebtedness.
Business Days:	London

1. Given its preference for staggered debt maturities and a balance between fixed versus floating-rate debt, Everfloat is leaning towards the second or third scenario. If Everfloat estimates that it will be able to realize a 290 bps p.a. spread for a GBP400 million loan tranche, calculate its expected annual interest rate savings under the third versus the second scenario (focus on the initial period before any principal is paid back and assume a flat yield curve).

   Solution

   Compare initial annual interest expense for the second and third scenarios:

   - Scenario 2: GBP41,300,000 (= 500 million × (0.4 × 7.15% + 0.6 × 9.00%)).
   - Scenario 3: GBP39,200,000 (= 500 million × (0.8 × 7.30% + 0.2 × 10.00%)).

   Thus, Scenario 3 results in a GBP2,100,000 initial interest expense savings.

2. Discuss two possible mezzanine structure changes that Everfloat might propose (other than size and tenor) to reduce near-term interest burden and their expected effect on overall financing cost.

   Solution

   Two possible mezzanine debt features which Everfloat may use to reduce its near-term interest burden include a payment in kind feature or the inclusion of warrants.

   A payment in kind feature involves investors foregoing several years of interest payments in exchange for an equivalent increase in debt principal. Given the greater risk associated with this deferred interest structure, Everfloat should expect to pay a higher overall debt coupon.

   The use of warrants on the other hand may be used to reduce the fixed debt coupon. However, this lender right to purchase Everfloat's common shares

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at a predetermined price in the future introduces the possibility of future equity dilution as shares appreciate.

As the Everfloat case demonstrates, considerations beyond interest expense, such as staggered debt maturities, restrictions on asset sales, fixed versus floating interest rate exposure, seniority of debtholder's claim, loan covenants, and other contingencies, all play a role in establishing the most appropriate debt structure for private market strategies. As the most flexible form of subordinated debt, mezzanine structures may be tailored in several ways to meet issuer and investor needs.

Unitranche Debt

In contrast to more complex private company debt profiles combining leveraged loans, high-yield and/or convertible or mezzanine debt, unitranche debt offers a simpler alternative by combining senior and subordinated debt features into a single hybrid loan, as shown in Exhibit 20.

Exhibit 20: Unitranche Debt and Agreement Among Lenders

As is the case for other forms of private debt, unitranche debt is available in multiple forms, but often includes a combination of senior secured and subordinated or mezzanine debt. As shown in Exhibit 20, this single tranche loan may involve one blended interest rate reflecting the risk of combined tranches, with creditors separately agreeing to share differently in the risk and return of the consolidated loan exposure via an intercreditor **agreement among lenders**. As the name suggests, the borrower is not a party to this agreement.

The contractual arrangement between creditors may serve to reallocate the unitranche facility's interest and principal payments based upon a revised priority of claims among lenders with specific rights assigned to each, or exchange voting rights to make changes to the covenants or other loan terms. In other cases, the single unitranche debt facility contains two separate tranches or classes of debt: (1) a senior or so-called **first-out tranche**, which is at an interest rate below the blended rate with amortization prior to final maturity, and (2) a junior, subordinated, or **last-out tranche**, which is outstanding until maturity at a higher rate than the overall blended rate of a single tranche.

The most attractive feature of unitranche debt from a borrower perspective is the existence of one loan agreement, which can be executed more quickly and with lower fees than public securities or widely syndicated debt arrangements. The relationship among lenders can take several forms, ranging from *pari passu* treatment

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to redistribution of claims using an agreement among lenders. These lenders are often GPs who distribute debt to LPs within a closed-end private debt fund and can more directly engage with borrowers to renegotiate loan terms on a proactive basis as needed. That said, the non-standard terms of private debt facilities and complexity of agreements among lenders (to which the borrower is not a party) diverges from standard intercreditor agreements and traditional bond and loan structures, which have been widely tested in court. As a result, greater uncertainty exists as to how these private debt structures will perform in the event of financial distress, bankruptcy, and liquidation.

While initial demand for unitranche debt was from private equity firms financing buyouts for small and medium-sized firms with just one or very few lenders, use of this debt structure has become more widespread among larger private firms, as highlighted in the following example.

THE ACCESS GROUP'S UNITRANCHE DEBT TRANSACTION

The Access Group is a British company providing software application solutions to a variety of industries across the UK, Ireland, and the Asia-Pacific region.

In 2022, the Access Group borrowed GBP3.5 billion from a club of direct lenders to support its acquisition-focused growth strategy. The financing included a GBP2.3 billion unitranche facility in what is believed to be the largest unitranche debt deal in Europe to date, and a GBP1.2 billion acquisition facility.

The unitranche debt was priced at Libor plus 575 basis points with PIK. The direct lenders included twelve firms including well-known names such as Apollo Global Management, Blackstone, and GIC. In addition to more flexible terms, analysts cited lower pricing than for comparable public market transactions at the time.

As the company continued its acquisition strategy, plans for a GBP500 million add-on to the deal were under consideration the following year.

Let us consider a unitranche facility as an additional financing alternative in the Everfloat acquisition of Boatswain Industries.

CASE STUDY

Everfloat Products Unitranche Term Facility

As Everfloat management discusses the GBP100 million mezzanine debt proposal, Spleenwood Capital's managing partner raises the potential of combining the senior secured and mezzanine debt into a unitranche term facility. In addition to lower fees and more rapid execution than a traditional syndicated leveraged loan, the Everfloat team recognizes the potential benefit of renegotiating debt terms with a single GP in the future if it chooses to sell pledged assets or make other adjustments.

Spleenwood offers to fully underwrite the unitranche facility based on its observation of strong demand for mezzanine debt and has identified another private debt fund willing to split the senior tranche via a participation agreement. Spleenwood shares several terms with Everfloat in Exhibit 21.

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Exhibit 21: Everfloat Products Unitranche Debt Summary of Terms

Issuer:	Everfloat Products
Settlement Date:	[T + 5 business days]
Term Facility:	A term loan unitranche facility consisting of a senior secured term loan facility ("first-out term facility") and a subordinated mezzanine tranche ("second-out term facility").
Maturity Date:	Ten years from settlement date
Amortization:	First-Out term facility: four years from settlement date
Principal Amount:	GBP500 million total, with first-out term facility of GBP400 million and second-out term facility of GBP100 million
Interest:	MRR + 350 bps p.a. until four years from settlement date 10.00% p.a. paid semiannually thereafter until maturity date
Interest Payment:	Commencing six months from [settlement date] to be paid semiannually with final payment on [maturity date]
Seniority:	The first-out term facility is a senior secured obligation of Everfloat Products and ranks *pari passu* with all other senior indebtedness. The second-out term facility is a subordinated obligation of Everfloat Products and ranks *pari passu* with other subordinated indebtedness.
Prepayment:	First-Out term facility prepayable at par starting one year after the settlement date
Business Days:	London

QUESTION SET

1. Identify and explain the seniority feature common between mezzanine and unitranche debt and discuss how this feature also differs between the two types of debt.

   Solution

   Mezzanine and unitranche both include debt contracts that are subordinated to other classes of debt issued by a company. However, unitranche debt is one debt facility that includes both subordinated and senior debt components into a single debt facility whereas mezzanine simply refers to a subordinated debt class.

2. In structural subordination, mezzanine debt is issued by the:

   A. operating company with a second lien on its assets.

   B. operating company with an intercreditor agreement.

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C. holding company.

Solution

Response C is correct. Structural subordination involves debt issued at the holding company level, one step removed from direct access to the operating company cash flows and pledged assets. Responses A and B are both incorrect as these refer to contractual subordination.

3. Identify and discuss two features of mezzanine debt that may be attractive for early-stage growth company issuers.

Solution

Two possible mezzanine debt features which may be attractive for early-stage growth companies include a PIK feature and an attached warrants feature. A PIK feature capitalizes interest to increase the debt outstanding, thus avoiding cash interest expenditures. By attaching warrants to the debt, the issuer adds equity-like features to the debt, thus reducing the need for cash coupons. As early-stage growth companies seek to preserve cash for company growth purposes as opposed to servicing debt payments, both features may be attractive.

4. Discuss an attractive feature of unitranche debt from an issuer perspective.

Solution

The most attractive feature of unitranche debt from an issuer's perspective is the existence of one loan agreement, which can be executed more quickly and with lower fees than public securities or widely syndicated debt arrangements.

5 PRIVATE DEBT PROFILES AND VALUATION

☐ analyze private debt profiles and calculate and interpret financial ratios used to value private debt investments

Private market strategies such as private real estate, infrastructure, and buyout equity depend upon the use of borrowed capital in addition to equity to develop and operate an asset or restructure a company to increase valuation and improve cash flow. Important features beyond debt availability, cost, and tenor include restrictive covenants, contingencies benefiting issuers and investors, and the use of underlying project or company assets as a secondary repayment source.

An important distinguishing feature of private markets is the type of **debt profile**, or detailed breakdown of short-term and long-term liabilities by tenor, seniority, and other features, used in these strategies. Unlike mature investment grade corporate issuers with stable cash flows and broad access to unsecured debt across maturities and markets, private issuers with less stable cash flows are usually sub-investment grade or unrated and must accept constraints in the form of security, covenants, or contingencies imposed by lenders as issuers seek to maximize their value creation potential using leverage.

The composition of a debt profile is a critical consideration in ensuring sufficient operating flexibility with adequate borrower protections, as well as in valuing these instruments under different credit and economic scenarios.

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Earlier in the curriculum, we distinguished between short-term forms of funding to meet working capital needs and longer-term funding using loans or bonds. **Revolving credit agreements** are the most common form of short-term bank borrowing facility and may be drawn and repaid as needed until maturity. Revolvers are sometimes available for under a year (usually 364 days) to minimize bank capital requirements, or for multiple years on either a secured or unsecured basis. In the case of leveraged buyout transactions, revolving credit is often made available on a secured basis by a bank based upon a pledge of fixed assets, or private lenders using specific claims to accounts receivable, inventory, or equipment as collateral. This latter form of secured revolving credit is often referred to as **asset-based lending**, as these lenders look primarily to the potential sale of underlying collateral rather than cash flow as the primary source of repayment.

We extend the earlier illustration of individual forms of debt by more closely examining how Bardstown Partners and Maudville Corporation arrive at a debt profile used to finance 75% of the take-private transaction.

CASE STUDY

Maudville Debt Profile

Maudville Corporation is a US chemical producer with nearly USD5 billion in revenue and USD1 billion in EBITDA. Bardstown Partners, a financial sponsor specializing in buyout equity, has offered to take Maudville private for USD5 billion with 20% in common equity, 5% in convertible preferred shares, and 75% in debt.

Working closely with Bardstown, Maudville's new management has established the following priorities in seeking to optimize establishing its debt profile:

- Maximize flexibility to prepay debt over the next three to four years.
- Strike a balance between fixed and floating-rate interest rate exposure.
- Maximize use of Maudville's significant fixed assets as collateral.
- Optimize pricing by tapping the more liquid syndicated bank market as well as private lender demand for junior and subordinated debt.
- Establish flexibility to renegotiate subordinated debt terms as needed by limiting the number of lenders and distribution of voting rights.

Given strong floating-rate leveraged loan market demand, Maudville maximizes the size of its senior secured first lien debt tranche while establishing a second lien junior tranche at a fixed rate, which is funded by Bardstown Partners' own private debt GP affiliate, Bardstown Credit Partners. Given the potential for conflicts between the two affiliates if Maudville were to face financial distress during the investment horizon, Bardstown has created clear written guidance governing information segregation across the two business units as well as policies as to how any resulting conflicts and Bardstown's handling of these will be communicated to LPs. As Bardstown is also building out its new mezzanine opportunity fund, it agrees to underwrite a non-amortizing mezzanine debt tranche at a higher fixed rate for a ten-year tenor, selling half of the debt facility to another private debt GP. In its debt sale agreement to a second private debt GP, Bardstown retains majority voting rights to amend mezzanine debt terms in exchange for a reduced interest rate.

Details of Maudville's debt structure are as follows:

Secured revolving credit facility. USD250 million, 364 day revolving credit facility priced at MRR + 150 bps p.a. on drawn amounts, which is secured by a first lien on Maudville's fixed assets and retained by Maudville's lead banks.

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Senior secured leveraged loan tranche. USD2.65 billion in seven-year, senior secured debt at a debt coupon of MRR + 200 bps (current MRR of 4.50% and initial coupon of 6.50%). Loan may be prepaid at par starting in one year and is secured by a first lien on Maudville's fixed assets and ranked *pari passu* with other senior secured debt. Covenants include maintenance of a debt to EBITDA ratio of no more than 6×.

Junior second lien fixed-rate tranche. USD600 million in seven-year junior debt at an 8.00% annual fixed interest rate, which amortizes in four equal installments starting in Year 4. The junior tranche is secured by a second lien on Maudville's fixed assets, established via an intercreditor agreement between the leveraged loan and the junior tranche and ranks *pari passu* with other junior secured debt. Covenants include maintenance of a debt to EBITDA ratio of no more than 6×.

Mezzanine debt tranche. USD500 million in non-amortizing, ten-year mezzanine debt at a 12.2% annual fixed interest rate. The mezzanine debt tranche is an unsecured subordinated obligation of Maudville and ranks *pari passu* with all other subordinated indebtedness. Covenants include maintenance of a debt to EBITDA ratio of no more than 6.5×.

Recall from earlier in the curriculum that corporate creditworthiness is a function of qualitative factors, such as a company's business model, industry, size, and competitive position, and quantitative factors including profitability, debt coverage, and financial leverage.

Financial statement modeling and forecasting tools used throughout the CFA curriculum to evaluate future equity and debt performance also apply to private market debt profiles with a few specific areas of focus. For example, the same buyout equity model used to assess a company's ability to execute on its business plan of value creation via EBITDA expansion, debt reduction, and market multiple expansion may be applied to debt valuation, provided that it incorporates an expected debt paydown plan with the appropriate level of debt detail by tranche, including prepayment penalties and the priority of claims. Estimating expected loss under different scenarios is a key focus, as credit spreads comprise a higher proportion of sub-investment grade and unrated private issuer debt total yield and price, and potential restrictive covenant breaches or debt contingency triggers are additional considerations for these more highly structured types of debt. Finally, illiquidity is an important factor for private debt valuation as for other private market instruments.

The **credit valuation adjustment (CVA)** framework shown earlier in the curriculum and below in Exhibit 22 represents the present value of credit risk for a loan, bond, or derivative obligation.

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Exhibit 22: Credit Valuation Adjustment

The CVA framework has two key credit risk components, namely (1) **probability of default (POD)**, or the likelihood that a borrower fails to make full and timely payments of principal and interest according to debt terms; and (2) **loss given default (LGD)**, or the amount a lender fails to recover if a default occurs. POD is usually shown in annual percentage terms, while LGD is expressed as a percentage of par value. Expected loss (EL) shown as the product of LGD and POD may also be considered as a simple one-period credit spread estimate, as shown in Equation 13:

$$\text{Credit spread} \approx \text{LGD} \times \text{POD}. \tag{13}$$

While the default probability for a given issuer applies across all debt tranches, recovery for a specific tranche under an event of default depends upon its relative position in the priority of claims among types of debt.

Key financial ratios used to evaluate corporate creditworthiness include profitability, debt coverage, and leverage are summarized below:

Profitability. Strong, stable earnings support cash flow generation as a primary source of repayment, with a focus on operating profits and recurring revenues. Macro factors, such as an unexpected cyclical downturn or declining market share, can adversely impact future profitability. The EBITDA margin is commonly used to gauge profitability:

$$\text{EBITDA margin} = \frac{\text{EBITDA}}{\text{Revenue}}. \tag{14}$$

That said, it is important to note that this non-GAAP measure of operating cash flow excludes capital expenditure and working capital changes.

Leverage. Buyout strategies often tailor an issuer's debt profile to support the highest possible degree of leverage, the timely reduction of which is among the key drivers of value creation. Leverage measures usually compare total debt to firm resources as gauged by assets, capital, profitability, or cash flow. Debt to EBITDA and **retained cash flow (RCF)**, or net cash from operating activities less dividends, to net debt, or debt less cash and marketable securities, are among the most common measures:

$$\text{Debt to EBITDA} = \frac{\text{Total debt}}{\text{EBITDA}}, \tag{15}$$

$$\text{RCF to net debt} = \frac{\text{Retained cash flow}}{\text{Debt} - \text{Cash and Marketable securities}}. \tag{16}$$

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Coverage. This ratio assesses an issuer's ability to meet debt obligations from operations by comparing periodic income or cash flow to debt service payments, interest expense, or debt-like payments such as leases. A key measure of debt coverage is EBITDA to interest expense:

$$\text{EBITDA to interest expense} = \frac{\text{EBITDA}}{\text{Interest expense}}. \tag{17}$$

A common approach among fixed-income analysts and credit rating agencies is to group existing and projected ratios by industry and credit rating for comparison with peers or comparison with recently traded bonds or loans of similar tenor and seniority. This estimation process is a form of matrix pricing or evaluated pricing as shown in the Maudville case for a debt analyst evaluating the senior secured leveraged loan.

CASE STUDY

Evaluating Maudville's Senior Secured Leveraged Loan

A debt analyst evaluating Maudville's outstanding debt first conducts research on key financial ratios for the commodity-based chemical sector in North America where Maudville primarily operates grouped by credit rating category as well as her observations of traded credit spreads for similar senior secured leveraged loans in the same industry with the results shown in Exhibit 23.

Exhibit 23: Chemical Industry Financial Ratios by Rating and Spreads

Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Senior Secured 7y Spread
Baa2 / BBB	18%–22%	2.25×–2.5×	23%–27%	10×–13×	150 bps
Baa3 / BBB–	15%–18%	2.5×–3×	20%–23%	8×–10×	165 bps
Ba1 / BB+	13%–15%	3×–3.25×	17%–20%	6×–8×	200 bps
Ba2 / BB	11%–13%	3.25×–3.75×	13%–17%	4×–6×	225 bps
Ba3 / BB–	9%–11%	3.75×–4×	10%–13%	2.5×–4×	250 bps
B1, B2, B3 / B	4%–9%	4×–6×	5%–10%	1.5×–2.5×	300 bps
Caa1, Caa2, Caa3 /CCC	1%–4%	6×–8×	1%–5%	0.5×–1.5×	375 bps

Based upon her estimated results from Maudville's first year of operations under new management, the analyst calculates the following financial ratios:

Financial Ratio	Maudville Corporation (End of Year 1)
EBITDA margin	21%
Debt to EBITDA	3.31
RCF / Net debt	22%
EBITDA / Int exp	4.1

Mapping her estimates of Maudville's key financial ratios at the end of Year 1 against those of ratings peers as well as observed traded spreads for similar debt, she concludes that both the issuance spread and ratings of Maudville's Ba1 / BB+-rated 200 bps senior secured issuance spread are consistent with the current leveraged loan market.

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Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Senior Secured 7y Spread
Baa2 / BBB	**18%–22%**	2.25×–2.5×	23%–27%	10×–13×	150 bps
Baa3 / BBB–	15%–18%	2.5×–3×	**20%–23%**	8×–10×	165 bps
Ba1 / BB+	13%–15%	3×–3.25×	17%–20%	6×–8×	**200 bps**
Ba2 / BB	11%–13%	**3.25×–3.75×**	13%–17%	**4×–6×**	225 bps
Ba3 / BB–	9%–11%	3.75×–4×	10%–13%	2.5×–4×	250 bps
B1, B2, B3 / B	4%–9%	4×–6×	5%–10%	1.5×–2.5×	300 bps
Caa1, Caa2, Caa3 /CCC	1%–4%	6×–8×	1%–5%	0.5×–1.5×	375 bps

Private debt valuation *changes* over time reflect a combination of top-down macroeconomic factors as well as bottom-up issuer-specific drivers.

From a macro perspective, the level and slope of credit spread curves change over the economic cycle. While the duration and magnitude of spread changes varies across cycles and industries, Exhibit 24 presents a stylized view of credit spread changes for investment grade (IG) and high-yield (HY) issuers, which represent most private debt issuers, over the economic cycle clockwise, starting in the upper left quadrant.

Exhibit 24: Credit Spread Curves over the Economic Cycle

In an early expansion phase, as profitability rises while defaults remain elevated, high-yield spreads are relatively high and well above investment grade spreads, which often exhibit a flat to inverted spread curve.

Later in the expansion phase, default rates fall and profits continue to climb, causing credit spread curves to steepen. This steepening continues as the expansion reaches its peak amid higher leverage and rising inflation expectations.

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As contraction begins, growth slows and the economy enters a recession while credit spreads rise and spread curves flatten, with the high-yield spread curve inverting in some cases due to lower profitability and higher defaults.

In addition to macroeconomic factors, we consider bottom-up factors, such as industry- and issuer-specific trends. For example, we would expect the chemical industry to reflect a relatively high degree of cyclicality given sector exposures to regional and global cycles as well as commodity prices, particularly for firms like Maudville as a commodity chemicals producer.

We revisit Maudville Corporation's buyout equity forecast from the Private Equity learning module with a closer look at factors affecting its debt to demonstrate the impact of a recession scenario on key financial ratios affecting the probability of default and therefore credit spreads as a driver of debt value.

CASE STUDY

Maudville Debt Valuation and Scenario Analysis

Recall that Bardstown Partners is pursuing a USD5 billion take-private transaction for Maudville, 75% of which is debt in the following term tranches:

- USD2.65 billion in seven-year, senior secured debt at MRR + 200 bps (current MRR of 4.50% and initial coupon of 6.50%) prepayable at par.
- USD600 million in seven-year, junior second lien debt at an 8.00% fixed rate which amortizes in four equal installments starting in Year 4.
- USD500 million in non-amortizing, ten-year, unsecured subordinated mezzanine debt at a 12.2% annual fixed interest rate.

Note that for modeling purposes, we assume the secured revolving credit facility is not outstanding at the end of the year and cost is captured in interest expense.

As prepayment of junior and mezzanine debt is likely to be more costly than the leveraged loan, we assume that any debt amortization occurring in the first three years involves paydown of the senior secured leveraged loan. Recall that Maudville's business plan to improve Maudville's operations over the next five years include the following assumptions:

- 5% annual sales growth
- Improved cost efficiencies, including:
    - Lowering cost of goods sold (COGS) as a percentage of sales by one percent per year from the current 55% to 50% of sales in Year 5, and
    - Selling, general, and administrative (SGA) expense reduction as a percentage of sales (currently 25%) starting in Year 3, to 22% in Year 5.

The analysis assumes no change in MRR over the period. Under the base case business plan forecast, Maudville's key financial ratios derived from income statement, cash flow, and balance sheet projections for the first three years are as follows:

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Maudville Corporation Key Financial Ratios (Base Case)

Financial Ratio	Year 1	Year 2	Year 3
EBITDA margin	21%	22%	24%
Debt to EBITDA	3.31	2.86	2.28
RCF / Net debt	23%	26%	34%
EBITDA / Int exp	4.1	4.6	5.5

In addition to the base case forecast, the analyst decides to add a recession scenario to her assessment in order to evaluate Maudville's business plan in an economic downturn, with the following revised assumptions:

- 5% sales growth in Years 1 and 2, with a 5% *decline* in Year 3
- Cost efficiency gains impacted by the Year 3 recession:
  - COGS as a percentage of sales lowered by one percent per year in Years 1 and 2, with a rise to 58% in Year 3.
  - SGA rises from 25% in Years 1 and 2 to 30% in Year 3.

With other assumptions remaining the same, under the recession forecast, Maudville's key financial ratios for the first three years are as follows:

Maudville Corporation Key Financial Ratios (Recession Case)

Financial Ratio	Year 1	Year 2	Year 3
EBITDA margin	21%	22%	12%
Debt to EBITDA	3.31	2.86	5.37
RCF / Net debt	23%	26%	13%
EBITDA / Int exp	4.1	4.6	2.5

The analyst once again reviews her summary of key industry financial ratios grouped by rating along with current market credit spreads. She decides to apply these same assumptions in her base case analysis for these loans with four years to maturity, while factoring in a 100 bps rise in credit spreads at the end of Year 3 under the recession scenario.

Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Senior Secured 4y Spread
Baa2 / BBB	18%–22%	2.25×–2.5×	23%–27%	10×–13×	150 bps
Baa3 / BBB–	15%–18%	2.5×–3×	20%–23%	8×–10×	165 bps
Ba1 / BB+	13%–15%	3×–3.25×	17%–20%	6×–8×	200 bps
Ba2 / BB	11%–13%	3.25×–3.75×	13%–17%	4×–6×	225 bps
Ba3 / BB–	9%–11%	3.75×–4×	10%–13%	2.5×–4×	250 bps
B1, B2, B3 / B	4%–9%	4×–6×	5%–10%	1.5×–2.5×	300 bps
Caa1, Caa2, Caa3 /CCC	1%–4%	6×–8×	1%–5%	0.5×–1.5×	375 bps

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1. Discuss the implications of the Year 3 financial ratios for the expected value of Maudville's senior secured leveraged loan at that time under the base case scenario.

Solution

As Maudville executes on its business plan to increase EBITDA and pay down debt under its business plan in a stable macroeconomic environment, it is able to increase EBITDA margin and debt coverage (EBITDA to interest expense as well as RCF to net debt) while lowering leverage. In comparison to peer ratios, Maudville's improved credit measures suggest that it may move into a higher rating category with lower credit spreads, as shown below:

Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Senior Secured 4y Spread
Baa2 / BBB	**18%–22%**	**2.25×–2.5×**	**23%–27%**	10×–13×	150 bp
Baa3 / BBB–	15%–18%	2.5×–3×	20%–23%	8×–10×	**165 bp**
Ba1 / BB+	13%–15%	3×–3.25×	17%–20%	6×–8×	200 bp
Ba2 / BB	11%–13%	3.25×–3.75×	13%–17%	**4×–6×**	225 bp
Ba3 / BB–	9%–11%	3.75×–4×	10%–13%	2.5×–4×	250 bp
B1, B2, B3 / B	4%–9%	4×–6×	5%–10%	1.5×–2.5×	300 bp
Caa1, Caa2, Caa3 /CCC	1%–4%	6×–8×	1%–5%	0.5×–1.5×	375 bp

We may therefore expect its senior secured leveraged loan to trade at a premium given the potential expected decline in its market credit spread or DM of 35 bps to 165 bps versus the quoted margin of 200 bps.

2. Discuss the implications of the Year 3 financial ratios for the expected value of Maudville's senior secured leveraged loan at that time under the recession scenario.

Solution

Given the cyclical nature of Maudville's business, the economic downturn adversely affects its business plan to increase EBITDA and pay down debt. The recession causes a decrease in Maudville's EBITDA margin and debt coverage while increasing leverage. In comparison to peer ratios, Maudville's weaker credit measures suggest that it may be downgraded, resulting in higher credit spreads compounded by an overall rise in high-yield spreads:

Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Senior Secured 4y Spread
Baa2 / BBB	18%–22%	2.25×–2.5×	23%–27%	10×–13×	250 bps
Baa3 / BBB–	15%–18%	2.5×–3×	20%–23%	8×–10×	265 bps
Ba1 / BB+	13%–15%	3×–3.25×	17%–20%	6×–8×	300 bps
Ba2 / BB	**11%–13%**	3.25×–3.75×	**13%–17%**	4×–6×	325 bps
Ba3 / BB–	9%–11%	3.75×–4×	**10%–13%**	**2.5×–4×**	**350 bps**

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Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Senior Secured 4y Spread
B1, B2, B3 / B	4%–9%	**4×–6×**	5%–10%	**1.5×–2.5×**	400 bps
Caa1, Caa2, Caa3 /CCC	1%–4%	6×–8×	1%–5%	0.5×–1.5×	475 bps

We may therefore expect its leveraged loan to trade at a discount given an expected150 bps increase in the market credit spread to 350 bps versus the quoted margin of 200 bps.

QUESTION SET

1. Which of the following is the most correct description of an asset-based revolving credit agreement used as part of a borrower's debt profile in a leveraged buyout?

   A. Long-term bank or private lending facility with no collateral

   B. Short-term bank or private lending facility with operating cash flow pledged as collateral

   C. Short-term bank or private lending facility with inventories pledged as collateral

   Solution

   C is the correct response. In leveraged buyouts, revolving credit agreements provide a short-term borrowing facility in addition to the issuer's longer-term debts. These credit agreements include asset collateral such as receivables, inventories, or possibly fixed assets. Response A is incorrect. While the revolving facility can be longer-term, there will be assets pledged as collateral. Response B is incorrect because the revolving facility requires assets as collateral rather than operating cash flow.

2. Assuming no change in benchmark yields over time, which one of the following types of debt commonly used in a leveraged buyout is likely to be prepaid first if the company achieves cash flow goals over time?

   A. Mezzanine debt

   B. Leveraged loans

   C. High-yield bonds

   Solution

   B is the correct response. Leveraged loans are issued with a call provision at par and their floating coupon rates ensure that the price of the loans remains near par in the absence of an improvement in the issuer's credit spread. Response A is incorrect as mezzanine debt is not issued with a call provision. Response C is incorrect. While high-yield bonds likely include a call provision, the call price is set well above par value and usually not callable for a few years, suggesting that these bonds are unlikely to be the first choice for prepayment.

3. An analyst is assessing the current price of a private debt transaction. At inception, the debt was priced at a credit spread of 225 bps because the

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profitability, leverage, and coverage ratios for the company imply a Ba2/BB credit rating based on the following table.

Rating Moody's/S&P Global	EBITDA Margin	Debt to EBITDA	RCF / Net Debt	EBITDA / Int Exp	Credit Spread
Baa2 / BBB	18%–22%	2.25×–2.5×	23%–27%	10×–13×	150 bps
Baa3 / BBB–	15%–18%	2.5×–3×	20%–23%	8×–10×	175 bps
Ba1 / BB+	13%–15%	3×–3.25×	17%–20%	6×–8×	200 bps
Ba2 / BB	11%–13%	3.25×–3.75×	13%–17%	4×–6×	225 bps
Ba3 / BB–	9%–11%	3.75×–4×	10%–13%	2.5×–4×	250 bps
B1, B2, B3 / B	4%–9%	4×–6×	5%–10%	1.5×–2.5×	300 bps
Caa1, Caa2, Caa3 / CCC	1%–4%	6×–8×	1%–5%	0.5×–1.5×	375 bps

In the current environment, the company's EBITDA margin is now 10%, its debt to EBITDA multiple is 4.0, its RCF to net debt is 12%, and its EBITDA to interest expense is 3.0. Based on the current ratios, estimate the company's current credit rating, and discuss the debt value implications associated with any change in the credit rating since the deal's origination.

Solution

Based on these updated ratios, the company's current credit rating has likely declined to Ba3/BB–. All four of the ratios fall into this classification, although the debt to EBITDA falls on the dividing point between Ba3/BB– and the category below. Based on the decline in credit quality, the private debt's discount margin should increase by 25 bps to 250 bps, and this should drive an appropriate valuation discount on the private debt.

6 PRIVATE DEBT RISK AND RETURN

- discuss the risk and return among private debt investments as well as versus other private market investments as part of a strategic asset allocation

Private debt investment funds have emerged as a significant source of debt capital as a result of tighter bank capital standards after the Global Financial Crisis of 2008–09. Private debt strategies primarily involve lending to sub-investment grade and unrated borrowers across the company life cycle, as well as private real estate and infrastructure projects. The rapid growth in private debt coincided with a period of very low sovereign yields following the Global Financial Crisis, coaxing many investors with a significant allocation to public fixed income to consider explicitly including private debt in their strategic asset allocations for the first time. For example, the higher return potential of private market debt compared to public market debt has made this asset class increasingly attractive for pension plans as discussed below, despite lower liquidity and lower transparency.

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PENSION PLANS TRANSITION TO PRIVATE DEBT ALLOCATIONS

Traditional pension plan investment strategies have relied heavily on public market debt investments to provide low risk cash flows to match fund liabilities. However, after over a decade of low to negative sovereign debt yields as a result of quantitative easing following the Global Financial Crisis, many pension plans added private debt as a separate asset allocation category.

For example, as part of its periodic comprehensive review of its investment portfolio and actuarial liabilities, CalPERS, the largest US public pension fund, decided in 2021 to increase its target allocation to private debt from 0% to 5%, including the following categories:

- direct lending: 20% to 100% of the total allocation;
- specialty lending: 5% to 40%;
- liquidity financing: 0% to 25%;
- real estate financing: 5% to 40%; and
- private structured products: 0% to 25%.

Specialty financing involves non-bank lending to commercial and consumer borrowers, including areas such as credit card receivables, leasing, and installment loans. **Liquidity financing** includes private debt funds which seek to generate income by investing in a portfolio of short-term obligations to maintain a stable net asset value (NAV). According to Preqin, an alternative investment data company, private debt was identified as the fastest-growing allocation category among US public pension funds with an average allocation target of 5.7%, up from 3%.

As in the case of private equity, strategies employed by private debt funds require longer investment time horizons, given the need for capital commitments from investors which may not be immediately drawn. Private debt funds on the other hand must maintain a solid pipeline of acceptable loans to fulfill these capital commitments over time. Given the higher credit spreads, borrower contingencies, and illiquidity of private debt, investors in these funds expect to earn higher returns than those available from public debt investments. Private debt manager due diligence should include an evaluation of the manager's skill at constructing diversified portfolios that generate stable returns over business cycles. Investors must weigh the benefits of using a manager and incurring management fees versus seeking to create a portfolio of direct private loans or co-investments.

Key sources of risk and return unique to debt used in private market strategies include the following:

Credit risk. Investors in the debt of private issuers expect to be compensated for the likelihood of default and potential loss for all forms of debt used in private market strategies. The credit spread component typically comprises the bulk of investor returns given both the higher likelihood of borrower default as well as their relative position in the capital structure and expected loss under a default scenario. Even though private debt exhibits fixed income characteristics such as a fixed claim with finite maturity, periodic cash flows and a more senior position than equity investments, these investments have historically been categorized within the respective private market category (private equity, real estate, or infrastructure) rather than fixed income, as changes in credit risk and spreads are tied to the underlying investment life cycle and they are generally illiquid.

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Interest rate risk. The inverse relationship between debt prices and yield is a key driver of risk and return for non-callable investment grade and sovereign debt, but as established earlier, this risk as measured by effective duration is lower for high-yield bonds and much lower for leveraged loans given the periodic reset of market reference rates than for publicly traded non-callable bonds.

Liquidity risk. Investors in non-traded private debt expect to receive a liquidity premium versus more widely held debt with otherwise similar characteristics. Unlike public debt funds, private debt funds generally originate new loans which are expected to be held to maturity. This approach together with a fund structure more closely aligned with that of private equity enables private debt funds to bear greater liquidity risk and target a higher risk-adjusted return as a result.

Inflation risk. Rising prices reduce the inflation-adjusted real returns associated with fixed-coupon debt instruments. However, because periodically resetting nominal market reference rates incorporate inflation expectations, the floating coupon structures present in leveraged loans and most direct lending facilities are especially attractive for institutions with inflation-adjusted liabilities.

Borrower and lender contingencies. Debt contingencies which benefit borrowers include loan prepayability and fixed-price call options on high-yield debt. While these features create investor uncertainty as to final debt maturities and reinvestment risk, investors expect to be compensated in the form of higher debt coupons versus non-callable debt. The hybrid nature of convertible bonds or mezzanine debt with embedded equity call options or warrants on the other hand represent contingencies which benefit lenders. The risk and return profile of these debt instruments are more equity-like and follow the investment life cycle, supporting their inclusion within the respective private market strategy allocation rather than fixed income.

Direct ending features. Public debt fund managers often supplement their own financial statement analysis with information from credit rating agencies and traded market prices for similar debt transactions. Direct lending in contrast requires private debt fund GPs to establish and maintain a high degree of expertise in finding new borrowers, conducting thorough due diligence, and structuring a properly documented loan facility which they monitor, manage, and periodically value through final maturity. In particular, non-sponsored loans involve higher search, due diligence, and monitoring costs and higher risks given the lack of a controlling financial sponsor. Despite their greater flexibility, newer structures, and documentation, such as agreements among lenders, they are untested in bankruptcy and therefore involve greater uncertainty as to their treatment in the event of financial distress.

As a new separate asset class which has rapidly emerged over a short period, institutional investors seeking to initiate or increase their private debt allocation face a number of challenges in the GP selection process. For example, the lack of sufficient data prevents them from performing a thorough long-term historical analysis of relative performance over time. Second, the period of rapid growth in private debt does not yet include a full credit cycle, which for sub-investment grade and unrated borrowers is a key factor affecting prospective returns for debt-based investments given the relatively high likelihood of loss under a financial distress scenario. Given these limitations on directly assessing fund manager quality based upon differences in performance, factors including the firm's track record in related private market equity strategies over the cycle, the prior experience of debt managers, as well as reviewing

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the GP's process of sourcing, conducting due diligence, structuring covenants and associated legal contracts, managing, and monitoring outstanding debt over time in detail are all of critical importance when evaluating managers. Many traditional banks whose involvement was historically limited to syndicated bank and public debt markets have also initiated private credit funds managed as limited partnerships, expanding the array of choices available to LPs.

Performing stringent due diligence of private debt fund managers and their performance net of fees is of particular importance given the relatively low allocation among many investors. Smaller investment sizes allow for fewer diversification opportunities across geography, industry, vintage year, and investment strategy, as is commonly observed for private equity investors.

The following case study addresses how a pension plan might consider these issues when establishing a private debt allocation target.

CASE STUDY

Northern States Private Debt Investment Strategy

Northern States Pension Plan is a large US-based public pension plan with a long history of investing in private markets. Nevertheless, private debt is a relatively new asset class and Northern States has not formally included these investments as part of its allocation targets in the past. Given the growing prominence of private debt, Northern States' Investment Committee decides to meet to discuss whether to include private debt in its private market allocation.

Northern States has excellent relationships with its broad array of general partners in other private market funds, and many of these organizations have developed high-quality private debt investment funds. The pension plan has been under considerable pressure to maintain or increase its overall portfolio return target while generating sufficient funds to meet the plan's liabilities, many of which are inflation-adjusted.

Current inflation is at 4.5% annually. Northern States' economic outlook is for inflation to either stabilize at current levels or potentially increase, and its expectation is that nominal interest rates will include changes in inflation.

Northern States currently has asset allocation and expected return targets as follows:

Asset Class	Target Allocation	Expected Return
Public equity	30%	9%
Private equity	25%	11%
Fixed income	20%	5%
Real estate and infrastructure	15%	9%
Other alternative investments	10%	9%
Total	100%	8.7%

Northern States currently owns investments in private debt, and these are included in its private equity allocation. The extent of its private debt portfolio amounts to 4% of the private equity holdings and is held in mezzanine debt and venture debt. These investments typically generate returns similar to the remainder of the private equity portfolio. Based on observations of the private debt market, the current consensus of the Investment Committee is that a diversified portfolio of private debt would have an expected return of 10%.

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Brianna Jenkins, Head of Alternative Investments at Northern States, has been tasked with presenting arguments regarding the institution of a formal allocation target to private debt. Jenkins plans to discuss several key points as part of her argument. These include the following:

- The effect of banking industry shocks on the market for private debt.
- The current nominal interest rate environment and inflation expectations.

1. Discuss why the effect of banking industry shocks are a relevant point to discuss in Northern States' decision to allocate to private debt.

   Solution

   Banking industry shocks, such as the Global Financial Crisis of 2008–09 or the 2023 shock involving the failure of Silicon Valley Bank outlined earlier, reduce the supply of debt capital coming from traditional banks. The private debt market provides a potential funding solution for borrowers in this environment. Northern States can leverage its existing relationships with private market funds and supply funding no longer provided by banks by participating in this newer area of private markets.

2. Justify an argument for Northern States to invest in private debt fund focused on leveraged loans, given its outlook on the nominal interest rate environment.

   Solution

   Leveraged loans are typically floating-rate debt instruments with coupons that reset as the MRR changes. Because Northern States believes that nominal interest rates are at risk of moving higher, an allocation to a fund investing in leveraged loans may be a way of generating returns that will keep pace with higher benchmark yields and fund liabilities that adjust with inflation.

3. Discuss three possible rationales for why the expected return on private debt is significantly higher than that of the fixed income asset class.

   Solution

   Rationale 1: Private debt includes illiquid debt investments in lower credit quality companies, thus carrying higher spreads due to credit risk and illiquidity. The fixed income portfolio is more likely to invest in high-quality, liquid government and corporate securities with zero to low credit spreads.

   Rationale 2: Private debt often includes features that are valued by the borrower (such as call provisions). To compensate the lender, borrowers must pay higher yields on the debt.

   Rationale 3: Some private debt (such as venture funds) may include equity-like features which create a higher risk profile for the debt securities than provided by fixed income securities, as well as a higher expected rate of return.

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QUESTION SET

1. A pension plan invested in a leveraged loan as well as a *pari passu* public market bond from the same issuer. After two years, the leveraged loan generated a higher return. Which one of the following statements is the most plausible explanation as to why this might have occurred?

   A. The leveraged loan's call at par contingency feature provided greater price appreciation.

   B. The leveraged loan's floating coupon rates improved inflation protection.

   C. The leveraged loan's price did not decrease as the issuer's credit spread increases.

   Solution

   B is the correct response. The floating coupons of a leveraged loan provide higher cash coupon returns to the lender when nominal rates increase with inflation. Response A is incorrect. The issuer has the right to call the loan at par value, but this does not provide greater price appreciation for the loan. Rather, the lender may demand higher yield on the loan by paying a lower price for the loan. Response C is incorrect. This statement is false as a leveraged loan's price declines with interest rate increases associated with credit spread increases (but not benchmark yield increases).

2. Which one of the following features is most consistent with private debt being riskier than public debt?

   A. More restrictive covenants on private debt

   B. Greater use of floating rates in private debt

   C. Credit rating differences between companies in private versus public debt markets

   Solution

   C is the correct response. Companies borrowing in private debt markets are likely lower-rated or unrated, thus implying higher risk in private debt markets. Response A is incorrect as more restrictive covenants are applied by the lender on the borrower to help offset the higher risk associated with lending to lower-rated companies. Response B is incorrect as floating rates only reflect changes in the underlying risks of debt markets in general. Greater use of floating rates does not reflect any difference in risk compared to public debt markets.

3. Discuss how both lower and higher interest rates may potentially be a risk factor for an investor in the private debt market.

   Solution

   The most obvious example of risks to private debt investing from higher or lower interest rates can be discussed using leveraged loans with floating coupons. An economic environment in which interest rates increase will cause leveraged loans to pay higher coupons if the interest rate increases occur because of benchmark yield increases. The higher cash flow burden associated with higher coupon payments may cause increased bankruptcies, thus lowering private debt returns. On the other hand, interest rate decreases may be associated with benchmark yield decreases associated

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with slowing growth. If the slowing growth becomes recessionary, corporate bankruptcies may increase in this circumstance as well. General partners must perform significant due diligence on their private debt target companies to ensure the ability to perform in a variety of economic scenarios.

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PRACTICE PROBLEMS

The following information relates to questions 1-4

Brianna Jenkins, Head of Alternative Investments at Northern States Pension Plan, has asked an analyst, Cheng Zhu, to assist on the plan's proposed allocation of 5% of its overall portfolio to rivate debt. Jenkins first shows the following table summarizing Northern States' current allocations across asset classes:

Asset Class	Target Allocation	Expected Return
Public equity	30%	9%
Private equity	25%	11%
Fixed income	20%	5%
Real estate and infrastructure	15%	9%
Other alternative investments	10%	9%
Total	100%	8.7%

Jenkins informs Zhu that a diversified portfolio of private debt would have an expected return of 10%.

Zhu is curious as to why the expected return on private debt is much higher than that expected from the fixed income portfolio and asks Jenkins about the potential risks associated with private debt. Jenkins responds with the following two statements:

Statement 1 One of the major types of private debt exhibits greater price sensitivity to interest rate changes compared to straight debt instruments.

Statement 2 Higher interest rate scenarios may be associated with increased bankruptcy risk in the corporate sector.

Jenkins continues discussing possible risks in the private debt category and notes that historical private debt fund performance varies depending upon the strategy focus of different funds. However, historical performance differences are not particularly noticeable across fund managers investing in similar strategies within private debt.

Jenkins also notes that the due diligence process of private debt fund GPs is a very important aspect of Northern States' investment process. She identifies three major risks associated with investing in private debt funds: (1) the macroeconomic risks facing borrowers, (2) the illiquidity of private debt funds, and (3) the covenants underlying the debts in which private debt funds invest.

1. Demonstrate how an allocation to private debt may allow Northern States to increase its total expected return.

2. Which response below is correct about Statements 1 and 2 made by Jenkins?

   A. Statements 1 and 2 are both true.

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B. Statement 1 is true, and Statement 2 is false.

C. Statement 1 is false, and Statement 2 is true.

3. Discuss why Jenkins believes that a lack of noticeable performance differences across private debt fund managers may reflect a risk of private debt investing.

4. Which one of the following return risks facing private debt investors is least likely to be potentially addressed through adequate due diligence of fund general partners?

A. Credit cycle risks of private debt

B. Private debt fund illiquidity risks

C. Private debt fund covenant risks

The following information relates to questions 5-8

Bardstown Partners, a private equity firm specializing in buyout equity investing, is the financial sponsor of a USD2 billion transaction to take Peerland Company, a mature grocery chain, private. Bardstown's senior management debated whether to allow Peerland's management team to negotiate directly with potential direct lenders or not. Ultimately, they decide to financially sponsor Peerland's direct lending.

Leveraged loans play a primary role in the debt profile of the Peerland buyout. Bardstown has issued USD800 million of floating-rate leveraged loans with six-year maturity as part of the overall financing of the transaction. The leveraged loans pay coupons at MRR plus 250 bps, and MRR is currently 4.80%. The other debt in the financing is a USD500 million of fixed-rate 8.50% coupon, high-yield bonds with an eight-year maturity. Both tranches of debt include call features. Bardstown's projections suggest that Peerland will generate sufficient cash flow to begin prepaying its debt in the first year following the buyout to begin lowering its leverage ratio towards longer-term targets.

The high-yield debt issued as part of the Peerland buyout includes a change of control provision which requires Bardstown to offer to repurchase all outstanding high-yield bonds at a fixed price (above par) if a new owner acquires a predetermined percentage of voting shares.

Bardstown Partners has built detailed projections of Peerland's operations, which include significant improvements in its EBITDA margins, debt to EBITDA multiples, and interest coverage multiples over a five-year time horizon. Bardstown expects the credit spread on Peerland's debt to improve by 100 bps under their assumptions. On the other hand, Bardstown has no projections regarding benchmark yield changes over the time frame of their projections.

5. Which of the following most accurately describes the loan pricing of Peerland's direct loans, given Bardstown's decision to sponsor as compared to non-sponsored direct loans?

A. Lower coupon rates

B. No difference in coupon rates

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C. Higher coupon rates

6. Which one of the following statements most correctly describes Bardstown's strategy to prepay Peerland's debt?

A. Prepay the high-yield bonds first to avoid their higher coupon payments

B. Prepay the leveraged loans first only if benchmark yields decline

C. Prepay the leveraged loans first because the call provision has a very short lockup period.

7. Discuss why the buyers of the high-yield bonds may want a change of control provision included as a restrictive covenant.

8. Which of the following duration measures is most appropriate to assess the price–yield sensitivity of the Bardstown sponsored leveraged loans?

A. Modified duration

B. Effective duration

C. Effective spread duration

The following information relates to questions 9-12

Spleenwood Capital, a fund management company specializing in private debt investing across a broad range of strategies, is evaluating an array of potential investments for several funds in which the company serves as general partner.

Many of Spleenwood's funds include direct lending arrangements structured as leveraged loan transactions. Leveraged loans are senior secured debt typically with floating-rate coupons and are made to borrowers with below investment grade credit ratings. In the current direct lending environment, Spleenwood is increasingly encountering companies able to access the leveraged loan market in covenant-lite transactions. Spleenwood's investment policy does not allow for it to engage in covenant-lite transactions.

Spleenwood has been actively pursuing fund opportunities focused on lending to younger growth-oriented companies. Spleenwood is attracted to these fund categories because the types of debt investments in these funds exhibit significantly different characteristics compared to most of the other private debt market. As part of its strategy to focus on growth-oriented companies, Spleenwood also seeks out companies that may consider issuing mezzanine debt. Spleenwood is attracted to the very high interest rates typically available from mezzanine issues.

Some of the growth companies that Spleenwood targets for mezzanine debt have indicated an interest in having the proposed mezzanine financing provided by Spleenwood included as part of a unitranche debt facility. Spleenwood considers the benefits and costs associated with being part of a unitranche structure.

9. Discuss the market conditions under which a covenant-lite transaction is likely to occur in private debt markets, and describe one example consistent with a covenant-lite transaction.

10. Which one of the following debt characteristics is most likely to be attractive to

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Spleenwood in its strategy to lend to younger growth-oriented companies?

A. Coupon income

B. Warrants and conversion rights

C. Secured by asset collateral

11. Discuss how Spleenwood might structure 10-year mezzanine debt to avoid a high cash flow burden on the borrower during the first four years of the debt contract while ensuring that the debt has no equity-linked features.

12. Which one of the following is a likely concern for Spleenwood with respect to the unitranche structure?

A. Borrower pays one blended interest rate

B. Complexity of agreements among lenders

C. Borrower pays lower fees than for syndicated debt

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SOLUTIONS

1. To increase portfolio return significantly, an allocation to private debt would be funded by reducing the allocation to fixed income. The expected return of private debt is 10% and this is 500 bps greater than the 5% fixed income expected return. Thus, a simple reallocation of 5% to private debt from fixed income is expected to yield an additional 25 bps of expected return (= 500 bps × 0.05). A reallocation utilizing other asset classes will reduce the potential for expected return and, in the case of private equity, a reallocation to private debt would reduce expected return. Note that this ignores any impact of different correlations between equities and fixed income and equities and private debt.

2. C is the correct response. Statement 1 is false because leveraged loans, a major category of private debt, are less price sensitive to interest rate changes than are straight debt. Statement 2 is true as higher interest rates may cause additional cash burdens on corporate borrowers with a potential that they may be faced with possible bankruptcy.

3. The inability to differentiate returns is likely associated with the lack of difficult economic circumstances facing private debt fund GPs over the historical reporting period in addition to their lack of liquidity. This creates an investment climate in which it may be difficult to assess fund manager quality based on differences in performance. Rather, investors must seek to manage their risks of private debt investing by performing stringent due diligence of fund managers on their entire investment process and portfolio construction process.

4. B is the correct response. While private debt has finite maturities in contrast to the underlying equity in the same issuer, private debt investors face significant illiquidity of private debt fund that cannot be addressed in their due diligence process. Response A is incorrect as investors should ensure that their due diligence process of GPs of private debt funds includes a thorough analysis of how the fund identifies borrowers who will be less susceptible to these sorts of macroeconomic risk factors. Response C is incorrect as private debt fund general partners able to negotiate adequate covenant protections are more likely to outperform their counterparts who include looser covenants on their transactions when economic stress events occur. As such, proper investor due diligence should review a GP's policies on drafting covenants as well as reviewing covenants of current portfolio investments.

5. A is the correct response. Prospective lenders tend to have less bargaining power in negotiating terms and pricing for sponsored loans. This implies that lenders must accept lower coupon rates, implying lower expected returns on direct loans. Because of the greater costs associated with identifying non-sponsored borrowers and analyzing and monitoring their creditworthiness, investors often expect higher returns in the form of wider credit spreads on these loans.

6. C is the correct response. Leveraged loans allow for the debt to be prepaid shortly after issuance at a price of par value. As a result of the low call price and the short lock-up period, leveraged loans can be prepaid almost immediately. Response A is incorrect as high-yield bonds have a longer lock-up period such that they cannot be prepaid in the first year after issuance. Response B is incorrect as declines in benchmark yields have little or no effect on the price of the floating-rate callable leveraged loans, so conditioning the prepayment on benchmark yields declining is not a necessary condition.

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7. If Bardstown sells Peerland before the high-yield bonds mature in eight years, the bondholders will benefit from the change of control provision and will be able to collect a premium to par value. Without the provision, Bardstown could simply use the sale proceeds and buy back the debt at prevailing market prices.

8. C is the correct response. The price of floating-rate coupon leveraged loans is not sensitive to changes in benchmark yields but only to changes in credit spreads. Thus, effective spread duration is the most appropriate measure of price–yield sensitivity. Response A is incorrect as modified duration is not appropriate for bonds with embedded options and adjustable cash flows. Response B is incorrect as effective duration measures price–yield sensitivity for changes in the benchmark yield but not credit spread changes.

9. In competitive markets with strong demand for leveraged loans, the types of maintenance covenants typically required for leveraged loans may be weakened to make the loan terms more favorable to the borrower.

   One example of a covenant-lite transaction may be to include an incurrence covenant such as requiring the borrower having a debt to EBITDA below a certain level only if the borrower is seeking to issue new debt. This covenant is weaker than a maintenance covenant in which the debt to EBITDA multiple is assessed at each reporting period to ensure that the multiple is below the agreed-upon level.

10. B is the correct response. The typical debt instruments issued by younger growth-oriented companies are venture debt and convertible debt. Both of these debt types typically include equity-linked features such as warrants (venture debt) and conversion rights (convertible debt) which increase the risk and expected returns of the instruments. Response A is incorrect because one effect of the inclusion of equity-linked features is to lower the coupon rates on these types of debt to preserve cash flows. Response C is incorrect as the early-stage companies issuing venture debt likely do not own assets that would be good collateral and convertible bonds typically are not secured.

11. A PIK feature involves investors foregoing several years of interest payments in exchange for an equivalent increase in debt principal. Spleenwood could structure the mezzanine debt to defer the first four years of coupon payments by increasing the debt principal to account for the deferred interest. Because Spleenwood is taking greater risk with this structure, the stated interest rate is likely greater than if Spleenwood structured the mezzanine debt as a standard fixed-coupon bond.

12. B is the correct response. The unitranche structure creates one loan agreement which can be executed more quickly and with lower fees than public securities or widely syndicated debt arrangements. This benefit to the borrower creates a more complicated contracting problem for the different lenders that are parties to the structure. The non-standard terms of private debt facilities and complexity of agreements among lenders (to which the borrower is not a party) diverges from standard intercreditor agreements, and these agreements have not been widely tested in legal settings. As a result, greater uncertainty exists as to how these private debt structures will perform in the event of financial distress, bankruptcy, and liquidation. Response A is incorrect as the sharing of interest is addressed by the agreement among lenders. Response C is incorrect as this is a benefit to the borrower.

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LEARNING MODULE

5

Private Special Situations

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	discuss the characteristics and risks of special investment situations
☐	discuss the features of distressed debt, financing alternatives for issuers in financial distress, and investment strategies in distressed situations
☐	discuss the features of complex investment situations involving financial dislocation or stress
☐	discuss the due diligence and valuation processes used to evaluate special investment situations
☐	discuss the risk and return among special situations and compared to other forms of private debt as part of a strategic asset allocation

INTRODUCTION

1

As described in earlier learning modules, private market strategies usually involve investments over a broad range of company life-cycle phases or project development stages with relatively long and illiquid holding periods. Private investment general partners (GPs) focus on adding value and generating returns over a multiyear investment life cycle in private equity, real estate, and infrastructure investments, among others.

Special situations investments, in contrast, are often of a shorter-term nature, focused on opportunities associated with events or market conditions that are expected to have a significant impact on the absolute or relative value of an issuer's private or public obligations. These events are most frequently associated with either financial dislocation or distress, although non-financial events such as fraud, litigation, or failed business combinations may be involved. This type of investment spans a wide range of corporate and sovereign issuers and investments, including private special situations funds, high-risk debt strategies within a private debt asset allocation, or as a separate category of opportunistic investments. Despite their investments in publicly traded securities in many cases, special situations funds are included here due to their predominantly private ownership structure. Given their episodic nature and limited scope, special situations represent a small but growing fraction of the overall private market universe. According to the alternative investment data provider Preqin,

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which includes such investments in its private debt category as either distressed debt or special situations and mezzanine debt, these strategies are expected to reach over USD1 trillion in global assets under management (AUM) by 2027, or just under half of all private debt investments under management.

This learning module builds on the foundation established in the Private Debt learning module in this pathway by first addressing the features of special situations investments. While the previous learning module highlighted the use of debt in private market strategies over a restructuring or project development life cycle, the focus here is on *events* that materially affect the value of an issuer's debt or equity securities. For example, financial distress, or a high likelihood that promised loan or bond payments will not be made in full on time, and its resolution via restructuring, bankruptcy, or liquidation are among the most common events associated with this investment subcategory. We will address the characteristics of distressed debt, which arise due to both adverse macroeconomic conditions and company- and industry-specific factors, as well as financing alternatives for distressed issuers. Investment approaches associated with special situations include short-term trading strategies related to credit events or business combinations, more active strategies seeking to control a firm as it emerges from bankruptcy, and more complex transactions involving capital structure or convertible arbitrage. As with other private markets, specialized GP knowledge and experience are critical to success in sourcing, evaluating, and executing special situations investments, which often include an understanding of the bankruptcy process. Valuation approaches are often supported by scenario analysis given the material impact of alternative outcomes. The combination of returns dominated by short-term price changes and the potential for less correlation and idiosyncratic sources of return are important drivers of the unique role of special situations in a strategic asset allocation.

LEARNING MODULE OVERVIEW

- Special situations involve opportunities associated with issuers in financial distress or events over a relatively short time horizon. Strategies include capitalizing on securities mispricing for distressed issuers, a corporate action such as a merger or acquisition, or a more complex investment situation, such as convertible arbitrage.
- Distressed debt involves issuers that are illiquid, insolvent, or at greater risk of not meeting debt obligations. Distressed financing alternatives include debt exchanges outside or within the bankruptcy process, as well as secured debtor-in-possession financing during the reorganization period.
- Structural models linking the price of equity and credit may be used to establish relative value across a firm's shares, bonds, and credit default swap (CDS) pricing. Capital structure and convertible arbitrage strategies seek to capitalize on pricing anomalies among these positions and within the capital structure in cases of financial dislocation.
- Investors in special situations often face a short time frame to conduct due diligence and have less information, which is subject to event-driven change. Given the challenges of incorporating the timing and magnitude of financial distress and other events into standard valuation approaches, scenario analysis is often applied to liquidation and going concern outcomes weighted by probability.

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- As a subcategory of private debt for many investors, special situations investments seeking to capitalize on event-driven mispricing have the potential to provide diversification to debt portfolios where interest income and the return of principal are primary sources of return.

SPECIAL INVESTMENT SITUATIONS

2

☐ discuss the characteristics and risks of special investment situations

Earlier Private Markets Pathway learning modules characterized private investments in company debt or equity, real estate, or infrastructure as illiquid positions held for multiyear investment periods over a range of company life-cycle or project development phases. The area of private investment that targets return by investing in stressed, distressed, or event-driven opportunities, often over a shorter time frame, is referred to as **special situations**.

In contrast to the value creation process used in other private market strategies, these opportunities involve discrete events that have a significant impact on investment value. Investment professionals often refer to **financial dislocation** as a case in which market prices are misaligned on an absolute or relative basis due to economic crises, changes in liquidity, market constraints, or other industry- or company-specific factors. While many situations may fall into this category, we distinguish here between financial distress and other event-driven opportunities.

Financial Distress

The loan or bond obligations of issuers considered unlikely to meet promised future interest and principal payments in a timely manner are referred to as **distressed debt**. Events associated with financial distress include failure to pay a contractual debt obligation on time, violation of a financial covenant in a bond indenture or loan agreement, and/or a situation in which the market value of a firm's assets falls below that of its fixed obligations when valued as a going concern. When issuers are unable to meet their fixed debt obligations, debtholders may become residual claimants to a firm's remaining net assets, as shown in Exhibit 1.

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Exhibit 1: Firm Value Distribution between Shareholders and Debtholders

Exhibit 1 shows the example of a firm valued at time T (V_T), at which time the firm's zero-coupon debt (D) also matures. If the firm is solvent ($V_T > D$), debtholders are paid in full and shareholders capture the remaining firm value. In the case of **insolvency** ($V_T < D$), a situation in which total liabilities exceed the market value of assets, V_T is distributed to debtholders, who receive less than the promised interest and principal, while shareholders receive nothing. Earlier in the curriculum, it was shown that this relationship between shareholders and debtholders has option-like characteristics. That is, shareholders hold a long position in the firm's assets (V_T) and have purchased a put option on firm value with an exercise price of D from debtholders. The put option premium may be interpreted as the credit spread paid to debtholders.

A distressed investor might seek to capitalize on the expected outcome by either (1) purchasing the bonds of an issuer trading at a significant discount to par in anticipation of being paid in full or receiving a higher discounted price or (2) selling short the stock of an issuer that is expected to become insolvent. Beyond this short-term approach involving non-controlling trading positions, investors may seek a more active role in restructuring as a significant minority or controlling investor or use the process to acquire and eventually resell an entire company.

In practice, the assessment and allocation of firm value among investors is more complex than shown in Exhibit 1. For example, asset valuation may vary widely when considering a forced sale to a third party versus continued operations as a going concern. Firm liabilities typically involve many claims, with more complex debt profiles and staggered interest and principal payment schedules over time, as well as different levels of seniority, security, and other contingency features. The substantial time and cost associated with the **bankruptcy** process are important drivers of alternative approaches, described later in this learning module.

Causes of financial distress include economic downturns leading to poor operating and financial performance and company- or industry-specific factors adversely affecting a firm or industry. For example, Exhibit 2 shows global annual corporate default rates from S&P Global Ratings over several decades.

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Exhibit 2: Annual Global Corporate Bond Default Rates (%)

Source: S&P Global Ratings.

Exhibit 2 demonstrates that the likelihood of default rises significantly amid economic slowdowns, reaching highs during the 1990–91 and 2001 recessions, the Global Financial Crisis of 2008-2009, and, to a lesser degree, the COVID-19 pandemic. Defaults are also far more frequent among high-yield issuers, or those with sub-investment-grade ratings at the time of default. One measure of investor loss in a default scenario is the **credit loss rate**, the *realized* percentage of par value lost to default for bonds, equal to the bonds' default rate multiplied by the loss severity. According to Moody's Investors Service, the highest annual credit loss rate for US investment-grade corporate bonds since 1983 was close to 0.4%, with an average of 0.05%. For high-yield bonds, the average credit loss rate was around 2.5%, while in several years, usually around economic recessions, losses exceeded 5%.

Industry-specific factors often play a role in the financial distress of firms, even in periods of relative macroeconomic stability. Earlier in the curriculum, risk factors considered that affect overall industry performance beyond cyclicality included industry structure and concentration, competitive intensity, value chain dynamics, and long-term growth and demand. For example, commodity-based companies are often considered among the most cyclical due to the direct impact of underlying economic activity and consumer demand on prices. However, the impact of supply increases and technological change may also contribute to weaker industry performance, as highlighted in the following example.

EXAMPLE 1

Petroleum Industry Bankruptcies amid the Global Oil Price Collapse

Beginning in July 2014, global oil prices faced their most sustained decline of the 21st century. The US benchmark West Texas Intermediate (WTI) crude oil price fell from highs of well over USD100 per barrel through mid-2014 to just USD30 per barrel in early 2016, as shown below.

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WTI Price per Barrel (USD), 2011–2018

Source: Bloomberg.

Supply outpaced demand due in part to new discoveries in the Permian Basin in the United States, as well as drilling technology improvements using hydraulic fracturing (or fracking) that lowered breakeven prices for crude oil production. Given balance sheets that hold predominantly fixed assets financed heavily by debt, the sustained oil price decline drove oil and gas firm revenues and profits sharply lower, forcing several exploration and production companies to seek bankruptcy protection in 2015. By late 2016, over 200 petroleum industry companies had filed for bankruptcy.

Weak demand for oil production and refinery equipment also caused recovery rates to plunge. Prior to 2015, historical recovery rates in the oil and gas industry averaged 58%. For the industry bankruptcies in 2015, recovery rates averaged only 21% as the value of oil production assets declined due to these industry-specific circumstances.

In other instances, financial distress is isolated to a single company. Company-specific risk factors include a single firm's weak or deteriorating competitive position in an industry, product market risk, execution risk, and excessive operating leverage. A sharp deterioration in company performance in periods of economic growth and otherwise strong industry performance may result from specific adverse events, such as product recalls, litigation, isolated operating or supply chain disruptions, or management irregularities, including fraud.

EXAMPLE 2

Luckin Coffee's Accounting Fraud

Luckin Coffee Inc. was founded in Beijing in 2017 with a goal of surpassing global coffee retailer, Starbucks, by offering lower-priced coffee for takeout and delivery through its proprietary technology application. Within one year, the company experienced rapid growth and reached a valuation of USD1 billion, with venture capital (VC) funding from one of China's largest VC funds, as well as from Singapore's sovereign wealth fund, GIC. Luckin Coffee continued to raise new capital, including nearly USD700 million via a public offering on the US NASDAQ exchange in May 2019. By July 2019, the company was valued at USD4 billion, with 5,000 locations across China and plans to double the number of stores by the end of 2021.

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The company's impressive growth reports prompted skepticism from some in the investment community. At the end of January 2020, a short seller released a research report based on customer traffic at Luckin Coffee locations compared to sales figures reported by the company. The research report suggested that Luckin had overstated 2019 revenues by as much as 88%. Luckin's auditor, EY, later found evidence of revenue overstatement in early 2020. China's market regulator initiated an investigation, concluding that Luckin had inflated revenues and misled investors.

Luckin shares were subsequently delisted from NASDAQ, and the US Securities and Exchange Commission imposed a USD180 million penalty on the company. In February 2021, Luckin Coffee filed for Chapter 15 reorganization in US bankruptcy court with plans to continue operations. When it emerged from bankruptcy, Luckin was able to find new investors and restart its revenue growth trajectory.

Special situations investors may take positions in the outstanding loans, bonds, or equity of distressed issuers to capitalize on expected price appreciation, as described above. More complex approaches may involve hybrid securities, such as convertible bonds, or combine short and long positions in instruments with different claims in the issuer's capital structure, as described later. Other strategies include the purchase of assets from forced sellers in liquidation at a discount to fair market value or the provision of special forms of secured financing to firms in distress.

Beyond the macroeconomic, industry, and company risks highlighted previously for corporations, distressed situations involve several additional risks unique to these investments, as described next.

Credit Risk

The **credit valuation adjustment (CVA)** framework introduced earlier in the curriculum is shown in Exhibit 3.

Exhibit 3: Credit Valuation Adjustment

Recall that CVA measures the present value of expected loss (EL), or the product of the probability of default (POD) and loss given default (LGD).

$$EL = LGD \times POD. \tag{1}$$

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Since distressed debt often involves issuers whose default may be imminent, as POD approaches 100%, expected loss rises to nearly equal the loss given default, with the underlying debt price (as a percentage of face value) approaching the expected recovery rate in a default scenario.

To properly diagnose sources of credit risk, analysts and investors typically distinguish between short-term issuer liquidity and longer-term solvency issues. Liquidity refers to the relative ability to convert a firm's resources into cash over an asset conversion cycle to cover its immediate obligations, while solvency assesses an issuer's cash flow generation potential over multiple periods to meet interest and principal payments.

Investor Liquidity Risk

Debt and equity instruments of issuers facing financial distress often face limited liquidity as price volatility rises. Many market participants are forced to sell if their investment policies preclude ownership of distressed debt or equity securities. Public equities failing to meet minimum exchange price requirements are often delisted as a firm approaches default.

Operational Risk

Firms facing financial distress may lose employees, customers, or suppliers unwilling to bear the greater risk of non-payment or liquidation while a firm restructures its debt or pursues bankruptcy.

Legal Risk

The costs and uncertainty associated with financial distress include creditor disputes and bankruptcy proceedings. As both the risks and costs associated with bankruptcy and other forms of litigation reduce the assets available to settle claims, distressed debt investors must weigh these costs against the potential benefits of pursuing such legal action.

Financial distress affects both corporate and sovereign issuers. A sovereign borrower's creditworthiness may deteriorate due to excessive fiscal deficits, inflexible monetary and exchange rate policies, or adverse economic conditions.

Sovereign borrowers in highly developed markets generally reflect the lowest credit risk among public sector borrowers. These issuers have the power to tax economic activity in highly diversified economies engaged in global trade with freely floating currencies widely held by external parties, including central banks, referred to as **reserve currencies**.

Sovereign issuers in *developing* markets, in contrast, are more susceptible to financial distress, for several reasons. These less wealthy economies often have limited economic diversification, fewer foreign trade partners, and less developed domestic financial markets. In addition, the restrictive, non-convertible, and often fixed exchange rate regimes in these economies limit policy effectiveness, magnify the impact of economic shocks, and increase the likelihood of financial distress. These countries with non-reserve currency regimes often rely on foreign direct investment and issuing debt denominated in major foreign currencies, which require sufficient currency reserves to service interest and principal and to pay for essential imports.

While distressed corporate issuers often enter legal bankruptcy proceedings to continue operations while restructuring debt, the principle of **sovereign immunity** limits the legal recourse of lenders to enforce debt claims against distressed sovereign borrowers. As a result, sovereign financial distress typically results in the restructuring of outstanding debt rather than asset sales or liquidation. On one hand, fiscal deficits and declining tax revenues are common sources of distress among sovereign bonds denominated in domestic currency. Foreign currency bonds, on the other hand, are more susceptible to weaker external conditions, which may involve domestic currency

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depreciation due to lack of competitiveness and/or falling foreign currency reserves. The unique example of El Salvador demonstrates the impact of a mismatch between a country's reserves and its outstanding debt.

EXAMPLE 3

El Salvador Averts External Debt Default

As a lower-middle-income developing country in Central America seeking to promote stable inflation and growth, El Salvador adopted the US dollar as its official currency over two decades ago following a period of pegging its currency to the US dollar. Despite a strong economic rebound following the COVID-19 shutdown, fiscal deficits remained high, and the country was heavily dependent on short-term external debt, with a debt-to-GDP ratio of over 80%.

In 2021, El Salvador's president, Nayib Bukele, made the country the first to adopt bitcoin (XBT) as legal tender, claiming it would ease the transfer of remittances from abroad and make digital transactions more accessible to an underbanked population. The country began actively purchasing the cryptocurrency as part of its external reserves. However, the USD/XBT exchange rate suffered a decline from over USD60,000 per XBT to approximately USD20,000 by July 2022, which coincided with a plunge in the price of El Salvador's 5.875% US dollar–denominated sovereign bonds to just 30% of par, as shown in Exhibit 4.

Exhibit 4: USD/XBT vs. 5.875% 2025 El Salvador US Dollar Bond

Source: Bloomberg.

Sharp declines in XBT in the wake of pending near-term US dollar debt maturities cast doubt on El Salvador's ability to meet its external obligations, leading to ratings downgrades from S&P and Moody's to CCC+ and Caa3, respectively.

The price of El Salvador's external bonds rebounded in the latter half of 2022 as the government offered to buy back a portion of its outstanding debt using reserves and was also able to arrange a USD450 million loan from the Central American Bank for Economic Integration, a multilateral financial institution focused on regional economic development. With this partial debt repurchase, incremental new funding and a mild XBT rebound, El Salvador averted default on the January 2023 bond maturity as debtholders were repaid in full.

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While sovereign immunity precludes such issuers from entering bankruptcy proceedings, investors in distressed sovereign debt face losses under a default scenario that often involves a debt restructuring plan in conjunction with a multilateral financial institution, such as the International Monetary Fund (IMF). While such plans are often accompanied by austerity measures, such as budget cuts and tax increases, debt investors incur losses in the form of interest and principal payment grace periods, extended payment terms, and other borrower concessions.

Reputational Risk

Investors in corporate or sovereign distressed debt face the potential of displacing workers, disrupting communities, and having an adverse environmental impact when forcing a firm to liquidate its assets or pursuing legal claims. Many public sector investors, such as pension funds and sovereign wealth funds, are wary of failing to meet their environmental, social, and governance (ESG) objectives when investing in such opportunities. For example, investors in sovereign debt obligations of **heavily indebted poor countries (HIPCs)**, a specific group of developing countries eligible for support from the IMF and the World Bank due to high rates of poverty and significant indebtedness, may be seen as taking advantage of such crises, as described in the following example.

HIPCS AND DISTRESSED DEBT FUNDS

The IMF and the World Bank launched the HIPC Initiative in 1996 to help HIPCs avoid unsustainable debt burdens.

Sovereign debt crises have posed a challenge to this goal when special situations funds use a strategy to purchase a portion of a country's distressed external sovereign debt in the secondary market at a deep discount. In some cases, a fund may elect not to participate in the restructuring process and use litigation to either attempt to recover the debt's face value or settle at a significant premium to the price originally paid. The offshore legal expenses and considerable time over which such litigation occurs impose a high burden on HIPCs. According to the African Development Bank Group, such fund efforts to target HIPC distressed debt are often successful, leading to annualized returns on investments ranging from 50% to 333%, among the highest for distressed debt investing.

Strategies to help HIPCs and other developing countries avoid financial distress and heavy indebtedness have been combined with environmental conservation initiatives. For example, in 2022, Belize and a subsidiary of The Nature Conservancy (TNC) agreed to a debt-for-nature swap under which the country was able to repurchase its external debt in exchange for fixed annual marine conservation expenditures during the 19-year loan term. Gabon entered a similar USD500 million debt-for-nature swap in the next year, repurchasing outstanding debt at a discount in exchange for an extended term loan at a lower interest rate contingent on promising to fund conservation efforts.

Corporate Actions and Other Event-Driven Opportunities

Special situations other than financial distress that drive investment opportunities include corporate actions such as business combinations, sales, and tender offers. In other cases, investors seek to capitalize on expected investment value due to litigation, regulatory sanctions, or significant issues adversely affecting an issuer's competitors, key suppliers, or customers.

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Other than financial distress, mergers, acquisitions, and divestitures are the most common event-driven situations that drive significant valuation changes. Special situations associated with business combinations are often referred to as **merger arbitrage** opportunities, which involve investors seeking to capitalize on price discrepancies of one or more securities issued either by the target, the acquirer, or another party associated with a transaction. Unlike the risk-free arbitrage associated with the law of one price introduced earlier in the curriculum, this form of mispricing is related to informational inefficiencies associated with the likelihood, timing, and final terms at which a transaction occurs that may cause securities to trade at a different value. Merger arbitrage managers commonly use borrowed funds to generate leveraged returns. The use of borrowed funds depends on the expected payout and the degree of confidence in the merger successfully closing.

Merger arbitrage opportunities are typically triggered by the announcement of a potential transaction for which the target company (TargetCo) is often acquired using cash or stock, as shown in Exhibit 5.

Exhibit 5: Merger Purchase Method and Corresponding Arbitrage Positioning

Whether a merger or acquisition is announced as an all-cash or all-stock deal, the market price of TargetCo typically remains below the announced price given the uncertainty associated with closing the transaction. The **arbitrage spread**, or the difference between the announced acquisition price and the post-announcement market price, represents the potential return opportunity of a merger arbitrage strategy if the deal closes based on original terms ignoring transaction costs. The simplest form of arbitrage is an all-cash transaction that involves the purchase of TargetCo shares in anticipation of deal closure, while an all-stock deal arbitrage strategy often combines a *purchase* of TargetCo shares and a *short sale* of the acquirer's shares, as shown in the following example.

KNOWLEDGE CHECK

Windslater Corporation seeks to acquire all the shares of Spruceneedle Company. Windslater's management team is considering two possible acquisition strategies: an all-cash purchase and an exchange of shares. Spruceneedle's share price prior to the acquisition announcement is CAD40 per share, and Windslater plans to offer a 25% premium. Windslater's current share price is CAD100 per share.

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1. Calculate the arbitrage spread if Windslater announces an all-cash purchase of Spruceneedle's shares and the share price increases to CAD46 upon this announcement. Discuss one fundamental reason why the arbitrage spread is greater than zero.

   Solution:

   Given the 25% premium, Windslater is offering CAD50 per share for Spruceneedle [= 40 × (1+0.25)], so the arbitrage spread equals CAD4 per share (= 50 – 46). An investor engaging in merger arbitrage would buy Spruceneedle shares at CAD46 upon the acquisition announcement with a possible payoff of CAD50 when the acquisition is completed. The arbitrage spread is greater than zero because there is a significant probability that the acquisition will not be completed as of the acquisition announcement date.

2. Discuss the trade that a merger arbitrage investor would likely construct if Windslater announces a stock-for-stock transaction if Spruceneedle's share price increases to CAD46 upon announcement and Windslater's share price is unchanged.

   Solution:

   The merger arbitrage investor would buy shares of Spruceneedle and sell shares of Windslater. Given Windslater's CAD100 price per share and the CAD50 purchase price for Spruceneedle, Windslater would offer to pay 0.5 share for each Spruceneedle share. The merger arbitrage investor would construct a similar trade by selling 0.5 share of Windslater for CAD50 and buying one share of Spruceneedle for CAD46. This trade results in a CAD4 per share arbitrage spread if the acquisition closes as announced.

Acquirers with liquid shares that may attract short selling under such strategies frequently seek to minimize stock price declines following a merger announcement by offering to purchase a company with a combination of cash and stock. Regardless of whether a merger is announced using all cash, all stock, or a combination of the two, the main risk associated with merger arbitrage is the same—namely, that the announced transaction does not take place. While most mergers are ultimately consummated, many fail for various reasons, which include the following:

- Debt financing becomes unavailable or subject to far less attractive terms.
- Governments, antitrust and competition regulators, or foreign investment rules in a region or country prevent the merger's completion.
- Changes in economic or industry conditions make the merger less attractive.
- Merger due diligence uncovers cases of fraud or material misrepresentation.
- A third-party bidder makes a counteroffer, which may delay timing but still results in a higher purchase price.

CASE STUDY

Elon Musk's Twitter (X) Acquisition

In April 2022, billionaire investor Elon Musk announced plans to acquire the social media company Twitter in a USD44 billion transaction that valued the firm at USD54.20 per share. The price represented a 38% premium over Twitter's traded price on the day before the announcement. Initially, the proposed deal was considered hostile, but within two weeks, Musk had arranged financing and Twitter agreed to the terms in what became one of the most quickly arranged

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deals of its size. Twitter's share price ranged between USD45 and USD52 during the remainder of April as investors weighed the likelihood of deal completion. Exhibit 6 shows Twitter's share price from the beginning of April 2022 until the company was taken private.

Exhibit 6: Twitter Stock Price, April–October 2022

Source: Bloomberg.

Despite its initial rapid pace, investor doubts were raised in May about the merger closing when Musk posted a comment, using Twitter, that he was reconsidering his bid pending more information regarding the proportion of "fake accounts" being reported among Twitter's total users. Twitter's share price fell to below USD40 following Musk's comments, approximately where it had traded before the acquisition announcement.

In July 2022, Musk announced plans to end his bid for Twitter as the company provided misleading information regarding the number of fake accounts on the social media platform. The initial response to this news was a decline in Twitter's price to approximately USD33 per share, before rebounding back to around USD40 by later in July. In early October 2022, Musk reversed his decision to contest the original merger agreement, and the deal closed near the end of the month at the original purchase price.

Note that an acquirer assumes all the assets and liabilities of the target company once a merger is complete, including the target company's debt obligations. As a result, business combinations also give rise to several types of debt-related merger arbitrage opportunities.

For example, recall from earlier learning modules that a **change of control** clause typically requires the issuer to offer to repurchase outstanding bonds at a fixed price at or above par if a new owner acquires a certain percentage of voting shares. In a merger scenario, this allows lenders and bondholders to put or sell back bonds to an issuer at a gain or negotiate more favorable debt terms.

In the case of debt whose repayment may not be triggered by a change of control clause, an acquirer may initiate a **bond tender offer** to buy back outstanding debt at a premium to the current market price. This public solicitation of debt to be purchased at a predetermined price for a specified period may involve either an offer of cash or an exchange of outstanding bonds for newly issued securities of equivalent value.

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More complex investments combining long or short debt, equity, and/or credit default swap positions to exploit significant mispricing in a single issuer's obligations are referred to as **capital structure arbitrage** strategies. Hybrid securities such as convertible bonds offer an additional opportunity to capitalize on the perceived mispricing of underlying risk components, including interest rate risk, credit, volatility, and equity risk, in what is known as **convertible arbitrage**. As in the case of merger arbitrage, these strategies also often use borrowed funds to increase returns using leverage. Recall from earlier learning modules that convertible bonds are fixed-income instruments that enable investors to exchange debt for equity at a pre-agreed price over a specific period.

QUESTION SET

1. Discuss one fundamental contrast between special situations investing compared to investing in other private market asset classes.

   Solution:

   The most fundamental contrast between special situations and other private markets relates to the time frame of the investment horizon. While most private market investing involves value creation over a long holding period, possibly 5–10 years or longer, the value creation from special situations investing is driven by the outcome of discrete events, typically occurring over much shorter time horizons.

2. Discuss the basic return-to-risk trade-off being considered by an investor in a cash-for-stock merger arbitrage opportunity in which an acquiror bids EUR70 for a target company and the target's stock price rises from EUR54 to EUR66 upon the acquisition announcement. Assume that the target stock falls to its original price if the merger does not close.

   Solution:

   The investor is considering whether a 6.06% (= 4 ÷ 66) return is a sufficient return for taking the risk that the acquisition will be successfully completed relative to the possibility of –18.18% (= –12 ÷ 66) return if the acquisition attempt fails and the target's stock price falls to its prior price.

3. Which one of the following best states the credit risk faced by an investor in the distressed debt of an issuer whose default is imminent?

   A. Probability of default (POD) by the issuer

   B. Loss given default (LGD) of the issuer

   C. Both POD and LGD

   Solution:

   B is the correct response. Because the distressed debt issuer's default is imminent, POD approaches 100%. Therefore, expected loss is equal to LGD, with the underlying debt price (as a percentage of face value) approaching the expected recovery rate in a default scenario. The investor is taking a view on how the realized recovery rate compares to the expected recovery rate priced into the security at the time of investment. A is not correct, because the POD is approximately 100% for the issuer of a distressed debt security whose default is imminent. C is not correct, because this response incorrectly includes POD.

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DISTRESSED DEBT

3

- discuss the features of distressed debt, financing alternatives for issuers in financial distress, and investment strategies in distressed situations

As described earlier, distressed debt involves the fixed obligations of issuers that are insolvent, face the risk of insolvency, or have a higher likelihood of failing to meet interest or principal payments in a timely manner. While both sovereign and corporate borrowers experience financial distress, our focus here is on corporate distressed issuers.

Distressed Debt Features

No universally accepted definition of distressed debt exists, although practitioners often identify such issuers by the observed market price of outstanding debt or equity obligations. That is, issuers with a bond yield *spread* of over 1,000 bps above the risk-free rate for a similar maturity or a corresponding loan *price* below 90% of par are usually classified as distressed. Alternatively, an equity price near or below the minimum trading price required to meet listing rules (such as USD1 on the New York Stock Exchange) indicates a high likelihood of distress, often leading to balance sheet restructuring, bankruptcy, or liquidation of assets.

Companies facing financial distress vary widely by size, industry, jurisdiction, and financial circumstances. Specific events associated with distress include a **technical default**, or violation of the terms and conditions of a credit or loan agreement. These events include the breach of a financial covenant or an actual non-payment of interest and principal in a timely manner, which often includes a 30-day grace period.

A thorough understanding of the causes of financial distress are an important first step in assessing a likely path for resolution and strategies for distressed investors. Exhibit 7 outlines common drivers of financial distress, which often occur concurrently.

Exhibit 7: Common Causes of Corporate Financial Distress

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High Leverage

High leverage itself is often a necessary but not a sufficient condition to cause financial distress. However, the compound effects of high financial leverage and uneven operating performance over the economic cycle are a common source of financial stress among firms in cyclical industries. The expected duration and severity of these effects are important factors when considering debt restructuring alternatives and investment prospects. While minor debt adjustments may be sufficient to address liquidity constraints, solvency issues may warrant more significant capital structure changes.

For example, a retailer with strong market share and operating performance may become unable to meet current debt service obligations amid declining cash on hand, rising inventories from slower sales, and delays in accounts receivable collections. A lender might conclude that given the firm's otherwise strong performance, sales and margins will rebound quickly, opting to amend the terms of the company's short-term debt obligations to bridge the temporary shortfall in net cash flow generation. In other cases, a cyclical downturn may prompt an issuer to reduce leverage via asset sales, as in the following example.

EXAMPLE 4

Swedish Real Estate Firm SBB Sells Assets to Reduce Leverage

Samhällsbyggnadsbolaget i Norden (SBB), a Swedish property company known as the country's largest landlord, was long known as a favorite of individual investors because of its growth, financial stability, and strong history of dividends. In 2021, SBB announced plans to nearly triple the size of its property portfolio over the next five years, increasing its leverage substantially just as Sweden's housing market began showing a significant decline in value.

In early 2023, SBB was facing cash flow strains from interest payments and looming repayments of maturing debt. The firm lost its investment-grade ratings and was downgraded several times during the year, reaching a speculative CCC+ S&P rating. To address short-term cash flow pressures, SBB embarked on a strategy of selling properties at a discount to book value. By late summer of 2023, market prices of SBB's securities declined to levels suggesting that SBB was unlikely to remain solvent, with senior bonds maturing within a year trading at a 15% discount to par and subordinated hybrid notes trading at a 90% discount. However, SBB's prospects improved as it accelerated its strategy of asset disposals, including a USD720 million sale to a North American real estate investor, which provided a short-term boost to its bond prices.

Changes in Assets or Liabilities

Material adverse changes in the value of key balance sheet items are an additional catalyst for financial distress. Unforeseen non-debt liabilities triggering insolvency often result from litigation, product recalls, or other forms of product- or customer-related liability that exceed a company's liability insurance coverage.

Asset impairment, in contrast, involves an adverse change in the market value of an asset in which the value falls below that which is recorded on the firm's balance sheet. Examples include changes in current assets, such as uncollectible accounts receivable, and changes in the value of long-term tangible and intangible assets.

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For example, the average market value of commercial aircraft plunged by a third in the wake of the COVID-19 pandemic amid widespread travel restrictions. While newer models still in production fell the least in price, airlines and aircraft lessors accelerated the retirement of older models approaching the end of their useful life.

Poor Operating Performance

While financial distress is often cyclical, in some cases underperformance reflects overall industry decline, poor management practices, or an uncompetitive business model. Insolvency due to high debt levels combined with poor operating performance may warrant more proactive measures to downsize or restructure a business.

Uncompetitive Business Model or Structure

In other cases, a company's new business model or strategy following a restructuring may be unable to support its balance sheet debt load. A new capital structure may depend on reaching financial milestones that prove to be unattainable. In the following example, this situation occurred in two phases.

EXAMPLE 5

Galeria Karstadt Kaufhof (GKK) Insolvency Proceedings

In 2023, Germany's largest department store chain entered insolvency proceedings, the German equivalent of US bankruptcy, for the second time in less than three years due to challenging market conditions and poor operating performance. Formed by a merger of Germany's two largest retailers (Karstadt and Kaufhof) in 2019, GKK's owners were slow to consolidate the combined firms' operations and realize the value of real estate holdings among its nearly 200 locations, facing resistance from its 34,000 unionized employees.

The firm first declared insolvency in July 2020 in the wake of the COVID-19 pandemic, emerging three months later with over EUR2 billion in debt write-downs, over 40 store closures, and several thousand employee layoffs. GKK was placed under new management with the goal of achieving growth in part by expanding its online sales from just over 4% of total revenue.

However, these measures did not prove sufficient to turn the company around, as it once again declared insolvency in March 2023. A second restructuring plan called for the closure of 50 additional stores, the downsizing of remaining locations in central business districts, and the release of an additional 4,000 employees from a level just half that at the time of the announced merger. Lenders were forced to accept a further EUR1 billion in debt losses.

Crisis in Confidence or Management

The discovery of fraud, aggressive accounting practices, or other financial irregularities often results in financial distress or bankruptcy. For example, the accounting fraud involving the falsification of Luckin Coffee sales data described earlier led to a delisting of the stock and a US bankruptcy filing in addition to investor lawsuits, from which the company successfully reemerged under new management.

Proper diagnosis of the causes and severity of declining creditworthiness is an important first step in determining appropriate steps to stabilize and improve performance. We return to the case study introduced in an earlier learning module to evaluate potential remedies to mitigate financial distress and identify associated investment strategies.

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CASE STUDY

Maudville Corporation Take-Private Transaction

Maudville Corporation, a US chemical producer with USD5 billion in revenue and EBITDA of USD1 billion, was taken private for USD5 billion by the buyout equity firm Bardstown Partners; 20% of the purchase price was funded with private common equity, 5% in private convertible preferred shares, and 75% in private debt. These funds were used to buy and retire the USD5 billion of publicly held equity. Bardstown plans to restructure and sell the company, targeting a 35% internal rate of return (IRR) on its equity investment over five years.

Under new leadership, Maudville worked with Bardstown and both syndicated bank and private lenders to create the following debt profile.

Maudville Corporation Original Take-Private Debt Profile

Debt Tranche	Size	Pricing	Tenor	Terms and Conditions	Lender(s)
Secured Revolving Credit Facility	USD250 million	MRR + 150 bps p.a. on drawn amounts	364 days	Secured by first lien on Maudville's fixed assets	Syndicated bank group
Senior Secured Leveraged Loan	USD2.65 billion	MRR + 200 bps	Seven years; Prepayable at par starting in one year	Secured by first lien on Maudville's fixed assets; Ranks *pari passu* with other senior secured debt; 6× debt-to-EBITDA maintenance covenant	Syndicated bank group
Junior Second Lien Fixed-Rate Tranche	USD600 million	8.00% fixed	Seven years; Amortizing in four equal installments starting Year 4	Secured by second lien on Maudville's fixed assets; Ranks *pari passu* with other junior secured debt; 6× debt-to-EBITDA maintenance covenant	100% Bardstown Credit Partners
Mezzanine Debt Tranche	USD500 million	12.2% fixed	10 years	Unsecured subordinated obligation; Ranks *pari passu* with all other subordinated indebtedness; 6.5× debt-to-EBITDA maintenance covenant	50%: Bardstown Mezzanine Opportunity Fund; 50%: Another private debt GP. Bardstown retains majority voting rights to amend mezzanine debt terms

Maudville's five-year restructuring plan seeks to achieve 5% in annual sales growth while reducing cost of goods sold (COGS) as a percentage of sales by 1 percentage point per year from 55% in Year 0, with annual 1 point SGA reductions as a percentage of sales from 25% starting in Year 3. Since the leveraged loan is prepayable at par after a year, early debt amortization involves the senior secured leveraged loan.

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1. Calculate Maudville's term debt maturity schedule, and evaluate possible events leading to financial distress over the five-year restructuring period.

Solution:

Maudville's term debt maturity schedule is as follows:

Year/Amortization (USD thousands)	Senior Secured	Junior Second Lien	Mezzanine	Total
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	150,000	0	150,000
5	0	150,000	0	150,000
6	0	150,000	0	150,000
7	2,650,000	150,000	0	2,800,000
8			0	0
9			0	0
10			500,000	500,000

While *voluntary* senior secured debt paydowns may occur earlier, note that no *mandatory* debt amortization is scheduled until Year 4.

Key potential events associated with financial distress over the five-year period include Maudville's failure to make timely interest payments, which may fluctuate in the case of the senior secured loan as the market reference rate (MRR) changes, and principal payments, which apply to the junior second-lien loan in Years 4 and 5. Also, Maudville must maintain at least a 6× debt-to-EBITDA ratio to avoid a technical default on its senior secured and junior second-lien loans and a 6.5× debt-to-EBITDA ratio to avoid a covenant breach on its mezzanine debt.

Distressed Debt Financing Strategies and the Bankruptcy Process

Credit risk, as defined earlier in the curriculum, refers to changes in the likelihood of default and loss severity under a default as reflected in market credit spreads. In contrast, actual technical or legal defaults must be addressed to avoid a contract violation triggering demand for full debt repayment. Issuers and investors have several alternatives and financing strategies to mitigate financial distress, as shown in Exhibit 8.

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Exhibit 8: Financing Strategies for Firms in Financial Distress

The use of alternatives outlined in Exhibit 8 varies widely based on different circumstances, including whether the issuer faces a short-term liquidity or long-term capital gap, as well as the possibility of a negotiated outcome with creditors without entering bankruptcy.

If the source of financial distress is limited to a temporary lack of short-term assets to meet obligations over an operating cycle, a solution is most often negotiated with liquidity providers. This may involve increasing the size of revolving credit agreements or working capital facilities, extending tenors, or waiving or changing covenants. For example, an issuer could agree to step up coupons or credit spreads if covenant levels are breached or seek less restrictive thresholds in exchange for higher pricing or other borrower restrictions or concessions.

Addressing long-term solvency gaps typically also requires a distressed issuer to negotiate additional sources of financing or reduce financial leverage. Common alternatives shown in the upper right of Exhibit 8 are as follows:

- *Sale or pledge of assets.* Given the general lack of cash among distressed firms, asset sales are a frequently used means of debt reduction. Whether considering the disposition of specific fixed assets or non-core businesses, pre-bankruptcy negotiation of sales provides sellers a greater opportunity to negotiate with strategic buyers and avoid forced sales at liquidation prices. Any assets used in ongoing operations previously excluded from secured debt collateral provisions may be included to improve the security position of lenders.
- *Secured debt or equity raise.* Raising additional debt or equity is another means of increasing capital, which for distressed firms is generally unavailable on an unsecured basis. Incremental borrowing may occur against assets that are not already fully encumbered under existing bond or loan agreements. Raising equity capital offers a debtor-friendly means of increasing

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firm solvency, which in the interest of time is often sourced from existing shareholders, while a secondary equity offering to new investors takes more time and involves greater cost.

- *Debt purchase or exchange.* A distressed issuer with sufficient liquidity could enter open market purchases of discounted debt or make a formal tender offer to retire certain debt tranches. In practice, however, the limited liquidity available to such issuers usually leads to a debt exchange in which the issuer offers new securities for existing bonds with lower par values, longer maturities, and other measures to ease the firm's debt burden. This approach, known as a **distressed debt exchange**, is accepted by bondholders to avoid the cost and a potentially worse outcome in the case of a bankruptcy filing.

Let us revisit the case of Maudville to consider its possible alternatives in a financial distress scenario.

CASE STUDY

Maudville Faces Financial Distress

During the first two years under new management, Maudville successfully executes on its business plan to grow sales, increase EBITDA, and reduce debt amid a stable economic environment. However, in Year 3, the company experiences a sharp drop in performance, with sales falling 7% amid increasing labor and material costs, driving COGS to 60% of sales. Maudville's key financial ratios derived from its income statement, retained cash flow (RCF), or net cash from operating activities less dividends, and balance sheet for the first three years are as follows:

Maudville Corporation Key Financial Ratios

Financial Ratio	Year 1	Year 2	Year 3
EBITDA Margin	21%	22%	10%
Debt to EBITDA	3.28	2.82	6.46
RCF/Net Debt	22%	27%	11%
EBITDA/Int. Exp.	4.1	4.6	2.1

Maudville's Year 3 EBITDA is USD511 million, with USD3,302 million in remaining term debt outstanding following the paydown of USD448 million in senior secured debt. Maudville has pledged substantially all its fixed assets as collateral, except for USD75 million in railcars, trucks, and other vehicles.

1. Discuss the nature of Maudville's financial distress, as well as possible remedies to address the situation.

   Solution:

   Given its debt of USD3,302 million and EBITDA of USD511 million, Maudville's 6.46× debt-to-EBITDA ratio exceeds the 6× maintenance covenant on its senior secured and junior second-lien debt tranches, placing it in technical default.

   Technical default remedies include a one-time covenant breach waiver, requiring approval of the syndicated bank group and Bardstown Credit Partners for respective tranches; amendment of the covenant threshold to

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a less restrictive level in exchange for higher pricing; or agreement to other borrower restrictions or concessions. At current EBITDA levels, Maudville's debt load exceeds the covenant threshold by USD236 million. The company could consider reducing debt by using cash to purchase debt on the open market or selling assets. One possible borrower concession might involve an incremental pledge of rail cars, trucks, and other vehicles to increase the collateral asset base.

As shown in the case study, firms with an initial covenant breach often find small open-market purchases or incremental asset sales preferable to a full debt-for-debt exchange. These and other measures can reduce debt and help avoid the bankruptcy process.

A **debt-for-equity exchange** involves the extinguishment of debt rather than amendment of debt terms in exchange for a position in the issuer's shares. Key issues to address in the case of a debt-for-equity swap include the type of equity received by debtholders (common shares, preferred shares, or convertible bonds) and the rights and restrictions associated with the new securities. Unlike the debt-for-debt exchange, existing shareholders typically face dilution when new shares are exchanged for outstanding debt.

Earlier in the curriculum, it was shown that the tax benefit of greater leverage is offset by the costs of financial distress or bankruptcy. Once a firm faces distress, issuers and investors often prefer to address technical and legal defaults outside of the bankruptcy process to avoid the considerable cost and time involved. However, the ability to avert legal bankruptcy proceedings depends on several factors, including a firm's cash position, the timing and magnitude of the expected financial shortfall, the complexity of the issuer's assets and capital structure, and regulatory and other constraints.

Limited liquidity prevents firms from taking immediate steps to mitigate financial stress, such as open-market debt repurchases. When weighing other measures to reduce leverage, the time to liquidity is an important determinant of the feasibility of specific alternatives. For example, a debtor may temporarily delay trade payables or sell individual asset sales relatively quickly to raise cash, while the sale of an entire business division takes more time. The impact of a shortfall may also be magnified by a lack of time and business resources available to address the issue.

Complex business models and capital structures are more difficult to restructure with relatively short notice. For example, the inability to identify individual retail locations, fixed assets, or non-core business units for disposal can complicate the deleveraging process. Complex capital structures involving secured debt, covenant protections, layers of subordination, and intercreditor agreements restrict the flexibility of borrowers and lenders to negotiate a plan that is satisfactory to all parties. Significant regulatory or external constraints on businesses, such as labor contracts and significant pension commitments, are additional complexities that lead distressed firms to seek bankruptcy protection versus a pre-bankruptcy settlement of claims.

The bankruptcy process seeks to protect the legal rights of all parties involved, afford a distressed issuer protection from creditors when operating as a going concern is preferable, and allow for an orderly asset liquidation when it is not. The US bankruptcy process is shown in Exhibit 9.

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Exhibit 9: US Bankruptcy Process

Once a debtor files for bankruptcy in a US court, it is granted an automatic stay, or protection, from lenders seeking to collect claims unless an exception (or relief) is granted. Legal protections extended to lenders in bankruptcy include strict limitations on **fraudulent conveyance**, or the transfer of assets to a third party to prevent creditors from reaching a borrower's assets. While local laws vary, US bankruptcy law allows the court to void such transactions for up to two years prior to bankruptcy filing and claw back funds to pay creditors.

FTX FRAUDULENT TRANSFERS

In November 2022, FTX, a Bahamas-based cryptocurrency exchange, filed for Chapter 11 bankruptcy protection under US law following a rapid decline in the value of its exchange token, FTT, causing a liquidity crisis. The company named a new CEO at the time of the bankruptcy filing to replace the company's founder.

Approximately eight months later, FTX Trading sued the founder of FTX as well as several other senior executives to recoup over USD1 billion in fraudulent transfers made by the company's senior executives during the two years prior to FTX's Chapter 11 filing. The complaint alleged that the defendants misappropriated funds to both offset losses of a trading affiliate and pay for luxury condominiums, political contributions, and speculative investments for personal gain.

Firms seeking to continue operations as a going concern propose a reorganization plan to be confirmed in court under a Chapter 11 bankruptcy filing. The company becomes a so-called **debtor in possession (DIP)**, remaining in control of the business under court supervision. A debtor may submit a proposal to the court to obtain **DIP financing**, a form of temporary debt financing senior to all other claims used to both cover ongoing bankruptcy costs and provide working capital and other financing to maintain operations while the firm is in bankruptcy.

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A similar reorganization process exists for US governmental entities (Chapter 9), while a Chapter 15 filing, which involves foreign creditors, is generally conducted in parallel with bankruptcy proceedings in the issuer's country of domicile.

To successfully emerge from Chapter 11, distressed firms must demonstrate that all creditors will be better off than under a liquidation scenario net of costs if asset sale proceeds were distributed according to the priority of claims. If a debtor firm cannot demonstrate greater value to lenders as a going concern, it files for liquidation under Chapter 7 of the Bankruptcy Code, turning assets over to a trustee for sale to settle all claims.

Investors who have purchased or sold credit protection on an underlying issuer facing financial distress closely track those events that may trigger a settlement of such contracts. Failure to make a debt payment, debt restructuring, or a bankruptcy filing generally constitute a **credit event** under outstanding credit default swap contracts. As shown in Exhibit 10, a protection buyer transfers the credit risk of an issuer or reference entity to a protection seller in exchange for a periodic premium. Standard CDS coupon rates of 1% and 5% exist for investment-grade and high-yield issuers, respectively. The present value difference between a periodic premium based on the issuer's CDS spread and the standard coupon for the contract life is exchanged at contract initiation.

If the defaulting issuer is a reference entity in a CDS contract, a credit event will trigger a settlement payment equal to the LGD multiplied by the contract notional amount from the protection seller to the protection buyer.

Exhibit 10: Credit Default Swap Mechanics

While US bankruptcy laws are generally considered more debtor friendly, many other jurisdictions have more stringent laws favoring creditors and are more likely to result in liquidation. In other cases, large companies considered to operate in the national economic interest may benefit from a form of direct or indirect government support such as loan guarantees or subsidies when facing financial distress to preserve domestic production and employment.

GLOBAL APPROACHES TO BANKRUPTCY

US corporate bankruptcy laws have a long history of allowing businesses to continue to operate following a bankruptcy filing, often with continuing management by the incumbent executive team. As a result, the United States has traditionally been viewed as the most debtor-friendly jurisdiction in the world. US law provides an extended period, typically 120 days, for management to file

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its plan of reorganization for review by the courts and creditors. Chapter 11 reorganizations commonly take well over one year in the best of circumstances and can last several years in complicated reorganization cases.

Insolvency laws and processes vary widely among the largest developed economies. For example, the UK bankruptcy process exhibits several contrasts to the US process. Overall, UK law is considered creditor friendly, with firm control in the reorganization process (known as administration) held by an administrator rather than company management. Nevertheless, historical empirical evidence on firm survival and creditor recovery rates are similar for the United States and the United Kingdom. Other countries' laws may focus more attention on protection of employment, such as in France, and research suggests that creditor recovery rates may be lower as a result. Germany and Japan have historically had strong banking sectors, resulting in more creditor-friendly processes. However, Japan's insolvency processes have evolved to focus more on restructuring firms to continue as going concerns, similar to the US approach.

The world's two most populous countries, China and India, continue to develop and improve their systems for resolving corporate insolvency cases. China's 2007 Enterprise Bankruptcy Law represented the nation's first comprehensive bankruptcy code, and for several years, bankruptcy filings remained relatively low, although these have increased over time. Similarly, India relied on a patchwork of different laws governing bankruptcy until 2016, when the country enacted its more comprehensive Insolvency and Bankruptcy Code.

Cross-border cooperation in reorganization processes is of growing importance as firms increasingly borrow and own assets in multiple jurisdictions. In 2005, the United States added Chapter 15 to its bankruptcy code to address insolvency cases involving more than one country.

An important consideration for financing strategies outside or within the bankruptcy process is the degree of control and expected timing associated with these alternatives. Successful out-of-court restructurings may be negotiated quickly but typically require agreement of all creditors to proceed.

As for settlements that occur *within* the bankruptcy process, an approach combining the expediency of pre-bankruptcy restructuring with favorable voting rules under a Chapter 11 reorganization—namely, the required consent of two-thirds of the volume and one-half of the investors for each claimant class—is referred to as a **prepackaged bankruptcy**.

A prepackaged bankruptcy involves a detailed business plan and exit strategy formulated by the debtor and agreed on with one or more major creditors in advance of bankruptcy filing. A prepackaged plan typically accelerates the process, reduces the likelihood of liquidation, and increases an issuer's ability to attract equity capital once it emerges from bankruptcy.

If the onset of financial distress is sudden or unexpected, an issuer is more likely to enter Chapter 11 bankruptcy in a **free fall bankruptcy**, or one with no plan or pre-agreement with creditors. While a debtor still controls company assets and typically has at least 120 days to file a plan, free fall bankruptcy is usually more expensive and time consuming, with a less certain outcome.

Distressed Issuer Investment Strategies

Many creditors and investors face pressure to dispose of distressed issuer obligations, including trade creditors, banks facing regulatory capital pressures for non-performing loans, and asset managers whose investment policy statement specifies credit quality minimums. In other cases, unconstrained investors see opportunity in distressed issuer debt and equity obligations. Three broad investment strategies are shown in Exhibit 11.

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Exhibit 11: Common Distressed Investment Strategies

Strategy	Trading Non-Controlling	Active Non-Controlling	Active Controlling
Target Investment	Traded debt, equity, or credit default swaps	Senior secured or unsecured public or private debt	Controlling stake in secured or unsecured public or private debt
Goal	Buy and hold	Actively engage in bankruptcy process	Seek control
Approach	Seek price appreciation or capital structure arbitrage opportunity	Seek returns upon exit from bankruptcy	Retain equity stake to continue restructuring after bankruptcy exit
Typical Holding Period	Six months or more	1–2 years	Exit in 2–3 years

The first distinction among these strategies is whether an investor takes a short-term trading position based largely on public information or seeks to actively engage in the debt restructuring process over time to influence the outcome. The former approach is commonly taken by alternative investors, such as hedge funds, as outlined in earlier in the curriculum. Specifically, credit hedge funds are well positioned to capitalize on temporary security mispricing due to the credit quality and liquidity constraints faced by many institutional investors. For example, in the case of **fallen angels**, or formerly investment-grade-rated issuers whose bonds are downgraded to high yield due to credit deterioration, a trading strategy might involve buying just after the downgrade to high yield in the wake of forced selling by high-grade investors, with a subsequent sale as these same bonds appreciate as they are widely added to institutional high-yield bond portfolios.

When evaluating distressed investment strategies in general and distressed debt in particular, it is important to look beyond standard yield-to-maturity and credit spread measures given the high likelihood of default and recovery in a default scenario, as illustrated in the following example.

EXAMPLE 6

Fallco's Distressed Bonds

A distressed credit fund manager is evaluating a possible investment in the senior unsecured bonds of Fallco, a fallen angel with one-year 6.00% and three-year 6.50% fixed senior unsecured annual coupon bonds outstanding. Both bonds recently traded at a price equal to 75% of par value. The current risk-free rate for both maturities is 5.00%.

1. Calculate the respective yields-to-maturity on Fallco's outstanding bonds and discuss the limitations associated with this return measure.

   Solution:

   Using the spreadsheet RATE function [= RATE(*nper*,*pmt*,*pv*,*fv*,*type*)], where *nper* is the number of periods, *pmt* is the periodic coupon payment, *pv* is the present value, *fv* is future or face value, and *type* corresponds to payments made at the end (0) or beginning (1) of each period, we can solve for the Fallco bond yields-to-maturity as follows:

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One-year 6% coupon: 41.33% = RATE(1,6,-75,100,0).

Three-year 6.5% coupon: 18.00% = RATE(3,6.5,-75,100,0).

Investors earn a rate of return on a bond equal to its yield-to-maturity only if

- the investor holds the bond to maturity and receives payment in full,
- no issuer default occurs, and
- the investor reinvests all coupon payments at the same yield-to-maturity.

Given the distressed nature of Fallco's debt, these assumptions underlying the yield-to-maturity calculation are less likely to be met, making this an unsuitable measure of return for such bonds.

2. The credit hedge fund manager notes a 40% historical recovery rate for senior unsecured bonds in Fallco's industry sector and estimates a one-third chance of a Fallco default in one year's time. Compare the recently traded price of Fallco's one-year bond to the estimated market price using these assumptions.

Solution:

To estimate the bond's market price, we first discount the 106 cash flow to the present at the 5% risk-free rate using a simple time-value-of-money calculation:

$$\text{PV} = \frac{\text{FV}_t}{(1+r)^t}.$$

$$100.9524 = \frac{106}{(1.05)^1}.$$

The price of 100.9524 represents the present value of bond cash flows at the risk-free rate, from which we must deduct the credit valuation adjustment. Recall that the CVA is the present value of expected loss, or the probability-weighted recovery in one period, as shown below in Exhibit 12.

Exhibit 12: Expected One-Year Return on Fallco Bond

Solve for the expected loss using Equation 1:

EL = POD × LGD

= 20.99 = 0.33 × (106 × 0.6).

Solve for the present value of expected loss and subtract from 100.9524:

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$$PV(EL) = 19.99 = \frac{20.99}{1.05}.$$

Estimated market price = 80.96 (= 100.9524 – 19.99). The current trading price of 75% of par value presents an attractive buying opportunity given the estimated value of approximately 81% of par value.

Alternatively, one can probability weight each of the separate outcomes:

No-default: Value = 106.

Default: Value = 106 × 0.4 = 42.4.

Expected end value = 0.67 × 106 + 0.33 × 42.4 = 71.02 + 13.99 = 85.01.

PV(Expected end value) = 85.01/1.05 = 80.96.

This simple example illustrates key parameters used to estimate the market value of a security, but the timing and likelihood of default is highly unpredictable in the case of financial distress. More complex capital structure arbitrage investment situations involving more than one security are addressed later.

Investors actively engaged in the restructuring process via either a controlling or non-controlling stake seek to create value by influencing the outcome of a distressed debt reorganization. These investment strategies are more closely aligned with private equity investments, except for the timing and method of investment.

In contrast to a more orderly take-private transaction in which a private equity sponsor contributes equity and raises debt for the remainder of the purchase price, an active distressed investor may acquire at least half of an issuer's outstanding loans and bonds, or a third in order to establish a blocking minority stake, with the goal of acquiring the firm in a debt-for-equity swap and likely contributing additional equity or partnering with another equity investor at a later stage.

Private equity GPs often view distressed situations as an attractive entry point to combine and consolidate companies within an industry following a cyclical downturn. For example, private equity played an active role in the oil and gas industry consolidation following the wave of bankruptcies described in an earlier example. By acquiring a controlling stake during the reorganization process, private investors can negotiate sweeping management changes, cost reductions, and other concessions that may contribute to a more rapid turnaround of a company than under stable market conditions. In some cases, a highly sought-after distressed firm may be purchased at terms favorable to the company's creditors, as in the following example.

HERTZ EMERGES FROM BANKRUPTCY

Hertz, a US rental car company, began Chapter 11 bankruptcy proceedings in May 2020 following the onset of the COVID-19 pandemic and the resulting decline in all travel-related businesses. In an interesting turn of events, used car prices soared in late 2020 because of global car shortages. Hertz took advantage of this opportunity to sell approximately a third of its fleet. As travel began to resume more quickly than anticipated in early 2021, the shortage of available vehicles caused car rental rates to soar.

In this environment, Hertz attracted interest from several private equity investor groups looking to bring the company out of bankruptcy. After a bidding war in spring of 2021, the winning investors paid approximately USD5.9 billion for Hertz. As part of their bid, both secured and unsecured claims in the company's Chapter 11 case received 100% payment and existing shareholders received small allotments of cash and equity stakes in the reorganized company.

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Active controlling investors usually hold their positions for two to three years following the exit from bankruptcy.

Active investors who are *not* seeking to take a controlling stake in the company may also purchase distressed debt and participate in creditor committees, as well as provide post-bankruptcy financing. These investors typically hold smaller stakes, may partner with larger or smaller investors to influence restructuring outcomes, and are more likely to exit soon after the company emerges from bankruptcy.

QUESTION SET

1. Discuss the circumstance under which excessive leverage is likely to contribute to a company's financial distress and its potential severity.

   Solution:

   While excessive leverage can be a factor leading to financial distress for a company, a compounding factor such as poor operating performance is usually necessary to create distress. The severity of distress may depend on whether poor operating performance is of a short-term cyclical nature or is evident of longer-term performance issues. High leverage increases the amount of cash flow necessary to service a company's debt.

2. Which of the following is the most likely strategy for a company whose debt-to-EBITDA ratio rises above a level defined in maintenance covenants?

   A. Raise additional debt capital.

   B. Reschedule debt repayment.

   C. Sell operating assets to raise capital.

   Solution:

   B is the correct response. The violation of a maintenance covenant reflects a technical default, and the most likely response is a short-term liquidity strategy, such as rescheduling debt repayments. A and C are incorrect because both represent strategies that would be used if the default were characterized by a longer-term insolvency issue.

3. Contrast the seniority ranking of debtor-in-possession financing of a company filing Chapter 11 bankruptcy relative to that of its existing debt claims, and explain a rationale for the relative ranking of DIP financing.

   Solution:

   DIP financing is short-term debt senior to all other existing claims against the debtor. This temporary financing is used to both cover ongoing bankruptcy costs and provide working capital and other financing to maintain operations while the firm is in bankruptcy. Thus, lenders need senior status to be willing to provide this capital to the bankrupt company.

4. Evaluate the following investment opportunity available to a distressed debt investor: Failco has a one-year 8% coupon bond trading at 70% of par value. The investor estimates a 60% chance of default for Failco and a 55% expected recovery rate. The current risk-free rate is 4%.

   Solution:

   Expected loss if Failco defaults:

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EL = 0.60 × (0.45 × 108) = 29.16.

Expected payoff in one year to buying Failco bond:

Expected payoff = 108 – 29.16 = 78.84.

Fair market value for Failco bond:

Value = 78.84 ÷ 1.04 = 75.81.

The bond trades at 70 and is worth 75.81, assuming the expected default probability and recovery rate given above, so the distressed debt investor should view this opportunity as potentially profitable.

4 OTHER SPECIAL SITUATIONS

☐ discuss the features of complex investment situations involving financial dislocation or stress

Financial distress arises as the value of an issuer's assets (V_T) declines compared to the face value of its debt (D). More complex investment situations associated with a company's capital structure require a closer examination of the building blocks of firm value.

Equity as an Option of Firm Assets: The Merton Model

As shown in Exhibit 1, a firm's value combines shareholder and debtholder claims. In theory, shareholder claims consist of assets (V_T) plus the right to deliver or "put" assets to debtholders upon default at an exercise price of D (p_0 at $t = 0$). Debtholders have a risk-free debt claim at maturity (D) plus the put option ($-p_0$) *sold* to shareholders. These components of firm value distributed between shareholders and debtholders are illustrated in Exhibit 13.

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Exhibit 13: Shareholder and Debtholder Payoffs at Time *T*

Earlier in the curriculum, it was shown that under put–call parity, at $t = 0$, the price of a long underlying asset plus a long put option must equal the price of a long call option plus the present value of a risk-free bond's face value (D) equal to the option exercise price. Substituting firm asset value as the asset and risk-free debt for the risk-free asset, we can show firm asset value under put–call parity (V_0) as

$$V_0 + p_0 = c_0 + \text{PV}(D).$$

$$V_0 = c_0 + \text{PV}(D) - p_0. \tag{2}$$

In Equation 2, the *shareholder* payoff is shown as a call option on firm value (c_0), while the debtholder payoff is equal to risk-free debt, PV(D), and the sold put ($-p_0$). This sold put option may be interpreted as the firm's *credit spread*, or the premium above the risk-free rate shareholders must pay debtholders to assume default risk.

This link between credit spreads to equity prices is the key feature of **structural credit risk models** introduced earlier in the curriculum. Structural models, or models using an option-based approach to evaluate a firm's market value of assets versus its fixed obligations, are commonly applied to evaluate default probabilities and complex investment situations. Exhibit 14 shows the features of a structural model, with the market value of equity, E_t, over time based on the market value of firm assets (V_t), a probability distribution based on asset value volatility (σ) and the face value of debt(D), also referred to as the default barrier.

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Exhibit 14: Structural Model of Default

At time T, equity and debt values are as follows:

$$V_T = E_T + D_T, \tag{3}$$

where

$$E_T = \max[(V_T - D_T), 0] \tag{4}$$

$$D_T = V_T - \max[(V_T - D_T), 0] \tag{5}$$

Equation 3 shows firm asset value divided between equity and debt. Equityholders own a call option on residual assets (Equation 4), while debtholders own a covered call position on the firm's asset value (Equation 5).

Structural models are also often referred to as Merton models, because they are based on the same work and apply the same Black–Scholes–Merton (BSM) option pricing model introduced in an earlier learning module on derivatives. Since equity value E_t may be expressed as a call option on residual firm value ($V_t - D$), we substitute this expression for the familiar ($S - X$) denoting the stock price minus the exercise price used in the original BSM model. This theoretical application of the BSM model also uses the volatility of the value of the firm's assets rather than that of the firm's equity:

$$E_t = V_t N(d_1) - e^{-rT} D N(d_2), \tag{6}$$

where

$$d_1 = \frac{\ln(V_t/D) + [r + (1/2)\sigma^2](T - t)}{\sigma\sqrt{T - t}}$$

$$d_2 = d_1 - \sigma\sqrt{T - t}$$

$N(x)$ denotes the probability of obtaining a value of less than x based on a standard normal distribution. Debtholders expect to receive D at maturity, while the value of *risky* debt prior to maturity at time t (D_t) simply equals the difference between firm asset value (V_t) and equity value (E_t):

$$D_t = V_t - E_t. \tag{7}$$

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Ignoring spread adjustments due to liquidity or other factors, the difference between the present value of risk-free debt ($e^{-rT}D$) and risky debt (D_t) represents the put option on firm value described earlier. The "price" of the put option is the present value of expected loss, or credit valuation adjustment.

Risky bond and CDS values are more easily compared when the put option price is shown as a spread over risk-free debt rather than based on the difference in present value of zero-coupon debt. The put option expressed as a periodic credit spread, or the difference between a risky yield R and the risk-free rate r, is shown in Equation 8 for a maturity of $T - t$.

$$R - r = \frac{1}{T-t}\left(\ln\left[\frac{D}{D_t}\right]\right) - r. \tag{8}$$

Since D_t is equal to face value of debt minus the value of the put option, we can see that the more valuable the put option, the higher the credit spread ($R - r$) becomes. Because of put–call parity, greater call option value implies greater put option value (i.e., higher equity value and lower debt value relative to asset value). These structural model relationships are illustrated in the following case study.

CASE STUDY

Cedere Corporation Equity and Debt Values Using a Structural Model

An analyst estimates that Cedere Corporation, a publicly traded company with 10 million shares outstanding, has assets with a market value of EUR3.25 billion and an estimated asset volatility of 20%. She observes that Cedere currently has a face value of EUR2.75 billion in debt outstanding and that the current risk-free euro interest rate is 5%.

1. Assuming a one-year time horizon, use the structural model to estimate the value of Cedere's equity, its risky debt, and its credit spread.

   Solution:

   Solve for Cedere's equity value using Equation 6:

   $$E_t = V_t N(d_1) - e^{-rT} D N(d_2).$$

   $$E_t = 3{,}250 \times N(d_1) - e^{-0.05} \times 2{,}750 \times N(d_2).$$

   $$d_1 = \frac{\ln(3{,}250/2{,}750) + (0.05 + (1/2)0.2^2)}{0.2} = 1.18527.$$

   $$d_2 = d_1 - 0.2 = 0.98527.$$

   Use the spreadsheet function NORM.S.DIST(*z*,*cumulative*) to solve for $N(d_1)$ and $N(d_2)$ given the respective values:

   $N(d_1) = 0.88204$ = NORM.S.DIST(1.18527,*true*).

   $N(d_2) = 0.83775$ = NORM.S.DIST(0.98527,*true*).

   Substituting these values into Equation 6, solve for E_t of EUR675 million, or a price per share of EUR67.50 (EUR675 million/10 million).

   Solve for Cedere's risky debt value using Equation 7:

   $D_t = 3{,}250 - 675 =$ EUR2.575 billion.

   Solve for Cedere's implied credit spread using Equation 8:

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$$R - r = \frac{1}{T-t}\left[\ln\left(\frac{2,750}{2,575}\right)\right] - 0.05.$$

Solve for $R - r$ of 1.58% p.a.

2. Discuss how Cedere's equity, debt, and credit spread values change if the market value of the firm's assets were to fall to EUR2.5 billion.

Solution:

A decline in Cedere's market value of assets (V_t) from EUR3.25 billion to EUR2.5 billion would reduce the value of a call option on residual assets ($V_t - D$), reducing the value of equity and increasing the value of the put option and the credit spread. We can calculate the impact of this change as follows:

Solve for Cedere's equity value using Equation 6:

$$E_t = 2,500 \times N(d_1) - e^{-0.05} \times 2,750 \times N(d_2).$$

$$d_1 = \frac{\ln(2,500/2,750) + \left(0.05 + (1/2)\,0.2^2\right)}{0.2} = -0.12655.$$

$$d_2 = d_1 - 0.2 = -0.32655.$$

Use the spreadsheet function NORM.S.DIST(*z*,*cumulative*) to solve for $N(d_1)$ and $N(d_2)$ given the respective values:

$N(d_1)$ = 0.44965 = NORM.S.DIST(–0.12655,*true*).

$N(d_2)$ = 0.37200 = NORM.S.DIST(–0.32655,*true*).

Substituting these values into Equation 6, solve for E_t of EUR151 million, or a price per share of EUR15.10 (EUR151 million/10 million).

Solve for Cedere's risky debt value using Equation 7:

D_t = 2,500 – 151 = EUR2.349 billion.

Solve for Cedere's implied credit spread using Equation 8:

$$R - r = \frac{1}{T-t}\left[\ln\left(\frac{2,750}{2,349}\right)\right] - 0.05.$$

Solve for $R - r$ of 10.76% p.a.

Note that the firm's share price fell but remained positive despite a decline in the market value of firm assets below the face value of debt ($V_t > D$). Consistent with an out-of-the-money call option on firm value, the positive equity price represents time value given the underlying volatility of asset prices.

Insights gained from structural models must be weighed against their limitations. In practice, the market value of a firm's assets and asset price volatility are not directly observable but instead are estimated using equity prices and equity volatility. Debt profiles with staggered maturities, different levels of seniority and security, and contingency features complicate the put option calculation, and it is difficult to calibrate models to sudden capital structure changes. Continuous trading and no-arbitrage pricing assumptions do not apply to firms in financial distress with less liquid debt and equity securities. In practice, the default probabilities and credit spreads resulting from the Merton model may require adjustments based on historical data or other factors to arrive at a default probability forecast. As a result, while useful in quantifying equity implied credit risk, structural models are usually complemented by other credit and equity valuation models and techniques.

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Capital Structure Arbitrage and the Merton Model

As described earlier, capital structure arbitrage strategies involve taking more than one position, typically a long and a short position, to capitalize on security mispricing in different markets for the same issuer. Discrepancies may arise due to the presence of different participants in equity, bond, loan, and CDS markets, as well as varying speeds of price adjustment.

Structural models are used as a basis to compare implied credit spreads across equity, bond, and CDS markets and predict changes based on market movements. For example, we showed that an implied credit spread from the equity value (or $S_{Equity,Implied}$) is equal to $(R - r)$, where R is the yield-to-maturity on an issuer's debt and r is the applicable risk-free rate. We can derive implied credit spreads over a range of equity prices and compare them to observed bond market spreads ($S_{Bond,Observed}$) based on traded prices as shown in Exhibit 15.

Exhibit 15: Model Results vs. Observed Bond Credit Spreads

The relationship between an issuer's equity price and its implied credit spread shown in the graph was established using a structural model. The downward-sloping curve reflects the fact that as share prices rise, the likelihood of default falls and credit spreads narrow. The data points above and below the curve represent spreads derived from the issuer's bond prices ($S_{Bond,Observed}$).

Under the assumption that the price of credit risk between implied credit spreads from equity and bond spreads should generally be aligned ($S_{Equity,Implied} \approx S_{Bond,Observed}$), a simple capital arbitrage decision rule to take advantage of *relative* mispricing between implied equity and bond spreads is as follows:

$S_{Bond,Observed} > S_{Equity,Implied}$: Buy bonds, sell equity short

$S_{Equity,Implied} > S_{Bond,Observed}$: Buy equities, sell bonds short

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If the observed bond spread $S_{Bond,Observed}$ exceeds the spread implied by the model, then the value of debt, D_t, and thus the bond price are *below* that predicted by the model. An investor who buys the bond and sells the stock short expects to gain as the mispricing ($S_{Bond,Observed} - S_{Equity,Implied}$) falls to zero.

A final consideration is the hedge ratio of this capital arbitrage strategy. Assuming the Merton model accurately represents the default probability, as in the case of other options, we can use the BSM model to derive the delta, or expected change in bond value for a given change in equity value, $\mathrm{d}D_t/\mathrm{d}E_t$, to determine this ratio as follows, using Equation 7:

$$\frac{\mathrm{d}E_t}{\mathrm{d}V_t} = N(d_1) \;;\; D_t = V_t - E_t.$$

$$\frac{\mathrm{d}D_t}{\mathrm{d}E_t} = \frac{\mathrm{d}V_t}{\mathrm{d}E_t} - 1 = \frac{1}{N(d_1)} - 1. \tag{9}$$

We consider a capital arbitrage strategy using the earlier case study.

CASE STUDY

Cedere Corporation Bond vs. Equity Capital Arbitrage Strategy

Recall that Cedere Corporation is a publicly traded company with 10 million shares outstanding. Cedere currently has one-year debt with a face value of EUR2.75 billion outstanding, and the current risk-free euro interest rate of 5% remains constant for the period under consideration.

1. Assuming a firm asset volatility of 20%, calculate the implied equity credit spread over a range from EUR10 to EUR100 per share using the structural model and interpret the results under the Merton model.

   Solution:

   Using the BSM model in Equation 6 and given that D equals EUR2.75 billion, r is 5%, $\sigma = 0.2$, and T is 1, we can solve for a given E_t, which when divided by 10 million gives us the respective price per Cedere share. For example, a EUR10 price per share implies E_t of EUR100 million. Solve for $\text{Spread}_{Equity,Implied}$:

   $$\text{EUR100 million} = V_t N(d_1) - e^{-0.05}\,2.75 \text{ billion } N(d_2),$$

   where

   $$d_1 = \frac{\ln(V_t/2.75 \text{ billion}) + [0.05 + (1/2)0.2^2](1)}{0.2}.$$

   $$d_2 = d_1 - 0.2$$

   Solve for V_t = EUR2.372 million by an iterative process, such as trial and error or the Goal Seek function in Excel.

   lve for D_t using Equation 7:

   $$D_t = 2{,}372 - 100 = \text{EUR2.272 billion.}$$

   Solve for Cedere's implied credit spread using Equation 8:

   $$R - r = \frac{1}{T-t}\left[\ln\left(\frac{2{,}750}{2{,}272}\right)\right] - 0.05.$$

   Solve for $\text{Spread}_{Equity,Implied} = R - r$ of 14.09% p.a.

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Using a spreadsheet to set up the calculation of Equation 6, Equation 7, and Equation 8, we can use a Data Table or Goal Seek function to solve for $\text{Spread}_{Equity,Implied}$ as a function of Cedere's equity price per share, as shown in the following table and Exhibit 16.

Cedere Equity Price (EUR)	$\text{Spread}_{Equity,Implied}$ (% p.a., σ = 20%)
10	14.09%
20	8.60%
30	5.75%
40	4.00%
50	2.83%
60	2.03%
70	1.46%
80	1.05%
90	0.76%
100	0.55%

Exhibit 16: Cedere Implied Credit Spread vs. Equity Prices

2. Assume an analyst observes that Cederes' shares are trading at EUR40 and its one-year zero-coupon debt is available for purchase at a price of EUR90 per EUR100 face value. Analyze the potential for capital structure arbitrage, and recommend a trading strategy incorporating an appropriate hedge ratio.

Solution:

Cedere's firm value is EUR2,875 million given equity value of EUR400 million (= EUR40 per share × 10 million shares) and debt value of EUR2,475 million (= 90% × EUR2,750).

Using Cedere's firm value of EUR2,875, we continue to assume that D equals EUR2,750 million, r is 5%, σ = 0.2, and T is 1. Next, we solve for d_1 and d_2:

$$d_1 = 0.5723 = \frac{\ln(2.875/2.75 \text{ billion}) + [0.05 + (1/2)0.2^2](1)}{0.2}.$$

$$d_2 = 0.3723 = 0.5723 - 0.2.$$

Then, we solve for $N(d_1)$ and $N(d_2)$ given the respective values:

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$N(d_1) = 0.7164 = \text{NORM.S.DIST}(0.5723, \textit{true})$.

$N(d_2) = 0.6451 = \text{NORM.S.DIST}(0.3723, \textit{true})$.

Using this information in Equation 6 to solve for Cedere's equity value (i.e., the call option value):

$E_t = 2{,}875 \times 0.7164 - e^{-0.05} \times 2{,}750 \times 0.6451 = 372$.

Thus, Cedere's equity value according to the structural model is EUR372 million, which compared to the current traded price of EUR400 million suggests that Cedere's equity is overvalued. Subtracting Cedere's model equity value of EUR372 million from the asset value of EUR2,875 million implies a fair value of debt of EUR2,503 million, which implies the traded value of EUR2,475 is undervalued.

Therefore, there appears to be potential for a capital structure arbitrage by buying Cedere's bonds and selling short the company's stock.

To construct the trade, we use Equation 9 to find the hedge ratio (i.e., change in debt value per change in equity value), and we use the $N(d_1)$ term from the BSM model of 0.7164 to calculate a ratio of 0.3958 [= (1 ÷ 0.7164) – 1]. So, per EUR1 of bond value purchased, sell short EUR0.3958 in equity value.

The prior case study assumed a constant risk-free rate, but fixed-coupon bond prices change as both the level of interest rates and the market's view of an issuer's credit risk changes. Investors use interest rate hedging strategies, such as an **asset swap**, to isolate a bond's spread component.

Exhibit 17 shows a bond's periodic fixed coupon to a market reference rate MRR plus (or minus) a spread using an asset swap.

Exhibit 17: Asset Swap Mechanics

If we assume an investor purchases a risky bond at par, the asset swap transforms the risky fixed-rate coupon to an equivalent fixed credit spread over MRR for the life of the bond. As the swap offsets bond value changes due to interest rate risk, the combination of risky bond and pay-fixed swap exposure leaves the investor with price risk based on bond credit spread (S_{Bond}) changes. However, note that under a bond default scenario, the investor still faces a mark-to-market settlement of the pay-fixed asset swap.

Recall from earlier that a credit default swap is a derivative contract in which a protection *buyer* pays a periodic premium based on the CDS spread at inception to a protection *seller*. The seller makes a contingent payment equal to the difference between par and the recovery rate to the buyer under a credit event. Unlike interest rate swaps, credit default swaps are terminated and settled after a credit event, with no remaining interest rate swap exposure.

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Under the no-arbitrage assumption that an investor can both borrow and lend at MRR as a reasonable approximation of the risk-free rate, r, Exhibit 18 illustrates the use of these strategies in taking a synthetic position in an issuer's bond or credit spread.

Exhibit 18: Bond vs. CDS Strategies in Managing Issuer Spread Risk

In the first instance, we demonstrate that an investor can create a long bond spread (S_{Bond}) position by borrowing at MRR for the life of the debt, buying the bond, and entering a pay-fixed interest rate swap. Alternatively, an investor may create a synthetic long bond position to earn the total rate of return, R, by depositing the bond purchase at a risk-free rate, selling CDS protection, and entering a receive-fixed swap. The cash flows of these two approaches are summarized in Exhibit 19.

Exhibit 19: Synthetic Bond Spread and Synthetic Bond Cash Flows

Cash Flows	Synthetic S_{Bond}	Synthetic Bond with CDS
At Inception	Borrow D	Lend D
	Purchase bond for D	Enter receive-fixed swap
	Enter pay-fixed swap	Sell CDS protection
	Net: 0	**Net: $-D$**
Periodic Cash Flows	Bond: + R	Deposit: + MRR
	Swap: + MRR + $S_{Bond} - R$	Swap: + r – MRR
	Loan: – MRR	CDS: + S_{CDS}
	Net: + S_{Bond}	**Net: + $(r + S_{CDS}) \approx R$**

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Cash Flows	Synthetic S_{Bond}	Synthetic Bond with CDS
At Maturity	Bond: Receive D	Loan: Receive D
	Loan: Pay D	
	Net: 0	**Net: D**

Arbitrage potential between these strategies is eliminated when bond and CDS spreads are closely aligned ($S_{Bond} \approx S_{CDS}$). In practice, a bond and CDS spread difference, or **CDS basis**, may arise due to bond price differences from par, accrued interest, and varying contract terms. For example, in the case of a *negative* CDS basis (where $S_{Bond} > S_{CDS}$), an investor might combine a synthetic long S_{Bond} position, shown above, with *buying* CDS protection on the same issuer to benefit as the basis declines over time.

As a protection *seller* realizes a mark-to-market *gain* when CDS spreads *narrow*, the position is equivalent to a long bond position. Capital structure arbitrage trades to take advantage of *relative* mispricing between implied equity and CDS spreads may be summarized as follows:

If:	Then:
$S_{CDS} > S_{Equity,Implied}$:	Sell CDS protection, sell equity short
$S_{Equity,Implied} > S_{CDS}$:	Buy equities, buy CDS protection

We have considered changes in implied asset values, as well as changes in equity values, to motivate capital structure arbitrage opportunities. However, these examples have assumed fixed volatility over time. Volatility changes in the structural model add a third dimension that may create capital structure arbitrage opportunities. We first consider how a volatility change affects the equity price versus implied credit spread relationship by revisiting our earlier case study.

CASE STUDY

Cedere Corporation Bond vs. Equity As Asset Volatility Changes

Cedere Corporation has 10 million shares and EUR2.75 billion in one-year debt outstanding. Rising uncertainty in Cedere's industry has caused the analyst to double the asset volatility assumption in her structural model to 40%.

1. Assuming a risk-free rate of 5%, calculate the implied equity credit spread for a share price of EUR10 per share using the revised structural model volatility assumption, and interpret the results.

   Solution:

   Using the BSM model in Equation 6 with D = EUR2.75 billion, r = 5%, σ = 0.4, and T = 1, solve for Spread$_{Equity,Implied}$ given E_t of EUR100 million (EUR10 per share):

   $$\text{EUR100 million} = V_t N(d_1) - e^{-0.05} 2.75 \text{ billion } N(d_2),$$

   where

   $$d_1 = \frac{\ln(V_t/2.75 \text{ billion}) + [0.05 + (1/2)0.4^2](1)}{0.4}$$

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$d_2 = d_1 - 0.4$

Solve for V_t = EUR1.878 billion using an iterative approach as in the prior case study, and note a comparison to EUR2.372 billion when 20% volatility was assumed.

Solve for D_t using Equation 7:

D_t = 1,878 – 100 = EUR1.778 billion.

Solve for Cedere's implied credit spread using Equation 8:

$$R - r = \frac{1}{T-t}\left[\ln\left(\frac{2,750}{1,778}\right)\right] - 0.05.$$

Solve for $\text{Spread}_{Equity,Implied} = R - r$ = 38.64% (versus 14.09% with 20% volatility).

The value of the call option held by shareholders on firm assets *rises* as volatility increases, causing the present value of firm assets at time t (V_t) to be lower for a given equity price and increasing the value of the put option sold by debtholders, both reducing the debt value (D_t) and increasing the credit spread ($R - r$) expressed as a percentage.

2. Revisit the arbitrage strategy used in Question 2 in the prior case study, and discuss an alternative interpretation of how a volatility change may impact the outcome.

Solution:

As Cedere's assumed asset volatility increases, the company's option values increase, holding asset value constant. Specifically, volatility increases imply higher fair values for Cedere's equity while the company's fair value of debt decreases, thus increasing the implied credit spread on Cedere's risky debt.

In a higher-volatility environment, Cedere's equity and debt values may move sufficiently that the company's stock becomes undervalued, and the debt overvalued. In fact, in the scenario of Question 2 in the prior case study, volatility above approximately 22.8% (which may be viewed as the implied asset volatility associated with Cedere's observed equity and debt prices) will create a situation in which the capital structure arbitrage would be to buy Cedere's shares and sell short the bonds.

An increase in volatility in the structural model leads to a shift in the equity price/implied bond spread relationship upward and to the right, as shown in Exhibit 20.

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Exhibit 20: Volatility and the Credit Spread/Share Price Relationship

This shift in the equity price/credit spread relationship increases the expected credit spread ($S_{Equity,Implied}$) for a given share price, changing the relative mispricing of observed trades based on the original volatility assumption. For example, in Exhibit 15, a short bond/long equity position would have realized a gain given the shift from low to high volatility and a new equity/credit spread relationship.

Investors may also take an explicit capital structure arbitrage position based on a view that the *implied* equity volatility suggested by the credit spread/share relationship in the structural model deviates significantly from actual equity volatility, as observed, for example, in the traded equity options market.

Convertible Bond Arbitrage Strategies

As described earlier in the curriculum, convertible bonds combine a straight bond with an embedded call option on an issuer's shares sold to investors. Investors may exchange debt into equity at a predetermined **conversion price** per share, or the price at which the debt may be fully exchanged for shares, during a period in the future.

Convertible bonds are relatively illiquid securities typically issued by early-stage or high-risk companies, with the call option contingency feature attracting lenders who may not be willing to offer standard fixed-rate debt to the issuer. Convertible bonds are also often offered at a discount to investors to attract capital more quickly than through a typical equity or bond offering. Exhibit 21 extends the earlier exhibit showing a straight bond's building blocks in terms of interest rate risk and credit risk to the case of convertible bonds.

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Exhibit 21: Convertible Bond Building Blocks

Extending the earlier synthetic long bond example, an investor may create a synthetic long convertible bond position by depositing the bond purchase price at a risk-free rate, selling CDS protection, entering a receive-fixed swap, and purchasing an equity call option that matches the bond's conversion terms.

The convertible bond issuer has sold equity volatility to the investor, typically in the form of a lower debt coupon versus standard non-convertible debt. This is demonstrated in Exhibit 21 by the investor's initial outlay of the straight bond purchase price D plus the equity call option(c_{Et}), which is greater than D in Exhibit 13 for the case of standard fixed debt.

Two key differences exist for capital structure arbitrage in the case of convertible debt versus straight debt. First, in contrast to the *indirect* impact of equity volatility on the relationship between credit spreads and share prices in the structural model, convertible bond investors hold a long equity volatility position in the form of an embedded call option. Increasing volatility results in gains to the convertible bondholder due to increases in value on the embedded call option. Second, the conversion feature associated with convertible bonds imposes arbitrage bounds on convertible bonds that do not exist in the case of straight bonds under the structural model. A wide range of capital arbitrage strategies may be used to isolate or offset equity, volatility, credit, and other exposures related to convertible bonds, three of which are listed below.

- *Credit risk.* An investor can purchase CDS protection to offset convertible bond issuer default risk.
- *Interest rate risk.* An investor can pay fixed on an interest rate swap to convert the fixed-rate exposure on the convertible bond to MRR.
- *Equity volatility risk.* An investor can use short equity positions or equity put options to hedge the equity market position of the convertible bond.

QUESTION SET

Laborantibus Partners manages a private fund specializing in distressed securities and is considering investments in public securities issued by Fracassar PLC, a British hotel chain encountering financial problems. Fracassar owns assets with a market value estimate of GBP6,500 million and has GBP7,500 million of zero-coupon debt outstanding that is scheduled to be

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repaid in six months (i.e., half of a year). Laborantibus estimates that Fracassar's annualized asset volatility is 50%. The current annualized risk-free rate is 5%. Based on this information, Laborantibus builds a structural model to estimate Fracassar's credit risk. As an analyst, you observe the following output from a spreadsheet estimate from this model.

Variable	Estimated Value
d_1	–0.1573
d_2	–0.5108
$N(d_1)$	0.4375
$N(d_2)$	0.3047
Call option value	GBP615 million

1. Calculate the estimated current value of Fracassar debt and the company's credit spread based on the results of the structural model.

   Solution:

   Fracassar's equity value is equal to the call option value of GBP615 million. So, Fracassar's debt value is GBP5,885 million (= 6,500 – 615), using Equation 7.

   Next, we solve for Fracassar's implied credit spread using Equation 8:

   $$R - r = \frac{1}{0.5}\left[\ln\left(\frac{7,500}{5,885}\right)\right] - 0.05.$$

   $R - r$ equals 43.49%, which reflects Fracassar's implied credit spread.

2. Laborantibus observes the actual credit spread on Fracassar's bonds is 40.0% and their price is GBP5,885. Which of the following best describes a potentially profitable capital structure arbitrage strategy?

   A. Buy Fracassar equity, and sell short Fracassar bonds.

   B. Buy Fracassar bonds, and sell short Fracassar equity.

   C. Buy Fracassar bonds, and buy Fracassar equity.

   Solution:

   A is the correct response. As shown in the solution to the prior question, a bond price of GBP5,885 implies a credit spread of 43.49%. When the observed credit spread is lower than the implied equity spread, the capital structure arbitrage strategy involves selling short bonds and buying equity. The investor expects spreads to widen to those implied by the structural model, causing the bonds to fall in value relative to equity. B is incorrect because it would be an appropriate strategy if the observed credit spread were greater than the implied credit spread. C is incorrect because this strategy implies that both securities are underpriced, which is not consistent with the structural model, because the two securities can only be mispriced in the opposite direction (i.e., one undervalued and the other overvalued).

3. Laborantibus revises its assumption about Fracassar's asset value given that it observes the market prices of Fracassar's equity and debt are GBP600 million and GBP6,000 million, respectively. The structural model is recal-

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culated, and outputs of the model are shown below. Recommend a capital structure arbitrage strategy incorporating an appropriate hedge ratio.

Variable	Estimated Value
d_1	–0.1141
d_2	–0.4676
$N(d_1)$	0.4546
$N(d_2)$	0.3200
Call option value	GBP659 million

Solution:

Given that Fracassar's equity is valued at GBP659 million and can be purchased for GBP600 million, the equity is undervalued by GBP59 million. Thus, Fracassar's debt is overvalued by GBP59 million. The capital structure arbitrage strategy is to buy Fracassar equity and sell Fracassar debt.

To construct the trade incorporating the hedge ratio, we use Equation 9 to find the hedge ratio, and we use the $N(d_1)$ term from the BSM model of 0.4546 to calculate a ratio of 1.1998 [= (1 ÷ 0.4546) – 1]. So, per GBP1 of bond value sold short, buy GBP1.1998 of equity.

4. While Laborantibus believes that Fracassar's asset volatility will likely stay high, it has also built a scenario in which asset volatility declines considerably as uncertainty about the value of hotel asset fades. Which of the following capital structure arbitrage trades works best to capitalize on this scenario?

   A. Buy Fracassar equity, and sell short Fracassar debt.

   B. Sell short Fracassar equity, and sell short Fracassar debt.

   C. Sell Fracassar equity, and buy Fracassar debt.

   Solution:

   C is the correct response. A decline in asset volatility will reduce the call option value that is Fracassar's equity while the company's debt increases in value. A is incorrect because this strategy is appropriate in the event of increasing volatility. B is incorrect because this strategy is not an arbitrage; it is simply a bearish strategy on firm value.

SPECIAL SITUATIONS DUE DILIGENCE AND VALUATION

5

☐ discuss the due diligence and valuation processes used to evaluate special investment situations

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Special Situations Due Diligence

The types of market-, industry-, and issuer-specific information gathered and analyzed in the due diligence process for special situations investments is similar to that described in earlier Private Markets Pathway learning modules. Recall that more detailed analysis is common in private versus public markets given the role of analysis in establishing a business plan for value creation over a relatively long holding period rather than for short-term trading purposes.

Given the relatively short-term, cyclical, and/or event-driven nature of distressed situations, investors typically have far less time to conduct due diligence and evaluate prospective investments. As a result, screening opportunities to prioritize specific investments is a critical initial step in the process. Key criteria such as issuer ratings, company size based on market capitalization, observed market prices of distressed bonds, and leverage ratios, such as debt/EBITDA, can help narrow investor focus on fewer targets whose debt is currently priced lower than expected based on observed financial ratios.

Statistical credit analysis models to measure creditworthiness often use the structural credit models introduced earlier or **reduced form models**. Unlike structural models, such as the Merton Model, reduced form models are not based on capital structure assumptions. Reduced form models provide a probability of default over a specific time frame, typically using observable company-specific variables, such as financial ratios, and market-based measures. An early example of the reduced form approach is the **Z-score** established by Edward Altman, which includes the following factors:

Liquidity: Working capital/total assets

Profitability: Retained earnings/total assets

Asset efficiency: EBIT/total assets

Market to book: Market value of equity/book value of equity

Asset turnover: Sales/total assets

These factors are weighted by coefficients to form a composite, or Z-score, used to classify firms into those expected to remain solvent versus bankrupt firms.

The structural models introduced earlier are also applied to estimate an issuer's probability of default to be considered along with the expected loss given default when evaluating the price of a distressed issuer's securities. Structural credit models used by practitioners include Moody's Analytics' Expected Default Frequency (EDF) and Bloomberg's Default Risk (DRSK) models, both of which estimate an issuer's probability of default over a selected period. For example, the DRSK model estimate includes a market-based asset value measure derived from equity market capitalization, asset value volatility based on equity volatility, and a default threshold measured using the book value of liabilities. Exhibit 22 shows the Bloomberg DRSK screen for the Swedish real estate firm SBB, described earlier, which estimates a one-year POD of 14.41%.

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Exhibit 22: Bloomberg DRSK Model for SBB

Source: Bloomberg.

Other important differences from the private markets due diligence process are the relative lack of information available to investors compared to a typical corporate acquisition and the more rapid change in a company's financial conditions due to market- or company-specific events.

For example, short-term, trading-based investors, such as credit hedge funds, are best positioned to capitalize on temporary mispricing due to forced sales among institutional investors. These short-term investors are typically limited to public information and have a greater focus on the relative liquidity of instruments under consideration given the higher price volatility associated with these investment opportunities.

Longer-term investors seeking to engage in the restructuring process via either a controlling or non-controlling stake use the due diligence process to gauge their influence over the outcome of a reorganization and ability to create value as the issuer emerges from bankruptcy. In some instances, an investor may establish a small initial investment position in a company because initial due diligence suggests an attractive buying opportunity. Over time, the investor may continue to build the position if ongoing due diligence suggests that a controlling stake is appropriate, while in other cases, the investor may trade the position or retain a minority position.

Valuable information for these prospective investors, such as customer lists, sales projections, or commercial contracts, is likely to be non-public, and company management may be unwilling or unable to share it with outsiders in times of distress. In other cases, access to restricted information may be limited to a bank or lending group and only available to existing creditors under a confidentiality agreement. Limitations on the use of confidential non-public information may restrict trading in public securities and other activities. In this situation or when no such lending group exists, prospective investors have limited bargaining power to obtain this information.

In addition to the financial due diligence common among private investments, including financial statement analysis, cash flow projections, and industry and competitive analysis, evaluation of distressed issuers should include a worst-case liquidation scenario in which the company is dissolved and its assets are sold individually rather than as a going concern. For companies already in bankruptcy, a detailed review of the initial and subsequent bankruptcy court filings and ongoing monthly operating reports provides vital information about the firm's current unsecured creditors, short-term cash flow projections, inventory liquidations, and material events.

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Legal due diligence for distressed companies should extend beyond the evaluation of organizational, legal commitments and outstanding litigation to include a thorough understanding of firm structure, as well as loan agreements and indentures within different legal entities, to identify any consolidation, structural, or financial issues or restrictions that may impact a creditor claim as the firm seeks or enters bankruptcy. For example, in contrast to fraudulent transfers described earlier in which assets are moved out of the reach of all creditors, an issuer may have granted a preference to one creditor over another, which may be reversed in bankruptcy court in what is known as a **voidable preference**.

Special Situations Valuation Approaches

Special situations investors make use of valuation techniques similar to those for public and private companies when considering an issuer as a going concern. In addition to the option-based structural model described in this learning module, techniques introduced earlier in the curriculum include the following:

- Income-based approaches based on discounted projected cash flows and a terminal value using assumed constant growth or a terminal market multiple
- Relative approaches (or the method of comparables) based on price-based or enterprise value–based multiples of firms with similar features
- Asset-based approaches seeking to estimate the value of underlying assets less liabilities

The key issue in valuing special situations is how to incorporate the likelihood, timing, and financial impact of specific events that give rise to investment opportunities. As described earlier in the curriculum, firms may face future alternatives that may be considered **real options** under a distressed scenario that can alter firm value. Recall that real options grant a firm the right but not the obligation to decide or take an action in the future. A company will choose to pursue (or exercise) a real option only if it enhances shareholder value. These options might include the sale of individual assets or an entire division of a firm. A related approach involves a **sum-of-the-parts valuation**, which considers the value of a firm's individual business segments if they were to be sold separately.

In what follows, we focus on events related to financial distress, such as bankruptcy, restructuring, and liquidation.

Consider how the potential for financial distress affects the standard discounted cash flow (DCF) valuation approach, as shown in Exhibit 23.

Exhibit 23: The Effect of Financial Distress on DCF Valuation

1. Decreased FCFF under Financial Distress

$$\text{Intrinsic Value}_t = \sum_{i=1}^{n} \frac{FCFF_{t+i}}{(1 + WACC)^i} + \frac{\text{Terminal Value}}{(1 + WACC)^n}$$

2. Higher WACC under Financial Distress

3. No Future Cash Flows after Liquidation

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Exhibit 23 shows three key challenges associated with applying the standard DCF approach to the case of a distressed company:

- *"Numerator" issues.* Analysts must identify and adjust key balance sheet and income statement items due to expected financial distress affecting a company's normalized earnings. The timing and magnitude of event-driven changes to revenue and cash flow are difficult to estimate.
- *"Denominator" issues.* Rates of return used to discount future cash flows or earnings are a second challenge in a distress scenario. In addition to the relative illiquidity of debt and complex capital structures involved, recall that distressed debt yields are not reflective of an expected rate of return, since these bonds trade at a significant discount to par.
- *Terminal value issues.* Discounting future cash flows back to the present implies that a firm will remain a going concern, a questionable assumption in a case of financial distress. The assumption of a future terminal growth rate or market multiple based on non-distressed valuations results in further distortions when considering a firm that may be restructured or liquidated in the near term.

Relative value comparisons using market multiples also fail to adequately account for financial distress, because they are typically calculated using ratios from non-distressed industry peers. As in the case of exit multiples for private equity, a relative value approach can be applied if the firm is considered a going concern—that is, a scenario under which it has averted dissolution.

Asset-based valuation approaches hinge on whether the market value is estimated as part of an ongoing business—that is, incorporating the value of existing products, customers, suppliers, and relationships—or whether the assets are sold individually and separate from the business. As described earlier, if an issuer cannot restructure its activities and obligations to sufficiently meet creditor obligations as a going concern, the individual sale of its assets to settle claims is the best course of action. The liquidation value of a firm's assets therefore often represents a lower bound for valuation purposes.

Liquidation most often occurs when a firm is uncompetitive; its assets are inadequate, outdated, or in disrepair; or the company's management is ineffective. While specialized industry knowledge is critical in assessing asset values under these circumstances, little secondary market information exists for most fixed assets, and their sale price is highly dependent on whether a distressed or orderly sale process takes place.

Valuing a firm's outstanding securities under liquidation involves comparing the value of firm assets (V_t) to debt (D) based on the priority of claims. Exhibit 24 illustrates this scenario by contrasting the balance sheet with asset liquidation proceeds versus debt.

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Exhibit 24: Liquidation Valuation Approach

The balance sheet on the left shows the book value of assets, equity, and debt, while on the right we see a shortfall ($V_t - D$) between asset liquidation values and debt. As a result, while senior secured lenders in this example will likely be repaid in full from liquidation proceeds, subordinated lenders will face a settlement value below the face value of debt. Consider the following liquidation valuation based on the earlier Maudville case study.

CASE STUDY

Maudville Corporation Liquidation Valuation

Recall that Maudville Corporation is a US chemical producer with USD5 billion in revenue and EBITDA of USD1 billion that was taken private for USD5 billion using debt (75%), equity (20%), and convertible preferred (5%) financing. After two years of profitability growth, operational improvements, and senior secured debt paydown, Maudville's revenue and profitability decline sharply in Year 3, leading to debt investor concerns over the company's financial situation entering Year 4. Maudville's remaining debt outstanding at the end of Year 3 is as follows:

Maudville Corp. Year 3 Debt Profile

Debt Tranche	Size	Tenor	Amortization	Terms and Conditions	Lender(s)
Secured Revolver	USD250 million	364 days		Secured by first lien	Syndicated bank group
Senior Secured Leveraged Loan	USD2.2 billion	Seven years		Secured by first lien; Ranks *pari passu* with other senior secured debt	Syndicated bank group
Junior Second-Lien Debt	USD600 million	Seven years	Amortizing in four equal installments starting Year 4	Secured by second lien; Ranks *pari passu* with other junior secured debt	100% Bardstown Credit Partners
Mezzanine Debt	USD500 million	10 years		Unsecured subordinated obligation; Ranks *pari passu* with all other subordinated indebtedness	50%: Bardstown Mezzanine Fund; 50%: Another GP. Bardstown has majority voting rights.

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An analyst constructing an end-of-Year-4 liquidation scenario observes Year 3 total assets of USD5,596 million and goodwill of USD1,258 million. She assumes that Maudville has fully drawn down its secured revolver and that goodwill should be excluded from the value of assets sold under her presumed distressed liquidation scenario.

1. Calculate the expected recovery of Maudville's outstanding debt by tranche under the liquidation scenario if the analyst assumes that assets are sold for 60% of their Year 3 book value.

   Solution:

   Year 3 assets of USD5,596 million minus goodwill of USD1,258 million results in assets for sale of USD4,338 million, 60% of which gives us liquidation proceeds of USD2,602.6 million (= 0.6 × USD4,338 million). Total debt outstanding with the fully drawn USD250 million revolver is equal to USD3,550 million (3,550 = 250 + 2,200 + 600 + 500), leading to an *average* debt recovery upon liquidation of 73.3% (= 2,602.6/3,550). Using the priority of claims, we first apply USD2,450 million to the first-lien revolver and senior secured debt claim, with the remaining USD152.4 million (= 2,602.6 – 2,450) in proceeds used to settle 25.4% (= 152.4/600) of the USD600 million in second-lien claims. Expected recovery by tranche may be shown as follows:

   First lien: USD250 million revolver 100% recovery

   USD2,200 million senior secured 100% recovery

   Second lien: USD600 million junior second lien 25.4% recovery

   Unsecured: USD500 million mezzanine 0% recovery

2. Discuss the impact of the distressed liquidation scenario described above on the company's convertible preferred shares.

   Solution:

   Because preferred shareholders are paid only once all debtholder claims are satisfied, convertible preferred shareholder claims will be zero under the distressed liquidation scenario.

An alternative to the liquidation case in the previous case study is a going concern scenario, or valuation of the firm under the assumption that it survives and continues to operate. The advantage of this approach is the avoidance of the valuation pitfalls described earlier, which can cloud the analysis by attempting to incorporate event-driven changes of unknown timing and magnitude. While the path to returning to profitability and competitiveness may be far from certain, the advantage to this approach is the ability to use valuation metrics such as market multiples for healthy industry peers.

CASE STUDY

Maudville Corporation Going Concern Valuation and Scenario Analysis

The analyst evaluating Maudville's value at the end of Year 4 assumes that after a challenging period, the company is able to reach a normalized EBITDA of USD750 million in two years' time (Year 6).

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1. Assuming the 6× EV/EBITDA industry multiple for Maudville's industry and using a risk-free discount rate of 5%, calculate the implied value of Maudville as a going concern at the end of Year 4.

   Solution:

   Given the assumed normalized EBITDA of USD750 million, we can solve for an enterprise value at the end of Year 6 of USD4,500 million (= 750 million × 6).

   Using a simple time-value-of-money calculation, we can solve for a present value of USD4,081.6 million at the end of Year 4.

   $$\text{PV} = \frac{\text{FV}_t}{(1+r)^t}.$$

   $$\text{USD4,081.6 million} = \frac{4,500}{(1.05)^2}.$$

2. Assuming a one-third probability of a distressed liquidation at the end of Year 4, solve for Maudville's enterprise value at the end of Year 4.

   Solution:

   Given the liquidation value as of the end of Year 4 of USD2,602.6 million from the earlier case study and the present value of Maudville as a going concern of USD4,081.6 million, we may solve for the implied enterprise value using a weighted average based on the assumed 33.3% likelihood of liquidation:

   USD3,588.6 million

   = (1/3) × USD2,602.6 million + (2/3) × USD4,081.6 million.

In practice, the default probability used in the simple scenario analysis shown in the case study may be derived from a structural or reduced form model, while the scenarios themselves may incorporate varying liquidation or restructuring assumptions. By isolating financial distress based on one or more specific scenarios and including a going concern recovery case in another, financial analysts can quickly tailor a valuation to changing market conditions.

QUESTION SET

1. Contrast the due diligence focus on distressed debt investments of credit hedge funds with investors looking to engage in the restructuring process.

   Solution:

   Credit hedge funds are short-term, trading-focused investors and will be focused on public information and the relative liquidity of credit instruments to assess their ability to take advantage of the price volatility. Investors engaged in the restructuring process are longer-term investors and use the due diligence process to assess how they may be able to influence the outcome of the reorganization process.

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2. Explain the issues associated with estimating the cost of debt capital when valuing a distressed company using standard discounted cash flow analysis.

   Solution:

   The common approach to estimating the cost of debt capital used in the weighted average cost of capital (WACC) is to calculate a yield-to-maturity on the firm's debt. The yield-to-maturity reflects the promised rate of return on debt, rather than the expected rate of return, which incorporates expected loss E(L). As a result, the yield-to-maturity provides an inaccurate estimate of the cost of debt.

3. Discuss the potential for using each of the three standard approaches to company valuation for distressed companies.

   Solution:

   Income-based approaches are difficult to use for distressed companies because of challenges with numerator (i.e., cash flow), denominator (i.e., cost of capital), and terminal value estimates. Income-based approaches are best suited to valuing businesses that are a going concern. Thus, income-based approaches should be used only for distressed businesses with a high probability of continuing as a going concern.

   Relative valuations, or using comparables, may be complicated by the definition of a peer group. A non-distressed peer group may be suitable for estimating terminal value for a distressed company that has a high likelihood of continuing operations as a going concern. However, controlling for the near-term effects of distress may complicate the use of comparables.

   Standard asset-based valuation often determines the market value of a company under the assumption of continuing operations, while a distressed company likely to be liquidated should rather assume a liquidation value of the company's assets. As such, asset-based valuation is more appropriate where the company has a high probability of continuing operations, but liquidation value of assets should be used if there is a high probability of discontinuing operations.

SPECIAL SITUATIONS RISK AND RETURN

6

☐ discuss the risk and return among special situations and compared to other forms of private debt as part of a strategic asset allocation

Private market debt investment typically involves sub-investment-grade or unrated issuers and assets and often involves securities with restrictive covenants and contingencies such as callability or equity-like features. Macroeconomic, industry-specific, or company-specific events may create distressed circumstances for a subset of these investments, giving rise to idiosyncratic risks, but also the potential for higher return for investors who are able to fund these opportunities upon short notice if distress occurs.

To address these opportunities, private funds have increasingly initiated special situations funds to fund distressed firms while providing investors with acceptable risk-adjusted expected returns. Given their investment focus on distressed debt, special

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situations funds are generally classified as a subset of private debt. As mentioned earlier, the market for private special situations funds is expected to grow to roughly half of the private debt market by 2027.

Institutional investors, such as pension plans, face an allocation challenge in their private debt strategies because they must assess a manager's ability to profit from the potentially higher risk associated with special situations funds as compared to other forms of private debt structure. While the issuers targeted by special situations funds typically face either a cyclical downturn or a steady deterioration in performance in a declining phase of their life cycle, fund GPs seek to navigate distressed situations to achieve returns from the following risk factors.

Credit Risk

Fund GPs expect portfolio assets to result in lower expected losses than those implied by their discounted purchase prices. Lower expected losses must reflect lower default rates or higher recovery rates in the event of default than expected as part of the restructuring process. That is, special situations fund GPs rely on their ability to either identify mispriced assets or identify situations in which they can add value to purchased debt securities by improving recovery rates on distressed assets. The following example illustrates the GP's or fund manager's ability to pursue a strategy to improve recovery rates.

BUSINESS HOTELS AND DEFAULT RISK AFTER THE COVID-19 SHUTDOWN

Following economic shutdowns related to COVID-19, hotel occupancy rates struggled to return to pre-pandemic levels, causing continued distress risk for many hotel owners and their investors. Hotels focused on business and convention traffic were especially risk prone in this environment because of the rise of remote work, which reduced business traveler demand and business meetings that traditionally used hotel conference room space.

Occupancy rates were slow to recover. For example, while Marriott International's occupancy rates exceeded 70% before the COVID-19 pandemic, by 2022, its North American occupancy remained depressed and its international properties remained below 60% occupancy.

Business-focused hotels also faced property value declines as occupancy rates failed to recover, reducing the collateral value of hotel owners and creating debt financing challenges for these issuers, who typically refinance properties every three years. Furthermore, the underlying financing of these hotels consisted largely of floating-rate loans; thus, rising interest costs due to the end of quantitative easing in 2022 placed additional cash flow strains on hotel owners.

While 2023 began with several hotel bankruptcy filings, including the world's tallest Holiday Inn, located in New York City's financial district, other hotel owners bypassed the reorganization process, allowing distressed properties to be foreclosed on by their lenders. Opportunities for asset sales were limited because potential buyers, such as private equity and sovereign wealth funds, were largely waiting for signs of market stabilization before bidding for distressed assets. For example, Blackstone, a significant private equity participant in lodging transactions, did not commit to any hotel purchases in the second half of 2022.

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Liquidity Risks

Because a proportion of investors may be forced to sell loans as the underlying assets become distressed, special situations fund GPs actively seek forced sale situations to take advantage of asset mispricing by bidding at prices below what they perceive as fair value.

Legal Risks

The complexity of issues arising from creditor disputes in a distressed environment highlights opportunities for fund GPs who have expertise and experience in navigating the bankruptcy process and negotiating to ensure acceptable recoveries in a distressed environment.

Fund GPs who can successfully manage these risks are more likely to generate significant price appreciation on their investments. Investors should note this difference between the primary source of returns in special situations as compared to private debt in which interest income and return of principal is assumed to be the primary return source. Thus, as a subcategory of private debt in most investor allocations, special situations investment is likely to provide diversification potential relative to private and public debt allocations. This is apparent when we consider the impact of inflation risk and interest rate risk on more traditional debt investments, neither of which is likely to significantly affect special situations returns.

Some private debt funds have a broader investment mandate that allows greater flexibility to pivot between distressed and non-distressed debt investments as industry and economic conditions warrant. This type of mixed focus by private debt funds may be advantageous to those investors with relatively small allocations to private debt and special situations relative to their overall asset allocation. In some cases, a closed-end fund may add an incremental fund to its existing structure to capitalize on a dislocation event, as described in the following example.

CONTINGENT DISLOCATION FUNDS

A contingent dislocation fund (CDF) is designed to invest capital upon the occurrence of a market disruption, or trigger, event. Such events might be defined as a financial or geopolitical crisis or a negative market signal. For private debt funds that typically lend to non-investment-grade companies within their main fund structures, events leading to financial distress offer attractive opportunities when additional capital is available in a timely manner.

Private debt funds often structure CDFs as a supplemental commitment to the primary debt fund, in which investor capital is only drawn if a dislocation event occurs. This provides a flexible mechanism in which the fund can access additional capital in the event of market stress. Typically, the CDF maintains an investment strategy similar to that of the primary debt fund.

The investor due diligence process for special situations fund managers shares common elements with that of a private debt fund manager but has several differences. Both seek to ensure superior credit analysis and structuring skills, as well as a manager's ability to adequately monitor, manage, and periodically value debt obligations. Special situations fund managers must demonstrate additional skills, such as managing legal and procedural aspects of the restructuring, bankruptcy, and liquidation processes important for issuers facing financial distress and dislocation. The following case study addresses a pension plan's evaluation process in considering a special situations fund investment as part of its overall asset allocation.

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CASE STUDY

Northern States Evaluates a Special Situations Fund

Northern States Pension Plan is a large US-based public pension plan with extensive private market investment experience. Its investment committee has scheduled a presentation with Bywater Capital on its Special Situations Fund III, the firm's latest fund offering with a strategic focus on distressed debt and other event-driven strategies.

Bywater Special Situations Fund I was recently fully exited with a net IRR of 15.0% and TVPI (total value to paid-in) of 2.0, and Special Situations Fund II is currently on track for similar performance. Compared to other private distressed debt funds, Bywater's performance is in the top quartile. While Bywater has successfully invested in different sectors, its investments recently have been concentrated in hospitality-related industries, including aviation and hotel properties.

Northern States currently owns a diversified public and private market debt portfolio, with a 10% allocation to private debt. Private debt investments include funds invested in senior secured floating-rate, mezzanine, and venture debt, and the underlying securities are typically unrated or below investment grade. The current asset allocation is shown below:

Asset class	Target allocation
Public equity	30%
Private equity	25%
Public fixed income	15%
Private debt	10%
Real estate and infrastructure	15%
Other alternative investments	5%
Total	100%

Northern States' economic outlook has recently changed to incorporate increasing probabilities of financial distress in several global industry sectors. As a result, the investment committee is evaluating investment strategies that may benefit from such an economic environment.

Brianna Jenkins, head of alternative investments at Northern States, has been asked to lead the discussion regarding an investment in Bywater Special Situations Fund III. Jenkins plans a discussion focused on the relation of special situations investing to the larger mandate of private debt investing.

1. Discuss how Northern States' economic outlook may affect the allocation decision to include special situations investments in their private debt portfolio.

   Solution:

   Because Northern States forecasts increasing financial distress in several sectors, the pension plan may be expecting lower returns on a portion of its private debt portfolio as the credit quality of the underlying loan portfolio declines. Distressed opportunities may provide Northern States with opportunities to attempt to partially offset the effects of distress on its existing private debt portfolio. Thus, Northern States may be open to allocating

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capital to special situations funds such as Bywater to augment returns in its private debt portfolio over time.

QUESTION SET

1. Discuss how a special situations fund GP creates value for investors with respect to credit risk in distressed debt situations.

   Solution:

   Special situations fund GPs use specialized skills to identify situations in which they can either identify mispricing or add value to purchased debt securities. This involves capitalizing on purchases when existing investors are forced to sell and seeking ways to lower expected losses on their investments below expected losses implied by their purchase prices. Lower expected losses must reflect lower default rates or higher recovery rates in the event of default than expected as part of the restructuring process.

2. Discuss why a pension plan's due diligence process on a distressed debt fund manager should include a thorough review of the fund's ability to address legal risks of potential investments.

   Solution:

   Distressed debt funds generate returns by applying expertise in navigating legal environments associated with debt restructuring and insolvency laws. Thus, a fund's ability to assess legal risks as it considers potential investments will be critical to the ability to add value to the fund. The complexity of issues arising from creditor disputes in a distressed environment highlights opportunities for fund GPs who have expertise and experience in navigating the bankruptcy process and negotiating to ensure acceptable recoveries in a distressed environment.

3. Discuss why a special situations fund may focus on specific industries in its selection of portfolio assets.

   Solution:

   Special situations investors often focus on specific industries due to their more favorable characteristics for distressed investments, including cyclicality and the prevalent use of secured debt to finance fixed assets. For example, firms that face volatile cash flows during economic downturns can represent attractive investment opportunities if their securities are mispriced or certain investors are forced to sell debt or equity. A specialized industry focus is advantageous in understanding asset values in a liquidation scenario. Industries involving firms with complex debt profiles secured by assets, restrictions such as covenants, and other contingencies offer advantages to special situations funds with expertise in understanding the valuation, liquidity, and legal environments that are likely to occur in a specific industry.

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PRACTICE PROBLEMS

The following information relates to questions 1-4

Brianna Jenkins, head of alternative investments at Northern States Pension Plan, is working on a presentation to the plan's investment committee to provide fundamental information to help the group consider investing in a distressed debt fund. As part of her work, she develops two visuals showing the contingent payoffs to both debt- and equityholders as functions of the asset value of a company and an equation demonstrating put–call parity.

Jenkins continues her presentation with a numeric example in which she shows a basic example of a structural model of credit risk. A company's asset value is CAD800 million, and it has zero-coupon debt with face value of CAD1,000 million maturing in two years. The volatility of the company's assets is 20% per year. The risk-free rate is 5% per year. Jenkins shows output from this model indicating that the value of a call option on this company's assets with an exercise price of CAD1,000 million is equal to CAD52 million and then states that the company's debt is trading at an observed credit spread of 10.4%.

Jenkins includes some examples of differing circumstances that may cause a company's debt to become distressed. Her examples include recessions, innovations that disrupt specific industries, and instances of company mismanagement and fraud. Jenkins follows this material with some discussion of additional operating risks faced by issuers in distress, such as loss of customers and employees.

Jenkins looks to close her presentation by providing some discussion of opportunities to invest in distressed debt funds. Northern States recently received a proposal from Bywater Partners to consider investing in its Bywater Special Situations Fund III. Bywater Partners has decided to focus exclusively on special situations investing. Alternatively, Northern States has an existing relationship with Spleenwood Capital, a firm with a broad private debt strategy. Spleenwood has begun including contingent dislocation funds (CDFs) as part of its private debt funds.

1. Which of the following best describes what Jenkins is seeking to illustrate with her visuals and the put–call parity equation?

   A. Equity value is zero any time that company asset value declines below face value of debt.

   B. Debt value is independent of equity value.

   C. Debt and equity values may be characterized as option values based on company asset value.

2. Analyze whether there is a profitable capital structure arbitrage trade available based on Jenkins's example.

3. Discuss the potential for a distressed issuer to suffer from excessive loss of employees depending on whether distress is more related to industry-specific conditions than company mismanagement.

4. Discuss one fundamental difference with respect to a distressed debt allocation

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between committing capital to Bywater versus Spleenwood.

The following information relates to questions 5-8

Spleenwood Capital, a private market firm focused on debt-focused investment strategies, is exploring the possibility of starting an event-driven special situations fund. The firm desires to focus primarily on debt-oriented control strategies but is open to considering other types of event-driven strategies. Given Spleenwood's desire to specialize in taking controlling stakes, the firm's principals believe that other investment strategies focused on assessing business combinations, such as merger arbitrage, may fit well with the overall fund focus.

Spleenwood explores additional approaches to merger arbitrage strategies that may leverage their skills in buying corporate debt. Specifically, Spleenwood considers investing in the debt of target companies with associated change-of-control clauses.

Spleenwood's managing directors further discuss a strategy of investing in debt of companies in which perceptions of mismanagement have contributed to long-term solvency issues. Spleenwood believes that there are profitable opportunities to pursue active and controlling strategies in buying company debt in such an environment.

Spleenwood prefers to avoid situations in which portfolio companies need to enter Chapter 11 bankruptcy reorganization in the United States as part of its active, controlling strategy. Rather, it prefers to buy the debt of companies that can be restructured outside the court system. However, if Chapter 11 cannot be avoided, Spleenwood strives to negotiate for prepackaged bankruptcy filings.

5. Contrast the event risk associated with merger arbitrage strategies with the event risk typically associated with distressed debt investing.

6. Discuss how Spleenwood expects to profit from a strategy targeting companies with change of control clauses.

7. Discuss why Spleenwood may prefer to negotiate debt-for-equity exchanges as a financing strategy (compared to other possible strategies) for its portfolio holdings in which mismanagement perceptions exist, and explain a potential challenge to implementing the strategy.

8. Discuss one significant reason why Spleenwood prefers to avoid unplanned Chapter 11 bankruptcy filings for the companies in which it has invested in debt, and discuss briefly what must happen to avoid this outcome.

The following information relates to questions 9-12

Laborantibus Partners, a private market firm specializing in distressed debt, is considering investments in public securities issued by Fracassar PLC, a British hotel chain encountering financial difficulties. Fracassar's debt, maturing in six months, is currently trading at GBP6,000 million. While Laborantibus has valued Fracassar as a going concern using a relative valuation approach based on public-

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ly traded European hotel chain comparables at an enterprise value of GBP9,000 million, it estimates a 30% probability that Fracassar defaults on its GBP7,500 million of debt in six months. Laborantibus assesses the liquidation value of Fracassar's assets at GBP3,000 million. Assume that the risk-free rate is 5% annually.

A few members of the Laborantibus investment committee express reservations about estimating Fracassar's enterprise value as a going concern using a relative valuation approach. They suggest that an income-based approach may be superior to use as a going concern valuation approach.

Laborantibus examines opportunities to trade across different seniorities of Fracassar's debt instruments. Fracassar's debt consists of GBP4,500 million of senior secured debt and GBP3,000 million of junior second-lien debt. The senior debt is trading at GBP4,200 million, and the junior debt is trading at GBP1,800 million.

Laborantibus observes that the credit default swap spreads on Fracassar's debt are higher than the associated bond spreads. Laborantibus considers the potential for a profitable trading opportunity.

9. Recommend whether Laborantibus should pursue an investment in Fracassar debt.

10. Evaluate the choice of estimating Fracassar's going concern value using relative valuation versus using an income-based approach.

11. Recommend a capital structure arbitrage trade involving Fracassar's senior and junior debt.

12. Explain how Laborantibus can create a synthetic Fracassar bond using a CDS.

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SOLUTIONS

1. C is the correct response. Asset value may be written as $V_0 = c_0 + \text{PV}(D) - p_0$. The equation reflects put–call parity, and the shareholder payoff is shown as a call option on firm value (c_0), while the debtholder payoff is equal to risk-free debt, PV(D), and the sold put ($-p_0$). A is incorrect because equity value will often be greater than zero despite asset value falling below face value of debt because of the call option's time value. B is incorrect because the debt value and equity value are related as a result of put–call parity.

2. Given that the equity value of the company is equal to the call option value of CAD52 million, the company's debt value is equal to CAD748 million (= CAD800 million – CAD52 million). The company's implied credit spread is approximately 9.5% {= [(1/2) × ln(1,000/748)] – 0.05}. Because the observed credit spread is approximately 90 bps greater, a profitable capital structure arbitrage is to buy the company's debt and sell its equity.

3. An operating risk, such as loss of employees, may depend on whether the events leading to the distress are macroeconomic, industry specific, or company specific.

   Distress due to macroeconomic factors typically involves economic downturns leading to poor operating and financial performance.

   In the case of distress due to industry-specific causes (such as the distress that occurred during and following the COVID-19 pandemic in travel-related industries), employees may find limited job opportunities that align with their experience and training.

   In the case of distress due to a company-specific factor related to mismanagement of a company, employees are more likely to have the ability to find alternate job opportunities related to their experience and training.

4. By committing capital to Bywater, Northern States is making an explicit allocation to distressed debt. In contrast, a commitment to Spleenwood commits capital to a distressed debt allocation only if a dislocation event occurs.

5. A merger arbitrage strategy's returns are defined by whether an acquisition is completed. For distressed debt investing, the event is resolution of distress. Unlike the merger arbitrage investment, resolution of distress is not a simple "yes" or "no" solution. The resolution of distress may take many forms of outcome in terms of how a distressed company's assets are divided between claimants. As such, the event risk for distressed debt is more complicated compared to that of merger arbitrage.

6. A change-of control-clause included in a corporation's covenants requires the issuer to offer to repurchase outstanding bonds at a fixed price at or above par, conditional on a new owner acquiring a specified percentage of the issuer's voting shares. Thus, Spleenwood will identify issuers with change-of-control clauses on their bonds that are potential takeover targets. By buying the debt of the most likely takeover targets, Spleenwood expects to sell back purchased bonds at a profit once the change-of-control clause is triggered.

7. A perception of mismanagement may provide incentives for Spleenwood to convert debt holdings into equity stakes sufficiently large to force a change in management. Other approaches to financing a distressed firm cannot address the issue of poor management because none of the other strategies translate into

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company ownership. The primary challenge for Spleenwood will be to buy a sufficiently large stake of company debt to ensure enough governance power after the debt-for-equity exchange to enact a management change.

8. An unplanned Chapter 11 bankruptcy filing is unlikely to be resolved quickly. A typical time frame for the company to successfully reorganize in this setting is likely to be two to three years or more, and this would reflect Spleenwood's investment horizon as an active, controlling investor. Avoidance of the unplanned Chapter 11 bankruptcy requires agreement among all creditors. For example, a prepackaged bankruptcy requires two-thirds of the volume and one-half of claimants to agree to terms, while out-of-court restructurings require all creditors to agree.

9. Based on the data given, Laborantibus would estimate that Fracassar's enterprise value is GBP7,200 million, as shown below.

   Enterprise value in six months = 0.3 × 3,000 + 0.7 × 9,000 = GBP7,200.

   If Laborantibus buys all of Fracassar's debt, the expected value is GBP6,150 million, as shown below.

   Debt value in six months = 0.3 × 3,000 + 0.7 × 7,500 = GBP6,150 million.

   Implied return for six months = (6,150 ÷ 6,000) – 1 = 2.5%.

   Laborantibus should not pursue an investment in Fracassar debt at its current price of GBP6,000 million. The expected return is approximately equivalent to the risk-free rate of 5% annually (i.e., 2.5% over half a year), which provides no compensation for the risks involved.

10. While both valuation approaches are more difficult to use for distressed companies, an approach using non-distressed comparables may be appropriate for assessing a going concern terminal value at the future date when the company either defaults or does not default. An income-based approach to valuation typically assumes several years of cash flows discounted at a risk-adjusted cost of capital. This approach likely creates several estimation challenges associated with both the cash flows (i.e., numerator issues) and the discount rate (i.e., denominator issues). Overall, the use of relative valuation is likely to be a less challenging approach to implement in valuing Fracassar as a going concern.

11. Using the default probability of 30% and the seniority structure of the two classes of debt, we estimate the value of the senior and junior debt in six months as follows:

    Senior debt value in six months = 0.3 × 3,000 + 0.7 × 4,500 = GBP4,050 million.

    Junior debt value in six months = 0.3 × 0 + 0.7 × 3,000 = GBP2,100 million.

    The future value of senior debt of GBP4,050 million is below its trading price of GBP4,200 million. Thus, the senior debt is clearly overpriced. The value of the junior debt implies a return of 16.67% over six months [= (2,100 ÷ 1,800) – 1]. Thus, a capital structure arbitrage would be to buy Fracassar junior debt and sell short its senior debt.

12. Laborantibus may create a synthetic long bond position in Fracassar by depositing the desired amount of the bond purchase at the market reference rate, selling CDS protection to collect the "high" CDS spread on Fracassar, and entering a receive-fixed interest rate swap to protect against interest rate risk from volatility in the MRR. The resulting return stream is the locked-in MRR plus the CDS spread received.

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LEARNING MODULE

6

Private Real Estate Investments

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	discuss important private real estate investment features
☐	discuss economic value drivers of private real estate investments and their role in a portfolio
☐	discuss the due diligence and valuation processes for private real estate
☐	discuss the distinctive investment characteristics of timberland and farmland
☐	discuss the risk and return among private real estate investments and as compared to other investments as part of a strategic asset allocation

INTRODUCTION

1

Real estate investments are heterogeneous building and property assets in illiquid and fragmented local markets. While earlier learning modules addressed income-producing properties and publicly traded real estate, such as real estate investment trusts (REITs), we now turn our attention to private real estate investments. While this asset class spans a wide range of investments, including diversified and core funds, we focus here on the features, economic drivers, valuation, and portfolio characteristics of value-add and opportunistic real estate investments. According to the alternative investment data provider Preqin, private real estate is the third-largest private markets asset class, of which roughly one-third involves value-add investments, one-third is opportunistic, and the remaining third involves privately held core or other assets. Private real estate is expected to exceed USD2 trillion in assets under management (AUM) by 2027 globally, over half of which is expected to be in North America, despite rapid growth in Asia and Europe. Private real estate equity and debt investments typically exhibit more equity-like return characteristics. They often involve major property renovation, repositioning, or new construction. In contrast, raw and less developed land used in agriculture and forestry represents distinct segments of the private real estate market.

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In this learning module, we first distinguish key features of private real estate markets. These investments often occur over a property development life cycle, unlike the more stable, consistent cash flows associated with core real estate. Farmland and timberland, in contrast, involve fewer or no physical improvements and derive their economic value from current and future agricultural use or the timber growth cycle, as well as capital appreciation. These differences give rise to specific investment characteristics for private real estate debt and equity investors, unique due diligence and valuation challenges, and distinctive risk and return features that define the role of these investments in a strategic asset allocation.

LEARNING MODULE OVERVIEW

- Private real estate investments usually involve major property refurbishment, repositioning, or new development and exhibit more equity-like characteristics than income-producing property.
- Debt and equity instruments used in property development frequently differ from public real estate investments in terms of the timing, terms, and type of funding involved, which often vary over capital commitment, deployment, and distribution phases.
- Private real estate due diligence incorporates more complex private investment structure details and the capital and development life cycles, while valuation approaches often include scenario and sensitivity analysis in addition to income and sales comparison approaches.
- Timberland and farmland are unique forms of largely private real estate investment involving raw land whose value is derived from economic use associated with the timber growth cycle or agricultural use, as well as potential capital appreciation.
- Relative risk and return analysis of private real estate investments assesses the expected timing and volatility of expected income and price appreciation based on economic drivers and includes the complex compensation structures of these investments.

2 PRIVATE REAL ESTATE INVESTMENT FEATURES

☐ discuss important private real estate investment features

General Characteristics

Real estate investments span a broad spectrum, from portfolios of stable income-producing equity or debt property assets, such as publicly traded REITs or mortgage-backed securities, which are publicly traded, to private investments. These private investments may involve anything from repurposing, repositioning, or developing new properties to using raw or undeveloped land for agriculture or forestry. In this lesson, we will concentrate on private debt and equity investments, particularly those that fall in the upper right area of Exhibit 1.

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Exhibit 1: Real Estate Investment Characteristics

New property developments, particularly those requiring substantial improvement as part of opportunistic real estate strategies, entail higher risk. They also exhibit more equity-like return characteristics. Such investments are commonly undertaken through private real estate vehicles, such as limited partnerships. As in the case of other private markets, private real estate investments typically involve longer investment periods, reduced liquidity, and greater direct control due to the transformational nature of value-add and opportunistic investment. Private real estate funds are different from **open-end funds** in public markets, which allow investors to contribute or withdraw capital freely and have no predetermined end date. Private real estate funds can be either open-end funds with certain constraints, known as **interval funds**, or **closed-end funds**. Interval funds lack a predetermined maturity date but come with liquidity constraints, such as limits on the proportion of total assets that can be redeemed periodically. Closed-end funds, in contrast, have a finite lifespan, necessitating an upfront capital commitment, a lockup period, and the eventual sale of the property or properties to distribute returns to investors.

In the realm of closed-end funds, general partners (GPs) typically combine several properties into a real estate limited partnership or a limited liability company, which is then distributed to numerous limited partners (LPs). Alternatively, GPs might establish separately managed accounts that consist of bespoke investments tailored for specific investors. One distinguishing characteristic of newly developed properties is the distinct phases they undergo in the real estate development life cycle, as demonstrated in Exhibit 2.

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Exhibit 2: Property Development Life Cycle

Although details of the development cycle vary for each property, there are five universal phases: planning, land acquisition, construction, completion and lease-up, and operation.

Planning

Developers constructing buildings on undeveloped or reclaimed land must first establish the physical and economic feasibility of a project. The initial step in the planning process is to assess a project's physical feasibility, or one that represents the site's best economic use, in compliance with local laws and regulations. For example, zoning requirements often restrict economic use and require provisions for **setback** or distance to property lines and **circulation**, such as security and emergency access to buildings or facilities. Consider the following case study, the first of several throughout this learning module that discuss the Pandan East project.

CASE STUDY

Pandan East Feasibility Study

A private real estate investor is assessing the physical feasibility of a vacant three-acre (130,680 ft^2) site for a 1,200-unit residential facility outside Kuala Lumpur, Malaysia, along the proposed Mass Rapid Transit Circle Line. Local zoning requirements dictate that 20% of the land must be set aside for setback and circulation, with the following apartment and parking plans:

- Apartments—Three 20-story towers with one 0.5-acre courtyard between the three towers,and each floor with an average of 20 units (1,200 ft^2 each) and 2,500 ft^2 of common space
- Parking—1,000 ft^2 per tower for surface parking, with additional space underground

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1. Assess the Pandan East project site feasibility given zoning restrictions, the site plan, and building and parking requirements.

   Solution:

   Zoning restrictions include setback and circulation of 26,136 ft^2 (= 0.2 × 130,680) and an open courtyard of 21,780 ft^2 [= 130,680 × (0.5/3)], while parking requirements total 3,000 ft^2 (= 1,000 × 3) and the building footprint is 79,500 ft^2 {= 3 × [(20 × 1,200) + 2,500]}. Solve for 264 ft^2 in excess space:

Physical Feasibility	ft^2
Gross Land Area	130,680
Less: Setback and Circulation	(26,136)
Less: Open Area	(21,780)
Available to Develop	82,764
Parking Space Needs	(3,000)
Available to Build	79,764
Building Footprint	(79,500)
Excess Space	264

Economic feasibility involves weighing a property's future economic use by residential or commercial tenants versus construction and operating costs to determine whether the project will meet or exceed required rates of return for debt and equity investors upon completion. Recall from earlier real estate learning modules that **net operating income** (NOI) is a key property income measure that ignores financing costs and taxes, as shown in Equation 1:

$$\text{NOI} = \text{Effective gross income} - \text{Operating expenses} - \text{Property maintenance allowance.} \tag{1}$$

We may estimate initial project return to both debtholders and equityholders on the basis of NOI versus project cost as follows:

$$\text{Project return} = \text{NOI}/\text{Project cost.} \tag{2}$$

Consider Pandan East's expected NOI and project return upon completion based on cost and rental assumptions in the following case study.

CASE STUDY

Pandan East Expected NOI and Project Return

The Pandan East project plan includes 1,200 residential units averaging 1,200 ft^2 each. Project planners estimate a monthly rent per ft^2 net of expenses in Malaysian ringgit of MYR2.75, with no additional income. Occupancy is expected to be 95% upon completion in two years, with 30% of gross rent as expenses, including a small capital improvement allowance. Estimated costs are as follows:

Line Item	MYR
Land	25,000,000
On-site land improvements	10,000,000
Construction cost/unit	200,000

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1. Calculate Pandan East's expected NOI upon completion.

Solution:

Calculate NOI using Equation 1. First, solve for effective gross income as equal to gross rent, or revenue from rental of the 1,200 units at full occupancy:

$$\text{Gross rent} = \text{MYR}47{,}520{,}000 = 1{,}200\text{ft}^2 \times 1{,}200 \text{ units} \times 2.75 \text{ rent/ft}^2 \times 12.$$

Next, subtract vacancies and operating expenses (5%, or 100% – 95%, and 30% of gross rent, respectively) from gross rent:

$$\text{NOI} = \text{MYR}30{,}888{,}000 = (1 - 0.35) \times \text{MYR}47{,}520{,}000.$$

2. Calculate Pandan East's project cost and return based on NOI.

Solution:

Calculate project costs by adding construction costs of MYR240,000,000 (= 1,200 units × MYR200,000/unit) to other costs:

Line Item	MYR
Land	25,000,000
On-site land improvements	10,000,000
Construction cost	240,000,000
Project cost	275,000,000

The return is equal to the NOI from Question 1 divided by project cost:

$$\text{Rate of return} = 11.23\% = \frac{\text{MYR } 30{,}888{,}000}{\text{MYR } 275{,}000{,}000}.$$

Recall from prior learning modules that the required rate of return on a property is often referred to as the **capitalization rate**, or cap rate. The **direct capitalization approach** shown earlier in the curriculum divides a single year's net operating income by the cap rate to estimate a property's value:

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}. \tag{3}$$

Land Acquisition

A developer may acquire land using a combination of equity and debt secured by the property. In addition to ensuring a property is free of outstanding liens or tax obligations, the acquiror must also receive approval for project plans and obtain necessary building permits and zoning exemptions or amendments prior to initiating construction. A prospective buyer may enter into an option agreement to secure the right, but not the obligation, to purchase a property at a fixed price for the period over which these issues are addressed. Investors may also choose to buy and operate an existing property with the intention of renovating in the future, as shown in a later case study.

Construction

The land improvement and building phase involves far greater execution risk than property operation. Potential delays and disruptions include labor disputes, unanticipated slowdowns in the supply of materials or equipment, and adverse weather conditions. Also, changing market prices can drive cost overruns for building materials, as in the following example.

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LUMBER PRICES DURING THE COVID-19 PANDEMIC

Lumber is an important commodity in US single-home residential construction, representing around 15%–20% of construction costs. Lumber price volatility increased during the COVID-19 pandemic. Exhibit 3 shows front-month lumber futures prices for a three-year period starting in March 2020.

Exhibit 3: Front-Month US Lumber Futures Prices, March 2020–March 2023

Source: Bloomberg.

As the pandemic began, lumber prices were close to USD400 per 1,000 board feet (1,000 board feet equals 2.36 m^3), surging until early May 2021, when the lumber futures price peaked at USD1,686, over four times the level from a year earlier. Note that the lumber futures contract specification has subsequently been amended to one-quarter of the original size, or roughly the amount of lumber used to build an average house in the United States.

While demand increased due to the impact of rising home prices on new construction starts and renovations, supply disruptions related to COVID-19 included labor shortages and decreased mill capacity due to health protocols. While lumber prices fell by late summer of 2021, another sharp price increase in the fall of 2021 coincided with a subsequent surge in COVID-19 cases, peaking in late winter before gradually declining, as Federal Reserve interest rate hikes dampened housing demand and lumber prices fell back to levels closer to historical averages.

In addition to changing market dynamics affecting project costs, construction delays pose risks for future income assumptions as market conditions change. Also, if a project encounters problems that require it to be sold during the construction phase, the sale price may be below total project costs incurred.

Completion and Lease-Up

Project risks continue to rise as a development nears completion given the need to offset rising costs with expected rental income. While some projects involve space built for a specific tenant, in the case of multiple commercial or residential tenants, developers often seek to pre-lease undeveloped or unfinished space using such incentives as reduced or free rent and free amenities for a given period in exchange for lease commitments.

Operation

Once the initial lease phase is complete, property risk declines, because longer-term tenant commitments are in place, and the property management phase begins. While public investment vehicles, such as REITs, often buy and hold such income-producing

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properties once normal occupancy is reached, private investors may play different roles over the life cycle, from developing a property on a speculative basis to be sold upon completion to selling a fully leased property on an opportunistic basis or owning and operating it indefinitely.

The features of private real estate debt and equity investments differ from those of public investments, usually consisting of income-producing properties, in several important ways. The first is timing, as debt and equity capital needs for new development rise from the time of site purchase through the construction period and completion phase. Second, the type of funding often varies over phases of the development cycle. For example, an **acquisition and development loan** (ADL) may be used to purchase and prepare land for a specific construction use, while a **construction and development loan** is outstanding during the building phase. ADLs and construction and development (C&D) loans disbursed over time typically accrue interest over the period of negative cash flow and are later replaced by a long-term mortgage loan. Equity also may be drawn down over time as a project meets certain milestones. Private real estate investments often follow capital commitment, deployment, and distribution phases over the development cycle, similar to many other alternative and private investments, as shown in Exhibit 4.

Exhibit 4: Sample Real Estate Development Financing Plan

Earlier real estate learning modules addressed measures used by debt and equity investors to assess risk and return. For example, debt investors use leverage and coverage measures to evaluate creditworthiness, including the **loan-to-value ratio** (LTV) and **debt service coverage ratio** (DSC), respectively:

$$\text{LTV} = \frac{\text{Debt outstanding}}{\text{Current property value}}. \tag{4}$$

$$\text{DSC} = \frac{\text{Net operating income}}{\text{Debt service}}. \tag{5}$$

A lower LTV and a higher DSC indicate greater creditworthiness. For example, while levels vary, real estate lenders often target an LTV of 0.8 or lower, whereas a DSC of 2× or greater is generally considered strong, with a minimum target of 1.2× to 1.4×. Equity investors, in contrast, evaluate before-tax returns using actual or expected NOI less debt service using an **equity dividend rate**:

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$$\text{Equity dividend rate} = \frac{\text{Before-tax cash flow}}{\text{Property purchase price} - \text{Debt outstanding}}, \quad (6)$$

where

$$\text{Before-tax cash flow} = \text{NOI} - \text{Debt service}. \quad (7)$$

We now examine the Pandan East project financing plan using these metrics.

CASE STUDY

Pandan East Financing Plan Details

Pandan East's MYR275,000,000 project financing plan is as follows:

Equity: 25% of cost, or MYR68,750,000 drawn in three steps. GP performance fees equal 20% of returns above a 15% hurdle rate upon completion.

1. Equity drawdown
   - Initial: MYR25,000,000 (land purchase and fees)
   - One Year: MYR25,000,000
   - Two Years: MYR18,750,000

Debt: 75% of cost, or MYR206,250,000 from private investors in two forms:

1. Construction and development loan
   - 10% annual interest
   - Monthly disbursements linked to construction milestones, such as zoning approval, foundation completion, and property inspections
   - Interest accrues monthly over a two-year construction period.
   - Loan is to be repaid from mortgage loan proceeds.
   - Secured by Pandan East land, property, and other project assets
   - End-of-month drawdowns as follows:
     - Month 1: MYR15,000,000
     - Months 2–6: MYR10,000,000
     - Months 7–20: MYR7,500,000
     - Months 21–23: MYR5,000,000
     - Month 24: MYR200,635
2. Mortgage loan
   - 20-year, MYR206,250,000 amortizing loan starting in two years
   - Drawn after final inspection and once construction claims and wages are paid and no property liens exist
   - 7% annual interest rate with fixed monthly payments of interest and principal repayment
   - Secured by Pandan East land and property

1. Calculate and show the ratio of equity to total capital monthly for the first year of the Pandan East project.

   Solution:

   Equity drawdown of MYR25,000,000 occurs both at inception and in one year's time, while C&D debt outstanding at month end is the sum of the loan drawdown to date and interest accrued on the initial period balance at the

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monthly equivalent of a 10% annual rate. Recall from earlier time-value-of-money lessons that this may be converted to a monthly rate, as follows:

$$R_{annual} = \left(1 + R_{monthly}\right)^{12} - 1;$$

$$R_{monthly} = 0.7974\% = (1 + 0.10)^{1/12} - 1.$$

Therefore, at the end of Month 2, the outstanding C&D loan balance is equal to MYR25,119,612, calculated as follows:

- MYR15,000,000 drawn at the end of Month 1
- MYR119,612 interest on initial balance (= 0.79741% × 15,000,000)
- MYR10,000,000 drawn at the end of Month 2

MYR25,119,612 = 15,000,000 + 119,612 + 10,000,000.

Use a spreadsheet to calculate monthly debt and equity balances. The following table provides a summary for the first 12 months. Candidates should note that the numbers presented throughout this case study as well as later case studies may reflect rounding from the spreadsheet calculations.

Month	C&D Loan Drawdown	C&D Interest	C&D Loan Balance	Equity	Total	Equity/ (Debt + Equity)
1	15,000,000	0	15,000,000	25,000,000	40,000,000	0.63
2	10,000,000	119,612	25,119,612	25,000,000	50,119,612	0.50
3	10,000,000	200,307	35,319,919	25,000,000	60,319,919	0.41
4	10,000,000	281,646	45,601,565	25,000,000	70,601,565	0.35
5	10,000,000	363,633	55,965,199	25,000,000	80,965,199	0.31
6	10,000,000	446,274	66,411,473	25,000,000	91,411,473	0.27
7	7,500,000	529,574	74,441,047	25,000,000	99,441,047	0.25
8	7,500,000	593,603	82,534,651	25,000,000	107,534,651	0.23
9	7,500,000	658,143	90,692,794	25,000,000	115,692,794	0.22
10	7,500,000	723,197	98,915,991	25,000,000	123,915,991	0.20
11	7,500,000	788,770	107,204,761	25,000,000	132,204,761	0.19
12	7,500,000	854,866	115,559,627	50,000,000	165,559,627	0.30

2. Solve for the LTV at the end of 12 months if the project's value equals cost in terms of debt and equity, as well as the DSC for the first year upon completion using Pandan East's expected NOI from the previous case study.

Solution:

Use Equation 4 to solve for LTV at the end of 12 months as follows:

$$\text{LTV} = 0.70 = \frac{115,559,627}{165,559,627}.$$

Note that LTV equals 1 – Equity/(Debt + Equity) in the solution to Question 1.

To determine DSC upon completion, we must solve for the fixed monthly mortgage loan payment. Earlier fixed-income lessons showed that periodic payments (A) for a fully amortizing loan using an annual rate can be calculated as follows:

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$$A = \frac{r \times \text{Principal}}{1-(1+r)^{-n}},$$

where

A = Periodic payment

r = Interest rate per period (0.005833 = 0.07/12)

Principal = Principal amount (MYR206,250,000)

n = Number of periods (240 = 20 × 12)

Solve for A of MYR1,599,054 per month as follows:

$$A = \text{MYR}1,599,054 = \frac{0.005833 \times \text{MYR}206,250,000}{1-(1+0.005833)^{-240}}.$$

We may also derive A using the Excel PMT function, PMT(*rate*,*nper*,*pv*,[*fv*],[*type*]), and solving for MYR1,599,054 using PMT(0.005833,240,206250000,0,0). The final entry of zero indicates that the mortgage loan settles at the end of the period.

Annual mortgage debt service is therefore MYR19,188,649 (= 1,599,054 × 12). Solve for DSC to be 1.61 using Equation 4 and NOI of MYR30,888,000 from Question 1 in the previous case study as follows:

$$\text{DSC} = \frac{\text{Net operating income}}{\text{Debt service}}.$$

$$\text{DSC} = 1.61 = \frac{\text{MYR}30,888,000}{\text{MYR}19,188,649}.$$

3. Calculate the equity dividend rate upon completion using Pandan East's expected NOI from the previous case study, as well as the GP performance fee.

Solution:

Using Pandan East's annual debt service of MYR19,188,649 from Question 2, solve for before-tax cash flow of MYR11,699,351 using Equation 6:

Before-tax cash flow = NOI – Debt service = 30,888,000 – 19,188,649.

Use Equation 6 to solve for the equity dividend rate:

$$\text{Equity dividend rate} = \frac{\text{Before-tax cash flow}}{\text{Property purchase price} - \text{Debt outstanding}}.$$

$$17.02\% = \frac{\text{MYR}11,699,351}{\text{MYR}275,000,000 - \text{MYR}206,250,000}.$$

GP performance fees are equal to 20% of the equity dividend rate in excess of the 15% hurdle rate. We first determine the before-tax cash flow threshold by multiplying the denominator of Equation 6 (MYR68,750,000 = 275,000,000 – 206,250,000) by the hurdle rate:

MYR10,312,500 = MYR68,750,000 × 0.15.

Next, we subtract this from the actual before-tax cash flow:

GP performance fee = MYR277,370 = 0.20 × (11,699,351 – 10,312,500).

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The Pandan East financing plan illustrates the timing and sources of funding for real estate development projects, as well as their relative risk and return. Despite its shorter tenor and use of the same underlying project as security, C&D lenders expect to earn a higher interest rate than mortgage lenders due to the greater default risk over the construction and development phase. Potential delays and disruptions and changing market conditions involve far greater execution risk than managing an existing income-producing property. A forced sale prior to completion may result in a price well below total project costs incurred. These loans often involve non-standard terms and may be more speculative in nature if no upfront mortgage commitment is in place. While C&D loan repayment depends on timely project completion and the disbursement of more permanent mortgage financing, positive rental cash flows upon project completion are a more reliable primary source of debt repayment. Equity returns also rely on future project income and a property's future sale price, which, as we will see in the following lesson, depends on key value drivers and economic conditions.

QUESTION SET

Questions 1–3 are based on the following information.

Asiastruct, a private real estate fund based in Singapore, has identified a property outside Bangkok for a residential development similar to the previous Pandan East case studies. The following information provides a summary of expected financial information on the property, development costs, and financing, shown in Thai bhat (THB):

Property:

- 900 residential units averaging 1,400 ft^2 each
- THB0.65 monthly rent/ft^2 at 95% occupancy expected in two years
- Operating expenses (including improvements) = 33% of gross rent.

Cost:

- Expected construction costs per unit = THB50,000.
- Expected land cost = THB6,000,000.
- Cost of land improvements = THB3,000,000.

Financing:

- Equity: THB12,750,000 with THB5,000,000 drawn in both Months 1 and 12 and THB2,750,000 drawn in Month 24
- Debt: THB41,250,000
  - Two-year C&D loan at 10% annual interest accrued monthly
    - Drawdowns
      - Month 1: THB3,000,000
      - Months 2–6: THB2,000,000
      - Months 7–20: THB1,450,000
      - Months 21–23: THB1,000,000
      - Month 24: THB801,398
  - 20-year mortgage loan drawn to repay C&D loan:
    - 6.80% annual interest with fixed monthly payments
    - Fully amortizing loan starting in two years

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1. Contrast the NOI and rate of return on the Bangkok opportunity to those from the Pandan East opportunity.

Solution:

To calculate NOI, first calculate annual gross rent of THB9,828,000 by multiplying the number of units (900) by average size per unit (1,400 ft^2) by expected monthly rent (0.65) by 12 months:

Annual gross rent: 9,828,000 = 900 × 1,400 × 0.65 × 12.

To solve for NOI, deduct vacancy costs equal to 5% of annual gross rent (or THB491,400) and deduct operating costs equal to 33% of annual gross rent (or THB3,243,240) to solve for NOI of THB6,093,360.

NOI: THB6,093,360 = 9,828,000 × (1 – 0.05 – 0.33).

Use Equation 2 to solve for the project's rate of return:

Project return = NOI/Project cost.

Total project cost is equal to the sum of land costs, land improvements, and expected construction costs of THB45,000,000 derived by multiplying the THB50,000 per unit by 900 units:

THB54,000,000 = THB6,000,000 + THB3,000,000 + THB45,000,000.

Divide NOI of THB6,093,360 by total project cost of THB54,000,000 to solve for a project return equal to 11.28%.

Project return: 11.28% = (6,093,360/54,000,000)

The NOI and project returns for the Bangkok and Pandan East projects are as follows:

Measure/Project	Bangkok	Pandan East
NOI	THB6,093,360	MYR30,888,000
Project Return	11.28%	11.23%

While the NOIs reflect differences in currency values, the expected project rates of return expected on these two projects are nearly the same.

2. Use the following table derived from the C&D loan to solve for the Bangkok project's LTV ratio at the end of Month 12 of the project.

Monthly Interest: 0.79741%

Month	Project Costs	Interest	Loan Draws	Loan Balance	Equity	Total	Equity/ Value	LTV
1	3,000,000	0	3,000,000	3,000,000	5,000,000	8,000,000	0.63	0.37
2	2,000,000	23,922	3,023,922	5,023,922	5,000,000	10,023,922	0.50	0.50
3	2,000,000	40,061	5,063,984	7,063,984	5,000,000	12,063,984	0.41	0.59
4	2,000,000	56,329	7,120,313	9,120,313	5,000,000	14,120,313	0.35	0.65
5	2,000,000	72,727	9,193,040	11,193,040	5,000,000	16,193,040	0.31	0.69
6	2,000,000	89,255	11,282,295	13,282,295	5,000,000	18,282,295	0.27	0.73
7	1,450,000	105,915	13,388,209	14,838,209	5,000,000	19,838,209	0.25	0.75
8	1,450,000	118,322	14,956,531	16,406,531	5,000,000	21,406,531	0.23	0.77
9	1,450,000	130,828	16,537,359	17,987,359	5,000,000	22,987,359	0.22	0.78

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Month	Project Costs	Interest	Loan Draws	Loan Balance	Equity	Total	Equity/ Value	LTV
10	1,450,000	143,434	18,130,793	19,580,793	5,000,000	24,580,793	0.20	0.80
11	1,450,000	156,140	19,736,933	21,186,933	5,000,000	26,186,933	0.19	0.81

Solution:

To compute the project LTV ratio for the following month, use project assumptions or calculations to compile the data in the columns from left to right for Month 12 as follows:

- Project Cost (Month 12): THB1,450,000
- Construction Interest: THB168,948 (or 0.797414% × THB21,186,933, equal to the Month 11 loan balance)
- Loan Draws: THB 21,355,881 (Month 11 loan balance of THB21,186,933 + THB168,948 in Month 12 construction interest)
- Loan Balance: THB22,805,881 (total draws of THB21,355,881 + THB1,450,000, Month 12 project cost)
- Equity Drawdown: THB5,000,000 (Month 12 equity drawdown as assumed)
- Total Equity: THB10,000,000 (existing equity of THB5,000,000 + THB5,000,000 equity drawdown)
- Total Financing: THB32,805,881 (loan balance of THB22,805,881 + THB10,000,000 in total equity)
- LTV: 0.6952 (= THB22,805,881/THB32,805,811)

3. Contrast the equity dividend rate on the Bangkok project with that of the Pandan East project, both before GP performance fees and after fees. Assume GP performance fees are equal to 20% of returns above a 15% hurdle rate upon completion for both projects.

Solution:

Equation 6 and Equation 7 showed the equity dividend rate and before-tax cash flow:

$$\text{Equity dividend rate} = \frac{\text{Before-tax cash flow}}{\text{Property purchase price} - \text{Debt outstanding}}.$$

Before-tax cash flow = NOI – Debt service.

First, solve for before-tax cash flow by determining the Bangkok project's annual debt service. Calculate the monthly mortgage payment using

$$A = \frac{r \times \text{Principal}}{1-(1+r)^{-n}}$$

or the Excel PMT function. Given monthly interest of 0.56667% (= 6.80%/12), a term of 240 months, and mortgage principal of THB41,250,000, we can calculate the monthly mortgage payment of THB314,878:

$$A = \text{THB}314,878 = \frac{0.0056667 \times \text{THB}41,250,000}{1-(1+0.056667)^{-240}},$$

or PMT(0.0056667,240,41250000,0,0).

Derive annual debt service of THB3,778,531 by multiplying this result by 12. Using NOI of 6,093,360 from Question 1, solve for before-tax cash flow:

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Before-tax cash flow = THB2,314,829 = 6,093,360 – 3,778,531.

Next, we solve for the equity dividend using before-tax cash flow of THB2,314,829 as the numerator and the difference between total project cost of THB54,000,000 from Question 1 and mortgage principal of THB41,250,000 (equal to the equity investment) as the denominator:

$$\text{Equity dividend rate} = 18.16\% = \frac{\text{THB}2,314,829}{\text{THB}54,000,000 - \text{THB}41,250,000}.$$

This is the Bangkok project's equity dividend rate before GP performance fees. To solve for the equity dividend rate after fees, we must first determine the before-tax cash flow threshold by multiplying the denominator of Equation 6 (THB12,750,000 = 54,000,000 – 41,250,000) by the hurdle rate: Cash flow hurdle = THB1,912,500 = 0.15 × THB12,750,000.

Next, solve for fees equal to 20% of before-tax cash flow in excess of the 15% hurdle rate and deduct this from the numerator:

GP fees: THB80,466 = 0.20 × (2,314,829 – 1,912,500).

Before-tax cash flow (after fees): THB2,234,363 = 2,314,829 – 80,466.

Recalculate the equity dividend using before-tax cash flow after fees:

$$\text{Equity dividend rate (after fees)} = 17.52\% = \frac{\text{THB}2,234,363}{\text{THB}54,000,000 - \text{THB}41,250,000}.$$

We can summarize equity dividend rates for the two projects as follows:

	Equity Dividend Rate (before Fees)	Equity Dividend Rate (after Fees)
Bangkok	18.16%	17.52%
Pandan East	17.02%	16.61%

Because equity dividend rates for the Bangkok project are approximately 100 bps higher than those for the Pandan East project, we might conclude that the Bangkok project is a more attractive equity investment for Asiastruct than the Pandan East project based on this measure, assuming they are otherwise similar and involve comparable risks.

PRIVATE REAL ESTATE VALUE DRIVERS AND PORTFOLIO CHARACTERISTICS

3

☐ discuss economic value drivers of private real estate investments and their role in a portfolio

Private Real Estate Economic Value Drivers

Expected real estate income and price appreciation are determined by the current and expected future economic use of a property for residential or commercial purposes. Key economic value drivers include specific property features, such as location, age, and amenities, in addition to regional and local economic conditions.

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Earlier real estate learning modules cited GDP, job growth, and wage growth as macroeconomic variables that tend to be positively correlated with rental rates and real estate prices. Local conditions enhancing the value of a property's economic use include an attractive business climate and infrastructure, favorable regulatory and tax policies, and the proximity of major suppliers, customers, and employers. Commercial real estate is an important production input for many industries, while rising employment, population growth, and consumer confidence increase demand for rental and owner-occupied housing.

Opportunistic private real estate investments involve a greater focus on expected price appreciation than income, which magnifies the importance of real estate cycle timing as an economic value driver. Earlier learning modules linked rising rental and occupancy rates as a signal to increase market supply. As private real estate investors weigh potential refurbishment and new development projects based on current market conditions, they must factor timing from project inception to completion and potential market changes into their investment decision. Exhibit 5 shows the relationship between project development phases and the real estate cycle.

Exhibit 5: Project Development and the Real Estate Cycle

As Exhibit 5 shows, a multiyear project planned and built during real estate market recovery and expansion may reach completion at an inopportune time in the real estate market as rents decline and vacancies rise. The following case study shows how changing market conditions may affect project return.

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CASE STUDY

Pandan East Return over the Real Estate Cycle

Assume the Pandan East project is completed during an oversupply phase in the real estate cycle. Due to the regional multifamily housing glut, the owners must reduce average rental rates to MYR2.50 per ft^2 to reach just 85% occupancy upon completion, while the owners are unable to reduce expenses as a fraction of gross rent despite lower-than-expected occupancy.

Recall that Pandan East includes 1,200 units averaging 1,200 ft^2 each, with expenses equal to 30% of gross rent. Assume the C&D loan has been repaid using the 20-year, 7% monthly MYR206,250,000 mortgage loan proceeds.

1. Calculate the revised before-tax cash flow and equity dividend rate for the Pandan East project under the new market conditions.

   Solution:

   Calculate NOI using Equation 1 by first solving for gross rent, or revenue from full occupancy rental of the 1,200 units at the average rent/ft^2:

   $$\text{Gross rent} = \text{MYR}43{,}200{,}000 = (1{,}200\ ft^2 \times 1{,}200 \text{ units} \times 2.5 \text{ rent}/ft^2 \times 12).$$

   Next, subtract vacancies and operating expenses (15%, or 100% – 85%, and 30% of gross rent, respectively) from gross rent:

   $$\text{NOI} = \text{MYR}23{,}760{,}000 = (1 - 0.45) \times \text{MYR}43{,}200{,}000.$$

   Recall from the previous case study that the annual mortgage debt service cost is MYR19,188,649. Solve for before-tax cash flow using Equation 7:

   $$\text{NOI} - \text{Debt service} = \text{MYR}4{,}571{,}351 = 23{,}760{,}000 - 19{,}188{,}649.$$

   Use Equation 6 to calculate the equity dividend rate:

   $$\text{Equity dividend rate} = \frac{\text{Before-tax cash flow}}{\text{Property purchase price} - \text{Debt outstanding}}.$$

   While the previous result is the numerator of Equation 6, the denominator (MYR68,750,000 = 275,000,000 – 206,250,000) remains unchanged:

   $$\text{Equity dividend rate} = 6.65\% = \frac{\text{MYR } 4{,}571{,}351}{\text{MYR } 68{,}250{,}000}.$$

While the completed project in the previous case study generates sufficient cash flow to meet fixed debt service obligations, a key question is whether the lower NOI is a temporary cyclical phenomenon or reflects a more permanent level of the property's earnings potential over time (sometimes referred to as **stabilized NOI**). If we assume the latter case of lower operating income for the foreseeable future, consider how the new market conditions drive economic value changes for both debt and equity investors.

Using the direct capitalization method and assuming a capitalization rate equal to the original expected project rate of return of 11.23%, we estimate the project's new value to be MYR211,576,135, using Equation 3:

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}.$$

$$\text{MYR}211{,}576{,}136 = \frac{\text{MYR}23{,}760{,}000}{0.1123}.$$

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We can break down the project's estimated value further by capitalizing the residual cash flows that accrue to equityholders only, which, in this case, includes before-tax cash flow after debt service of MYR4,571,351. If we consider the 15% hurdle rate mentioned earlier in the case study as a reasonable return on equity assumption for similar projects, we may solve for the market value of project equity by modifying the equity dividend calculation in Equation 6:

$$\text{Equity dividend rate} = 15\% = \frac{\text{MYR}4,571,351}{\text{Market value of equity}}.$$

Market value of equity = MYR30,475,676.

Because total project value is the sum of equity market value and the market value of debt, we can indirectly solve for the market value of debt as MYR181,100,459:

$$\text{Total project value} = \text{Market value of equity} + \text{Market value of debt}. \tag{8}$$

MYR211,576,135 = MYR30,475,676 + MYR181,100,459.

Note that the 23% decline in total project value involves an estimated 56% decline in equity and a 12% decline in estimated mortgage loan market value.

Finally, we may show how changing market conditions affect mortgage debt coverage and leverage. Lower NOI reduces debt service coverage (that is, results in a lower DSC ratio) for lenders versus original project assumptions:

$$\text{DSC (Original)} = 1.61 = \frac{\text{MYR } 30,888,000}{\text{MYR } 19,188,649}.$$

$$\text{DSC (Revised)} = 1.24 = \frac{\text{MYR } 23,760,000}{\text{MYR } 19,188,649}.$$

A decline in market value gives rise to higher leverage, as shown by comparing expected LTV at completion using original project cost versus revised LTV under new market conditions:

$$\text{LTV (Original)} = 0.75 = \frac{\text{MYR } 206,250,000}{\text{MYR } 275,000,000}.$$

$$\text{LTV (Revised)} = 0.97 = \frac{\text{MYR } 206,250,000}{\text{MYR } 211,576,135}.$$

Details of differences in the base case and the oversupply case are as follows:

	Average Rent (MYR)	Occupancy Rate (%)	Equity Dividend	LTV	DSC
Original Case	2.75	95%	18.16%	0.75	1.61
Oversupply	2.50	85%	6.65%	0.97	1.24

Structural changes in demand are another important economic value driver for private real estate investments. Property owners can adapt their existing assets to the evolving needs of commercial and residential end users to maximize return on their investments. In doing so, they often invest in value-add strategies that involve upgrades or changes in the economic use of an existing income-producing property, as in the following case study.

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CASE STUDY

Kingston Tower NOI and Sales Price

Kingston Tower is an aging 250,000 ft^2 office building on the outskirts of Toronto with few amenities and dwindling occupancy. Given the shift to hybrid work following the COVID-19 pandemic, a real estate GP is considering the purchase and renovation of the property to capitalize on market trends by creating a mixed-use, amenity-rich coworking and luxury apartment complex. The GP's analyst reviews the following NOI calculation in Canadian dollars (CAD) for the prior year given an average base rent of CAD40 per ft^2, 90% occupancy, and revenue and expense based on a percentage of gross rent:

Kingston Tower (Prior Year)	CAD	% Gross Rent
Revenue		
Gross Rent	10,000,000	100%
Operating Expense Recovery	1,000,000	10%
Other Income	400,000	4%
Less: Vacancy	(1,000,000)	10%
Concessions	(200,000)	2%
Effective Gross Income	10,200,000	
Less: Operating Expenses		
Taxes, Insurance, Maintenance	(5,000,000)	50%
Property Maintenance Allowance	(2,000,000)	20%
Net Operating Income	3,200,000	

1. Assuming a cap rate of 12%, use the direct capitalization method to estimate the property's value based on the prior-year NOI.

   Solution:

   Use Equation 3 to solve for the property's value based on prior-year NOI:

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}.$$

$$\text{CAD}26,666,667 = \frac{\text{CAD}3,200,000}{0.12}.$$

2. The GP learns that current-year occupancy has fallen to 80% as tenants shifting to hybrid work policies fail to renew multiyear leases. Calculate expected current-year NOI and property value as in Question 1 for the current year using the same cap rate, revenue, and expense assumptions.

   Solution:

   The decline in occupancy to 80% doubles the effective gross income deduction for vacancy from 1,000,000 to 2,000,000 (= 20% × CAD10,000,000), while other revenue and expenses are unchanged since gross rent does not change.

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Solve for current-year NOI of CAD2,200,000 by subtracting the CAD1,000,000 decrease in income from prior-year NOI (= 3,200,000 – 1,000,000).

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}.$$

$$\text{CAD}18,333,333 = \frac{\text{CAD}2,200,000}{0.12}.$$

3. Evaluate the appropriateness of using the direct capitalization method from a seller versus buyer perspective in this example.

Solution:

The direct capitalization method is appropriate if the NOI used in the numerator of Equation 3 reflects a normalized level of the property's earnings potential, which is expected to be constant over time. This may be a reasonable assumption from the seller's perspective if the seller believes the structural change in demand is permanent and there are no plans to change the property's economic use. While the GP buyer may use this method as an estimate of value to a seller based on current cash flows and economic use, the buyer may use other valuation approaches to determine the price it is willing to pay.

Investors in value-add real estate strategies aim to acquire an existing property and invest funds to implement changes that increase income and property value beyond expectations based on current economic use. A seller may be unable to identify such opportunities, may not be able or willing to capitalize on them due to a lack of expertise or financing, or have a limited risk appetite. The prospective buyer need not pay the seller a premium for the possible value it brings to a transaction. The highest bidder for a property expects the greatest return on those value drivers and is able and willing to assume the associated execution risk. The following case study shows the prospective purchase price a potential investor might be willing to pay based on a target hurdle rate.

CASE STUDY

Kingston Tower Refurbishment Project

The Kingston Tower renovation involves the conversion of upper floors totaling 50,000 ft^2 into luxury apartments and the remaining 200,000 ft^2 into high-end coworking spaces with full amenities based on the following timeline:

- Year 0: Purchase property
- Year 1: Operate office building at 80% occupancy while obtaining all permits and rezoning approvals. Assume first-year NOI (NOI_1) of CAD2,200,000 from the previous case study.
- Year 2: Renovate vacant floors while operating remainder of office building under existing leases. Renovation costs exceed second-year NOI (NOI_2) for a net cash flow of (CAD2,000,000).
- Year 3: Complete renovation and initiate new coworking and residential leases and operations. Renovation costs to exceed third-year NOI (NOI_3) for a net cash flow of (CAD2,000,000).
- Year 4: Coworking and residential space fully operational, with stabilized fourth-year NOI (NOI_4) of CAD6,412,500 based on

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- Coworking base rent CAD55/ft^2, residential base rent CAD50/ft^2
- 95% occupancy
- Revenue and expense assumptions as follows:

Kingston Tower (Post-Renovation)	CAD	% Gross Rent
Revenue		
Gross Rent	13,500,000	100%
Operating Expense Recovery	1,350,000	10%
Other Income	607,500	4.5%
Less: Vacancy	(675,000)	5%
Concessions	(270,000)	2%
Effective Gross Income	14,512,500	
Less: Operating Expenses		
Taxes, Insurance, Maintenance	(6,750,000)	50%
Property Maintenance Allowance	(1,350,000)	10%
Net Operating Income	6,412,500	

1. Assuming a capitalization rate of 17%, solve for the expected property value at the end of three years based on the NOI once renovation is complete using the direct capitalization method.

   Solution:

   Use Equation 3 to solve for the property's expected value in three years based on NOI in Year 4:

$$\text{Property value} = \frac{\text{Expected NOI}_4}{\text{Capitalization rate}}.$$

$$\text{CAD}37,720,588 = \frac{\text{CAD}6,412,500}{0.17}.$$

2. Given the expected project cash flows, what should the GP be willing to pay for the property today to achieve a hurdle rate of 17%?

   Solution:

   Given both the expected future cash flows and the 17% hurdle rate, we can use an internal rate of return (IRR) calculation to solve for the property value V_0 that would result in a 17% IRR:

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This may be solved using a financial calculator or the Microsoft Excel IRR function [=IRR(*values,guess*)]. We enter an estimated value for V_0 and solve for IRR, and then, using the Goal Seek function in Excel or trial and error on a calculator, we can iterate a new solution for V_0 for which the IRR of all cash flows is 17%. For example, assuming an initial price of CAD20,000,000, we enter IRR(-20000000,2200000,-2000000,35720588) and can solve for IRR of 22.28%. Using trial and error or the Goal Seek function to arrive at an IRR of 17% by changing V_0, we can solve for V_0 of approximately CAD22,725,000.

Private Real Estate Portfolio Characteristics

Private real estate investment projects typically involve construction or renovation following the acquisition of land or existing property to increase income and capital appreciation potential. Value-add investors usually focus on renovating and repositioning existing income-generating real estate assets, while opportunistic strategies entail new development or repurposed properties with longer periods of investment and negative cash flow. In both cases, these property changes over an investment life cycle entail greater risk but also higher expected return than the more stable, lower returns associated with operating and maintaining income-producing properties.

As in the case of other private markets where acquisition of assets or companies is followed by an investment or restructuring period to increase profitability, private real estate fund portfolios are typically characterized by multiyear cash calls or commitments, deployment of committed funds, and eventual realization of returns only once projects are completed and sold.

In addition to earmarking an existing investment allocation to fund future drawdowns, investors entering private real estate transactions must be willing to accept long investment time horizons over which the investment is illiquid and its net asset value (NAV) is relatively uncertain given the limited ability to sell a property during the construction or renovation phase.

While an underlying property or properties may be more difficult to buy or sell prior to completion, an increasing number of LP investors sell underlying fund interests to new investors in the secondary market. Similar to private equity secondaries, these transactions offer existing LP investors an ability to liquidate and diversify their holdings prior to a fund's termination date, while new investors may be attracted by

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shorter investment horizons, the ability to acquire a position at a price below the current NAV, and access to otherwise unavailable investments. General partners also often have an interest in leading secondary transactions to promote liquidity or rebalance an existing portfolio. In other cases, GPs offer interval funds with a limited number of fund redemptions or repurchases prior to termination. Many such open-end funds are offered for sale by LPs on the secondary market. While these GP provisions offer investors a degree of liquidity under normal market conditions, this source of liquidity may become unavailable during periods of market stress, as in the following case.

BLACKSTONE REIT (BREIT) REDEMPTION RESTRICTIONS

In 2017, Blackstone, the world's largest private real estate firm, launched the Blackstone Real Estate Income Trust (BREIT) in order to provide high-net-worth individuals access to private market real estate investments. BREIT grew to USD69 billion in assets under management over five years and contributed approximately 17% of Blackstone's earnings. As interest rates rose in 2022, publicly traded REIT prices fell, while BREIT continued to show significant positive returns. As a result, individual investors in BREIT increasingly sought to withdraw funds in late 2022, with the demand for withdrawals exceeding Blackstone's redemption limits. The contract underlying the BREIT fund allows for monthly investor redemptions of no more than 2% of fund value and quarterly redemptions of 5%. These limits were reached in November 2022, and as a result, less than half of investor repurchase requests could be satisfied by Blackstone for several months.

The BREIT situation highlights a number of issues related to private versus public real estate investments. The increased demand for BREIT redemptions led more investors to submit redemption requests for BREIT shares and other non-traded REITs. Investors who are able to move their money out of BREIT may find more attractive valuations in publicly traded REITs. Those investors whose redemption requests are not met often seek to offer their position on the secondary market. Alternative private trading platforms have sought to establish their own secondary markets for BREIT and similar non-traded REITs, reducing GP control over LP fund access previously controlled by selling agreements.

QUESTION SET

Questions 1–4 are based on the following information.

Alyssa Tan, a senior analyst at Asiastruct, considers how a debt or equity investment in the THB54 million Bangkok project would be affected if its completion coincides with an oversupply in the local real estate market. She develops the following table to compare data from the original project assumptions from the previous lesson with an oversupply scenario in which rents fall 10%, vacancies increase from 5% to 15%, and operating expenses rise from 33% to 35% of gross rent:

	Original Assumptions Year 3 (THB)	Oversupply Scenario Year 3 (THB)
Rent per ft^2 (monthly)	0.65	0.585
Gross Rent (total units)	9,828,000	8,845,200
Less: Average Vacancy	491,400	1,326,780

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	Original Assumptions Year 3 (THB)	Oversupply Scenario Year 3 (THB)
Effective Gross Income	9,336,600	7,518,420
Operating Costs	3,243,240	3,095,820

We continue to assume that the project is financed with THB12,750,000 in equity and THB41,250,000 in debt financing with a 20-year 6.80% mortgage. Key calculations from the project base case are as follows:

Net Operating Income	6,093,360
Annual Debt Service	3,778,531
Before-Tax Cash Flow	2,314,829

Assume that the property's capitalization rate is 11.28% and the equity dividend rate is 18.16%.

1. By what percentage does before-tax cash flow decline from the original assumptions in the oversupply scenario?

   A. 22.0%

   B. 27.8%

   C. 72.2%

   Solution:

   Response C is correct. Subtract operating costs from effective gross income to solve for NOI of THB4,422,600 in the oversupply scenario versus THB6,093,360 in the original case. Deducting the debt service costs from the revised NOI results in before-tax cash flow of THB644,069. Comparing this number to the original before-tax cash flow of THB2,314,829, we find a 72.2% decline [= (2,314,829 – 644,069)/2,314,829].

2. Calculate and interpret the revised equity dividend rate of the Bangkok project.

   Solution:

   We can substitute the revised before-tax cash flow into Equation 6 to solve for the revised Bangkok project equity dividend rate:

   $$5.05\% = \frac{\text{THB}644,069}{\text{THB}12,750,000}.$$

   The equity dividend rate also declines by 72.2% from 18.16% to 5.05% as a result of the decline in before-tax cash flow.

3. Calculate and interpret the LTV ratio of the Bangkok project upon completion under the revised scenario. Continue to assume a capitalization rate of 11.28%.

   Solution:

   To determine the LTV ratio, we must first calculate the property value using expected Year 3 NOI as in Equation 3:

   $$\text{Property value} = \frac{\text{Expected NOI}_3}{\text{Capitalization rate}}.$$

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$$\text{THB}39,200,000 = \frac{\text{THB}4,422,600}{11.28\%}.$$

Next, solve for LTV by dividing the THB41,250,000 loan amount by the revised property value:

$$\text{LTV} = 1.05 = \frac{41,250,000}{39,200,000}.$$

An LTV above 1 implies that the face value of the loan exceeds the property value. We would therefore expect the debt to be priced at a discount to its face value in this scenario.

4. Suppose that Alyssa Tan's oversupply scenario presented previously is a temporary rather than permanent market phenomenon in the local rental market. Discuss the bias created by the analysis conducted in Questions 1–3.

Solution:

The prior three questions used the oversupply assumptions to calculate a stabilized NOI and before-tax cash flow. If this situation is temporary, the analysis in Questions 1–3 generates an overly pessimistic view of the Bangkok property's long-term value. As future NOI and before-tax cash flow is expected to recover, a discounted cash flow analysis for the transition period to a higher stabilized NOI would reflect a more realistic and higher valuation for the property equity and debt.

PRIVATE REAL ESTATE DUE DILIGENCE AND VALUATION

4

☐ discuss the due diligence and valuation processes for private real estate

Earlier real estate learning modules stressed the importance of evaluating a property's physical attributes and costs of operation, as well as expected rental rates and future market dynamics affecting income and potential capital appreciation. More complex investment structures and the construction and financing life cycle of a refurbished or newly developed property add further dimensions to the due diligence process for private real estate. While real estate valuation approaches are like those for other private market assets, private markets may incorporate option- or scenario-based analysis in addition to more conventional income, cost, and sales comparison approaches.

Private Real Estate Due Diligence

Key elements of private real estate due diligence for a newly developed property are outlined in Exhibit 6.

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Exhibit 6: Elements of Private Real Estate Due Diligence

Market Review and Outlook

Regional and local business outlooks are an important gauge of future commercial and residential real estate demand. While due diligence for income-producing properties focuses primarily on current sale prices and lease rates and trends, opportunistic property investors also consider comparable prices of undeveloped land or properties targeted for refurbishment, as well as construction costs. Forward projections of real estate cycle dynamics as a project reaches completion are important for estimating future income, while in the case of value-add real estate renovation projects, improved local economic conditions may be necessary to generate higher rental and lease income following capital improvements. Community engagement, the anticipated arrival or departure of major employers, or similar development in the area, as well as changes to public infrastructure, are additional factors to consider.

Property and Project Plan Review

Investors typically review property surveys and physical, engineering, and environmental feasibility studies, as well as construction plans and details. In addition to the reputation and experience of the architecture and engineering (A&E) firm serving as technical consultant, coordination and integration of the design and construction process are key factors affecting the timely completion of a project within the original budget.

Developer, Contractor, and Supplier Review

Investors depend heavily on close cooperation between developers, general and specialty contractors, and suppliers during the construction phase. In some cases, an A&E firm or general contractor agrees to deliver a project on a **turnkey** or fully completed basis, which can streamline the process but also concentrates execution risk. In other cases, work occurs in stages, with progress payments made at key milestones. Important factors to consider include the experience of contractors on similar projects, past partnership with involved parties (as well as their financial strength), adherence to safety measures, alignment of incentives, and adequate liability insurance.

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Lease Commitments and Cash Flow Projections

The level and variability of property income will vary widely depending on the business strategy, type of property, and lease commitments in place upon completion. For example, a project may be built to suit a single commercial tenant with a pre-signed rental contract, have one or two major retailers committed to leases in a multi-tenant shopping facility, or be constructed on a purely speculative basis with no predevelopment leases in place. Other base-case assumptions supporting income and expense forecasts should be critically evaluated, including possible construction or lease delays or other adverse events.

Financing Plan Review

Potential debt and equity investors may take a similar approach in assessing the level and variability of future cash flows but often view associated risks and considerations very differently based on their position in the project's capital structure and life cycle timing.

*ADLs and C&D Loans.*Investors in debt drawn during the land purchase, development, and construction phases of a project focus specifically on the nature of costs funded, expected financial leverage, and the commitment and timing of permanent debt financing. For example, these investors have greater risk when drawdowns are for fees or project management costs as opposed to land and building materials expenses, outlays that are more likely to be recouped in the sale of an unfinished project. The probability of default for such loans is greater for projects that rely more heavily on debt financing or that lack a firm mortgage commitment upon completion. Early-stage lenders pay particular attention to the financial condition of developers, loan covenants, and completion of project milestones over time.

Mortgage Loans. Permanent lenders evaluate the degree of upfront commitment, as well as the expected and actual debt coverage, leverage, and the profitability of the completed project. Firm loan commitments at rates or spreads fixed prior to project completion carry greater risk because they must rely on the value of the undeveloped land only, while standby commitments usually allow for adjusted market rates and other terms upon loan disbursal. Mortgage prepayment features give rise to reinvestment risk for lenders.

Equity. Prospective equity investors must balance the higher return of projects with greater leverage and financial flexibility with the risk-reducing benefits that financially sound debt providers able to meet debt drawdowns typically impose, such as leverage- and covenant-based constraints. Equity owners must understand the consequences of debt drawdowns not occurring or a loan not closing and be prepared to potentially inject additional equity to bridge the project or walk away and lose their existing equity investment.

Partnership Agreement, Legal, and Documentation Review

Private real estate investments often involve a partnership agreement that governs shareholder rights, such as voting or GP appointment rights; financial disclosures; and sale restrictions, such as lockup provisions. This review also extends to compensation arrangements seeking to align manager and investor incentives. Prospective LP investors must weigh the potential risks of earlier involvement, concentration in larger investments, and/or longer lockup periods against greater rewards offered by GPs for such positions. As in the case of public investments, a legal and tax review of ownership history ensures that a property is free of any liens or tax obligations to protect the new owner and secured lenders.

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Private Real Estate Valuation Approaches

Private real estate valuation incorporates elements of the income, cost, and sales comparison approaches introduced in earlier learning modules that are used to value public real estate and other private market assets. Factors that distinguish the valuation of private real estate include property development life cycle dynamics, the future state of the real estate market, and the income and capital appreciation of a completed project. In addition, real options are associated with an investor's ability to alter a planned course of action in response to changing market conditions, as shown later.

Private real estate investors often apply more than one valuation approach to arrive at a price at which they may be willing to buy or sell a property over the development life cycle, with the preferred method varying based on an investor's position and property characteristics.

For example, an income-based approach is most appropriate when earnings are considered the primary source of value based on the property's current or future economic use. The single-year NOI in the numerator of the direct capitalization method described earlier and shown in Equation 3 implicitly assumes consistent earnings in the future. In the case of new development, direct capitalization was used earlier to gauge the Pandan East property's post-completion value based on future earnings under its new economic use. Given the lack of cash flows from the vacant three-acre plot used for the project, it is not current earnings but, rather, the potential for development from which the raw land derives its value. In this case, a market price comparison to other nearby comparable properties available for development is more suitable than an income valuation approach.

In the earlier Kingston Tower case study, an existing income-producing property is under consideration for major renovation under a value-add investment strategy. Recall that previously, the direct capitalization method was used to compare the difference in the value of the cash flow stream under the property's current use and the expected cash flows after renovation. Investors typically demand a higher return in the construction phase versus the cap rate for a stabilized NOI. In practice, both the seller and buyer are also likely to consider more than one valuation approach. For example, given uncertainty surrounding future office occupancy, the seller may look to a sales comparison or market approach by considering prices at which similar or comparable properties recently traded. In addition to considering other renovation targets, the buyer may also consider the cost of new development versus renovation. The cost approach involves evaluating the expense of buying the land and constructing a new property on the site that has the same economic use as the property being appraised (referred to as the subject property). The following case study illustrates these approaches.

CASE STUDY

Kingston Tower Seller and Buyer Valuation Approaches

The seller uses a sales comparison approach based on public records or other data sources to compare prices per square foot of three comparable properties, adjusting for differences from the subject property in terms of size, age, location, and market conditions at times of sale.

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Measure/Property	Subject Property (Kingston Tower)	Comparable Property 1	Comparable Property 2	Comparable Property 3
Sale Date		6 months	9 months	18 months
Sale Price		28,895,000	21,295,000	13,575,000
Gross Annual Rent		13,500,000	9,250,000	8,795,000
Gross Square Feet	250,000	325,000	225,000	220,000
Rent/ft^2		24	26	27.27
Additional Distance from City Center	0 miles	3 miles closer	2 miles further	4 miles further
Age	25y	15y	20y	30y
Price/ft^2		88.91	94.64	61.70
Adjustments:				
Sale Date		0%	4%	8%
Square Footage		5%	–1%	–2%
Location		–5%	5%	8%
Age		–10%	–5%	5%
Net Difference		–10%	3%	19%
Adjusted Price		26,005,500	21,933,850	16,154,250
Adjusted Price/ft^2		80.02	97.48	73.43
Estimated Price/ft^2 for Subject Property		83.64		
Estimated Value (CAD)		20,910,759		

Using a cost approach, the buyer estimates the price of purchasing vacant land and developing a comparable property with the same rental space and economic use following the proposed renovation, while adjusting for the difference between a new building and an older, renovated building.

Estimate Components	Estimate (CAD)
Excavation and steel framing	1,000,000
Foundation	1,250,000
Façade (glass, brick, mortar)	2,400,000
Floor finishing	950,000
Roofing/ceiling/insulation	1,500,000
Interior walls and finishing	2,000,000
Electrical and lighting	1,750,000
Plumbing	1,175,000
HVAC (heating, ventilation, and A/C)	1,200,000
Interior furnishing	2,250,000
Parking and paving	500,000
SUBTOTAL	15,975,000
Architect/legal/tax/permits/accounting	1,250,000
Development period interest	1,250,000

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Estimate Components	Estimate (CAD)
Contractor profit	2,700,000
SUBTOTAL	5,200,000
Comparable land cost	4,950,000
Cost estimate for new building	26,125,000
Adjustment for age of subject property (–15%)	22,206,250

Recall from the previous case study that the GP investor is targeting a 17% hurdle rate and expects the following cash flows during renovation and upon completion:

- Year 1: Assume NOI_1 of CAD2,200,000
- Year 2: Renovation costs exceed NOI_2, net cash flow of –CAD2,000,000.
- Year 3: Renovation costs exceed NOI_3, net cash flow of –CAD2,000,000.
- Year 4: Stabilized NOI_4 of CAD6,412,500 at 95% occupancy

1. Using estimated property price based on values derived under the sales comparison and cost approaches, determine whether the GP investor should pursue the Kingston Tower project given its stated hurdle rate.

Solution:

In Question 2 in the previous case study, we calculated a property price V_0 of CAD22,725,000 for which the IRR of all cash flows equaled the GP's hurdle rate of 17%. Given the lower estimated V_0 using the sales comparison and cost approaches—CAD20,910,759 and CAD22,206,250, respectively—the expected IRR is above 17% and the GP investor would pursue the project under either valuation scenario, as shown below:

Sales comparison approach:

IRR = 20.4% [=IRR(-20910759,2200000,-2000000,35720588)].

Cost approach:

IRR = 17.9% [=IRR(-22206250,2200000,-2000000,35720588)].

The valuation approaches shown thus far are relatively straightforward given their *static* nature; that is, they capture a property's value by discounting a single year's cash flow as a perpetuity or a ratio comparing sales based on a common unit of measure. When an analyst seeks to capture cyclical or multiperiod trends, a *dynamic* approach based on discounting a series of income projections and a terminal value to the present is more appropriate. The discounted cash flow (DCF) method is applied when an analyst has sufficient information to estimate property cash flows over several years. Earlier learning modules showed the property value using DCF as a combination of forecasted NOI and a terminal value on a future date.

$$\text{Property value} = \sum_{i=1}^{n} \frac{\text{NOI}_{t+i}}{(1+r)^i} + \frac{\text{Terminal value}}{(1+r)^n}. \tag{9}$$

Terminal values can be derived by capitalizing the NOI of comparable properties or using the final year's projected NOI multiplied by 1 plus the constant growth rate, g, discounted by the cap rate:

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$$\text{Terminal value} = \frac{\text{NOI}_n(1+g)}{r-g}. \tag{10}$$

We illustrate this for a secondaries LP investor evaluating the purchase of the beleaguered Pandan East development described earlier, where we assumed project completion amid a real estate market in an oversupply phase.

CASE STUDY

DCF Valuation of Pandan East Secondaries Purchase

Recall from earlier the situation in which Pandan East is completed during a real estate market glut, forcing the owner to rent new units at an average MYR2.50 per ft^2 and reach just 85% occupancy versus an expected MYR2.75 per ft^2 and 95%, respectively, under the original plan for the first year after completion.

Pandan East includes 1,200 units averaging 1,200 ft^2 each, with expenses equal to 30% of gross rent. The first full year's NOI may be shown as follows:

Pandan East (Year 0)	MYR	% Gross Rent
Revenue		
Gross Rent	43,200,000	100%
Other Income	0	0%
Less: Vacancy	(6,480,000)	15%
Effective Gross Income	36,720,000	
Less: Operating Expenses	(12,960,000)	30%
Net Operating Income	23,760,000	

While the GP contract and business plan foresee four more years of ownership before exit, an original LP investor is soliciting secondary market bids from new LP investors. An analyst conducting due diligence on the purchase of an equity stake in Pandan East projects the following rent and occupancy rates:

Period	Average Rent (MYR)	% Occupancy
Year 1	2.60	90%
Year 2	2.75	95%
Year 3	2.85	95%
Year 4	3.00	95%

The LP analyst assumes no added income and expenses equal to 30% of gross rent, as well as a required rate of return of 12% and a 2% constant growth rate starting at the end of four years.

1. Calculate the present value (PV) of NOI over the four-year holding period.

   Solution:

   First, project Year 1 to Year 4 cash flows based on LP analyst assumptions:

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Pandan East NOI Projections

NOI Components	Year 1	Year 2	Year 3	Year 4
Average Rent	2.60	2.75	2.85	3.00
Occupancy	90%	95%	95%	95%
Gross Rent	44,928,000	47,520,000	49,248,000	51,840,000
Other Income	—	—	—	—
Less Vacancies	(4,492,800)	(2,376,000)	(2,462,400)	(2,592,000)
Effective Gross Income	40,435,200	45,144,000	46,785,600	49,248,000
Operating Expenses	(13,478,400)	(14,256,000)	(14,774,400)	(15,552,000)
NOI	26,956,800	30,888,000	32,011,200	33,696,000

Second, calculate the PV of NOI using the first expression in Equation 9,

$$\sum_{i=1}^{n} \frac{\text{NOI}_{t+i}}{(1+r)^i}, \text{ where } r = 12\%,$$

or in Excel using the NPV function [=NPV(*rate,value1,value2…*)] with a rate of 12% and values equal to each annual NOI to get MYR92,891,653:

$$\text{MYR}92,891,653 = \frac{26,956.800}{(1.12)^1} + \frac{30,888,000}{(1.12)^2} + \frac{32,011,200}{(1.12)^3} + \frac{33,696,000}{(1.12)^4}.$$

2. Calculate the terminal value based on Year 4 NOI and the expected price the new LP investor would be willing to pay for the property.

Solution:

Use Equation 10 to solve for terminal value using NOI_4 of MYR33,696,000, r of 12%, and g equal to 2% to derive a future terminal value of MYR343,699,200:

$$\text{Terminal value} = \frac{\text{NOI}_4(1+g)}{r-g}.$$

$$\text{MYR}343,699,200 = \frac{33,696,000(1.02)}{0.12-0.02}.$$

Substitute this result into Equation 9 to estimate the property's value to the LP investor by combining the PV of NOI with the terminal value PV:

$$\text{Property value} = \text{MYR}311,318,708 = \text{MYR}92,891,653 + \frac{\text{MYR}343,699,200}{(1.12)^4}.$$

A detailed cash flow forecast over multiple periods under a single likely economic scenario is most suitable for properties or companies with relatively stable income sources that do not change over the forecast period, as in the prior case study. When greater uncertainty exists over a development cycle coupled with potential real estate market changes during the construction phase, a valuation based on **scenario analysis** may be more appropriate. Scenario analysis combines a base case with alternative outcomes, allowing the incorporation of more favorable or adverse scenarios in the valuation process.

$$\text{Property value} = \sum_{i=1}^{n} \text{Probability}(i) \times \text{Property value}_i. \tag{11}$$

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In Equation 11, the property's value under scenario i (Property value$_i$) is weighted by its respective probability, Probability(i), and $\sum_{i=1}^{n}$ Probability(i) = 1. For example, at project inception, a prospective investor might consider the three potential scenarios upon completion shown in Exhibit 7.

Exhibit 7: Private Real Estate Valuation Using Scenario Analysis

While the valuation method used in Equation 11 for all scenarios must be consistent, it may involve income-, cost-, or market-based approaches. We illustrate the use of scenario analysis by revisiting the Kingston Tower refurbishment project using direct capitalization.

CASE STUDY

Kingston Tower Scenario Analysis

An analyst weighing a Kingston Tower investment examines prospective returns under different market rent assumptions. Since she believes the high-end coworking rental market is more cyclical than residential real estate, she establishes three scenarios upon project completion under which coworking rent exhibits greater variability as follows:

Scenario/Probability	Coworking Rent (CAD/ft^2)	Residential Rent (CAD/ft^2)
Expansion (25%)	60	55
Base (40%)	55	50
Downside Case (35%)	45	50

The analyst assumes 95% occupancy in all three cases and similar income and expense assumptions as before. Recall the project includes 50,000 ft^2 of luxury apartment space and 200,000 ft^2 of coworking space developed over

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three years, with NOI_1 of CAD2,200,000 and net cash flow of –CAD2,000,000 in Years 2 and 3. The analyst calculates post-completion NOI in Year 4 under each of the three scenarios as follows:

Cash Flow Item/ Scenario	Upside Case (Expansion)	Base Case	Downside Case (Over-supply/ Recession)	% Gross Rent
Revenue				
Gross Rent	14,750,000	13,500,000	11,500,000	
Operating Expense Recovery	1,475,000	1,350,000	1,150,000	10%
Other Income	663,750	607,500	517,500	4.5%
Less: Vacancy	(737,500)	(675,000)	(575,000)	5%
Less: Concessions	(295,000)	(270,000)	(230,000)	2%
Effective Gross Income	15,856,250	14,512,500	12,362,500	
Less: Operating Expenses	(7,375,000)	(6,750,000)	(5,750,000)	50%
Less: Property Maintenance Allowance	(1,475,000)	(1,350,000)	(1,150,000)	10%
Net Operating Income	7,006,250	6,412,500	5,462,500	

1. Calculate the expected property value under the three possible scenarios at the end of Year 3 using a direct capitalization approach and a 17% required rate of return.

Solution:

We first calculate the property's value at the end of Year 3 under each scenario using Equation 3:

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}.$$

$$\text{Property value}_{Upside} = 41,213,235 = \frac{7,006,250}{0.17}.$$

$$\text{Property value}_{Base} = 37,720,588 = \frac{6,412,500}{0.17}.$$

$$\text{Property value}_{Downside} = 32,132,353 = \frac{5,462,500}{0.17}.$$

Next, solve for an expected property value of CAD36,637,868 using probability-weighted capitalized values as shown in Equation 11:

$$\text{CAD}36,637,868$$
$$= (0.25 \times 41,213,235) + (0.40 \times 37,720,588) + (0.35 \times 32,132,353).$$

Note that this expected value is less than the original base-case estimate of CAD37,720,588 from before due in part to the higher probability (35%) associated with the downside versus upside case.

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2. If we assume a purchase price (V_0) of CAD22,000,000, determine the likelihood of the investor reaching or exceeding her 17% target IRR.

Solution:

We can determine the rate of return under each scenario using the same Excel IRR formula [=IRR(*values,guess*)] as before, with *value1* equal to V_0 of CAD22,000,000 and *value4* equal to the respective terminal value under each scenario:

Upside case (25%):

IRR = 22.10% [=*IRR*(-22000000,2200000,-2000000,39213235)]

Base case (40%):

IRR = 18.31% [=*IRR*(-22000000,2200000,-2000000,35720588)]

Downside case (35%):

IRR = 11.68% [=*IRR*(-22000000,2200000,-2000000,30132353)]

This implies that the investor has a 65% chance (= 25% + 40%) of reaching or exceeding a 17% IRR on the prospective investment under these assumptions.

A key advantage of scenario analysis is that it considers a range of future potential outcomes rather than a single point estimate. Establishing a range of outcomes allows analysts to incorporate changing market conditions or other factors more explicitly into a valuation approach. Given the heterogeneous and illiquid nature of real estate markets, pursuing a simpler approach by forecasting fewer scenarios and individual variables is usually preferable to the greater financial modeling detail used in valuing public market securities.

In addition, **sensitivity analysis** is often used to determine the impact of a change in one or more key variables affecting investment return. For instance, given the focus on both coworking and residential rent as two key drivers of expected property value in the previous case study, we may create a two-variable Excel data table to examine how different values of these variables affect the expected property value assuming a 17% cap rate, as shown in Exhibit 8.

Exhibit 8: Kingston Tower Sensitivity Analysis: Property Value

Coworking rent (CAD per ft^2)	Residential Rent (CAD per ft^2)		
	55	**50**	**45**
65	50,955,882	49,485,294	48,014,706
60	45,073,529	43,602,941	42,132,353
55	39,191,176	**37,720,588**	36,250,000
50	33,308,824	31,838,235	30,367,647
45	27,426,471	25,955,882	24,485,294
40	21,544,118	20,073,529	18,602,941

Base Case*:* CAD37,720,588

Note that the base case corresponds to the scenario under which coworking and residential rent are CAD 55 and CAD 50 per ft^2, respectively. An alternative use of sensitivity analysis in this example would be to consider how the expected IRR would

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vary if the property were purchased for CAD22,725,000 as originally assumed associated with different coworking and residential rent assumptions for the terminal value in Year 4 as shown in Exhibit 9.

Exhibit 9: Kingston Tower Sensitivity Analysis – Expected IRR

Coworking Rent (CAD per ft^2)	Residential rent (CAD per ft^2)		
	55	**50**	**45**
65	30.13%	28.80%	27.44%
60	24.64%	23.18%	21.70%
55	18.60%	**17.00%**	15.34%
50	11.88%	10.07%	8.19%
45	4.23%	2.13%	–0.06%
40	–4.76%	–7.29%	–9.97%

Base Case: IRR = 17%

As in Exhibit 8, the 17% IRR base case corresponds to the scenario with coworking and residential rent of CAD55 and CAD50 per ft^2, respectively.

Under the real estate valuation approaches described thus far, an investor chooses a single, pre-determined course of action. In practice, investors face multiple investment alternatives that can affect a property's value, known as **real options**. As described earlier in the curriculum, real options involve the right but not the obligation to take future action. A firm or investor should choose to pursue a real option only if it increases value.

In the case of real estate development, real options available to investors purchasing land or a property for possible upgrade often include the following:

- **Delay option**: Developers may increase a project's present value by postponing property construction until market conditions improve.
- **Sequencing option**: Dividing and executing a project in staggered phases rather than all at once may increase a project's risk-adjusted return by reducing exposure to market oversupply during the lease-up period.
- **Switching option**: The option to choose among alternative projects for a given plot of land or switch economic uses for an existing project, such as a mixed-use facility, may increase value.

Investors may use different methods to factor these alternatives into valuation:

1. Conduct a DCF analysis *without* options. If the project IRR meets an investor's hurdle rate without including options that would increase its NPV, then the NPV without options represents the *minimum* return.
2. Calculate NPV with real options. Under this approach, the firm calculates project NPV based on expected cash flows and then subtracts the incremental cost of real options and adds back its value, as shown in Equation 12:

$$\text{Project NPV} = \text{NPV (without options)} - \text{Option cost} + \text{Option value}. \tag{12}$$

3. Use a decision tree or option pricing model. Either approach may be used to assess the value of a project involving future sequential decisions and alternative outcomes. These models often assign probability and expected timing to future outcomes used to calculate the project's NPV.

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The decision as to whether to delay a project is illustrated in the Knowledge Check below.

KNOWLEDGE CHECK: PROJECT TIMING DECISION

An investor in vacant land is weighing the decision of whether to build today or delay construction for one year. Estimates of current and future costs and real estate market prices are as follows:

Build today: Construction costs today are USD95,000,000, and the completed building value is expected to be USD115,000,000 in present value terms.

Build in one year: The investor estimates a 70% probability of continued real estate market expansion and a 30% chance of a downturn, in which case the project will not be built, and the owner incurs USD250,000 in property taxes in either scenario. Under the expansion scenario, construction costs (including financing) are expected to rise 8%, while the completed building value will increase by 20%.

1. If the investor has a required rate of return of 17%, determine whether the investor should build the project today or delay for one year.

Solution:

The decision of whether to build today or delay involves a comparison of today's return to the present value of construction delay based on the following decision tree and modification of Equation 11:

Build today:

USD20,000,000 = USD115,000,000 – USD95,000,000.

Build in one year:

PV(Delay) = USD20,965,812

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$$= \frac{0.7 \times (138,000,000 - 102,600,000 - 250,000) + 0.3 \times (-250,000)}{1.17}.$$

The investor should therefore delay the project given the higher present value.

QUESTION SET

1. Alyssa Tan at Asiastruct has identified three property transactions in Thailand from the past two years comparable to the original 1.26 million ft^2 project (with 900 residential units averaging 1,400 ft^2 each) located in Bangkok from earlier in the learning module. Tan evaluated each property's key features, including their relative location, age, and size, which she combined in order to establish an expected net difference in price per ft^2. Selected data from these three properties and the new Bangkok project are summarized below.

Data/project	Bangkok	Comp 1	Comp 2	Comp 3
Gross square feet	1,260,000	1,000,000	1,400,000	1,100,000
Price per ft^2		THB 50.24	THB 61.58	THB 44.76
Location adjustment		–4%	+2%	9%
Age adjustment		–2%	+2%	0%
Size adjustment		–2%	+1%	–1%
Net difference		–8%	5%	8%

If the Bangkok project cost is THB54,000,000 today and the value derived from this sales comparison is used as a basis for the expected price of the development upon completion in two years, determine whether the project is likely to exceed Asiastruct's 10% hurdle rate.

Solution:

First, solve for the average adjusted price per ft^2 of the three properties:

Adjusted price per ft^2: Comp 1: THB46.22 = THB50.24 × (1 – 0.08).

Comp 2: THB64.66 = THB61.58 × (1 + 0.05).

Comp 3: THB48.34 = THB44.76 × (1 + 0.08).

Average adjusted price: THB53.07 = (46.22 + 64.66 + 48.34)/3.

Next, solve for the Bangkok property value upon completion in two years by multiplying the square footage by the average adjusted price:

THB66,872,652 = 1,260,000 ft^2 × THB53.07/ft^2.

Finally, calculate the return for an initial cash outflow equal to today's project cost and an inflow equal to the estimated property value in two years. We may use either the Excel PMT function or a discounted cash flow approach to solve for an IRR of 11.28%:

IRR = 11.28% [=IRR(-54000000,0,66872652)], or

$$\text{FV} = \text{PV}(1 + r)^t;\ r = \left(\frac{\text{FV}}{\text{PV}}\right)^{\frac{1}{t}} - 1\ ;$$

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$$11.28\% = \left(\frac{66,872,652}{54,000,000}\right)^{\frac{1}{2}} - 1.$$

The 11.28% estimated return exceeds the analyst's 10% hurdle rate.

2. Alyssa Tan is considering a scenario analysis to build on her earlier analysis of the Bangkok project. Her NOI forecast of THB 6,093,360 for the first full year of operation (Year 3) is the base case, and her oversupply scenario of a 10% fall in rents and vacancies and a 2% rise in operating costs, yielding an NOI of THB4,422,600, is the downside case. Tan adds a growth scenario in which a local shortage of rental housing results in 10% upside to rental rates, lower vacancies, and lower operating costs, resulting in Year 3 NOI of THB7,151,344. These three scenarios and their associated probabilities are summarized below:

Scenario	Probability	Year 3 NOI (THB)
Growth Scenario	25%	7,151,344
Base-Case Scenario	45%	6,093,360
Oversupply Scenario	30%	4,422,600

Assuming a direct capitalization approach with a 10% cap rate, determine whether the Bangkok project meets her 10% hurdle rate using scenario analysis and assuming the same initial investment of THB54,000,000.

Solution:

Use the same approach as in Equation 11 to solve for the expected NOI given the three scenarios and their associated probabilities:

$$\text{NOI} = \sum_{i=1}^{n} \text{Probability}(i) \times \text{NOI}_i.$$

$$\text{NOI} = \text{THB}5,856,628$$
$$= (0.45 \times 6,093,360) + (0.30 \times 4,422,600) + (0.25 \times 7,151,344).$$

Use Equation 3 to solve for the expected property value upon completion:

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}.$$

$$\text{THB}58,566,281 = \frac{5,856,628}{0.10}.$$

Note that this is the expected property value at the end of Year 2. Similar to Question 1, we may calculate the return using an initial cash outflow equal to today's project cost of THB54,000,000 and an inflow equal to THB58,566,281. Using the Excel PMT function or a discounted cash flow approach, we solve for an IRR of 4.14%:

IRR = 4.14% [=*IRR*(-54000000,0,58566281)], or

$$\text{FV} = \text{PV}(1+r)^t;\ r = \left(\frac{\text{FV}}{\text{PV}}\right)^{\frac{1}{t}} - 1\ ;$$

$$4.14\% = \left(\frac{58,566,281}{54,000,000}\right)^{\frac{1}{2}} - 1.$$

The 4.14% estimated return is below the analyst's 10% hurdle rate, and she should therefore not pursue the project based on scenario analysis.

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3. As Asiastruct considers its alternatives, Alyssa Tan is exploring the Bangkok project today versus a one-year delay in construction. After considering all value estimates from earlier exercises, she decides on an appropriate future estimate of the property value upon completion. She notes the present value of the completed project at her 10% hurdle rate is THB59,090,909. The present value of construction costs if the project is initiated today is THB54,000,000. Tan has established two possible market scenarios if construction is delayed by one year:

   Growth scenario (60% probability): Construction costs rise by 12%, while the completed project value increases by 16%.

   Stable scenario (40% probability): Construction costs rise 3%, while the completed project value increases by 1%.

   Justify Tan's recommendation on whether Asiastruct should build the Bangkok project now, delay for a year, or not pursue the project at all.

   Solution:

   The justification for a recommendation to build now or delay is best conducted using an NPV analysis based on expected probabilities and using a discount rate equal to Asiastruct's hurdle rate.

   First, we evaluate whether to build the project now by comparing project costs to value upon completion in PV terms:

   PV of project construction cost: THB54,000,000

   PV of project upon completion: THB59,090,909

   Project NPV: THB5,090,909 = 59,090,909 – 54,000,000.

   Asiastruct would pursue the project today given its positive NPV of THB5,090,909, which we now compare to a one-year delay.

   Next, we evaluate the estimated return given a project delay by comparing construction costs to value upon completion under both scenarios weighted by probability as of the time the project starts in one year.

   Growth scenario (60% probability):

   Construction costs in one year: THB60,480,000 = 54,000,000 × 1.12.

   Project value in one year: THB68,545,455 = 59,090,909 × 1.16.

   Difference between project value and construction costs in one year: THB8,065,455 = 68,545,455 – 60,480,000.

   Stable scenario (40% probability):

   Construction costs in one year: THB55,620,000 = 54,000,000 × 1.03.

   Project value in one year: THB59,681,818 = 59,090,909 × 1.01.

   Difference between project value and construction costs in one year: THB4,061,818 = 59,681,818 – 55,620,000.

   Use probability weights to estimate the project's value in one year:

   Project value: THB6,464,000 = (8,065,454 × 0.6) + (4,061,818 × 0.4).

   Discount project value by the hurdle rate to compare to today's land price:

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$$\text{THB}5,876,363 = \frac{\text{THB}6,464,000}{(1+0.10)^1}.$$

Since the delayed project's PV of THB5,876,363 exceeds that of pursuing the project today when discounted by Asiastruct's hurdle rate, Tan should recommend delaying construction by one year.

TIMBERLAND AND FARMLAND INVESTMENT CHARACTERISTICS

5

- discuss the distinctive investment characteristics of timberland and farmland

Timberland Investment Characteristics

Private timberland investment began as a shift in ownership from private forest product companies in the United States seeking greater tax and capital efficiency to tax-exempt pensions and other investors seeking portfolio diversification. While most private investable timberland is in the United States, these investments have expanded to regions including Central and Eastern Europe, Latin America, Australia, and New Zealand.

As in the case of other types of real estate, timberland derives its value from current and future economic use. Timberland use involves the biological growth and harvest of timber naturally grown or cultivated and managed on forest plantations for use in the paper, packaging, and construction industries. The suitability of land for timber production varies by climate, soil type, and the age, species, and density of existing tree cover. Thinned or harvested timber is logged by private firms, which pay a **stumpage fee** to timberland owners for the right to harvest. These logs are then transported and processed or milled and kiln dried for further use or sale at market prices that vary based on quality and potential end uses. **Pulpwood** consisting of lower-quality, small, and often thinned trees is the primary input for paper products, while higher-priced **sawtimber** is top-quality timber used for construction lumber and other building products, such as plywood and particleboard. Unharvested timber appreciates in value over time not only due to growth but also since a higher proportion of many older trees may be sold as sawtimber.

Given a harvest cycle that can span 25–100 years, timberland is usually evaluated based on a long-term investment horizon that combines income and capital appreciation. Exhibit 10 shows the cash flows associated with a simple timber growth and harvest cycle, as in the following case.

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Exhibit 10: Timber Growth and Harvest Cycle Cash Flows

KNOWLEDGE CHECK: PINE PLAINS LLC TIMBER MANAGEMENT PLAN

Pine Plains LLC (PPLLC) is a private investment firm that owns a several thousand–acre pine plantation in the southern United States. PPLLC's 25-year timber rotation plan calls for the reforestation of recently harvested bare land, with thinning planned in 18 years and final harvest in 25 years. PPLLC forestry management establishes the following per-acre estimates of expected revenue and expenses:

Year	Description	USD per acre
Expenses:		
Annual (1–25)	Management fee	4.00
0	Site preparation and planting	500.00
1	Weed control and fertilizer	75.00
Revenues:		
18	Thinning revenue	725.00
25	Final harvest revenue	5,750.00

1. Assuming a 6.5% annual required rate of return, calculate the net present value of PPLLC's timber rotation plan.

   Solution:

   Recall from earlier time-value-of-money lessons that a single cash flow in n periods may be discounted to the present as follows:

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$$\text{PV(Cash flow)} = \frac{\text{Cash flow}}{(1+r)^n},$$

where r is the required rate of return and n is the number of periods, and the present value of a series of fixed cash flows is calculated as

$$\text{PV(Series of fixed cash flows)} = \sum_{i=1}^{n} \frac{\text{Cash flow}}{(1+r)^i}.$$

Using r of 6.5%, we can calculate the PV of PPLLC's timber rotation as follows:

Year	Description	USD per acre	PV USD per acre
Annual (1–25)	Management fee	(4.00)	(48.79)
0	Site preparation and planting	(500.00)	(500.00)
1	Weed control and fertilizer	(75.00)	(70.42)
18	Thinning revenue	725.00	233.37
25	Final harvest revenue	5,750.00	1,191.04
	PV of timber rotation plan		USD805.20

Similar to NOI for a developed property, the present value in the prior example represents the return of a timber rotation through final harvest over 25 years. We can calculate the net future value (NFV) of the rotation per acre at the end of the 25-year period to be USD3,887.26:

$$\text{NFV} = \text{USD3,887.26} = \text{USD805.20} \times (1.065)^{25}.$$

If an acre of land remains in rotation indefinitely with constant costs and revenues, we would expect to earn NFV of USD3,887.26 at the end of each 25-year cycle in perpetuity. Since income is realized over a multiyear cycle rather than annually, we approach timberland valuation differently from other real estate assets by solving for the so-called **land expectation value** (LEV), or the value of an acre of bare land in perpetual timberland production, using the discounting formula for a perpetual periodic annuity, as follows:

$$\text{LEV} = \frac{\text{NFV}}{(1+r)^t - 1}, \tag{13}$$

where

NFV = Net future value of a single timber rotation

r = Required rate of return

t = Length of timber rotation in years

For example, we may solve for LEV in the case of Pine Plains LLC as follows:

$$\text{LEV} = \text{USD1,015.56} = \frac{\text{USD3,887.26}}{(1.065)^{25} - 1}.$$

While LEV provides a valuation based solely on timber rotation cash flows under simple assumptions, in practice, additional factors, such as potential alternative land use or premiums paid by investors to capture carbon credits, may significantly affect timberland prices. As a result, the discounted cash flow approach is often complemented by sales comparisons when similar recent transactions exist.

The unique characteristics of timberland investments may be traced to their biological features. For example, cash flows derived from the harvest and sale of real assets used as inputs in basic industries offer inflation-hedging potential and tend to

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have low correlations with other asset classes. Forest management techniques may be employed to optimize age distribution of trees, the stocking of species, and the acceleration or deferral of harvests in response to market price changes at little or no cost. Environmental conservation efforts and other constraints on available global timberland supply combined with growing demand for pulp and wood products form the basis for continued demand. Timberland has favorable cyclical characteristics, because growing trees appreciate regardless of economic conditions and the real estate cycle and serve as a long-term inflation hedge as a real asset. Although thinning serves as a form of forest management, timberland owners face biophysical risks from drought, wildfires, pests, and disease. Beyond its attractive risk and return features, investor interest in timberland has also increased due to its environmental, social, and governance–related characteristics. A secondary source of timberland returns is the purchase of forests or carbon credits from forest owners as a form of **carbon offset**. Carbon offsets are investments that reduce or remove carbon dioxide and other greenhouse gases to compensate for emissions produced elsewhere to achieve reduction or net-zero emission goals.

TIMBERLAND INVESTMENTS AS A CARBON OFFSET

While timberland returns are primarily based on the harvest of trees over the growth cycle, the market for carbon offsets has increased financial incentives for timberland owners to leave their trees standing. As government mandates for carbon offsets through cap-and-trade systems continue to develop, many issuers and investors have initiated voluntary carbon offsets to achieve emission reduction targets. For example, carbon emitters such as oil and gas companies are eager to purchase voluntary offsets, while timberland owners may sell these credits in exchange for allowing continued growth in uncut timber.

New market entrants seeking to match buyers and sellers of carbon credits have developed sophisticated approaches to quantifying the carbon benefits of harvest deferral. For example, Natural Capital Exchange (NCX) in the United States combines satellite images with field measurements to establish the size and species of trees in each acre of forest using Microsoft's AI for Earth. Once a property assessment is completed, timberland owners may submit offers to NCX on the number and price of carbon credits they are willing to sell for one year and, once accepted by a bidder, receive compensation following verification of harvest deferral at the end of the year.

Timberland investors face a high degree of illiquidity and must therefore consider these investments as components of a long-term portfolio. The length of the timber growth and harvest cycle and the processing and delivery cycle used to convert raw timber into pulp, paper, and lumber dampen the effect of short-term market fluctuations for finished products. For example, rising market prices for pulpwood and sawtimber may not always be reflected in higher stumpage prices for landowners, as shown in the following example.

SUPPLY FACTORS AND LUMBER PRICES DURING THE COVID-19 PANDEMIC

An earlier example illustrated the sharp rise in US lumber prices during the COVID-19 pandemic. In addition to continued strong demand for lumber in the construction industry due to continued low interest rates and increases in home renovations and new residential building, supply chain issues unique to COVID-19, including a shortage of truck drivers, declining mill capacity caused by worker shortages, and increased safety protocols, were cited as causes for the spike in lumber prices.

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Timberland owners, in contrast, receive stumpage prices upon harvest, which have remained largely stable over time and are far less volatile than the final product, which includes labor, transportation, and other processing costs, as shown in Exhibit 11. The exhibit shows stumpage spot and lumber futures prices from 2013 to 2023.

Exhibit 11: US Stumpage Spot Prices vs. Lumber Futures Prices, 2013–2023

Source: Bloomberg.

The relatively stable Timber Mart South Tennessee Pine Sawtimber Stumpage spot price (TMSATNPS Index) is the US dollar price per ton as shown on the right axis, while the more volatile front-month lumber futures price ("LB1 Comdty") is shown on the left axis in US dollars per 110,000 board feet of random length lumber.

Farmland Investment Characteristics

In contrast to private timberland historically held by forest product companies, traditional farm ownership varies widely across regions, ranging from often smaller, family-owned and -operated farming enterprises in the United States to larger-scale, concentrated agricultural land ownership in such countries as Brazil or state-owned land in developing countries in Africa and Southeast Asia. In contrast to timberland, farmland investments may be of smaller size—perhaps tens or a few hundred acres or hectares. For example, 98% of US farmland is owned by families, excluding corporations, cooperatives, and external managers, and it remains a key source of global family wealth.

While institutional farmland investment has a history similar to that of timberland, with large US investors seeking portfolio diversification, the greater variety of agricultural products and operating models gives rise to a broader investment risk-versus-return spectrum, as shown in Exhibit 12.

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Exhibit 12: Farmland Investment Risk/Return Spectrum

Similar to other forms of real estate, farmland derives its value from current and future economic use. The suitability of land for agricultural production varies widely based on temperature, soil type, rainfall, and available irrigation sources. A shorter growth cycle is measured in seasons for **row crops**, or those harvested annually and rotated, and in years for **permanent crops** planted for many seasons, such as orchards or vineyards, which typically generate a higher return per acre or hectare. Crops are used either directly as a raw material in food production or as an intermediate good when **feed crops**, such as grains, are cultivated for use in raising livestock.

A key distinction in farmland investment is the difference between **own–operate** approach and the **own–lease** approach to farmland ownership. The owner–operator model involves owning land, buildings, equipment, and other assets and operating an agricultural business. Under the own–lease model, far more common among financial investors, an owner or lessor receives fixed rental payments for undeveloped tillable acreage under a multiyear lease agreement from a farm operator lessee who assumes all other business risks. Owner-operated farms and agricultural businesses have cash flow features and risk–return characteristics similar to those of private companies addressed earlier in the curriculum, while own–lease farmland investments earn periodic rent, which offsets property tax, with no other significant income or expenses. As a result, financial returns on own–lease farmland are primarily in the form of capital appreciation instead of income.

The shift to private investable farmland began among tax-exempt pensions and other investors for several reasons, including

- portfolio diversification,
- long-term capital appreciation,
- an inflation hedge, and
- a relative lack of correlation with the economic cycle.

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Steady and growing demand for food and other plant- and animal-based raw materials combined with government policies ensure stable demand for agricultural land use. Examples of government intervention in agriculture include production supports, subsidies, and other programs under the Common Agricultural Policy of the European Union, as well as US Renewable Fuel Standards mandating and subsidizing the production of biofuels from corn and other plants, which represents 10% of the country's gasoline supply. While farmland generally lacks the degree of carbon capture available from timberland, opportunities to reduce carbon emissions include environmental protection via expanded conservation areas; sustainable farming practices, such as reduced tillage; and soil and water protection.

Unlike other vacant land, farmland generates positive cash flow in the form of land leases less taxes with no capital improvements necessary, while also granting an owner a perpetual option to develop the property for an alternative economic use in the future. In addition to the inflation-hedging properties of tillable land whose economic use is based on the value of real assets, such as crops, the option to rezone and repurpose a property may be particularly valuable if land prices are volatile or the property is subject to increasing urban density or greater proximity to transportation infrastructure.

QUESTION SET

1. DugFir LLC is a private investor in timberland throughout the western United States. The firm intends to spend USD400 per acre today for site preparation and planting and an additional USD90 per acre on weed control and fertilizer in one year and expects thinning revenue of USD500 per acre in 15 years and harvest revenue of USD7,000 per acre in 25 years. Its annual management fee is USD3 per acre. Which of the following is closest to the correct land expectation value per acre (LEV) of this proposed timberland development assuming an 8% required return?

   A. USD664

   B. USD778

   C. USD815

   Solution:

   The correct response is B. The present value of the rotation plan is USD664.39 and may be calculated as the sum of its components, shown and summarized in the table that appears later in this solution.

   We can solve for the present value of the annual USD3.00 management fee as –32.02 in several ways—namely, as the PV of a series of cash flows:

   $$\text{PV(Series of fixed cash flows)} = \sum_{i=1}^{n} \frac{\text{Cash Flow}}{(1+r)^i} = \sum_{i=1}^{25} \frac{\text{USD3.00}}{(1+0.08)^{25}}.$$

   We can also use the same annuity calculation used for mortgage payments earlier by solving for the principal:

   $$A = \frac{r \times \text{Principal}}{1-(1+r)^{-n}}; \text{USD3.00} = \frac{0.08 \times \text{Principal}}{1-(1+0.08)^{-25}}.$$

   Or we can use the Excel PV function [=PV(*rate,nper,pmt,[fv],[type]*)], or PV(0.08,25,3,0,0).

   All other fees and returns are single-period PV calculations:

   $$\text{Weed control and fertilizer costs: (USD83.33)} = \frac{\text{(USD90)}}{1.08}.$$

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Thinning revenue: $\text{USD}157.62 = \frac{\text{USD}500}{(1.08)^{15}}$.

Final harvest revenue: $\text{USD}1,022.13 = \frac{\text{USD}7,000}{(1.08)^{25}}$.

Year	Description	Cost/return per acre	PV USD per acre
Annual (1–25)	Management fee	(3.00)	(32.02)
0	Site preparation and planting	(400.00)	(400.00)
1	Weed control and fertilizer	(90.00)	(83.33)
15	Thinning revenue	500.00	157.62
25	Final harvest revenue	7,000.00	1,022.13
	PV of timber rotation plan		USD664.39

Solve for the land expectation value by first calculating the net future value in the numerator of Equation 13 as follows:

$$\text{LEV} = \frac{\text{NFV}}{(1+r)^t - 1}.$$

The NFV of USD664.39 at the end of 25 years is equal to USD4,550.05 [= USD664.39 × $(1.08)^{25}$]. Dividing this amount by $(1.08)^{25} - 1$ yields an LEV result of USD777.99.

2. Which of the following valuation approaches is unlikely to apply to timberland?

   A. Sales comparison approach

   B. Cost approach

   C. Discounted cash flow approach

   Solution:

   The correct response is B. Unlike developed real estate, the asset (timber) cannot be bought and constructed; thus, the cost approach does not apply to timberland. Both the sales comparison and discounted cash flow approaches are typically used for valuing timberland, so responses A and C are incorrect.

3. Explain why short-term fluctuations in finished wood products, such as lumber, may not translate into similar fluctuations in stumpage fees.

   Solution:

   The length of the timber growth and harvest cycle and the processing and delivery cycle used to convert raw timber into pulp, paper, and lumber dampen the effect of short-term market fluctuations for finished products on stumpage fees. As an example, the sawtimber must be processed at a mill and then transported to a building site. If labor costs rise considerably, due to shortages of skilled labor for staffing mills and driving trucks, the price of lumber may increase significantly while stumpage fees for the sawtimber remain stable.

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PRIVATE REAL ESTATE RISK AND RETURN

6

- discuss the risk and return among private real estate investments and as compared to other investments as part of a strategic asset allocation

Real estate investments were characterized in earlier learning modules as a source of diversification from public fixed-income and equity securities, a hedge against inflation as a real asset, and a source of cash flows and enhanced return due to their illiquid nature. While largely public and private core and core-plus investments consist of income-producing properties, value-add and opportunistic real estate returns primarily involve capital appreciation by increasing value through the upgrade of a property's economic use or creation of new capacity.

Institutional investors—such as pensions and sovereign wealth funds—and ultra-high-net-worth individuals or family offices are usually best suited to accommodate the larger investment sizes, lack of liquidity, and longer and less certain time horizons associated with private real estate. These investors align their allocation to such investments with their risk tolerance, return objectives, and market expectations, as demonstrated in the following case study.

CASE STUDY

XGT's Real Estate Investment Strategy

XGT, a large developed-market public pension plan, has the following investment policy for real assets, including real estate by segment:

Real Assets: Real Estate 15% (± 3%)

Inflation Sensitive 5% (± 3%)

Suballocation (Real Estate): Core 60% (± 5%)

Value-Add 20% (± 5%)

Opportunistic 20% (± 5%)

1. Benchmark and Restrictions

The portfolio benchmark is the NCREIF Open End Diversified Core Equity (ODCE) index net of fees. Portfolio allocations seek a long-term return in excess of the benchmark while remaining within target ranges.

2. Core Real Estate

Core investments include stable, well-diversified, income-producing properties in developed markets expected to produce a return net of fees of 7% per annum. Core portfolio leverage is limited to 40% of total asset value.

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3. Value-Add Real Estate

Value-add investments include repositioned, renovated, or redeveloped properties with expected risk and return that exceed the expected risk and return of core real estate. These investments are expected to have limited income and greater capital appreciation, with expected return net of fees of 8% per annum. Value-add portfolio leverage is limited to 60% of total asset value.

4. Opportunistic Real Estate

Opportunistic real estate investments focus on development, extensive redevelopment, and land development and may include international or emerging markets. Opportunistic investments are expected to return 10% per annum net of fees, with portfolio diversification and leverage to be vetted individually in the due diligence process.

XGT's Investment Committee is considering changes to its allocation between value-add and opportunistic segments given expected distributions over the next six months. Following an extended period of low borrowing costs, rising rents, and new construction growth, XGT's investment consultant forecasts higher interest rates and an economic slowdown in the next 12–24 months.

1. Discuss XGT's decision between increasing value-add or opportunistic portfolio allocations in light of the consultant's economic forecast.

   Solution:

   Value-add and opportunistic investments entail the greater risk and return of upgrading or changing a property's economic use, which also involves higher leverage compared to core real estate. Under the consultant's forecast scenario, higher rates and a pending real estate market slowdown increase debt financing costs and required cap rates and reduce the income-producing potential of properties once completed. While value-add projects usually involve property redevelopment with existing current income and shorter development periods, opportunistic real estate investments typically involve initial negative income with greater leverage and the highest project risk as a project nears completion, magnifying the importance of real estate cycle timing as an economic value driver. This suggests that an increased allocation to value-add as opposed to opportunistic real estate is warranted under this scenario.

The prior case study illustrates the risk-versus-return trade-off across various real estate investments and over the property development life cycle.

General partners seek to construct an optimally diversified asset portfolio of value-add or opportunistic assets across different geographies, asset types, and expected cash flow timing designed to maximize the likelihood of achieving investor hurdle rates or preferred rates of return. Investors comparing the risk and return among private real estate investments to other private market opportunities typically focus on expected IRR, as shown earlier, or a simpler **multiple of invested capital** (MOIC), or money multiple, on total invested capital (or paid-in capital). This calculation ignores the timing of cash inflows and outflows, is typically calculated on a gross basis ignoring fees, and simply compares the total value of all realized investments and residual asset values (assets that may still be awaiting sale) relative to capital invested:

$$\text{MOIC} = (\text{Realized value of investment} + \text{Unrealized value of investment})/\text{Total invested capital}. \tag{14}$$

These return metrics are used to compare private real estate to other private investments, portfolio benchmarks, or target returns, as illustrated in the following case study.

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CASE STUDY

XGT's Kingston Tower Investment

XGT's Investment Committee decides to increase its value-add private real estate allocation following the recommendation of its consultant, choosing an LP investment that includes the Kingston Tower project described earlier, an office tower conversion into apartments and coworking space. The GP investor expects the following cash flows during renovation and upon completion:

- Year 1: Assume NOI_1 of CAD2,200,000.
- Year 2: Renovation costs exceed NOI_2, net cash flow of –CAD2,000,000.
- Year 3: Renovation costs exceed NOI_3, net cash flow of –CAD2,000,000.
- Year 4: Stabilized base-case NOI_4 of CAD6,412,500 at 95% occupancy.

The GP plans to sell Kingston Tower at the end of three years at an expected property value of CAD37,720,588 assuming a 17% cap rate:

$$\text{Property value} = \frac{\text{Expected NOI}_4}{\text{Capitalization rate}}.$$

$$\text{CAD}37,720,588 = \frac{\text{CAD}6,412,500}{0.17}.$$

GP fees include a 1% annual management fee plus a 20% performance fee determined at the end of the holding period based on property appreciation if the investment return after management fees exceeds a 10% hurdle rate. For purposes of this example, assume that Kingston Tower is purchased for CAD20,000,000 in Year 0 and the investment is financed by equity, with no further transaction costs.

1. Solve for XGT's base-case MOIC.

   Solution:

   Solve for MOIC using Equation 14:

   MOIC = (Realized value of investment + Unrealized value of investment)/Total invested capital.

   Given the expected sale of Kingston Tower at the end of Year 3, unrealized investment value is zero, with the MOIC equal to the sum of cash inflows divided by cash outflows, as follows:

   Cash inflows: NOI_1 + (Expected property value)4

   Cash outflows: (Purchase price)0 + NOI2 + NOI3

   $$\text{MOIC} = 1.663 = \frac{2,200,000 + 37,720,588}{20,000,000 + 2,000,000 + 2,000,000}.$$

2. Calculate XGT's base-case IRR both before and after fees.

   Solution:

   Using the Excel IRR function [=IRR(*values,guess*)] as shown earlier and the cash flows in the following table,

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Year 0	Year 1	Year 2	Year 3
(20,000,000)	2,200,000	(2,000,000)	35,720,588

we can solve for IRR *before* fees, equal to 22.28%:

22.28% = IRR(-20000000,2200000,-2000000,35720588).

To solve for IRR *after* fees, we incorporate both the 1% annual management fee and the 20% performance fee to obtain net cash flows, as follows.

Year	Year 0	Year 1	Year 2	Year 3
Gross	(20,000,000)	2,200,000	(2,000,000)	35,720,588
1% Mgmt. Fee		(200,000)	(200,000)	(200,000)
20% Perf. Fee				(3,544,118)
Net Cash Flow	(20,000,000)	2,000,000	(2,200,000)	31,976,470

The 20% performance fee is CAD3,544,118, or 0.2 × (37,720,588 – 20,000,000).

We can solve for IRR *after* fees, equal to 17.14%:

17.14% = IRR(-20000000,2000000,-2200000,31976471).

3. Determine the breakeven Kingston Tower property value required at the end of Year 3 in order for XGT to meet the return requirements as stated in its value-add real estate investment policy.

Solution:

Recall from XGT's investment policy that value-add real estate is expected to earn a return of 8% per annum net of fees. We must therefore solve for an expected property value at the end of Year 3 that gives us an IRR *after* fees of 8%. Note that since the 8% IRR falls below the 10% hurdle rate required for the 20% performance fee to apply, the GP will earn only the 1% management fee. We therefore must solve for the gross cash flow in Year 3 given an 8% IRR after fees, as shown in the following table:

Year	Year 0	Year 1	Year 2	Year 3
Gross	(20,000,000)	2,200,000	(2,000,000)	? + (2,000,000)
1% Mgmt. Fee		(200,000)	(200,000)	(200,000)
Net Cash Flow	(20,000,000)	2,000,000	(2,200,000)	? + (2,200,000)

As shown previously, we can use the Excel IRR function, entering an estimated value for Year 3 net cash flow [= (Expected property value)$_3$ – 2,200,000) and solving for IRR, and then use the Goal Seek function to iterate a new solution for the Year 3 net cash flow for which the IRR of all net cash flows is 8%.

For example, assume that the property may be sold at the end of Year 4 for CAD28,200,000 with a Year 3 net cash flow of CAD26,000,000. Solve for IRR:

9.11% = IRR(-20000000,2000000,-2200000,-2600000).

Using Goal Seek to solve for an IRR of 8% by changing Year 3 net cash flow, we arrive at a Year 3 net cash flow of CAD25,248,590. Given that this includes the expected property value and NOI$_3$ of –CAD2,000,000 and CAD200,000 in management fees, we can solve for an expected property value of CAD27,448,590, or CAD25,248,000 + CAD2,200,000.

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4. Interpret the breakeven property value from Question 3 in the context of the investment consultant's forecast, the earlier scenario analysis, and the sensitivity analysis in Exhibit 8.

Solution:

Based on project assumptions including Kingston Tower's expected purchase price, renovation costs, and cash flow, including the capitalization rate used to solve for the future sale price based on stabilized Year 4 NOI, XGT is expected to reach its target 8% return after fees if the property can be sold for at least CAD27,448,590 at the end of three years.

Given the investment consultant's forecast of a likely economic downturn, it makes sense to consider this expected property value in the context of the downside case established earlier by the LP analyst, under which it was assumed that coworking space rent would equal just CAD45 per ft^2 and residential rent would equal CAD50 per ft^2 in Year 4. However, the expected IRR from the earlier calculation is not directly comparable given the assumed higher purchase price and the absence of fees. Instead, we may consider the property value sensitivity analysis in Exhibit 8 based on different coworking and residential rental rates, which shows an expected property value at the end of Year 3 of CAD25,955,882 based on these downside-case assumptions. This suggests that XGT will fail to reach its minimum 8% return after fees under the downside case proposed by the analyst. We may confirm this by recalculating IRR after fees using the lower sale price of CAD25,955,882 at the end of three years and deducting –CAD2,000,000 Year 3 NOI and the CAD200,000 management fee for a Year 3 net cash flow of CAD23,755,882:

5.77% = IRR(-20000000,2000000,-2200000,23755882).

This example and those that precede it demonstrate the application of valuation tools along with scenario and sensitivity analysis used by financial analysts in practice to thoroughly evaluate the expected risk and return of these investments. When carefully and consistently applied in the context of investment policies and market analysis, private real estate investments can play an important role in meeting investor objectives and goals.

QUESTION SET

1. Which of the following real estate classifications is likely to have the highest return expectation?

   A. Value-add real estate

   B. Opportunistic real estate

   C. Core real estate

Solution:

The correct response is B. Opportunistic real estate, because of its focus on initial development of properties, carries the highest levels of risk in private real estate investing. Its returns are focused on the capital appreciation of the project during its development phase. Value-add real estate is riskier than core real estate; however, value-add projects are less likely to be in the development cycle for as long as opportunistic ones. Core real estate includes established income-producing properties and, as such, carries the lowest risk and return expectations among the major real estate categories.

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The following information relates to Questions 2 and 3.

Alyssa Tan at Asiastruct approaches the Bangkok residential project analysis in earlier question sets from a different perspective, using the following simplified details:

Assume the property requires an investment of THB54,000,000 over the two years of property development and construction. Asiastruct contributes THB24,000,000 initially and an additional THB30,000,000 at the beginning of the second year. At the beginning of the third year, the property begins operations, with NOI of THB6,093,360 during the third year. Asiastruct is planning to sell the property upon its opening at the beginning of the third year, assuming a cap rate of 10%. Given that this project is an opportunistic investment, Asiastruct has return expectations of 10% net of fees.

2. Calculate the real estate investor's MOIC and IRR, and discuss the associated implications for Asiastruct as a result of these calculations.

Solution:

First, use the third-year NOI and the cap rate to compute an expected selling price of the property of THB60,933,600 at the end of the second year. The cash flows are as follows:

Year	0	1	2
Cash flows (THB)	(24,000,000.00)	(30,000,000.00)	60,933,600.00

MOIC = 60,933,600/54,000,000 = 1.13.

IRR can be calculated using the IRR function in Excel to arrive at IRR of 8.66%. Without comparable property MOICs to use for comparison purposes, it is impossible to assess the relative attractiveness of the MOIC of 1.13.

The IRR provides a better comparison because this measurement accounts for the timing of cash flows and can be compared more directly to return requirements. Given that the investor expects a 10% return on opportunistic real estate investments net of fees, it is clear that the 8.66% IRR (before fees) makes the Bangkok project economically unattractive.

3. Analyze how much improvement would be necessary in the Bangkok project's NOI to reach a 10% IRR (before fees).

Solution:

While this analysis may be solved by trial and error, the Goal Seek function in Excel allows for a quick solution methodology. The set cell is the one in which the IRR function is solved. Set the desired value to 10.00%, and allow the project NOI to change. If the Bangkok project NOI can be improved to THB6,203,806, then the 10% return can be met (ignoring fees). This is a 1.81% improvement in NOI, and the investor would need to assess the feasibility of such an increase.

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PRACTICE PROBLEMS

The following information relates to questions 1-5

Northern States, a US multi-employer pension plan with USD80 billion in assets, has the following investment policy for real assets, including real estate by segment:

Real Assets: Real Estate 15% (± 3%)

Inflation Sensitive 5% (± 3%)

Suballocation (Real Estate): Core 60% (± 5%)

Value-Add 20% (± 5%)

Opportunistic 20% (± 5%)

Northern States' investment committee is discussing its planned real estate and real assets portfolio weights for the coming year.

The consensus view of committee members regarding the economy and the market for residential housing is summarized by the following two statements:

Statement 1	The US national economy is currently in or nearing a recession.
Statement 2	The lack of residential housing supply is a major concern for US adults.

The discussion shifted to Northern States' suballocations within real estate. Given the committee's expectations of a recession, they decided to maintain the current weight on core real estate while calling for a vote to re-allocate between value-add and opportunistic real estate.

The conversation turned to the due diligence process involved in opportunistic projects. The pension plan participates in all its private real estate investments as an LP. The investment committee's risk guidelines for participation as an LP include strict covenants regarding LTV and DSC for the GPs of all private real estate investments. The committee members discussed whether they should consider changes to the LTV and DSC guidelines in light of the economic climate.

Committee members also discussed the valuation environment in private real estate. Due to the residential housing supply situation, properties that were typically selling at high prices (based on price per square foot) using sales comparison valuation approaches tended to produce high valuations, while valuations of the same properties using direct capitalization approaches tended to produce lower value estimates.

The final discussion topic of the investment committee involves the pension plan's investments in timberland. Recently, lumber prices had become quite volatile, and some members of the committee suggested that they would prefer to reduce the plan's exposure to timberland investments as a result.

1. Which two phases of the real estate cycle are most likely reflected by Statements 1 and 2?

   A. Oversupply and recession

   B. Recession and recovery

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C. Recession and expansion

2. Contrast the relative risks of private value-add versus opportunistic real estate suballocations faced by Northern States given its market view.

3. Which of the following would be the most appropriate changes to Northern States' LTV and DSC risk guidelines in the current economic climate?

   A. Increase LTV and decrease DSC benchmarks.

   B. Decrease LTV and increase DSC benchmarks.

   C. Increase LTV and increase DSC benchmarks.

4. Which of the following is the most likely argument for the discrepancy between the sales comparison and direct capitalization valuation approaches?

   A. Direct capitalization approach cap rates are currently too low.

   B. Rental revenues are strong in most housing markets around the country.

   C. The residential housing supply is temporarily too low.

5. Provide a counterargument to the statement made by committee members regarding the volatility of lumber prices and its effect on timber investments.

The following information relates to questions 6-9

BFW Invest Considers an Opportunistic Project

Sylvia Steinhaeuser, managing director of BFW Invest, a European fund with EUR12 billion in assets under management, is considering a new construction opportunity on a one-acre (43,560 ft^2) property in Lisbon, Portugal. The project is expected to cost EUR5,000,000 and generate NOI of EUR540,000 in its first full year of operation following a two-year construction period. BFW has recently hired Sven Walters as a new analyst, and Steinhaeuser has asked him to evaluate this as his initial project. Steinhaeuser introduces Walters to the process of opportunistic private real estate investment by describing several aspects of this type of investment and follows up with a series of questions.

Steinhaeuser begins the discussion of how new construction projects are financed. She learns that Walters is already familiar with publicly traded REIT projects but has had little exposure to new construction financing.

Portugal has become very popular with immigrants from other EU countries settling in the country as remote workers and retirees, and the conversation turns to the current state of the Lisbon rental market. Given the influx of new residents, developers are seeking opportunities to add rental housing in Lisbon.

Steinhaeuser turns her attention to valuation issues. The plan is to incur 50% of project cost immediately and the remaining 50% in one year. She informs Walters that the cap rate assumed upon completion will be 9.2%. BFW currently uses a 10% hurdle rate for new construction projects.

Steinhaeuser addresses possible risks that would adversely affect project return. For example, labor issues could easily delay the completion of construction, while inflation and the rising cost of construction materials could easily cause returns

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to fall below the project's base-case projections. Steinhaeuser mentions that, while unlikely, construction delays could potentially postpone the opening of the building by as much as one full year.

6. Describe two differences between the financing for a new construction project as compared with the acquisition of an existing income-producing property.

7. Identify the most likely current stage of the real estate cycle in Lisbon, and explain one possible risk associated with a new construction project in this market phase.

8. Based on the current assumptions regarding project cost, the construction schedule, future NOI, and the cap rate, calculate the IRR of the Lisbon project and evaluate the economic feasibility of this project.

9. Calculate the percentage by which NOI would need to increase if construction delays cause a one-year delay in the opening of the building (assuming all other assumptions remain the same with no cash flows in Year 2) for the building project to meet BFW Invest's hurdle rate.

The following information relates to questions 10-13

BFW Invest Considers a Value-Add Project

Because Sylvia Steinhaeuser at BFW Invest has been impressed with Sven Walter's work on the Lisbon project, she assigns him to another transaction in which the fund will buy an existing office building in Madrid slated for conversion to high-end residential apartments with retail space on the ground floor. The fund's hurdle rate on the project is 10%. Under its current use as office space, expected NOI during the next year is EUR1,400,000.

The purchase price is EUR15,000,000, and during the first year, Steinhaueser estimates that NOI will be EUR1,000,000 as existing leases expire and office tenants relocate. Renovation will start in the second year, with net cash outflows of EUR4,000,000. New residential tenants are expected to occupy selected upper floors during the third year as renovation continues on lower floors, with net cash outflow of EUR1,000,000. By the end of Year 3, renovation is expected to be complete, with expected Year 4 NOI of EUR3,000,000 and expected property value after full renovation at the end of three years of EUR28,000,000.

After presenting the basic facts of the project, Steinhaeuser asks Walters about a contrast between this sort of renovation project and the new construction project that they recently discussed.

The analyst raises the issue of the possible effect of a recession on the renovation project returns. Steinhaeuser implies that such conditions may warrant an indefinite delay to the renovation. In such a case, the fund would plan to continue to operate the building in its current use as an office building.

Steinhaeuser realizes that she has not discussed the fund's fee structure with Walters. As a general partner, the fund charges annual management fees of 1.5% based on the size of initial investment and a performance fee of 20% based on returns in excess of the hurdle rate at the end of a three-year holding period. The performance fee is earned only if the investment performance exceeds a 10% hurdle rate, which occurs if Year 3 returns before fees are EUR23,153,000. The project will be financed only with equity and no additional transaction costs.

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Steinhaeuser has noticed that the market for buildings in Madrid recently had been showing increased competition among buyers for the sort of property under consideration. As a result, she believes that a winning bid may need to exceed EUR15,000,000. She asks Walters to assess the maximum price that the fund could consider paying for the building.

10. Contrast the source of returns between a renovation project and a new construction project.

11. Evaluate whether the Madrid building purchase is economically feasible for the BFW Invest fund if it continues to operate as an office building.

12. Calculate the annual management fee and the performance fee for the Madrid property, and determine whether the after-fee performance of the investment meets BFW Invest's hurdle rate.

13. Determine the maximum price that BFW Invest could pay for the Madrid property while incorporating management fees.

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SOLUTIONS

1. B is correct. Recession and recovery are both characterized by a lack of new construction that may likely result in an undersupply of residential housing. Response A is incorrect because the oversupply phase of the real estate cycle is less likely to coincide with a lack of housing. Response C is incorrect because these two phases of the real estate cycle do not coincide with one another; expansion usually moves into an oversupply phase prior to a recession.

2. Value-add real estate projects involve refurbishing or repurposing an existing income-producing property, while opportunistic real estate involves substantial development, such as new construction or redevelopment. Although both types of private real estate involve greater risk than stable income-producing properties included in core real estate, value-add properties typically generate income over some or all of the redevelopment phase, while opportunistic real estate usually generates no cash inflows until the project is complete and is likely to involve greater exposure to future lease rates upon completion. As a result, value-add real estate provides a less risky asset allocation during a recession.

3. B is correct. LTV refers to the loan to value ratio, with a higher LTV implying greater financial leverage and therefore higher risk. DSC refers to the debt service coverage ratio, with a lower ratio reflecting fewer resources available to service debt obligations and therefore greater risk. Given Northern States' expectation of a recession, the investment committee is most likely to amend its guidelines to reduce risk by lowering LTV and raising DSC requirements.

4. C is the best response. The lack of residential housing supply likely creates more competition between potential buyers, thus driving prices above what might be indicated by an income-based valuation model. Response B suggests that the NOI in direct capitalization models would be high, thus making the associated valuations high (not low). Response A also implies high valuations from a direct capitalization model.

5. As long-term investments that derive their value from the harvest of raw materials over the timber harvest cycle, timberland investment income is more closely related to the level of stumpage fees as opposed to lumber prices. Stumpage fees are much less volatile than lumber prices, because lumber is a finished product that also reflects costs associated with processing and transportation. For example, labor shortages throughout the supply chain can create lumber supply shocks while stumpage fees remain relatively constant.

   An additional revenue source from timberland investments comes from the purchase of carbon offsets in which carbon emitters pay timberland owners to delay harvests, which is similarly unaffected by lumber prices.

6. The first key difference relates to the timing of the financing. To purchase an income-producing building, the full proceeds of equity and debt financing must be available at the time of acquisition. A new construction project, in contrast, usually draws upon financing sources over time throughout the land acquisition and construction phases of the project based on the achievement of project milestones. Nevertheless, financing should be committed in advance.

   The second difference relates to the type of financing. The purchase of existing income-producing property usually involves a mortgage loan secured by the existing property. In the case of a new construction project, developers often initially draw upon an acquisition and development loan to finance the land acquisition

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and a construction and development loan to finance project construction costs. As the building nears completion, developers often replace these loans with a mortgage loan secured by the property.

7. Given the local market dynamics described by Steinhaeuser, it is most likely that the Lisbon market is in an expansion phase of the real estate cycle. A possible risk related to this stage of the real estate cycle is that Lisbon may move to an oversupply stage by the time the project is completed.

8. The expected project cash flows are as follows:

Year	0	1	2
Cash flows	(2,500,000)	(2,500,000)	5,869,565

The first two cash flows reflect construction costs, while the Year 2 cash flow is the expected value of the completed building using the direct capitalization method. We may calculate this using Equation 3 based on Year 3 NOI of EUR540,000 and the cap rate of 9.2%:

$$\text{Property value} = \frac{\text{Expected NOI}}{\text{Capitalization rate}}.$$

$$\text{EUR}5,869,565 = \frac{\text{EUR}540,000}{9.2\%}.$$

Determine the economic feasibility of the project by comparing the IRR to BFW's 10% hurdle rate. Using the Excel IRR function [=IRR(-2500000,-250000000,5869565)], we may solve for the project IRR of 11.18%.

Because the IRR is greater than the hurdle rate, the Lisbon project appears to be economically feasible.

9. The construction delay shifts the final project cash flow from the end of Year 2 to the end of Year 3. We can solve for the Year 3 cash flow that generates a 10% hurdle rate using a trial-and-error process or the Excel Goal Seek function and confirm that the Excel IRR function [=IRR(-2500000,-2500000,0,6352717)] gives us a result of 10%. The original and revised cash flows are as follows:

Year	0	1	2	3
Original cash flows	(2,500,000)	(2,500,000)	5,869,565	—
Revised cash flows	(2,500,000)	(2,500,000)	—	6,352,717
IRR	10.00%			

Given a Year 3 cash flow of EUR6,352,717, we can show that Year 3 NOI (and expected building value) would need to be 8.23% higher than that in Year 2 for the project to achieve a 10% IRR:

8.23% = 6,352,717/5,869,565 – 1.

10. Value-add and opportunistic private real estate investments are less focused on the income component of returns (the primary component of public real estate investment returns) and are more focused on the potential for capital appreciation during the development phase of the project. A significant contrast between a renovation project compared to a new construction project is that renovation projects may allow for cash inflows after the building is purchased while a new construction project is purely focused on the potential for capital appreciation. This contrast may be important in that after a building is purchased for renovation, the buyer may find that deteriorating economic conditions make it prefer-

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able to continue operating a building as is until the real estate market reaches a recovery phase.

11. Based on the expected NOI of EUR1,400,000 for the Madrid building during the next year and a purchase price of EUR15,000,000, the project return can be calculated using Equation 2:

    Project return = NOI/Project cost,

    which is just 9.33% (= 1,400,000/15,000,000). Since this return falls below BFW Invest's hurdle rate of 10%, the Madrid building purchase is not economically feasible for BFW Invest if it is expected to operate indefinitely under its current use in the current rental market. In order for the property purchase to reach the hurdle rate, BFW would have to either lower its offer price or consider the possibility of a delayed renovation if the market improves in the analysis.

12. The annual management fee is EUR225,000 per year (= 1.5% × 15,000,000).
    To calculate the performance fee, we must first solve for cash flow at the end of the three-year holding period, which combines the EUR28,000,000 expected sale price and the net cash outflow of EUR1,000,000 in Year 3.

    Year 3 cash flow: EUR27,000,000 = 28,000,000 – 1,000,000.

    The performance fee is therefore

    EUR769,400 = 20% × (27,000,000 – 23,153,000).

    The before-tax cash flow, fees, and after-tax cash flow are as follows:

Year	0	1	2	3
Cash flows before fees	(15,000,000)	1,000,000	(4,000,000)	27,000,000
Fees		(225,000)	(225,000)	(994,400)
Cash flows after fees	(15,000,000)	775,000	(4,225,000)	26,005,600

    Use the Excel IRR function to calculate the IRR after fees:

    13.96% = IRR(-15000000,775000,-4225000,26005600).

    The resulting IRR after fees is 13.96%, which exceeds BFW's hurdle rate.

13. Because an earlier question also involved the calculation of the Madrid project IRR after fees, we can use the same information to determine the purchase price (or Year 0 cash outflow) using the Excel IRR function for which the IRR equals BFW Invest's 10% hurdle rate:

    10% = IRR(*Year 0 cash flow*,775000,-4225000,26005600).

    We can solve for the purchase price (or Year 0 cash flow) as EUR16,750,000 using trial and error or the Excel Goal Seek function. The cash flows are as follows:

Year	0	1	2	3
Cash flows before fees	(15,000,000)	1,000,000	(4,000,000)	27,000,000
Fees		(225,000)	(225,000)	(994,400)
Cash flows after fees with IRR = 13.96%	(15,000,000)	775,000	(4,225,000)	26,005,600
Cash flows after fees with IRR = 10%	(16,750,000)	775,000	(4,225,000)	26,005,600

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LEARNING MODULE

7

Infrastructure

LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	discuss important infrastructure investment features
☐	discuss infrastructure investment methods and investment vehicles and their uses
☐	discuss the infrastructure investment process over the project life cycle and the roles of infrastructure debt and equity financing
☐	discuss the due diligence and valuation processes for infrastructure investments
☐	discuss the risk and return among infrastructure investments and as compared to other investments as part of a strategic asset allocation

INTRODUCTION

1

Infrastructure investments involve capital-intensive, long-lived assets whose underlying economic use is associated with the provision of essential services, such as transportation or power generation.

While sovereign, regional, and local governments borrow and levy taxes to build and operate infrastructure assets using public funds, our focus in this learning module is the features, structures, process, due diligence, valuation, and portfolio characteristics of private unlisted infrastructure investments. As of October 2022, private unlisted infrastructure remained the fourth largest private asset class after private equity, private debt, and real estate, with over USD1.25 trillion in global assets under management (AUM). This private asset class is forecast by the alternative investment data company Preqin to reach USD1.9 trillion by 2027, approaching the size of private real estate AUM.

Infrastructure investments are characterized by unique, often project-based structures with distinct cash flows and risk and return characteristics resulting from contractual or regulatory arrangements associated with public use. Like other private assets, infrastructure assets are typically large and illiquid—in some cases, involving existing government assets that are privatized, and in other cases, involving new assets built, operated, and often transferred to public use at the end of a predefined operating period.

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In this reading, we first distinguish important features of private infrastructure. Infrastructure assets share similar life-cycle characteristics with private real estate but have important differences. As in the case of private real estate, these investments involve an initial development phase with negative cash flows, followed by a longer operating period over which costs are recovered and returns are generated. That said, the inability to repurpose single-use, long-lived infrastructure assets often means that their value is solely derived from contractual or regulatory relationships that govern their specific economic use in providing essential services. These relationships usually dictate the capital structure and investment process for debt and equity investors. While infrastructure assets are usually far less liquid and adaptable to other economic uses than non-infrastructure investments, they often benefit from inelastic demand, direct or indirect subsidies, or competitive and regulatory constraints that reduce business and operating risks. The use of special purpose entities to allocate project risks among public and private entities gives rise to unique due diligence challenges and distinctive risk and return features. Long-term stable cash flows from infrastructure investments combine bond- and equity-like characteristics that drive market-based valuation approaches and define their role in a strategic asset allocation.

LEARNING MODULE OVERVIEW

- Infrastructure investments are single-use, long-lived assets that may be classified on the basis of the inherent business risk faced by investors. The business risk depends on the specific security's place in the capital structure and its claim on cash flows of the underlying project, as well as the project type, corporate governance features, and geoeconomic exposure.
- Single-asset infrastructure companies typically involve a special purpose company with debt and equity investments closely tied to specific commercial contracts, while investments in entities engaged in multiple projects are more closely aligned with a corporate structure.
- Unlike private equity or real estate investments, which typically seek an exit in several years following capital appreciation due to restructuring or development, infrastructure investments that use a build–operate–transfer structure transfer their assets at the end of an operating period and therefore have a terminal value of zero.
- Due diligence challenges unique to infrastructure investments include jurisdictional, legal, and regulatory considerations; technical aspects of the engineering, procurement, and construction phase; and the commercial terms of their operation as defined by contractual or regulatory relationships.
- Given the unique and illiquid nature of infrastructure assets, valuation approaches generally focus on discounting expected cash flows over the commercial term using risk-adjusted discount rates.
- Because infrastructure assets are characterized by a relatively high payout of cash flows following a construction phase and their returns are less correlated with public bond and equity returns, their inclusion in a strategic asset allocation most often seeks to benefit from both diversification and long-term liability matching.

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INFRASTRUCTURE INVESTMENT FEATURES

2

☐ discuss important infrastructure investment features

Infrastructure assets share some features of private commercial real estate investments but have critical differences. Both involve large, heterogeneous, illiquid investments in real assets that often follow a distinct development life cycle. However, whereas value-add and opportunistic commercial or residential real estate investments ultimately generate market rents as a primary source of revenue, infrastructure investments have little or no economic value beyond the public goods or essential services they provide. The unique contractual relationships among public and private entities related to the use of infrastructure assets creates distinct risk–return profiles for private investors. These investments are often grouped by the underlying industry associated with the service provided, such as power generation or transportation, as well as the associated stage of development. For example, new infrastructure projects and assets are referred to as **greenfield investment**, while **brownfield investment** may involve the privatization or repurposing of existing public assets or an expansion of existing facilities providing the same service. As with real estate investments, infrastructure projects and investment funds are often grouped by core, value-add, and opportunistic criteria, as shown in Exhibit 1.

Exhibit 1: Infrastructure Investment Risk and Return Spectrum

From an investment perspective, the source, type, and timing of compensation offered for the provision of these essential services or public goods is of primary importance. For example, in some cases, a local or regional government authority enters a **concession agreement** with a private firm that establishes terms and conditions to plan, build, operate, finance, and maintain an infrastructure asset, such as a toll road, bridge, or other facility. Under such an agreement, the public authority, often referred to as the **grantor**, provides the private developer or operator, also known

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as the **concessionaire**, the right to charge user fees over a predetermined operating period to both recover construction and maintenance costs and provide a return to investors once the facility is completed and meets specifications.

Infrastructure investment returns are primarily derived from an asset's income-generating potential, because most projects are single-use investments with little or no alternative economic value. Furthermore, they are often built on public land or land acquired under government authority for fair market compensation and are frequently transferred to the public entity at the end of an operating period with a terminal value of zero.

A key feature that distinguishes infrastructure from other investments is the underlying business model. In contrast to corporate issuers or real estate, long-term contractual arrangements clearly define services provided, as well as the economic terms. Infrastructure investors may act as private project developers and/or asset operators.

Private developers may agree to build a hospital, a bridge, or power generation facilities to certain technical specifications required to deliver services and receive progress payments during construction and upon completion. Asset operators generate revenue that usually involves one of three possible approaches:

Fixed or availability-based payment: Public or private sector end users agree to payment of a fixed income stream over the period during which the asset is available for use. An operator must meet all construction, operating, and financing cash flows from this income stream. Under this arrangement common among **social infrastructure** investments, or those directed toward education, health care, and other government services, as well as the transport and energy sectors, the asset is often returned to the public sector entity and the terminal value is zero.

Commercial payment: Under a commercial or so-called **merchant payment scheme**, the operator has the right to collect service or user fees over the operating period but remains exposed to the asset's business risk based on demand and other economic factors. Merchant payment schemes are frequently used for power generation and toll road assets.

Regulation-based payment: In network-based industries where natural monopolies are common, such as power or water distribution, public authorities often seek to stabilize pricing or impose pricing restrictions. These measures may be designed to offer a specific return on investment, limit price adjustments to the rate of inflation or a predetermined rise in service charges, or encourage investment in a particular area or technology. While this approach has the effect of limiting potential returns, it also may be used to encourage investment by reducing business risk to investors.

Regulation-based payments are also used to promote investment in renewable energy. For example, the United Kingdom is one of several developed market countries that uses **contracts for difference (CfDs)** as a primary mechanism to promote investment in low-carbon electricity generation, such as wind and solar power. CfDs are used by the **Low Carbon Contracts Company (LCCC)** to stabilize a project's renewable energy income, as shown Exhibit 2.

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Exhibit 2: Contracts for Difference in UK Renewable Energy

Qualified low-carbon energy project developers bid on a fixed, likely inflation-adjusted, indexed electricity rate for periodic future delivery over 15 years, with successful bidders entering a CfD with the UK government–owned LCCC. Under the CfD, a developer exchanges the difference between the **strike price**, or the fixed contractual rate agreed at a CfD auction for each period, and a **reference price**, or the average UK electricity market price for the period. For intermittent projects, such as wind power, market reference prices for a given day are set hourly based on the prior day's power auctions.

If the pre-agreed strike price exceeds the market reference price, the project company receives the difference from LCCC, while the project company must pay LCCC the difference when the market price exceeds the strike price, thus ensuring a stabilized electricity price for the contracted period and volume.

KNOWLEDGE CHECK: WYNDSIDE LIMITED CONTRACT FOR DIFFERENCE

Wyndside Limited is an onshore wind farm that was awarded a 15-year CfD at auction with a strike price of GBP230.18 per MWh for 25 MW (1MW = 1,000 kW) of power. The **intermittent market reference price (IMRP)** is the market reference price determined daily on the basis of the prior day's hourly electricity rates.

1. Explain how the CfD is used to determine Wyndside's income for the quarter (equal to 90 days) if the IMRP for the current quarter is GBP208 per MWh. Assume no CfD inflation adjustment, 24-hour daily operation, and constant 25 MW per hour output.

   Solution:

   If the pre-agreed strike price under the CfD exceeds the market reference price, then Wyndside receives the difference from LCCC. Wyndside's income is the sum of the electricity income based on IMRP plus the CfD settlement:

   Wyndside income (IMRP): 11,232,000 = GBP208 × 25 MW × 90 days × 24 hours.

   CfD settlement: 1,197,720 = (230.18 – 208) × 25 MW × 90 days × 24 hours.

   Wyndside income: GBP12,429,720 = 11,232,000 + 1,197,720.

   While this CfD settlement mechanism addresses a contractual volume for a given period, note that wind farms in practice are subject to output vari-

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ability due to seasonal and weather conditions, among other factors, which prevent them from fully offsetting revenue-related risk.

Single, standalone projects are usually governed by a **special purpose entity (SPE)**, also referred to as a special purpose vehicle (SPV), established to undertake a project. This approach is similar to asset-backed securities, where a standalone SPV is created to purchase loans from an originator and issue securities backed by loan interest and principal payments. In the case of a project SPV, the entity's sole purpose is to facilitate the construction, operation, and financing of an infrastructure asset over its contractual life both by limiting the liability of private firms that build, operate, and maintain the asset in exchange for contractual or commercial operating cash flows and by limiting debt and equity investor claims to a project's net cash flows.

The long-lived, illiquid nature of infrastructure investments combined with the contractual and business risk characteristics we have outlined result in unique infrastructure cash flow, diversification, and exposure profile features:

Cash flow features: As long-lived, single-use assets, infrastructure investments typically offer investors a higher cash yield than other asset classes because there are limited opportunities for cash flow reinvestment into an existing project. As a result, equity investors can usually expect a higher proportion of revenues as dividends, while debtholders are often able to receive relatively high yields compared to similar investments with low credit risk.

Diversification features: Given the provision of essential or public services that often have few substitutes and inelastic demand, infrastructure asset returns typically exhibit lower correlation with other asset classes and tend to be less exposed to cyclicality or market downturns. For example, according to a study by PGIM, a global investment management firm, the total return correlation between private infrastructure equity assets and public equities from 2012 to 2021 was 0.57, which is higher than that of equities and fixed income but lower than correlations between types of private equity.

Exposure profile features: Given the distribution of relatively predictable cash flows over extended contractual periods, infrastructure assets offer the potential for cash flow or liability matching for long-term institutional investors, such as pension funds, as a source of income and portfolio duration.

Given the unique nature of infrastructure project risks, the EDHEC Infrastructure Institute initiated the **Infrastructure Company Classification Standard (TICCS)** in 2018, with the input of asset owners and asset managers, to categorize investments based on key characteristics affecting relative risk and return. These features include the form of business risk, the underlying industry, corporate governance, and geoeconomic exposures, as shown in Exhibit 3.

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Exhibit 3: The Infrastructure Company Classification Standard

Business risk characteristics of infrastructure investments at the center of the exhibit were defined earlier by whether cash flows are fixed or availability based, merchant, or commercial, or regulation based. These cash flows constitute the income over the asset's period of operation used to cover upfront development and construction costs and ongoing maintenance upon completion and to compensate investors over an asset's life. Given their long useful life, regulatory risk in the form of political, legal, and governmental change is an additional feature of business risk for infrastructure assets. The anticipated level and volatility of cash flows affect not only the level of risk and return but also the degree to which leverage can be used to finance these long-lived assets.

The *industry* classifications shown at the bottom of Exhibit 3 used to group and evaluate private companies are important, but they often ignore key distinctions associated with the development and operation of infrastructure assets. Industry risk factors include cyclicality, concentration, and competitive intensity, as well as growth and demand. While an investment's technical and physical features may be similar to other investments in the same industry, relative risk and return are often dictated by the business model. For example, a power generation facility that delivers electricity to the power grid under a government-sponsored price stabilization scheme may face less business risk than an identical facility with a long-term power purchase agreement with a private manufacturing company, but it bears more regulatory risk. Also, while low-carbon energy solutions may benefit from income stabilization schemes as described earlier, traditional power-generation assets face the risk of tighter environmental restrictions over their useful life. Infrastructure assets in the same sector therefore often require groupings with greater specificity based on the types of services rendered, technologies employed, and customers, as well as the terms of service.

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The type of *corporate governance* shown on the left side of Exhibit 3 refers to the use of single-asset project companies typically governed under SPEs, as opposed to multi-project corporations engaged in infrastructure. The choice of corporate governance used directly influences project capital structure; the contractual framework governing the development and operation of a single asset imposes tighter constraints on managers than under a corporate structure with multiple projects. Lenders can exercise greater control over the sources and uses of cash flow for a single project and are therefore usually more willing to offer higher leverage in comparison to debt financing considered for a multi-project corporate structure. In the case of publicly traded infrastructure companies involved in multiple projects, debt and equity investors in liquid securities are exposed to an evolving project portfolio over time as opposed to a single-use asset for a finite period. For example, in the case of Hochtief AG, a publicly traded construction and global infrastructure company based in Germany, the company has shifted its focus from German reunification projects in past years to such new areas as energy transition, digital infrastructure, and sustainable mobility.

Finally, *geoeconomic* classification on the right side of Exhibit 3 refers to the local, national, or global exposures associated with an infrastructure asset. For example, as with real estate assets where income depends on local economic conditions, investors often seek geographic diversification among similar infrastructure assets whose commercial revenue stream is closely tied to economic activity, such as traffic for toll roads and business and leisure travel for airports. In some cases, a project may directly hinge on the creditworthiness or counterparty risk of a local or national government, while in others—such as bridges, ports, or distribution networks—a project's viability may depend on the level of cross-border activity or global trade. These large, immobile assets depend directly and indirectly on national government policies to determine how public entities partner with private sector entities to develop and operate infrastructure. These so-called **public–private partnerships (PPPs)** take many forms but are usually defined as a long-term contractual relationship between the public and private sectors involving a concession agreement or other form of compensation in exchange for delivering an essential service or public good.

While private market solutions to address the provision of public goods are often seen as an attractive investable alternative to schemes funded entirely through fiscal budgets, PPPs often face unique and unforeseen risks when put into practice. For example, while the vast majority of transport infrastructure investment following German reunification was funded through taxation, the following private project example illustrates some of the challenges faced when estimating usage and revenue for any infrastructure project, whether publicly or privately financed.

WARNOW TUNNEL PROJECT

The Warnow tunnel, a 0.8 km road tunnel under the Warnow River in Rostock, was the first German toll road constructed following the passage of the Private Highway Construction Financing Act after reunification. Under the new law, a new form of PPP known as the F-Model was used; it transferred the right to collect tolls to private investors but involved a bidding process that took place prior to formal project approval.

Completed in 2003 at a cost of EUR220 million, the Warnow tunnel was nearly bankrupt within three years of completion. The investors and planners had overly optimistic traffic forecasts, particularly for trucks facing much higher tolls than passenger cars. Truck drivers chose instead to take a 10–15 km detour on public roads rather than incurring the EUR9.00 (or EUR17.50 in summer) toll per vehicle, and overall tunnel traffic remained at roughly half the level necessary for the project to be profitable. Following a two-year period of

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negotiation with the City of Rostock as grantor, the operating concession was extended from 20 years to 50 years and the toll structure was adjusted to make the project economically feasible for the operator.

This widely cited example is often used to describe the pitfalls of the so-called F-Model and to justify subsequent changes to German PPP transport structures.

The role of private infrastructure investments differs markedly in developed and developing countries for several reasons.

Developed markets are characterized by diversified domestic economies with a strong financial sector, extensive existing domestic transportation and energy networks, and fiscal budgets that provide essential services and public goods through taxation and borrowing. Private infrastructure is prevalent in industries in which public sector assets are privatized or a well-established regulatory framework governs activity, such as power and water utilities or transportation. In other cases, government intervention is used to promote either brownfield investment to revitalize disadvantaged areas or greenfield development to stimulate growth in such areas as renewable energy.

Developing countries, in contrast, face less economic diversification, few budgetary resources to provide public goods, evolving transportation and energy networks, and a less robust financial sector with a greater likelihood of domestic currency devaluation, which creates currency risk. In these cases, private infrastructure investment is more often greenfield than brownfield and tied to projects that seek to provide a catalyst for overall economic growth and development. Global and regional development banks and supranational financial institutions, such as the World Bank and its affiliate, the International Finance Corporation (IFC), frequently play a pivotal role in providing technical assistance to these countries for infrastructure investments, such as concession agreement terms, standard bidding documents, and legal and regulatory advice, as well as various forms of financing. Private investors in developing market infrastructure typically look to the engagement of these public and other private entities with experience and expertise with similar projects to mitigate country and political risk associated with long-term illiquid developing market investments.

In contrast to developed markets, infrastructure asset performance in developing economies often hinges on the market for a key global commodity or domestic industry that may be a driver of continued economic development, as well as a critical source of foreign currency reserves. While developing market investments are less frequently associated with brownfield investments, the following fictional case study provides a counterexample in which existing infrastructure may be repurposed to align resources to national government priorities using private investment.

CASE STUDY

Tay Bac Airport (Vietnam)

In response to growing cross-border travel and trade in the northwestern Vietnamese province of Tay Bac, the Vietnamese Ministry of Transport has proposed the repurposing of an abandoned military airport site for civilian use as a regional airport to primarily serve passengers on domestic routes and connecting flights to global destinations, promoting tourism, trade, and local economic growth.

The Ministry of Transport intends to work in conjunction with the IFC under a plan where private sector firms will design, build, finance, operate, and maintain the Tay Bac Airport (TBA) facilities over the next 20 years.

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The proposed commercial arrangement between the Ministry of Transport and the airport operator foresees nominal concession payments related to airport operations, with the bulk of expected project revenue based on commercial payments tied to airport traffic, as well as the right to generate ancillary revenues from parking, duty-free shopping, and other sources on the property.

1. Describe TBA's infrastructure investment features using TICCS.

   Solution:

   Corporate governance: As a single standalone project, we would expect the Tay Bac Airport project to be built and operated using an SPE structure to accommodate long-term contractual relationships between public sector project sponsors and private sector parties involved in the design, construction, financing, operation, and maintenance of airport facilities.

   Business risk: Tay Bac Airport's business risk and business model primarily involve a commercial payment scheme, because projected airport revenue is reliant on passenger and cargo traffic and other traffic-related revenue.

   Geoeconomic risk: Because TBA is in the transport sector and associated with goals of promoting tourism, international trade, and economic growth via both domestic travel and connections to global routes, TBA's geoeconomic risk involves both global and national exposures.

   Industry Risk: The project will have significant exposure to the tourism industry, as well as some exposure to ancillary industries related to the operation and upkeep of the facility.

Despite their obvious differences, the Wyndside and Tay Bac Airport projects share several common features, such as their lack of adaptability to alternative economic uses and a development period with negative cash flows followed by a period of contractual cash inflows available to pay development costs and generate investor returns. The investment methods and structures used to achieve the objectives of the public and private parties involved, as well as third-party investors, have similar features. Infrastructure investments span the development and operation cycles as shown in the following section.

QUESTION SET

1. Describe two possible rationales for establishing a special purpose entity for governing a private infrastructure project.

   Solution:

   In the case of a project SPE, the entity's sole purpose is to facilitate the construction, operation, and financing of an infrastructure asset over its contractual life. For private infrastructure projects, an SPE has the effect of both (1) limiting the liability of private firms that build, operate, and maintain the asset in exchange for contractual or commercial operating cash flows and (2) limiting off-balance-sheet debt and equity investor claims to a project's net cash flows.

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2. Which of the following corporate governance structures in private infrastructure is likely to allow for greater debt financing assuming similar creditworthiness?

   A. Single-asset companies

   B. Multi-project companies

   C. Publicly traded infrastructure companies

   Solution:

   The correct response is A.The choice of corporate governance used directly influences project capital structure; the contractual framework governing the development and operation of a single asset imposes tighter constraints on managers than under a corporate structure with multiple projects. Lenders can exercise greater control over the sources and uses of cash flow for a single project and are therefore usually more willing to accept a higher degree of leverage than under a corporate structure (i.e., multi-project companies or publicly traded infrastructure companies).

3. Vento Anglio Limited (VAL) is a private 125 MW onshore wind farm project planned in western England. Because it expects to qualify as a low-carbon energy project developer, VAL intends to take advantage of the UK government's CfD scheme and deliver electricity to the local power grid. Describe VAL's infrastructure investment features using TICCS.

   Solution:

   Corporate governance: As a single, standalone project company, we would expect VAL to be governed by a special purpose entity) established solely to undertake the wind farm project as opposed to a corporate structure.

   Business risk: Given its intention to use a contract for difference (CfD) scheme to stabilize power revenue, we should classify VAL's business risk as involving regulation-based payments, since the CfD contract stabilizes electricity prices for the life of the contract for difference.

   Industry risk: VAL's underlying industry is the renewable power sector.

   Geoeconomic risk: Changes to the domestic UK government's programs to encourage investment in renewable energy are a form of geoeconomic risk.

INFRASTRUCTURE INVESTMENT STRUCTURES 3

☐ discuss infrastructure investment methods and investment vehicles and their uses

Infrastructure investments take several forms similar to those from other private markets, ranging from fund investments in a portfolio of infrastructure assets or projects, co-investment, or direct investment in a project or asset.

While smaller investors that are unable to accommodate sizable stakes in these often large-scale, highly illiquid, single-use assets typically invest as one of many limited partners, larger institutional investors frequently consider significant minority, majority, or 100% ownership, as in the following example.

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PUBLIC SECTOR PENSION (PSP) INVESTMENTS IN INFRASTRUCTURE

PSP Investments was established in 1999 by the Canadian government to manage and invest the public sector pension plans of the federal Public Service, the Canadian Forces, the Royal Canadian Mounted Police, and the Reserve Forces. PSP's assets under management grew during its first 20 years of operation to over CAD200 billion.

Beyond public market equities and fixed income, PSP expanded to private market investments, including infrastructure, seeking to invest in large assets with stable long-term cash flows to match its liabilities for very long tenors with no exit requirements. PSP participates in both co-investment opportunities with significant minority ownership stakes and 100% direct investments, such as AviAlliance.

AviAlliance is a leading global airport investor and manager based in Germany, which PSP acquired from Hochtief AG, a publicly traded global infrastructure company, over a decade ago.

In contrast to other private market investments, infrastructure assets often require a high degree of technical, engineering, regulatory, and other expertise to ensure the physical and economic feasibility of a project over its life cycle. Smaller general partner (GP) funds and other investors who are unable to make large investments and lack the necessary depth of resources and sector- and asset-specific expertise often seek to co-invest in projects led by a major fund manager, sovereign wealth fund, or pension fund with greater experience. As infrastructure involves essential services or public goods created and supported in tightly regulated markets governed by regional or national authorities, public entities often play a key role in determining the investment method, types of financing, and parties involved. In other instances, especially in developing countries, regional development banks or supranational entities, such as IFC, offer technical assistance for engineering and financing proposals and bid processes.

Most developed market governments have created **export credit agencies (ECAs)** to promote the export of domestic goods and services via credit insurance, subsidized or guaranteed debt financing, which is often a key factor in reducing cost, extending the tenor, or increasing the availability of debt financing for capital goods used in developing market infrastructure.

In the case of a UK wind farm, the project requires assembly, installation, and operation of the wind turbines to generate and transmit electricity to the power grid at optimal levels and in compliance with the British Standards Institution and pricing regulated by the Office of Gas and Electricity Markets. The UK Department of International Trade has sponsored initiatives seeking to attract foreign investors to provide debt and equity financing for renewable energy.

As for Tay Bac Airport in Vietnam, introduced earlier, the facility must meet physical feasibility requirements of aircraft, passengers, and cargo. International passengers, airlines, and freight companies will also expect Tay Bac Airport to meet high global service requirements, such as the International Air Transport Association's standards of interoperability and technology. Transport linkages requiring local and regional authority agreements to provide road, rail, and other onward travel connections are important elements required to attract and accommodate traffic over the concession period.

These complex contractual relationships among developers, contractors, suppliers, private and public service providers, managers, and investors are usually governed through an SPE structure over a project's life cycle. Because no two projects are identical, the form of an infrastructure project SPE is often uniquely structured to follow

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its function in establishing and allocating sources and uses of cash, as well as risks, roles, and responsibilities among parties involved. Exhibit 4 provides a generalized structure of a special purpose entity.

Exhibit 4: Infrastructure Project Special Purpose Entity

As Exhibit 4 shows, the project SPE is often a separate holding company (shown in the diagram as HoldCo) established for financing purposes that also has an operating company (or OpCo) that holds the assets, contracts with related parties, and generates cash flows. In some cases, both entities issue securities and investors must be aware of the seniority of their claim depending on the issuing entity and the project cash flows.

In addition to their legal segregation using SPEs, infrastructure investments are often governed by a set of standardized procedures for the selection of parties involved in the development, construction, operation, and financing of the project once its size, scope, and timing are determined. Key steps in the process are shown in Exhibit 5.

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Exhibit 5: Infrastructure Project Bidding Process

The **request for proposal (RFP)** outlines project details, requirements, and timing, as well as assessment criteria used to award contracts to successful bidders. In addition to laying out the size, scope, technical specifications, and the nature of essential services to be provided by an infrastructure asset to all interested parties submitting a sealed bid for the project, the RFP process also aims to promote a fair, competitive, and transparent process for all parties involved.

To better understand how these infrastructure methods and structures work in practice, we now return to the case of the Vietnamese airport introduced earlier. In the case of Tay Bac Airport, private investors engage with global institutions, public sector authorities, and private entities with extensive experience and expertise in developing and operating regional airports to mitigate associated geoeconomic risk, as shown in the following case study.

CASE STUDY

Tay Bac Airport Limited Investment Vehicle and Structure

The state-owned Airports Corporation of Vietnam (ACV), a subsidiary of Vietnam's Ministry of Transport and operator of Vietnam's existing international airports, has completed a successful RFP process for the design, construction, financing, and operation of the new Tay Bac Airport on 500 hectares of government land on an abandoned military site in northwestern Vietnam, and it was awarded the contract.

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The project is co-sponsored by the IFC as a provider of both technical support and debt financing and AviAlliance, a private industrial airport investor, manager, and equity provider. Tay Bac Airport Limited (TBA Limited) was established as the project company and concessionaire, with ACV serving as grantor over the 20-year period, with ownership and control transferred to ACV at the end. TBA Limited's structure is summarized in Exhibit 6.

Exhibit 6: TBA Limited Structure

As shown in the diagram, TBA Limited has four sources of debt and two sources of equity financing and intends to directly contract with design and civil contractors in the initial development phase and general and specialist contractors over the facility construction period and for operations and maintenance once TBA is operational.

TBA is projected to cost USD900 million, as shown in the following table, with 65% of the project (or USD585 million) funded with debt and the rest with equity:

TBA Development Costs	USD
Facilities	515,000,000
Equipment & Systems	135,000,000
On-Site Land Improvements	100,000,000
Civil Engineering	90,000,000
Parking & Transportation	50,000,000
Upfront Costs & Reserves	10,000,000
Total	900,000,000

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1. Explain the benefits to a TBA Limited debt or equity investor of investing directly with the special purpose company as opposed to the Airports Corporation of Vietnam over the concession period.

   Solution:

   The legal separation between TBA Limited (the SPE concessionaire) and the Airports Corporation of Vietnam (the grantor) provides important benefits to both debt and equity investors of the infrastructure project.

   First, investors are protected from cash flow risks arising from other assets (i.e., all other airports in Vietnam) associated with the grantor. The cash flows to investors are strictly associated with the Tay Bac Airport asset.

   Second, investors can focus any monitoring efforts solely on the operations of Tay Bac Airport as opposed to monitoring Airports Corporation of Vietnam.

2. Discuss the potential benefits of using ECA-guaranteed bank loans as debt for the TBA project.

   Solution:

   Developed market governments create export credit agencies to promote the export of goods and services via credit insurance and political risk insurance protecting against project expropriation and the inability to repatriate cross-border cash flows and subsidized or guaranteed debt financing. These features of ECAs assist in reducing cost, extending potential tenor, and increasing the availability of debt financing for capital goods used in developing market infrastructure. Thus, the use of the ECA-guaranteed bank loans likely comes at lower interest rates and with better loan terms than non-guaranteed debt. The guaranteed feature also should provide additional confidence to other possible lenders on the project.

QUESTION SET

A private equity GP initiates the 125 MW Vento Anglio project by entering into a GBP1.825 million land use contract for 12,000 acres of remote land to build and operate a wind farm following community engagement and receipt of local authority permits. The GP establishes Vento Anglio Limited (VAL) with the basic structure in Exhibit 7.

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Exhibit 7: VAL Structure

The VAL wind farm is projected to cost GBP160 million, as shown in the following table, using GBP50 million in equity and the remainder in debt financing:

VAL Development Costs	GBP
Land Use Cost	1,825,000
Wind Turbines & Related Costs	137,500,000
Site Setup Costs	1,600,000
Development Fees	2,300,000
Contingency	6,500,000
Interest Reserves	4,020,000
Operating Deficit Reserves	4,255,000
Miscellaneous Closing Costs	2,000,000
Total	160,000,000

The VAL wind farm has a 30-year expected life, after which the turbines are expected to be recycled to cover wind-down costs and the land will be returned to owner use.

1. Explain the benefits to wind turbine suppliers and LCCC of contracting directly with the special purpose entity VAL versus the private equity GP.

   Solution:

   Because of the specific and technical nature of an infrastructure asset like the Vento Anglio project, an SPE can be organized and staffed to provide the unique project knowledge required to interact with suppliers to the project (such as the wind turbine suppliers and LCCC). The private equity general partner, in contrast, is unlikely to be staffed with such asset-specific expertise.

2. Identify key differences between the structure of VAL compared to the structure from the TBA example presented earlier in the lesson.

   Solution:

   The VAL structure does not include a grantor as in the TBA scenario in which Airports Corporation of Vietnam (ACV) grants the concession to build, operate, and transfer Tay Bac Airport to ACV at the end of the contract. There is also no ECA supporting debt issuance.

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While VAL will interact with government authorities through the process of providing electricity to the national power grid and obtaining local permits, it is not a concessionaire as in the TBA example. Finally, unlike TBA, which is transferred to ACV for continued operation, the VAL project does not remain in operation at the end of the project's life.

3. Evaluate a critical area of technical expertise necessary for VAL management based on the development costs shown previously and discuss the implications of a lack of expertise.

Solution:

Of the GBP160 million cost budget for the project, almost 86% of these costs are classified as wind turbine and related costs. As a result, it is imperative that the private equity GP ensure that the VAL management team has a high degree of expertise in the construction and operation of wind turbines. A lack of knowledge in this critical aspect of building a wind farm may cause delays, cost overruns, and other adverse events that may substantially reduce project returns.

4 INFRASTRUCTURE INVESTMENT PROCESS

☐ discuss the infrastructure investment process over the project life cycle and the roles of infrastructure debt and equity financing

Private market investments such as venture capital, growth or buyout equity, or value-add or opportunistic real estate projects are often characterized by value creation over a transformational life cycle. Several features of infrastructure assets affect their value creation process in the project life cycle, including their size, a higher degree of illiquidity, and lack of ability to repurpose, in contrast to other private market investments. As we have discussed, these large-scale fixed assets involve a development process with sizable sunk costs to deliver specific essential services or public goods under contractual relationships established with public entities. Unlike private equity investors who may alter restructuring or company exit plans based on market conditions or private real estate investors who may repurpose a property to meet changes in demand, infrastructure investments are usually more difficult to liquidate or convert to alternative uses.

Infrastructure asset inflexibility extends beyond the development phase to the period of operation and in many cases to the final asset transfer to public ownership, resulting in a zero terminal value to investors. The phases of such a **build–operate–transfer (BOT) project** are shown in Exhibit 8.

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Exhibit 8: Infrastructure Project Build–Operate–Transfer Life Cycle

BOT projects are characterized by an initial construction or "build" phase, followed by a predefined operating period over which contractual or commercial cash flows are generated before the asset is transferred to a public authority. Given the high degree of sunk costs in these specialized fixed assets, the payout period of infrastructure assets typically spans several decades. In developed markets, BOT projects are most common in such sectors as transportation, energy and water resources, and other network utilities for which large-scale investment is required for projects with a high level of fixed assets and long operating periods. In developing countries, BOT structures are commonly used to attract foreign investors in partnership with multilateral funding agencies for selected projects necessary to support economic growth where public funds are inadequate.

The use of debt versus equity financing also differs over the infrastructure asset life cycle versus other private investments. Many private investments combine debt and equity financing over a development period characterized by negative cash flows, followed by an operating period where sustainable cash flows support a relatively high degree of leverage. While private equity and real estate investment returns come from cash flows over a holding period and a terminal value upon exit, infrastructure equity investors must receive their returns largely in the form of dividends given the minimal or zero terminal value of most infrastructure assets. As the infrastructure asset's equity cushion declines, the ability to support debt financing falls, with debt repayment occurring earlier in the project life cycle, as shown in Exhibit 9.

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Exhibit 9: Infrastructure Project BOT Investment Life Cycle

Once an infrastructure asset enters the operating phase, cash flows are used to pay debt service, operating and maintenance expenses, and other costs, after which funds are available to equityholders in the form of dividends. Given the limited growth options, limited opportunities for cash flow reinvestment, and contractual or regulated business model associated with infrastructure assets, most SPEs are characterized by a strict cash flow waterfall that dictates the prioritization and use of project cash flow to meet all obligations, as well as payments to debt- and equityholders, as shown in Exhibit 10.

Exhibit 10: Project SPV Sample Cash Flow Waterfall

The SPV's debt may in some cases be enhanced by the establishment of reserve accounts for debt service and other obligations. For example, when project cash flows are less predictable, a **debt service reserve account (DSRA)** is often established, which accumulates sufficient cash in order to meet specific debt service requirements and from

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which funds are released when payments are due. Reserve accounts are often used for operating and maintenance costs and for decommissioning equipment at the end of its serviceable life. For example, the eventual closure and dismantling of a power generation facility and its equipment often involves a reserve account.

The roles of debt and equity financing in infrastructure projects can vary significantly depending on the business model, underlying industry, and public and private entities involved in a specific project. As with other private investments, such as real estate, debt investors often consider leverage and coverage measures to evaluate creditworthiness, such as **loan to value (LTV)** and the **debt service coverage ratio** (DSCR), respectively:

$$\text{LTV} = \frac{\text{Debt outstanding}}{\text{Current project value}}. \tag{1}$$

$$\text{DSCR} = \frac{\text{Net cash flow from operations}}{\text{Debt service}}. \tag{2}$$

Equity investors, in contrast, evaluate before-tax returns using actual or expected net cash flow from operations minus debt service to establish an **equity dividend rate**:

$$\text{Equity dividend rate} = \frac{\text{Before} - \text{tax net cash flow}}{\text{Equity invested}}, \tag{3}$$

where:

$$\text{Before-tax cash flow} = \text{Net cash flow from operations} - \text{Debt service}. \tag{4}$$

Note that this equity return calculation rate does not include fees. Recall from earlier in the curriculum that GP fees (R_{GP}) often involve a fixed percentage (r_m) of AUM as a management fee on end-of-period assets (P_1) and a GP performance fee (p) as a percentage of total period return ($P_1 - P_0$) in excess of a hurdle rate (r_h):

$$R_{GP\,(\text{Net with hurdle})} = (P_1 \times r_m) + \max\{0, [P_1(1 - r_m) - P_0 \times (1 + r_h)] \times p\}. \tag{5}$$

The infrastructure investment process and use of debt and equity are similar to other private markets during the development and construction phases with varying degrees of public sector involvement, while the predefined operating period places constraints on the use of leverage.

For example, in the earlier case of the UK wind farm, Wyndside, the public sector stabilized project cash flows under the contract for difference scheme used to offset electricity price volatility. However, more complex, larger-scale projects in developing economies designed to address national economic priorities (such as Tay Bac Airport) often rely on direct and indirect financial incentives, subsidies, and/or guarantees from multilateral institutions, developed market governments, and private partners to attract additional foreign debt and equity investors.

CASE STUDY

TBA Limited Financing Plan

The Tay Bac Airport project involves the reclamation of a former military base and construction of a 3,200 meter runway, as well as a new passenger terminal with the initial capacity to serve 5 million passengers per year with retail and other services, auto rental, and rail and road transportation links (to be established by the Transport Ministry), as well as fueling, maintenance, and cargo handling facilities. Expected project development costs over three years are as follows:

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TBA Development Costs	USD
Facilities	515,000,000
Equipment & Systems	135,000,000
On-Site Land Improvements	100,000,000
Civil Engineering	90,000,000
Parking & Transportation	50,000,000
Upfront Costs & Reserves	10,000,000
Total	900,000,000

Upon completion, TBA will hold a 20-year concession under which it is due to receive periodic contractual payments for operating passenger and cargo aviation services while holding the right to operate retail, parking, and other airport-based services under a commercial or merchant payment scheme based on demand and other economic factors.

TBA Project Financing Plan

Equity: 35% of cost, or USD315,000,000, 25% of which is from AviAlliance, with the remaining 75% from other equity investors drawn in three stages. GP performance fees upon completion are 10% of returns above a 15% hurdle.

Equity drawdown:

- Initial: USD157,500,000 (AviAlliance equity is fully drawn)
- One year: USD78,750,000
- Two years: USD78,750,000

Debt: 65% of cost, or USD585,000,000, from public and private investors:

1. International Finance Corporation (IFC) senior loan (USD150,000,000)
   - 6% annual interest
   - Fully disbursed at the end of Year 2 linked to project milestones
   - Accrued interest is capitalized in Year 3 and paid in Year 4 on full balance outstanding.
   - Loan is repaid in 12 equal annual installments comprising principal and interest payments starting in Year 5
   - Secured by TBA project assets
2. Senior syndicated bank loan—Term Loan A (USD235,000,000)
   - 7.5% annual interest paid annually on balance outstanding
   - Fully disbursed at the end of Year 3 linked to construction milestones
   - Full balance outstanding for three years, with principal amortization in four equal annual tranches thereafter
   - Secured by TBA project assets
3. Bank loan (ECA guaranteed; USD100,000,000)
   - 6.5% annual interest paid annually on outstanding balance
   - Fully disbursed at the end of Year 3 linked to export and delivery of ECA-eligible equipment and systems
   - Interest is paid on full balance outstanding for 10 years, with full (bullet) loan repayment at maturity.

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- Insured by developed market ECA against political and commercial risks and secured by equipment financed under loan agreement

4. Junior construction and development loan (USD100,000,000)
   - 9.5% annual interest accrued on outstanding balance
   - Immediate disbursal upon project initiation and equity drawdown
   - Capitalized interest and principal are paid in four equal installments starting at the end of Year 14.
   - Subordinated claim to TBA project assets, which is repaid only once senior creditor claims are paid

TBA Operations

In its first full year of operation, Tay Bac Airport expects to earn an average of USD40 in per-passenger total airport revenue from 5 million passengers and before-tax cash flow based on the following assumptions:

Tay Bac Airport Operations	USD
Total Revenue (5,000,000 passengers × USD40 each)	200,000,000
Operating Expenses (40% of Revenue)	80,000,000
EBITDA	120,000,000
Capital Expenditures (CapEx)	20,000,000
Net Cash Flow from Operations	**100,000,000**

1. Calculate the debt outstanding and the DSCR for the first full year of operation (Year 4) of the Tay Bac Airport project.

   Solution:

   The debt service coverage ratio is equal to net cash flow from operations divided by debt service, as shown in Equation 2:

   $$\text{DSCR} = \frac{\text{Net cash flow from operations}}{\text{Debt service}}.$$

   Net cash flow from the first year of operations is given as USD100,000,000, and we must solve for Year 4 debt service as follows:

   1. IFC senior loan (USD150,000,000)

      As 6% interest is capitalized in Year 3 and paid in Year 4 on the full balance, we may calculate Year 4 debt outstanding and debt service as follows:

      Debt outstanding: USD159,000,000 = USD150,000,000 × (1 + 0.06).

      Debt service: USD9,540,000 = USD159,000,000 × 0.06.
   2. Senior syndicated bank loan—Term Loan A (USD235,000,000)

      7.5% annual interest is paid, and the full balance is outstanding:

      Debt service: USD17,625,000 = USD235,000,000 × 0.075.
   3. Bank loan (ECA guaranteed; USD 100,000,000)

      6.5% annual interest is paid, and the full balance is outstanding:

      Debt service: USD6,500,000 = USD100,000,000 × 0.065.
   4. Junior construction and development loan (USD100,000,000)

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While 9.5% annual interest is accrued on the outstanding balance, interest is capitalized and not paid until installments begin at the end of Year 10:

Debt outstanding: USD143,766,095 = USD100,000,000 × $(1 + 0.095)^4$

Debt service: USD0

Debt outstanding is the sum of the four loans outstanding at the end of Year 4:

USD637,766,095 = 159,000,000 + 235,000,000 + 100,000,000 + 143,766,095.

No debt amortization occurs in Year 4, so debt service is the sum of the interest payments on the four loans at the end of Year 4:

Debt service: USD33,665,000 = 9,540,000 + 17,625,000 + 6,500,000 + 0.

Solve for DSCR to be 2.97 as follows:

$$\text{DSC} = 2.97 = \frac{\text{USD } 100,000,000}{\text{USD } 33,665,000}.$$

2. Solve for the LTV at the end of Year 4 if the TBA project has a value that has appreciated 10% above its original development cost.

Solution:

Use Equation 1 to solve for loan to value as follows:

$$\text{LTV} = \frac{\text{Debt outstanding}}{\text{Current project value}}.$$

Given Tay Bac Airport development costs of USD900,000,000, we can solve for an estimated project value of USD990,000,000 (= 1.1 × 900,000,000):

$$\text{LTV} = 0.644 = \frac{637,766,095}{990,000,000}.$$

Note that while capitalized interest decreases debt service, it increases LTV.

3. Calculate the equity dividend rate for the first full year of TBA's operation, as well as the GP performance fee (ignoring management fees).

Solution:

Using TBA's Year 4 debt service of USD33,665,000 from Question 1, solve for before-tax cash flow of USD66,335,000 using Equation 4:

Before-tax cash flow = Net cash flow from operations – Debt service

= 100,000,000 – 33,665,000.

Use Equation 3 to solve for the equity dividend rate by dividing before-tax cash flow by project equity.

$$\text{Equity dividend rate} = 21.1\% = \frac{\text{USD}66,335,000}{\text{USD}315,000,000}.$$

GP performance fees are equal to 10% of the equity dividend rate in excess of the 15% hurdle rate. We may use a simplified version of Equation 5 (where $r_m = 0$) to solve for the performance fee as follows:

$$R_{GP\,(\text{Net with hurdle})} = (P_1 \times r_m) + \max\{0, [P_1(1 - r_m) - P_0 \times (1 + r_h)] \times p\}.$$

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$$R_{GP\ (\text{Net with hurdle},\ r_m=0)} = \max\{0, [P_1 - P_0 \times (1 + r_h)] \times p\}.$$

P_1 is equal to USD381,335,000, or the sum of the equity dividend and equity, with r_h of 0.15 and p of 0.10:

$$= \max\{0, [381,335,000 - 315,000,000 \times (1.15)] \times 0.1\},$$

which results in a GP performance fee of USD1,908,500.

QUESTION SET

The 125 MW Vento Anglio Limited (VAL) project involves the purchase and installation of 50 2.5 MW wind turbines at a cost of GBP1.1million per MW, with total development costs incurred either upfront or equally over three years, as follows:

VAL Development Costs	GBP
Wind Turbines & Related Costs	137,500,000
Contingency Reserve	6,500,000
Operating Deficit Reserves	4,255,000
Interest Reserves	4,020,000
Development Fees	2,300,000
Misc. Closing Costs	2,000,000
Land Use Cost	1,825,000
Site Setup Costs	1,600,000
Total	160,000,000

VAL turbines have a 30-year serviceable life, and VAL plans to contract with LCCC for fixed-price delivery under a 15-year CfD agreement when operations begin. Note that while wind power generation in practice often varies due to changing weather conditions over time and other factors, the wind farm capacity used for VAL modeling purposes is a probability-weighted measure of a minimal level for each wind turbine to produce over an average year with 90% probability, referred to in the renewable energy industry as a **P90 level**.

VAL Project Financing Plan

Equity: 31.25% of cost, or GBP50,000,000 drawn in three steps. Upon completion, GP performance fees are 15% of returns above a 12% hurdle rate.

Equity drawdown:

- Initial: GBP20,000,000
- One year: GBP15,000,000
- Two years: GBP15,000,000

Debt: 68.75% of cost, or GBP110,000,000 from private investors in two forms:

Construction and development (C&D) loan

- 8% annualized interest

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- Monthly loan disbursements linked to construction milestones, such as site setup and timely commissioning of wind turbines as scheduled
- Interest accrues monthly over a three-year construction period.
- Secured by VAL land, equipment, and other project assets
- 36 end-of-month drawdowns (disbursements) equal to GBP2,725,108 each
- Loan is to be repaid from amortizing term loan proceeds.

Amortizing term loan

- 15-year, GBP110,000,000 amortizing loan starting in three years
- Drawn once 125 MW are fully operational and connected to grid
- 7% annual interest rate with 180 fixed monthly payments of interest and principal repayment
- Secured by VAL land, equipment, and other project assets

VAL Operations

VAL's expected revenue from its first full year of operation is shown in the following table.

Measure	Amount
Wind Farm Capacity (MW)	125
P90 Farm Capacity (kWh, 1,000 kW = 1 MW) (Wind Farm Capacity for 8,760 Hours)	1,095,000,000
Efficiency (%)	35%
Total Output (kWh)	383,250,000
Down Time (%)	5%
Actual Output (kWh)	364,087,500
Fixed Price for Delivery (GBP/kWh)	0.125
First Full Year of Revenue (GBP)	45,510,938
Operating Expenses (GBP)	(9,715,082)
Net Cash Flow from Operations (GBP)	**35,795,855**

VAL turbines are assumed to be 35% efficient in capturing wind power. With 5% expected down time and a starting contractual rate of GBP0.125 per kWh, first-year estimated revenue is GBP45,510,938 (= 125MW × 1,000 kWh/MW × 8,760 hours/year × 35% efficiency × 95% operating time × GBP0.125).

1. Calculate and show the ratio of equity to total capital monthly for the first year of the VAL project.

   Solution:

   Equity drawdown of GBP20,000,000 occurs at inception and does not occur again until the beginning of the second year, while C&D debt outstanding at month end is the sum of the loan drawdown to date and interest accrued on the initial period balance at the monthly equivalent of an 8% annual rate. Recall from earlier time-value-of-money lessons that this may be converted to a monthly rate as follows:

   $$R_{annual} = \left(1 + R_{monthly}\right)^{12} - 1;$$

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$R_{monthly} = 0.6434\% = (1 + 0.08)^{1/12} - 1.$

Therefore, at the end of Month 2, the outstanding C&D loan balance is equal to GBP5,467,750, calculated as follows:

- GBP2,725,108 drawn at the end of Month 1
- GBP17,533 interest on initial balance (= 0.6434% × 2,725,108)
- GBP2,725,108 drawn at the end of Month 2
- GBP5,467,750 = 2,725,108 + 17,533 + 2,725,108.

Use an Excel spreadsheet or Google Sheet to calculate monthly debt and equity balances. The following table provides a summary for the first 12 months.

Month	C&D Loan Drawdown	C&D Interest	C&D Loan Balance	Equity	Total	Equity/ (Debt + Equity)
1	2,725,108	0	2,725,108	20,000,000	22,725,108	0.88
2	2,725,108	17,533	5,467,750	20,000,000	25,467,750	0.79
3	2,725,108	35,180	8,228,038	20,000,000	28,228,038	0.71
4	2,725,108	52,939	11,006,086	20,000,000	31,006,086	0.65
5	2,725,108	70,813	13,802,007	20,000,000	33,802,007	0.59
6	2,725,108	88,803	16,615,918	20,000,000	36,615,918	0.55
7	2,725,108	106,907	19,447,934	20,000,000	39,447,934	0.51
8	2,725,108	125,129	22,298,170	20,000,000	42,298,170	0.47
9	2,725,108	143,467	25,166,746	20,000,000	45,166,746	0.44
10	2,725,108	161,924	28,053,778	20,000,000	48,053,778	0.42
11	2,725,108	180,499	30,959,385	20,000,000	50,959,385	0.39
12	2,725,108	199,194	33,883,687	20,000,000	53,883,687	0.37

2. Calculate the LTV at the end of 12 months if the project's value equals cost in terms of debt and equity.

   Solution:

   Use Equation 1 to solve for LTV at the end of 12 months as follows:

   LTV= 0.63 = 33,883,687/53,883,687.

   Note that LTV equals 1 – [Equity/(Debt + Equity)] in the solution to Question 1.

3. Calculate the DSCR *for the first year after completion* using VAL's expected first full year of revenue.

   Solution:

   To determine DSCR upon completion, we must solve for the fixed monthly mortgage loan payment. Earlier fixed-income learning modules showed that periodic payments (A) for a fully amortizing loan may be calculated as follows:

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$$A = \frac{r \times \text{Principal}}{1 - (1 + r)^{-n}},$$

where

A = Periodic payment

r = Interest rate per period (0.07/12)

Principal = Principal amount (GBP110,000,000)

n = Number of periods (180 = 15 × 12)

Solve for A of GBP988,711 per month as follows:

$$A = \text{GBP}988,711 = \frac{0.005833 \times \text{GBP}110,000,000}{1 - (1 + 0.07/12)^{-180}}.$$

We may also derive A using the Excel PMT function PMT(rate, nper, pv, [fv], [type]), giving us an answer of –GBP988,711 using PMT(0.07/12, 180, 110000000, 0, 0). The final entry of zero indicates that the amortizing term loan settles at the end of the period.

Annual debt service is therefore GBP11,864,533 (= 988,711 × 12).

Solving for DSCR gives 3.02 using Equation 2 and net cash flow from operations of GBP35,795,855 from above as follows:

DSCR = Net cash flow from operations/Debt service.

DSCR = 3.02 = GBP35,795,855/GBP11,864,533.

4. Calculate the equity dividend rate for the first full year of VAL's operation and the GP performance fee (ignoring management fees).

Solution:

Using VAL's annual debt service of GBP11,864,533 from Question 2, solve for before-tax cash flow of GBP23,931,322 using Equation 4:

Before-tax cash flow = Net cash flow from operations – Debt service.

GBP23,931,322 = 35,795,855 – 11,864,533.

Use Equation 3 to solve for the equity dividend rate:

$$\text{Equity dividend rate} = 47.9\% = \frac{\text{GBP}23,931,322}{\text{GBP}160,000,000 - \text{GBP}110,000,000}.$$

GP performance fees are equal to 15% of the equity dividend rate in excess of the 12% hurdle rate. Solve as before using a simplified version of Equation 5:

$$R_{GP\,(\text{Net with hurdle},\ r_m=0)} = \max\{0, [P_1 - P_0 \times (1 + r_h)] \times p\}.$$

P_1 is equal to GBP73,931,322, or the sum of the equity dividend and equity, with r_h of 0.12 and p of 0.15:

$$= \max[0, (73,931,322 - 50,000,000 \times 1.12) \times 0.15],$$

which results in a GP performance fee of GBP2,689,968.

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INFRASTRUCTURE INVESTMENT DUE DILIGENCE AND VALUATION

5

- discuss the due diligence and valuation processes for infrastructure investments

Infrastructure Investment Due Diligence

Infrastructure investments are distinguished by their greater complexity and longevity relative to other assets. Investors often develop or engage advisers with specific legal and sector-specific technical expertise to conduct due diligence.

In addition to specific jurisdictional, legal, and regulatory considerations, detailed technical issues associated with engineering, procurement, and construction contracts, as well as the details, scope, and commercial terms of the concession agreement, are among the unique elements of infrastructure due diligence, as highlighted in Exhibit 11.

Exhibit 11: Elements of Infrastructure Investment Due Diligence

As in the case of other private markets, investors use a variety of sources to gather information about factors affecting the asset's future economic use, including forecasting demand and long-term growth. In private equity or real estate, asset appreciation over a several-year period of restructuring or development drives a greater focus on the market or real estate cycle. Infrastructure investors, in contrast, seek to ensure the protection of a project's long-term viability over multiple cycles with a greater focus on both jurisdictional and legal issues, as well as performance and default risk of the multiple parties involved. Three key areas of importance for infrastructure due diligence are highlighted next.

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Jurisdictional, Legal and Regulatory Framework

The direct and indirect involvement of public authorities in infrastructure projects requires a broad knowledge of host country laws and a detailed understanding of regulations specifically pertaining to a project's grantor of property use, the right to construct and operate the asset under an associated concession, and key commercial terms. In particular, the legal status of the grantor and laws governing its authority, the means of dispute resolution, and possible sovereign immunity issues are considerations for investors to factor into their analysis.

Lenders must also thoroughly investigate financial recourse, such as the ability to assume control or take possession of project assets, cash reserve accounts, insurance proceeds, or other assets, as well as the right to take corrective action via negative covenants or other means when a project is in trouble.

When investing in developing markets, investors also consider the degree of technical and financial support from global or supranational financial institutions, governments, and globally active developers and operators, as well as the existence of currency controls or limitations on the repatriation of returns or capital investments.

Compliance with anti-corruption laws, ESG issues, and reputational risk issues also require evaluation.

Engineering, Procurement, and Construction Contract Issues

Investors must evaluate both a project's technical feasibility to meet service needs over the anticipated contract life and its adherence to legal and regulatory requirements. Engineering, design, and construction plans must be comprehensive and achievable by project developers and must meet all safety and regulatory requirements (both local and international standards). Reasonable project cost estimates must be combined with a realistic timeline that incorporates time required for permits and approvals, as well as potential delays, risks, and contingencies. Investors must also understand the likelihood and consequences of cost overruns and project delays.

Procurement and contracting arrangements for the project must follow specific guidelines and regulations, such as local labor laws; address the potential environmental and community impact; and comply with zoning and land use regulations. Investors must review procurement strategy, evaluate contracts and sub-contracts, and assess the reputation, track record, and financial stability of developers and contractors.

Concession Scope, Specifications, and Term

Beyond the broad distinction among fixed or availability-based, commercial, or regulation-based payment schemes outlined earlier, investors must thoroughly understand the specific size and timing of revenue flows, as well as any contingencies. For example, the concessionaire may be required to meet specific maintenance or operating standards to be fully compensated. The concessionaire may also be required to renew or upgrade assets or increase capacity as the concession term nears its end.

In other cases, total project receipts do not cover operating costs or additional investments, requiring the grantor to establish alternative forms of cost recovery, including subsidies, taxes, or other government sources. Consider the challenges faced by the new Berlin airport, which we will describe next.

BERLIN BRANDENBURG AIRPORT

Because Berlin's existing three airports lacked the capacity to meet expected future air traffic demand for the country's new capital, a new single airport, Berlin Brandenburg Airport, was proposed to expand capacity following German reunification in 1990.

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After establishing a project company in 1991, federal, state, and local authorities reached a consensus on using one of the existing airports (Schönefeld) as the site for the new project over a five-year period.

Originally planned as a privately constructed and operated airport over a 50-year concession period, the initial consortium selected to build and operate the new airport was removed due to legal action by a losing bidder, and ultimately the privatization effort was abandoned in 2003.

Once the project shifted to the public sector, legal action by nearby residents adversely impacted by the airport expansion delayed the start of construction until 2006. Although the Berlin Brandenburg Airport was slated to open in 2011, five years after construction began, substantial cost overruns and poor construction planning, execution, and management led to nearly a decade of further delays, with the airport finally opening for commercial traffic in October 2020, nearly 30 years after official planning began. Over this period, the project planner became insolvent, the architectural firm was dismissed, and a host of technical and engineering problems arose over the construction period, from faulty wiring to an inadequate fire safety system.

Infrastructure Investment Valuation

Earlier learning modules have demonstrated the use of public market valuation approaches, such as discounted cash flow, relative value, or replacement cost methods, in private markets, which have varying degrees of applicability and typically require several adjustments among different asset classes.

In the case of private infrastructure assets, the preferred method is the discounted cash flow (DCF) approach with periodic equity distributions in the form of dividends (D_t) in the numerator and a series of discount rates in the denominator combining risk-free rates (r_t) with an asset-specific risk premium (γ_t) comprising relevant risk factors, as shown in Exhibit 12 and Equation 5.

Exhibit 12: Areas of Focus for Infrastructure Asset Valuation

$$\text{Intrinsic value} = \sum_{t=1}^{T} \frac{D_t}{(1 + r_t + \gamma_t)^t}, \tag{6}$$

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$$\gamma_t = \text{Risk factor}_{1,t} + \text{Risk factor}_{2,t} + \ldots; \gamma = \sum_{k=1}^{K} Risk\ factor_{k,t}. \quad (7)$$

The predominant use of the DCF method is also often due to a lack of comparable infrastructure asset transactions severely limiting the application of relative value techniques, while the alternative of a replacement cost approach ignores a project's underlying business model, source of cash flows, and life cycle timing.

The Tay Bac Airport case study continues with expected cash flows for the project.

CASE STUDY

Tay Bac Airport Expected Cash Flows

Meg Zhu is a senior analyst at InfraEast, an infrastructure firm considering an investment in the Tay Bac Airport project. She notes the expected USD200,000,000 in initial operating year (Year 4) revenue from 5,000,000 passengers generating USD40 in gross revenue each. Based on her analysis of expected Vietnamese economic growth and existing airport cost structures, Zhu formulates the following assumptions to project future cash flows:

- For the first 10 years of operation (through Year 13), Tay Bac Airport passenger traffic grows 5% annually while revenue per passenger rises 1% per year. Starting in the 11th year of operation (Year 14) through the end of the concession period, the respective growth rates fall by 50%.
- Zhu estimates operating and other expenses equal to 50% of revenue and assumes a tax rate of 20%.

Zhu next uses the following debt details to determine annual debt service:

IFC Senior Debt

Year	Drawdown	Interest Accrued	Interest Paid	Principal Paid	Debt Service	Debt Outstanding
2	150,000,000					150,000,000
3		9,000,000				159,000,000
4		9,540,000	9,540,000		**9,540,000**	159,000,000
5		9,540,000	9,540,000	9,425,048	**18,965,048**	149,574,952
6		8,974,497	8,974,497	9,990,551	**18,965,048**	139,584,402
7		8,375,064	8,375,064	10,589,984	**18,965,048**	128,994,418
8		7,739,665	7,739,665	11,225,383	**18,965,048**	117,769,036
9		7,066,142	7,066,142	11,898,906	**18,965,048**	105,870,130
10		6,352,208	6,352,208	12,612,840	**18,965,048**	93,257,290
11		5,595,437	5,595,437	13,369,610	**18,965,048**	79,887,680
12		4,793,261	4,793,261	14,171,787	**18,965,048**	65,715,893
13		3,942,954	3,942,954	15,022,094	**18,965,048**	50,693,799
14		3,041,628	3,041,628	15,923,420	**18,965,048**	34,770,379
15		2,086,223	2,086,223	16,878,825	**18,965,048**	17,891,554
16		1,073,493	1,073,493	17,891,554	**18,965,048**	

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Senior Term Loan A

Year	Drawdown	Interest Paid	Principal Paid	Debt Service	Debt Outstanding
3	235,000,000				235,000,000
4		17,625,000		**17,625,000**	235,000,000
5		17,625,000		**17,625,000**	235,000,000
6		17,625,000		**17,625,000**	235,000,000
7		17,625,000	58,750,000	**76,375,000**	176,250,000
8		13,218,750	58,750,000	**71,968,750**	117,500,000
9		8,812,500	58,750,000	**67,562,500**	58,750,000
10		4,406,250	58,750,000	**63,156,250**	

Bank Loan (ECA guaranteed)

Year	Drawdown	Interest Paid	Principal Paid	Debt Service	Debt Outstanding
3	100,000,000				100,000,000
4		6,500,000		6,500,000	100,000,000
5		6,500,000		6,500,000	100,000,000
6		6,500,000		6,500,000	100,000,000
7		6,500,000		6,500,000	100,000,000
8		6,500,000		6,500,000	100,000,000
9		6,500,000		6,500,000	100,000,000
10		6,500,000		6,500,000	100,000,000
11		6,500,000		6,500,000	100,000,000
12		6,500,000		6,500,000	100,000,000
13		6,500,000	100,000,000	106,500,000	

Junior Debt

Year	Drawdown	Interest Accrued	Interest Paid	Principal Paid	Debt Service	Debt Outstanding
0	100,000,000					100,000,000
1		9,500,000				109,500,000
2		10,402,500				119,902,500
3		11,390,738				131,293,238
4		12,472,858				143,766,095
5		13,657,779				157,423,874
6		14,955,268				172,379,142
7		16,376,019				188,755,161
8		17,931,740				206,686,901
9		19,635,256				226,322,156
10		21,500,605				247,822,761

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Year	Drawdown	Interest Accrued	Interest Paid	Principal Paid	Debt Service	Debt Outstanding
11		23,543,162				271,365,924
12		25,779,763				297,145,686
13		28,228,840				325,374,527
14		30,910,580	30,910,580	70,626,722	**101,537,352**	254,747,755
15		24,201,037	24,201,037	77,335,315	**101,537,352**	177,411,440
16		16,854,087	16,854,087	84,683,265	**101,537,352**	92,728,175
17		8,809,177	8,809,177	92,728,175	**101,537,352**	0

1. Calculate the expected Tay Bac Airport revenue, net cash flow from operations, and after-tax dividend over the 20-year concession period.

Solution:

Using the assumptions provided, we can determine TBA's annual revenue. Initial operating (Year 4) revenue of USD200,000,000 grows at an annual rate of 6.05% [= (1.05 × 1.01) – 1] through Year 13 and 3.515% [= (1.025 × 1.005) – 1] thereafter. For example, Year 5 operating revenue is USD212,100,000, or 200,000,000 × 1.05 × 1.01.

Net cash flow from operations is half of revenue. Using the previous debt service analysis and Equation 4,

$$\text{Before-tax cash flow} = \text{Net cash flow from operations} - \text{Debt service},$$

we can solve for before-tax cash flow, which when reduced by the 20% tax rate gives us the after-tax dividend. These figures are summarized for the full concession period as follows:

Year	Revenue	Net Cash Flow from Operations	Debt Service	Interest Payments	Before-Tax Cash Flow	Tax	After-Tax Dividend
4	200,000,000	100,000,000	33,665,000	33,665,000	66,335,000	13,267,000	53,068,000
5	212,100,000	106,050,000	43,090,048	33,665,000	62,959,952	14,477,000	48,482,952
6	224,932,050	112,466,025	43,090,048	33,099,497	69,375,977	15,873,306	53,502,672
7	238,540,439	119,270,220	101,840,048	32,500,064	17,430,172	17,354,031	76,141
8	252,972,136	126,486,068	97,433,798	27,458,415	29,052,270	19,805,531	9,246,740
9	268,276,950	134,138,475	93,027,548	22,378,642	41,110,927	22,351,967	18,758,961
10	284,507,705	142,253,853	88,621,298	17,258,458	53,632,555	24,999,079	28,633,476
11	301,720,421	150,860,211	25,465,048	12,095,437	125,395,163	27,752,955	97,642,208
12	319,974,507	159,987,253	25,465,048	11,293,261	134,522,206	29,738,799	104,783,407
13	339,332,965	169,666,482	125,465,048	10,442,954	44,201,435	31,844,706	12,356,729
14	349,555,370	174,777,685	120,502,399	33,952,208	54,275,286	28,165,095	26,110,190
15	360,085,726	180,042,863	120,502,399	26,287,259	59,540,463	30,751,121	28,789,343
16	370,933,308	185,466,654	120,502,399	17,927,580	64,964,255	33,507,815	31,456,440
17	382,107,674	191,053,837	101,537,352	8,809,177	89,516,485	36,448,932	53,067,553
18	393,618,668	196,809,334			196,809,334	39,361,867	157,447,467
19	405,476,430	202,738,215			202,738,215	40,547,643	162,190,572
20	417,691,408	208,845,704			208,845,704	41,769,141	167,076,563
21	430,274,361	215,137,181			215,137,181	43,027,436	172,109,744

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Year	Revenue	Net Cash Flow from Operations	Debt Service	Interest Payments	Before-Tax Cash Flow	Tax	After-Tax Dividend
22	443,236,376	221,618,188			221,618,188	44,323,638	177,294,551
23	456,588,872	228,294,436			228,294,436	45,658,887	182,635,549

2. Contrast the risks of the Senior Term Loan A and the junior debt tranches in the context of TBA's debt profile and project phases.

Solution:

While Term Loan A interest and principal reflect a senior debt claim, the greater risks of the junior debt tranche are reflected in the fact that it is drawn earlier (Year 0 versus Year 3 in the case of Term Loan A), remains fully outstanding during TBA's construction and development phase, is repaid later (Years 13–17 for junior debt, Years 7–10 for Term Loan A), pays no interest until amortization, represents a subordinated claim to TBA project assets, and is repaid only once periodic debt service for the other three loans is paid.

Junior debt repayment occurs following the expected initial revenue growth phase of the project—that is, during a period after which the growth in the number of passengers and revenue per passenger has leveled off.

3. Discuss the project period or periods in which TBA is at greatest risk of being unable to meet its debt service.

Solution:

The debt service coverage ratio, shown in Equation 2, provides a measure of whether the project is able to meet its debt obligations from expected net cash flow from operations:

$$\text{DSCR} = \frac{\text{Net cash flow from operations}}{\text{Debt service}}.$$

As demonstrated in the following table, the project's DSCR is expected to reach a low of 1.17X in Year 7 as the amortization of Term Loan A begins. Note that the DSCR also remains relatively low (below 2X) during the years when Term Loan A principal is amortized (Years 7–10) and when the bank ECA loan and the junior loan are amortized (Years 13–17).

Year	Net Cash Flow from Operations	Debt Service	DSCR
4	100,000,000	33,665,000	2.97
5	106,050,000	43,090,048	2.46
6	112,466,025	43,090,048	2.61
7	119,270,220	101,840,048	1.17
8	126,486,068	97,433,798	1.30
9	134,138,475	93,027,548	1.44
10	142,253,853	88,621,298	1.61
11	150,860,211	25,465,048	5.92
12	159,987,253	25,465,048	6.28
13	169,666,482	125,465,048	1.35
14	174,777,685	120,502,399	1.45
15	180,042,863	120,502,399	1.49

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Year	Net Cash Flow from Operations	Debt Service	DSCR
16	185,466,654	120,502,399	1.54
17	191,053,837	101,537,352	1.88
18	196,809,334		
19	202,738,215		
20	208,845,704		
21	215,137,181		
22	221,618,188		
23	228,294,436		

As illustrated in the case study, infrastructure projects often make use of multiple sources of public and private debt to optimize the cost and timing of debt service and outstanding debt over the project life cycle. These relationships are shown with net cash flow from operations in Exhibit 13.

Exhibit 13: Tay Bac Cash Flows and Debt

The IFC and ECA loans reduce debt costs compared to traditional private market sources. The senior term loan market has relatively standardized terms, while the junior loan offers private investors higher return in exchange for subordinated claims, capitalized interest, and full drawdown over the construction phase combined with a longer tenor.

The denominator used to discount infrastructure asset cash flows involves a combination of the term structure of risk-free rates and an asset-specific risk premium. Note that these risk premiums may vary over time based on changes over the project life cycle and market conditions. As in the case of private company valuation, the limited applicability of the capital asset pricing model using public company comparables results in the use of a buildup approach that combines a number of risk factors:

- *Size:* Larger infrastructure assets are less liquid, and therefore a higher liquidity premium is associated with owning such assets. This factor typically rises under adverse market conditions when investors seek greater liquidity.

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- *Leverage:* While higher leverage generally commands a higher risk premium, falling leverage ratios over the life of an infrastructure project contribute to lower future discount rates. Note also that projects with a contractual, fixed cash flow business model are often able to support greater leverage than those with merchant payment schemes.
- *Profitability:* Profitability is inversely related to risk and is often believed to have a smaller impact on the discount rate than other factors. Higher profits lead to a lower and typically negative risk premium (that is, they receive less of a discount via a lower denominator in Equation 5), while lower profits have a higher risk premium.
- *Investment:* High capital expenditures as a proportion of project assets typically indicate an asset in the development phase of its life cycle, which is associated with the highest risk. This factor tends to be higher for greenfield investments than for brownfield investments.
- *Country risk:* As in the case of equities or other private assets, developing markets have higher project risk than do developed markets.
- *Currency risk:* If long-term project cash flows are in a foreign currency and remain unhedged, then a currency risk premium should be incorporated to address the risk of depreciation in the foreign currency cash flows and its impact on investor currency returns.

These aggregated risk factors are combined with each respective risk-free rate to derive a periodic discount rate used for valuation purposes as shown in the case of Tay Bac Airport.

CASE STUDY

Tay Bac Airport Discount Factors and Valuation

Meg Zhu at InfraEast continues her analysis of the Tay Bac Airport project at the end of Year 3 by estimating annual discount factors for the expected annual dividends to equityholders. As a first step, she observes the following US dollar risk-free zero rates that apply at the end of each period.

Year	US Dollar Risk-Free Zero Rates
4	3.0960%
5	3.2040%
6	3.2310%
7	3.2760%
8	3.3390%
9	3.4110%
10	3.4560%
11	3.5190%
12	3.6090%
13	3.7395%
14	3.8070%
15	3.9339%
16	4.0482%
17	4.1418%
18	4.2453%
19	4.3407%

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Year	US Dollar Risk-Free Zero Rates
20	4.4568%
21	4.5216%
22	4.5459%
23	4.5657%

Next, Zhu analyzes the project in the context of key risk factors compared with transaction prices. Using a statistical analysis of past price observations and the key risk factors listed previously, she draws the following conclusions:

- *Size:* As a regional airport, Zhu considers Tay Bac Airport to be a mid-size project, which warrants a 1.50% risk premium above the risk-free rate over the project life.
- *Leverage:* Zhu assigns the highest (2.50%) project leverage risk premium for Years 4–6, which, given significant debt reduction due to amortization of Term Loan A and the maturing ECA bank loan, is reduced to 1.50% for Year 7 through Year 13. Zhu assigns a 0.50% leverage premium to Years 14 through 17 and 0.00% thereafter because debt will have been repaid.
- *Profitability and investment:* Tay Bac Airport's expected median profitability and relatively low investment levels (once construction is completed in the first three years) warrant a –1.00% and 0.50% risk premium adjustment, respectively.
- *Country and Currency Risk:* Based on Vietnam's status as a thriving middle-income economy and positive outlook, Zhu estimates the country risk for Vietnam to be a constant 4% throughout the concession period. Given that project cash flows are primarily in Vietnamese dong (VND) while financing is denominated in US dollars and the currency risk is unhedged, Zhu increases the risk premium by 1% based on potential future VND depreciation risk.

1. Calculate the respective annual discount rates for the Tay Bac Airport project concession period based on Meg Zhu's research.

Solution

We can solve for the respective annual discount rate by adding the risk-free zero rate, r_t, to the sum of the risk factors, γ_t, as shown in Equation 7:

$$\gamma_t = \text{Risk factor}_{1,t} + \text{Risk factor}_{2,t} + \ldots.$$

The respective discount factors ($r_t + \gamma_t$) are shown in the far right column in the following table:

Year	US Dollar Risk-Free Zero Rates	Size	Leverage	Profitability	Investment	Country and Currency Risk	Discount Factor ($r_t + \gamma_t$)
4	3.0960%	1.50%	2.50%	–1.00%	0.50%	5.00%	11.5960%
5	3.2040%	1.50%	2.50%	–1.00%	0.50%	5.00%	11.7040%
6	3.2310%	1.50%	2.50%	–1.00%	0.50%	5.00%	11.7310%
7	3.2760%	1.50%	1.50%	–1.00%	0.50%	5.00%	10.7760%
8	3.3390%	1.50%	1.50%	–1.00%	0.50%	5.00%	10.8390%
9	3.4110%	1.50%	1.50%	–1.00%	0.50%	5.00%	10.9110%
10	3.4560%	1.50%	1.50%	–1.00%	0.50%	5.00%	10.9560%

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Year	US Dollar Risk-Free Zero Rates	Size	Leverage	Profitability	Investment	Country and Currency Risk	Discount Factor ($r_t + \gamma_t$)
11	3.5190%	1.50%	1.50%	–1.00%	0.50%	5.00%	11.0190%
12	3.6090%	1.50%	1.50%	–1.00%	0.50%	5.00%	11.1090%
13	3.7395%	1.50%	1.50%	–1.00%	0.50%	5.00%	11.2395%
14	3.8070%	1.50%	0.50%	–1.00%	0.50%	5.00%	10.3070%
15	3.9339%	1.50%	0.50%	–1.00%	0.50%	5.00%	10.4339%
16	4.0482%	1.50%	0.50%	–1.00%	0.50%	5.00%	10.5482%
17	4.1418%	1.50%	0.50%	–1.00%	0.50%	5.00%	10.6418%
18	4.2453%	1.50%	0.00%	–1.00%	0.50%	5.00%	10.2453%
19	4.3407%	1.50%	0.00%	–1.00%	0.50%	5.00%	10.3407%
20	4.4568%	1.50%	0.00%	–1.00%	0.50%	5.00%	10.4568%
21	4.5216%	1.50%	0.00%	–1.00%	0.50%	5.00%	10.5216%
22	4.5459%	1.50%	0.00%	–1.00%	0.50%	5.00%	10.5459%
23	4.5657%	1.50%	0.00%	–1.00%	0.50%	5.00%	10.5657%

2. Solve for the expected Tay Bac Airport project value at the end of Year 3.

Solution:

We can calculate the expected Tay Bac Airport project value at the end of Year 3 by first determining the present value (PV) of each annual dividend using the respective periodic discount rate and then adding the results. For example, because the Year 5 dividend is expected in two years, we solve for the PV of the Year 5 dividend as follows:

$$\text{USD}38,855,420 = \frac{\text{USD}48,482,952}{(1 + 0.11704)^2}.$$

The results for all expected concession period dividends are shown in the following table.

Year	Adjusted Rate	Discount Factor $(1 + r + y)^{-(t-3)}$	After-Tax Dividend	PV of After-Tax Dividend
4	11.596%	0.89609	53,068,000	47,553,676
5	11.704%	0.80142	48,482,952	38,855,420
6	11.731%	0.71693	53,502,672	38,357,864
7	10.776%	0.66408	76,141	50,563
8	10.839%	0.59777	9,246,740	5,527,460
9	10.911%	0.53722	18,758,961	10,077,691
10	10.956%	0.48300	28,633,476	13,829,884
11	11.019%	0.43333	97,642,208	42,311,566
12	11.109%	0.38749	104,783,407	40,602,181
13	11.240%	0.34467	12,356,729	4,259,055
14	10.307%	0.33991	26,110,190	8,875,161
15	10.434%	0.30393	28,789,343	8,749,895
16	10.548%	0.27154	31,456,440	8,541,572
17	10.642%	0.24273	53,067,553	12,881,303
18	10.245%	0.23153	157,447,467	36,453,096
19	10.341%	0.20712	162,190,572	33,593,391

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Year	Adjusted Rate	Discount Factor $(1 + r + y)^{-(t-3)}$	After-Tax Dividend	PV of After-Tax Dividend
20	10.457%	0.18439	167,076,563	30,806,599
21	10.522%	0.16518	172,109,744	28,428,668
22	10.546%	0.14883	177,294,551	26,386,709
23	10.566%	0.13415	182,635,549	24,500,611

Next, we use Equation 6 to determine the expected project value:

$$\text{USD}460,642,367 = \sum_{t=4}^{23} (\text{PV of after} - \text{tax dividend})_t.$$

3. Discuss the return to equityholders over the construction period.

Solution:

During the construction period (Years 1 – 3), equity investors contribute capital into the project while the asset is generating no positive cash flows. So, there is no cash yield earned during the construction period. The return to equityholders is estimated on the basis of the expected future cash flows occurring over the 20-year life of the project beginning in Year 4. As shown in the solution to the prior question, the value of the project at the end of Year 3 is USD460,642,367, and we can calculate a project internal rate of return (IRR) of 13.51% using the initial equity investment of USD315,000,000 and a three-year period. This can be calculated using the IRR function on a financial calculator or using the Excel RATE formula as follows:

Project return = RATE(nper, pmt, -pv, fv)

= 13.51% = RATE(3, 0, -315000000, 460642367).

While the previous example represents the analyst's base-case estimate of project value, uncertainty over an infrastructure project's life cycle often warrants the use of **scenario analysis** or **sensitivity analysis**, as in the case of other private market investments. Recall that scenario analysis involves the combination of a base case with more favorable or adverse alternative outcomes to determine expected value using the average of scenario values weighted by their respective probabilities, while sensitivity analysis measures the impact of changes in one or more key variables on investment value.

Scenario analysis is of particular importance when structural or regulatory changes can lead to an abrupt shift in an infrastructure project's economic return. For example, the value of long-lived power generation projects based on fossil fuels may be impaired by policy changes discouraging the use of fossil fuels in response to climate change or increased operating costs due to enhanced regulatory measures to protect the environment. However, a future reduction in subsidies or less favorable terms for stabilized pricing mechanisms, such as CfDs, may adversely impact the return on long-lived renewable energy projects. Note that infrastructure investments are often viewed as providing an inflation hedge because of the ability of these assets to generate additional revenues during inflationary periods.

Sensitivity analysis is frequently used as a valuation tool in the case of variable merchant-based cash flows, where changes to key business drivers are critical to understand potential investment value changes under different economic and market conditions. Sensitivity analysis is also important in renewable power infrastructure projects where short-term and long-term variations in wind speed, cloud cover, rainfall, and other factors can undermine project finances.

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CASE STUDY

Tay Bac Airport Sensitivity Analysis

Meg Zhu at InfraEast takes an additional step in her analysis by stress testing the two key drivers of value in her earlier analysis—namely, the expected growth rates for both the number of passengers and revenue per passenger. She creates a two-variable Excel data table to examine how the starting values for these two growth rates affect the valuation and IRR of the project:

Passenger Growth Rate (%)	Revenue per Passenger Growth (%) Base-Case Value: USD460,642,367		
	0%	1%	2%
7%	520,983,041	594,196,594	674,084,447
6%	457,813,060	524,660,869	597,531,959
5%	399,597,144	460,642,367	527,121,640
4%	345,930,584	401,687,248	462,344,864
3%	296,441,420	347,378,578	402,734,563

Passenger Growth Rate (%)	Revenue per Passenger Growth (%) Base-Case IRR: 13.51%		
	0%	1%	2%
7%	18.26%	23.56%	28.86%
6%	13.27%	18.54%	23.79%
5%	8.25%	13.51%	18.72%
4%	3.17%	8.44%	13.65%
3%	–2.00%	3.32%	8.53%

1. Discuss how changes in the growth expectations in her sensitivity analysis might cause Zhu to revisit her assumptions affecting the *numerator* of the infrastructure valuation.

   Solution:

   In her expected dividend calculations that make up the numerator of the infrastructure valuation as shown in Equation 5, Zhu has made the simple assumption that operating expenses are directly proportional to revenues. In the case of lower-than-expected passenger volumes, Zhu may consider revisiting this assumption due to the fixed costs of operating the airport at lower-than-expected capacity. However, if passenger volumes are much higher than her base case, the facility may face capacity constraints that require additional capital expenditures, which would lower expected dividends versus original estimates.

2. Discuss how changes in the growth expectations in her sensitivity analysis might cause Zhu to revisit her assumptions affecting the *denominator* of the infrastructure valuation.

   Solution:

   As noted in the answer to Question 1, changes in expected passenger volume may have an impact on both profitability and investment levels over the Tay Bac Airport project life cycle. Large deviations from the base case

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assumptions may warrant an adjustment of the risk factors used to discount expected dividend cash flows. For example, lower-than-expected passenger growth might reduce the expected median profitability of the project and therefore imply a higher discount rate. However, higher-than-expected traffic may result in higher capital expenditure, increasing the investment risk factor and raising the discount rate.

3. Discuss how changes in inflation may affect the valuation of the Tay Bac Airport project.

Solution:

Inflation may be reflected by the growth in revenue per passenger shown at the top of the sensitivity tables. If an increase in inflation is accompanied by the ability of the Tay Bac Airport project to generate greater revenue growth per passenger, then subsequent improvements in cash flow from operations may assist in hedging Tay Bac Airport's value from the effects of inflation. While the sensitivity table shows value (and IRR) improvements as revenue growth per passenger increases, care must be taken to also assess inflationary effects on Tay Bac Airport's operating costs. Cost increases due to inflation may offset revenue increases. Furthermore, inflationary pressures may also negatively affect the demand for air travel, thus reducing the passenger growth rate. Overall, the effects of possible inflation on Tay Bac Airport's value are likely too complex to be reflected in the two-variable Excel table.

As the case study demonstrates, scenario and sensitivity analysis tools help investors and risk managers gauge the impact of changes in key value drivers but may also raise shortcomings of simplified model assumptions that warrant further refinement. In the following section, we will further address the drivers of relative risk and return among infrastructure investments and compare them to other private markets.

QUESTION SET

Meg Zhu at InfraEast continues her assessment of the sensitivity issues associated with the Tay Bac Airport project. Specifically, she wants to explore issues of cost overruns and delays in construction as they relate to valuation and debt service coverage, and she wants to review the discount rate assumptions.

Use relevant information from the Tay Bac Airport examples presented earlier to answer Questions 1–4.

1. Demonstrate the effect of a 10% cost overrun on the expected return to the equity investor of the Tay Bac Airport project, assuming that the cost overrun must be funded by an additional equity contribution in Year 3.

Solution:

A 10% cost overrun increases the amount of the overall project cost from USD900 million to USD990 million. We may use the Excel RATE function to calculate the revised project return. If the Year 3 project value remains at USD460,642,367, then the additional equity contribution of USD90,000,000 reduces the future value in Year 3 to USD370,642,367 (= 460,642,367 – 90,000,000) and we can calculate return as 5.57%.

Equity project return = RATE(nper, pmt, pv, fv)

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= 5.57% = RATE(3, 0, -315000000, 437514322).

The IRR declines from 13.51% in the original scenario to 5.57% with the cost overrun.

2. Demonstrate the effect of a one-year delay on the expected return to the equity investor of the Tay Bac Airport project, assuming that all expected project cash flows remain in place (and assume for simplicity that debt can be renegotiated to delay debt cash flows for one year and that discount rates do not adjust for the delay).

Solution:

In this case, the value of the project (USD527,514,322) is delayed from the end of three years to the end of four years. Reverting the initial equity investment amount to USD315 million and changing the *nper* amount from three to four in the IRR formula result in

Expected return = IRR(4, 0, -315000000, 460642367) = 9.97%.

The IRR declines from 13.51% in the original scenario to 9.97% with the one-year delay.

3. Evaluate the one-year delay scenario if debt cash flows are not delayed by considering debt service coverage ratios of the Tay Bac Airport project.

Solution:

Given the growing cash inflows expected for the project throughout its life, the DSCRs are best considered at the times during the project when debt service reaches high points. In the earlier example in which debt service was examined, debt service reaches highs in Year 7 (USD101,840,048) and in Year 13 (USD125,465,048). So, a one-year delay in net cash flow from operations implies that the revised DSCR in Year 7 would be equal to the original Year 6 net cash flow from operations divided by 101,840,048. Similarly, for the DSCR in Year 13, the original Year 12 net cash flow from operations would be divided by 125,465,048.

Revised Year 7 DSCR = 112,466,025/101,840,048 = 1.10.

Revised Year 13 DSCR = 159,987,253/125,465,048 = 1.28.

The one-year delay, while reducing the DSCRs for the Tay Bac Airport project, still allows for debt service to be fully covered from net cash flow from operations under the revised cash flow scenario.

4. Justify the pattern of declining discount factors used to determine the Tay Bac Airport project value.

Solution:

As shown earlier in the example, the discount rates decline over the life of the Tay Bac Airport project from 11.596% in the first year in which the asset generates positive cash flows to 10.5657% during the last year of the project. While several factors are used to determine the discount rate, including the size of the project, profitability, investment, and country and currency risk premiums, none of these factors vary over the project's life. Only the risk-free rate and the leverage factor show declines over the project's life. While the risk-free rate reflects an upward-sloping term structure, the increase is more than offset by the decline in the leverage factor premium. This reflects

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the decline in the project's debt outstanding that begins after Year 6 and continues throughout the life span of the project.

6 INFRASTRUCTURE RISK AND RETURN

☐ discuss the risk and return among infrastructure investments and as compared to other investments as part of a strategic asset allocation

Investment features contributing to the unique role of infrastructure among private market assets stem from the provision of services with relatively inelastic demand and less exposure to market cyclicality or economic shocks. While most infrastructure investments involve a high distribution of stable cash flows over long-term contractual periods, they may also benefit from significant barriers to entry, as highlighted in the following example.

MACQUARIE SUPER CORE INFRASTRUCTURE FUND

As the world's largest infrastructure general partner, Sydney-based Macquarie Asset Management closed the first series of its Super Core Infrastructure Fund in 2018 with EUR2.5 billion in initial investments. The fund's focus is on core regulated infrastructure assets in gas and electricity distribution in Western Europe. At the time of its launch, initial projections of the fund's target return were 7%–8% with a 5% cash yield. Given the focus on core assets, the risk profile is lower than diversified infrastructure funds (with target returns of 10%–12%).

In late 2022, Macquarie closed a follow-on offering of EUR2.3 billion. Since the fund's inception, it also raised additional capital of EUR7.8 billion in co-investment, increasing total capital raised from investors in the super core strategy to EUR12.6 billion. The fund has expanded its geographic footprint and now owns assets in countries including the United Kingdom, Germany, Finland, Spain, and Greece.

The Super Core Infrastructure Fund has been classified as an Article 8 fund under the Sustainable Finance Disclosure Regulation as part of the EU's Financing Sustainable Growth Action Plan. Article 8 funds are those that promote environmental or social features. This classification is attractive to European institutional investors and global investors seeking investments in private market assets with ESG characteristics.

The Super Core Infrastructure Fund's acquisition focus involves the ownership of assets that connect electricity and gas production facilities, thus improving the capacity to distribute power from existing generation facilities. For example, the Super Core Infrastructure Fund owns the operator of the national electricity distribution network in Greece. By improving the ability of the network to distribute the electricity produced by solar and wind on the Greek mainland to the Greek islands, Macquarie's Super Core Infrastructure Fund expands the electrical grid, lowers household energy costs, and improves network reliability.

While assets in core infrastructure equity, such as the fund in the previous example, offer the lowest risk and return among infrastructure equity assets, their stable cash flows and favorable duration characteristics are increasingly seen as a long-term liability-matching alternative to default-risk-free government bonds.

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These infrastructure investments typically offer return levels well in excess of other long-duration investments, provided an investor is able to accept these assets' lack of liquidity.

For example, the infra300 equity index of unlisted infrastructure investments had a return over a 10-year period (from 2009 to 2019) of just over 12% per annum, with a 13.9% total return volatility and just a 24% correlation with the MSCI World Index.

This liability-matching feature is increasingly used by long-term institutional investors, such as pensions, sovereign wealth funds, ultra-high-net-worth individuals, and family offices. These investors align their allocation to such investments with their risk tolerance, return objectives, and market expectations as demonstrated in the following example.

CASE STUDY

Northern States Infrastructure Investment Strategy

Northern States Pension Plan is a large US-based public pension plan that added infrastructure investments as a suballocation in its overall asset allocation to private markets in the past five years. Northern States has established the following investment policy for infrastructure assets:

Infrastructure investment strategic objectives:

- Improve investment portfolio diversification.
- Earn yield above earnings assumptions and generate stable cash flows.
- Match future liabilities and expected long-term distributions.
- Preserve capital and hedge against inflation.
- Engage as a responsible investor to promote sound environmental practices.

Infrastructure investment performance target:

The plan has a performance target of exceeding a return of US CPI plus 5.00% per annum net of fees on its private unlisted investments and seeks to exceed the appropriate public market benchmark for publicly traded infrastructure assets.

Long-term target infrastructure allocation ranges:

- Core: 30%–70%
- Value-add: 20%–60%
- Opportunistic: 5%–25%
- Publicly traded: 0%–10%
- Co-investment and direct investment: 0%–10%

Long-term target infrastructure geographic allocation:

- United States: 25%–70%
- OECD, Ex-US: 20%–60%
- Non-OECD: 0%–25%

In addition to limited liability companies and limited partnerships, Northern States policy allows for co-investment or direct investment in infrastructure assets without an asset manager. Northern States currently has a 70% allocation to US-based core infrastructure via a single closed-end fund and 30% to a value-add closed-end infrastructure fund focused on assets in the EU, all of which are member countries of the OECD.

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Brianna Jenkins, head of alternative investments at Northern States, has asked you as an analyst on her team to prepare a memo related to the Tay Bac Airport equity investment opportunity for the investment committee.

1. Evaluate a possible equity investment by Northern States into the Tay Bac Airport opportunity with respect to the pension fund's performance target and allocation ranges for infrastructure investments.

   Solution:

   First, Northern States has a performance target of exceeding a return of US CPI plus 5.00% per annum net of fees on its private unlisted investments. In an earlier section, the internal rate of return for the Tay Bac Airport project was calculated as 13.51%. As such, the Tay Bac Airport investment opportunity is likely to achieve the pension fund's performance target assuming inflation remains relatively unchanged.

   Second, Northern States has a current 70% core infrastructure and 30% value-add infrastructure allocation. However, the pension fund is allowed to allocate between 5% and 25% to opportunistic infrastructure assets, and this is likely the classification to which the Tay Bac Airport project belongs.

   Given that Northern States currently has no allocation to opportunistic infrastructure, an investment in the Tay Bac Airport project appears plausible in this component of the fund's target allocations.

   Finally, Northern States has the potential to further diversify its portfolio internationally. Its current allocations are 70% to the United States (which is at the maximum of its target) and 30% to the EU (which is in the middle of its target). Northern States may allocate up to 25% to infrastructure assets in non-OECD countries.

   Overall, an investment in the Tay Bac Airport project is feasible when considering Northern States' performance target and allocation ranges for infrastructure asset investment.

2. Evaluate a possible equity investment by Northern States into the Tay Bac Airport opportunity with respect to the pension fund's strategic objectives for infrastructure investments.

   Solution:

   Northern States has the following strategic objectives for its infrastructure investments:

   - Improve investment portfolio diversification.
   - Target return at or above earnings assumptions and generate stable cash flows.
   - Match future liabilities and expected long-term distributions.
   - Preserve capital and hedge against inflation.
   - Engage as a responsible investor to promote sound environmental practices.

   An investment in Tay Bac Airport would provide both asset-type and geographic diversification, as discussed in the prior solution, and its expected return of 13.51% appears likely to meet the performance target of 5% above US CPI.

   However, the cash flow projections presented in an earlier section suggest that the Tay Bac Airport project may not generate stable cash flows, making long-term liability matching potentially difficult.

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Future spikes in inflation may dampen leisure travel, thus reducing the project's cash flows. As such, this investment may be a less effective inflation hedge.

Finally, given Northern States' stated goal of promoting sound environmental practices, the analyst may need to weigh any potential environmental benefits of the airport project as a more efficient means of travel than, for example, road construction in promoting economic growth and tourism versus the expected increase in air travel often cited as a contributor to greenhouse gas emissions.

Despite their complexity and illiquidity, unlisted infrastructure investments can add diversified, stable cash flows to effectively match an investor's anticipated liability cash flows in the context of an investment strategy and policy. The examples in this learning module used to evaluate the structure, method, investment process over the life cycle, and estimated market value of these assets are similar to those used by practitioners to thoroughly evaluate the expected risk and return of these investments.

QUESTION SET

1. Using the case study and example from Infrastructure Risk and Return, evaluate whether Northern States Pension Fund would likely benefit from an investment in the Macquarie Super Core Infrastructure Fund relative to its current infrastructure allocation.

   Solution:

   Northern States would be unlikely to benefit from investing in the Super Core Infrastructure Fund.

   It has reached its current maximum allocation to core infrastructure asset investments, so any amount invested in the Super Core Infrastructure Fund would require a liquidation of its current US closed-end fund holding in core infrastructure. Although this change would improve the geographic diversification of its infrastructure portfolio, the return performance may be more related to the core feature.

2. Evaluate whether Northern States would favor an infrastructure asset investment with availability-based payments with respect to its strategic objectives.

   Solution:

   An infrastructure asset with availability-based payment provides a fixed income stream, so this would best allow for Northern States' goal of achieving a match between its liabilities and the cash flows from investment.

3. Which of the following strategic objectives listed in the Northern States example is least likely to be provided by an investment in Vento Anglio Limited, introduced in an earlier example for an investor heavily invested in core infrastructure?

   A. Improve portfolio diversification.

   B. Match future liabilities and expected long-term distributions.

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C. Engage as a responsible investor by promoting sound environmental practices.

Solution:

A is the correct response. Because the VAL project produces electricity and is paid a fixed price through a contract for difference arrangement, its income stream is likely similar to core infrastructure in electricity generation.

B is incorrect because of the fixed price arrangement. C is incorrect because the wind farm project promotes sound environmental practices.

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PRACTICE PROBLEMS

The following information relates to questions 1-5

Brianna Jenkins, head of alternative investments at Northern States Pension Plan, a large US-based public pension plan, is helping a new analyst become familiar with private infrastructure investment.

After covering basics of classifying infrastructure investments across the risk–return spectrum, Jenkins mentions that Northern States has a 70% allocation to US-based core infrastructure via a single closed-end fund and 30% to a value-add closed-end infrastructure fund focused on assets in the EU.

The analyst asks Jenkins about the revenue streams associated with private infrastructure assets, and Jenkins outlined the basics of the three types of payment streams that asset operators receive: availability based, commercial (also called merchant), and regulation based. Jenkins noted how these payment structures create differing levels of business risk for investors in these assets. Jenkins further discussed how private infrastructure assets fit within a broader diversified portfolio.

The analyst asked Jenkins about Northern States' history of private infrastructure investing, and Jenkins explained how Northern States had grown its expertise in infrastructure over the last five years and is now able to participate in the market as a direct investor in specific infrastructure industries. Additionally, Northern States continued to build related industry-specific expertise through its equity investments.

1. Which of the following allocation changes should Northern States consider in order to assume greater risk in its infrastructure suballocation?

   A. Add an allocation to core-plus assets while decreasing its value-add assets.

   B. Add an allocation to opportunistic assets while decreasing its core assets.

   C. Increase its allocation to core assets while decreasing its value-add assets.

2. Which of the following payment approaches is likely associated with the most business risk for a private infrastructure investment?

   A. Availability-based payment

   B. Commercial payment

   C. Regulation-based payment

3. Discuss the factors that are likely to make private infrastructure assets an effective portfolio diversifier.

4. Discuss how industry expertise factors into the methods by which Northern States may participate as an equity co-investor or direct investor in private infrastructure projects.

5. Contrast the cash flow assumptions of valuing a private infrastructure asset under the build–operate–transfer model relative to a private real estate investment.

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The following information relates to questions 6-9

The 125 MW Vento Anglio Limited project involves the purchase and installation of 50 2.5 MW wind turbines at a cost of GBP1.1 million per MW, with total development costs incurred either upfront or equally over three years, as shown in the following table.

VAL Development Costs	GBP
Wind Turbines & Related Costs	137,500,000
Contingency Reserve	6,500,000
Operating Deficit Reserves	4,255,000
Interest Reserves	4,020,000
Development Fees	2,300,000
Misc. Closing Costs	2,000,000
Land Use Cost	1,825,000
Site Setup Costs	1,600,000
Total	160,000,000

VAL turbines have a 30-year serviceable life, and VAL has contracted with LCCC for fixed-price delivery under a 15-year CfD agreement at a rate of GBP0.075 per kWh when operations begin. While the vast majority of the total development costs consist of the outlay for the wind turbines, close to GBP15 million of the cost budget is set up as contingency and reserve funds.

VAL Project Financing Plan

Equity: GBP50,000,000

Debt: GBP110,000,000 from private investors in two forms:

C&D loan

- 8% annual interest
- Monthly disbursements linked to construction milestones, such as site setup and timely commissioning of wind turbines as scheduled
- Interest accrues monthly over a three-year construction period.
- The loan is to be repaid from amortizing term loan proceeds.
- Secured by VAL land, equipment, and other project assets
- 36 end-of-month drawdowns of GBP2,725,108 each

Amortizing term loan

- 15-year, GBP110,000,000 amortizing loan starting in three years
- Drawn once 125 MW are fully operational and connected to grid
- 7% annual interest rate with 180 fixed monthly payments of interest and principal repayment
- Secured by VAL land, equipment, and other project assets

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VAL's expected revenue from its first full year of operation is shown in the following table.

VAL Operations	
Actual Output (kWh)	364,087,500
Fixed Price for Delivery (GBP/kWh)	GBP0.075
First Full Year of Revenue	GBP27,306,563
Operating Expenses (45% of revenue)	(GBP12,287,953)
CapEx	(GBP4,125,000)
Net Cash Flow from Operations	**GBP10,893,609**

With a contractual rate of GBP0.075 per kWh, first-year estimated revenue is GBP27,306,563 (= 364,087,500 × GBP0.075).

6. Discuss why an SPE such as VAL would establish reserve accounts.

7. Which of the following cash flow structures best characterizes VAL's business risk in the TICCS system?

   A. Availability-based payments

   B. Commercial payments

   C. Regulation-based payments

8. Discuss VAL's rationale for financing the wind farm with two different forms of debt.

9. Demonstrate that VAL's contract for difference with LCCC guarantees the same annual revenue regardless of the prevailing market price of electricity assuming no fluctuation in wind speeds.

The following information relates to questions 10-13

Meg Zhu is a senior analyst at InfraEast, an infrastructure firm considering an equity investment in the VAL wind farm project, and she has built a spreadsheet model based on facts shown in the previous Item Set.

Zhu is working on assessing the sensitivity of project value. The first issue with which she is concerned is the CfD rate. Rather than a rate of GBP0.0.075 per kWh, she has decided to lower the assumption of the CfD rate to GBP0.07 per kWh to reflect any potential decline in prices before the CfD terms are set. Zhu estimates the value of the project's equity given a CfD rate of 0.075 per kWh at GBP74,376,852, and her value estimate declines to GBP58,706,468 if she assumes a CfD rate of 0.07 per kWh. Zhu believes that 8% is an acceptable hurdle rate for a wind farm project in a developed market. Ultimately, she decides to base her valuation on a CfD rate of 0.075 per kWh.

Zhu is concerned about the effects on future electricity prices of continued expansion of solar and wind power capacity, so she decides to build in an assumption that after the CfD contract price for the first 15 years expires, VAL will have to contract for a lower market price for electricity for the latter half (Years 16–30) of the wind farm's life. She is uncertain as to whether and how the CfD

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scheme will change in the future. She believes that a GBP0.07 market electricity rate might be a real possibility at the end of 15 years. The following table shows selected data from the projections in Year 15 of the wind farm's operation (based on a rate of GBP0.075 per kWh). Revenue and operating expenses grow over time at a 1.5% annual rate.

Revenue (GBP)	Operating Expense + CapEx	Net Cash Flow from Operations	Debt Service
33,635,015	19,260,757	14,374,258	11,864,533

Zhu has also been carefully considering how to estimate discount rates for the valuation. She has decided to estimate zero-coupon GBP bond rates and then adjust each year's discount rate to reflect project size, leverage, profitability, and investment. She maintains a size premium of 1.0% and an investment premium of 0.5% for all 30 years of the project. During the first 15 years of the project, she includes a 3.0% leverage premium and a –1.0% premium (i.e., 1.0% discount) for profitability. During the final 15 years of the project, the leverage premium is set to 0.0%.

10. Recommend whether Zhu should view an investment in the VAL project's equity as acceptable given her two possible CfD scenarios and justify your recommendation.

11. Calculate the effect of the lower market electricity rate of GBP0.07 per kWh on VAL's expected revenue for the wind farm in Year 16. Assume a constant annual growth in demand factor of 1.5%.

12. Discuss whether the change in Zhu's assumptions about market electricity rates will affect the projected VAL equity dividend rate between Years 15 and 16 of the wind farm's operation. For simplicity, assume expenses grow in line with demand.

13. Discuss why Zhu decides to change the leverage premium in the discount rate for the final 15 years (Years 16–30) of the VAL project.

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SOLUTIONS

1. B is the correct response. Opportunistic assets are the highest risk classification among the infrastructure categories. Changing its allocation to Opportunistic will increase its risk profile.

   Response A is incorrect because core-plus assets are typically lower risk than value-add assets. Response C is incorrect because core assets are lower risk than value-add assets.

2. B is the correct response. Commercial (or merchant) payments will vary based on demand for the infrastructure asset, such as in the case of collections on a toll road.

   Response A is incorrect because availability-based payments are fixed by the contract and thus create lower business risk. Response C is incorrect because regulation-based payments are fixed by government authorities to allow for a sufficient rate of return, such as in the case of power companies.

3. Private infrastructure assets are used to provide essential or public services with few substitutes and typically are characterized by inelastic demand. Infrastructure asset returns typically exhibit lower correlation with other asset classes and tend to be less exposed to cyclicality or market downturns.

4. Northern States participates as an equity investor as a limited partner in infrastructure assets in industries in which it has not yet built sufficient expertise to manage the investment process more directly. As it gains sufficient expertise in a specific industry, it is more likely to invest as a general partner or co-investor in infrastructure assets in that industry.

5. Both types of private asset categories require a cash flow forecast over a time horizon. The point of contrast is that a private real estate asset is expected to be sold at the end of the time horizon and cash is expected to be received. A private infrastructure asset is usually assumed to have zero value at the end of the cash flow forecasting time horizon because the asset is transferred from the concessionaire to the grantor at that point in time.

6. The SPE's debt may in some cases be enhanced by the establishment of reserve accounts for debt service and other obligations. For example, when project cash flows are less predictable, a debt service reserve account is often established that accumulates sufficient cash in order to meet specific debt service requirements and from which funds are released when payments are due. Reserve accounts are often used for operating and maintenance costs and decommissioning equipment at the end of the project's serviceable life, such as the eventual closure and dismantling of wind turbines in the case of VAL.

7. C is the correct response. Power companies are regulated by government entities, and the price that they are able to charge is based on these regulations. The CfD structure of VAL supplements the regulatory nature of the payment scheme by fixing a price per kWh for a specific volume, ignoring the impact of wind speed variability.

   Response A is incorrect because the payment can still fluctuate based on electricity demand. Response B is incorrect because commercial payments are more variable based on the demand for the infrastructure asset's usage.

8. The VAL wind farm is financed in two phases. The first phase provides the shorter-term financing required to build the asset, and this phase is expected

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to last three years. Thus, the construction and development loan provides this financing, and repayment of the loan occurs from the second phase of financing: the amortizing 15-year term loan. Once construction is completed and the wind farm begins operation, the wind farm generates cash flows and VAL can make fixed repayments of principal and interest on this loan from the expected cash flows from electricity sales.

9. The CfD guarantees that VAL will generate revenue of GBP0.075 per kWh regardless of the price at which it sells electricity output. The intermittent market reference price is the market reference price, and for simplicity, we assume an annual IMRP; this is the price at which VAL will sell its electricity. If the IMRP is greater than GBP0.075 per kWh, then VAL will make a payment to LCCC for the difference. For example, suppose the IMRP is GBP0.09 per kWh on average for a full year. Then, VAL's revenue is GBP32,767,875 (= 364,087,500 × GBP0.09).

   However, VAL must make a payment to LCCC for the difference between the IMRP and the CfD rate. This payment is GBP5,461,313[= 364,087,500 × (GBP0.09 – GBP0.075)]. Subtracting the amount of this payment from VAL's revenue calculated previously provides VAL's guaranteed revenue of 27,306,563.

   If the IMRP is less than GBP0.075 per kWh, then VAL will receive a payment from LCCC for the difference. Suppose the IMRP is GBP0.06 per kWh on average for a full year. Then, VAL's revenue is GBP21,845,250 (= 364,087,500 × GBP0.06).

   However, VAL receives a payment from LCCC for the difference between the IMRP and the CfD rate. This payment is GBP5,461,313 [= 364,087,500 × (GBP0.075 – GBP0.06)]. Adding the amount of this payment to VAL's revenue calculated previously provides VAL's guaranteed revenue of 27,306,563.

10. The IRR of the VAL project's equity under the original assumption of GBP0.075 as the guaranteed rate for the full 30-year time horizon of the project is equal to 14.15% [= RATE(nper, pmt, -pv, fv) = RATE(3, 0, -50000000, 74376852)].

    The IRR of the VAL project under the updated assumption of GBP0.07 as the guaranteed rate for the full 30-year time horizon of the project is equal to 5.50% [= RATE(nper, pmt, -pv, fv) = RATE(3, 0, -50000000, 58706468)].

    The IRR of the VAL project exceeds the 8% hurdle rate at a CfD rate of 0.075 but fails to do so if the CfD rate is 0.07. As such, Zhu's assumption about future electricity rates is critical to her recommendation. If she fully believes that a CfD rate of 0.075 is attainable, then an investment in the VAL project is attractive.

11. Year 16 of the revised revenue forecast may be estimated by first calculating the percentage decline in revenue from Year 15 to Year 16 due to the price change. We first divide the new market rate of GBP0.07 per kWh by the prior rate of GBP0.075, then multiply the result by the constant annual growth factor of 1.015, and finally subtract from 1:

    $$5.27\% = \left(1 - \frac{\text{GBP0.07}}{\text{GBP0.075}} \times 1.015\right).$$

    We can calculate the revised Year 16 revenue by multiplying the expected Year 15 revenue by this result:

    Revised Year 16 revenue: GBP31,863,571 = (1 – 0.0527) × GBP33,635,015.

12. Recall from Equations 3 and 4 that the equity dividend rate is calculated as follows:

    $$\text{Equity dividend rate} = \frac{\text{Before} - \text{tax net cash flow}}{\text{Project cost} - \text{Debt outstanding}},$$

    where

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Before-tax cash flow = Net cash flow from operations – Debt service.

The most notable aspect from these formulas is that debt service declines from its Year 15 amount of GBP11,864,533 to zero in Year 16. Thus, all else equal, the before-tax cash flow increases by over GBP11.8 million between Years 15 and 16 because VAL's debt service has been paid. As a result, we would expect a significant increase in the equity dividend rate in Year 16 compared to Year 15 despite the decline in revenue from a decline in the assumed electricity price.

We can also explicitly show this result by estimating the equity dividend rate in both years. First, solve for before-tax cash flow in Year 15 using the information from the table: GBP2,509,725 (= 14,374,258 – 11,864,533). This gives an equity dividend rate of 5.02% (= 2,509,725/50,000,000). Year 16 net cash flow from operations is estimated by subtracting estimated operating expenses and capital expenditures (which grow at a rate of 1.5% per year from the Year 15 amount of GBP19,260,757) from estimated Year 16 revenue:

Net cash flow from operations = Revenue – Operating expenses.

GBP12,313,903 = 31,863,571 – (19,260,757 × 1.015).

This result is equal to the before-tax cash flow in the numerator of Equation 3, while the denominator equals the equity contribution of GBP50 million. Solve for the equity dividend rate as 13.25%:

$$24.63\% = \frac{\text{GBP}12,313,903}{\text{GBP}50,000,000}.$$

13. The 15-year term loan is fully repaid following the first 15 years of the VAL wind farm project. During the first 15 years of the project, the discount rate warranted a premium to reflect the risk associated with the project's financial leverage. Once the debt is repaid, the discount rate can be reduced to reflect the lack of required debt service payments in the project's capital structure from Years 16 to 30.

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