

R27 Asset Allocation to Alternative Investments

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1. Introduction

There is no universally accepted definition of ‘alternative’ investments. For this reading, alternative investments include the following asset classes:

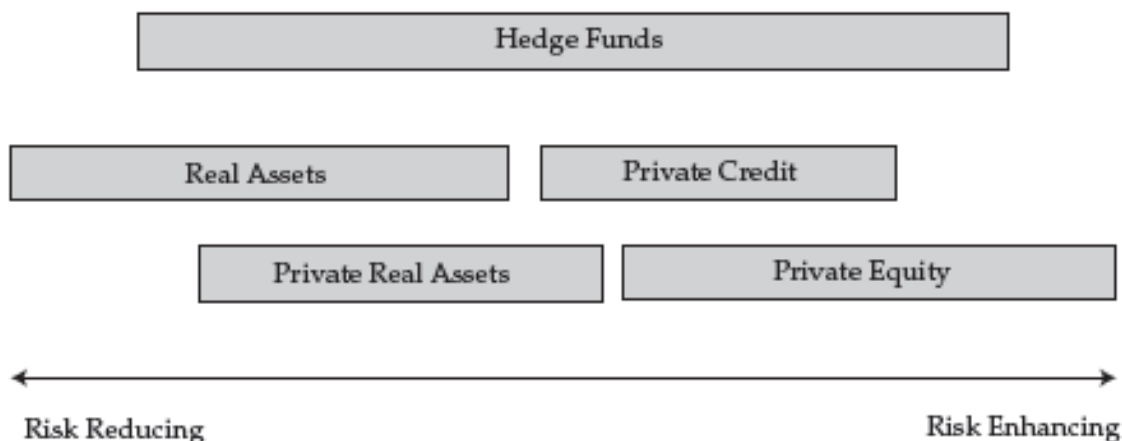
- Private equity
- Hedge funds
- Real assets
- Commercial real estate
- Private credit

In this reading, we discuss the role of alternative investments in a multi-asset portfolio. We compare the diversification benefits of alternative investments relative to bonds when added to a portfolio comprising of equities, consider the different ways to define an opportunity set, consider the suitability of alternative investments, discuss approaches to asset allocation when alternative investments are included, and the need for liquidity planning for alternative investments. Finally, we cover the unique monitoring requirements for alternative investments.

2. The Role of Alternative Investments in a Multi-Asset Portfolio

The major benefit of adding alternative investments to a traditional portfolio consisting of stocks and bonds is that they can increase the portfolio’s risk-adjusted return. Some alternative investments have a higher expected return (risk enhancing), while others have an expected diversification benefit (risk-reduction). Both these factors can help improve a portfolio’s risk-adjusted return.

Exhibit 1 from the curriculum provides a framework of different types of alternative investments in the risk/reward continuum.



At one end of the spectrum, real assets provide a diversification benefit and can help protect a portfolio from unexpected inflation. At the other end of the spectrum, private equity provides a higher expected return as compared to public equities.

Investors can have different perspectives on risk reduction. For example, to reduce

volatility, some large institutional investors may be interested in strategies that are non-correlated with their existing portfolio. They may add an alternative investment strategy which may be riskier on its own but offers low correlation to their investments. Other investors may be interested in reducing the 'left tail' risk associated with a stock portfolio and may seek alternative investments to achieve that objective.

Asset classes in a portfolio can have different functional roles: capital growth, income generation, risk diversification, and/or safety. Exhibit 3 from the curriculum illustrates how different alternative investments are perceived to fulfill these roles.

Asset Class		Role			
		Capital Growth	Income	Diversifying Public Equities	Safety
Fixed Income and Credit	Governments		M	H	H
	Inflation-Linked		M	H	H/M
	Inv.-Grade Credit		M	H	M
	High-Yield Credit		H	M	
	Private Credit		H	M	
Equities	Public Equity	H	M		
	Private Equity	H	M	M	
Real Estate	Public Real Estate	M	H	M	
	Private Real Estate	M	H	M	
Real Assets	Public Real Assets (Energy, Metal, etc.)			H	
	Private Real Assets (Timber, etc.)	H	H	H	
Hedge Funds	Absolute Return		M	H	
	Equity Long/Short			M	

Notes: H = high/strong potential to fulfill the indicated role; M = moderate potential to fulfill the indicated role.

2.1 The Role of Private Equity in a Multi-Asset Portfolio

- When added to a traditional portfolio, the main role of private equity is to enhance returns. This higher return expectation is based on the illiquidity risk associated with private equity investments.
- Since the same fundamental factors affect both private and public companies, private

equity provides limited diversification benefit when added to an equity portfolio.

- The volatility of private equity is estimated using a public equity proxy, and adjustments are made based on the nature of the private equity investment. Private equity indexes are generally not used, because they contain smoothed returns data which understates volatility.

2.2 The Role of Hedge Funds in a Multi-Asset Portfolio

- Hedge fund strategies span the spectrum from risk reducers to return enhancers.
- Long/short equity strategies provide equity-like returns but with lower exposure to equity premium.
- Short-biased equity strategies try to generate alpha by going short on overvalued securities.
- Arbitrage and event-driven strategies deliver equity-like returns with little to no correlation with traditional asset classes.

2.3 The Role of Real Assets in a Multi-Asset Portfolio

- Real assets include several subcategories such as timber, commodities, farmland, energy, and infrastructure assets. They are generally perceived to provide a hedge against inflation.
- Timber investments provide both growth and inflation-hedging properties. Growth is provided through the actual physical growth of the trees themselves and the appreciation in land value. An Inflation hedge is provided because timber may be harvested when the prices are high; during periods of low prices the owner can decide not to harvest and wait for prices to rise.
- Commodities include metals, energy, livestock, and agricultural commodities. Investments in commodities are typically made using futures contracts. Commodities serve as a hedge against inflation and provide a differentiated source of alpha. Some commodities such as gold, act as safe havens in times of crisis.
- Farmland investing can have a commodity-like profile or a commercial real estate-like profile.
 - A commodity-like profile occurs when the investor owns the farmland and employs a farmer for tending and selling the crops. Here the investor retains the commodity price and execution risk.
 - A commercial real estate-like profile occurs when the investor owns the farmland and leases the property to a farmer. The commodity price and execution risk are then passed on to the farmer.
- Energy investments include various strategies based on exploration, development, transportation and delivery of energy sources such as oil and natural gas. Energy investments are usually considered real assets because the investor owns the mineral rights to the commodities which are correlated with inflation.
- Infrastructure investments typically involve the construction and maintenance of public

projects such as buildings, bridges, highways, airports, etc. They usually generate stable/modestly growing income and also tend to have a high correlation with overall inflation.

2.4 The Role of Commercial Real Estate in a Multi-Asset Portfolio

- Strategies range from core to opportunistic.
 - Core strategies focus on income generation. For example, collecting rent from fully occupied properties.
 - Opportunistic strategies focus on capital appreciation. For example, developing properties to sell, purchasing distressed properties, and rehabilitating them.
- Commercial real estate protects against unanticipated inflation in two ways:
 - Rents increase with inflation.
 - Physical buildings are often valued as a function of replacement cost. Therefore, their value tends to increase as inflation increases.

2.5 The Role of Private Credit in a Multi-Asset Portfolio

- Private credit includes direct lending and distressed investments.
- Direct lending refers to lending money to individual borrowers or small companies that cannot easily access public markets. Direct-lending assets are income-producing, and the owner assumes default and recovery risks. They have a bond-like profile. High-quality assets behave like investment-grade bonds. Whereas low-quality assets behave like high-yield bonds.
- Distressed investing refers to purchasing securities of a company that is under financial distress. The investor usually takes an active role to turn around the company. Distressed debt investments have an equity-like profile because the performance of the investments depends on the performance of the company. The idiosyncratic risk of the company is high and dominates all other risks such as interest rate risk.
- Both strategies have high illiquidity risks.

3. Diversifying Equity Risk

In this section, we try to answer the question: Are alternative assets better risk mitigators than government bonds?

To answer this question, we compare the performance of public equities with portfolios comprised of 70% equities and 30% other asset classes (bonds, alternative investments, cash, etc.)

The investor's time horizon is also an important consideration. For a short time horizon, volatility is an important risk measure. Whereas, for a long time horizon, not achieving the long-horizon return objective is the most important concern.

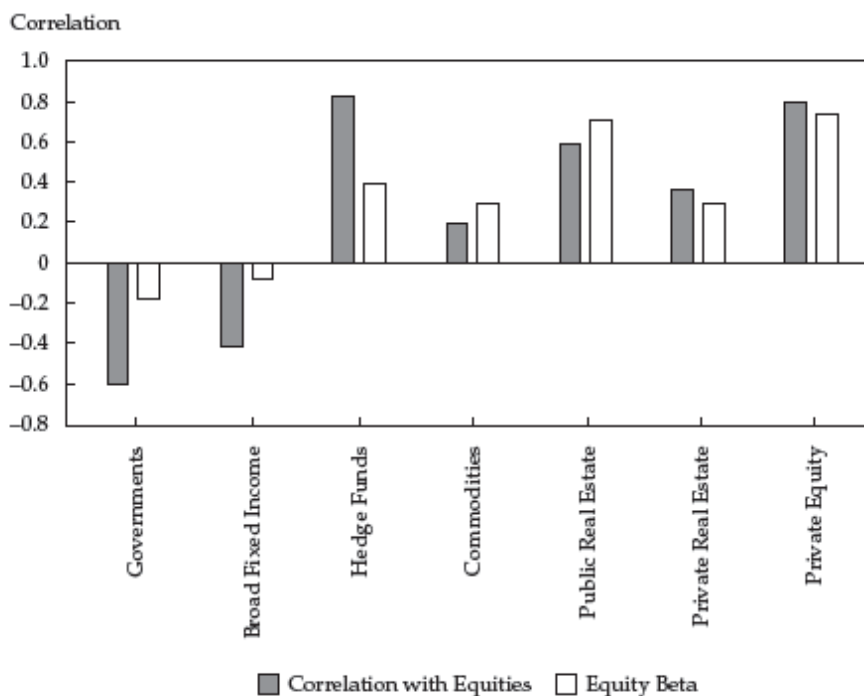
3.1 Volatility Reduction over the Short Time Horizon

The reported volatility and correlation numbers for alternative assets are understated because:

- Reported returns are often based on appraisals and estimates.
- Databases often exhibit survivorship bias and back-fill bias.
- Indexes (such as hedge fund indexes) may already reflect a diversification benefit.

Therefore, for proper risk estimation, the reported returns of alternative assets often need an adjustment called unsmoothing.

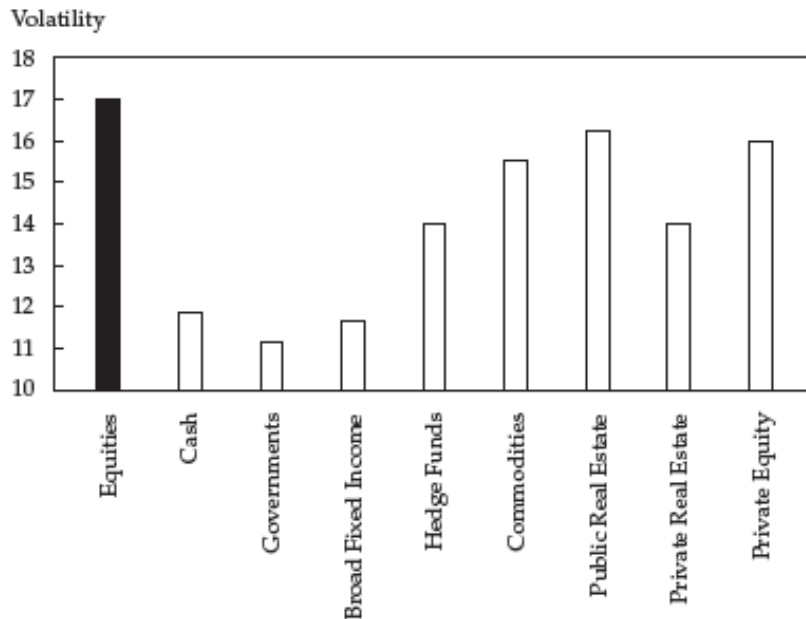
Exhibit 6 of the curriculum shows the correlations of fixed income and alternative assets to public equities. It also shows each asset class's estimated equity beta. This data is for the period 1997 – 2017.



- Bonds provide a good diversification benefit, as indicated by the negative correlation and low beta values.
- Hedge funds have a high correlation but a low beta. This indicates that hedge funds move with the equity markets, but the magnitude of their movement is less than equities.
- Commodities have a weak positive correlation with equities and low beta. This indicates that a bigger portion of commodity returns is driven by factors unrelated to equity markets.
- Private equity has a strong positive correlation with equities and high beta. This indicates that private equity also experiences drawdowns at the same time the

equity market falls.

Exhibit 7 of the curriculum compares the volatility of public equities with volatilities of portfolios comprised of 70% equities and 30% other asset classes.



As compared to an all-equity portfolio (black bar), the volatility of a 70% equity and 30% bond portfolio is significantly lower because of the negative correlation between these two asset classes. Portfolios of 70% equities and 30% any of the alternative asset also have lower volatilities, but they do not provide as much diversification benefit as bonds. Therefore, we can conclude that in the short run, government bonds are better risk mitigators as compared to alternative assets.

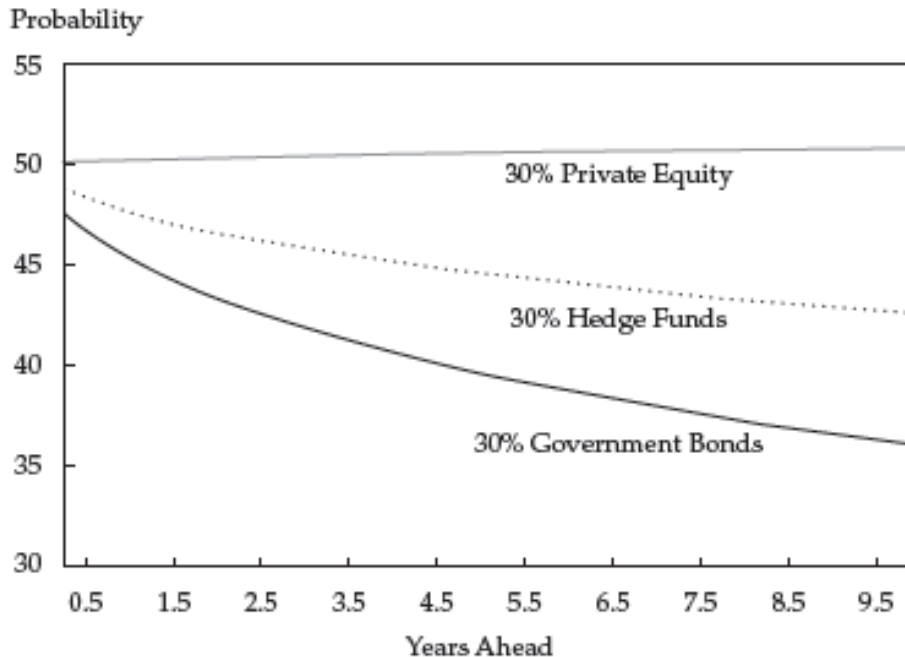
However, this conclusion is valid when growth prospects are positive, and inflation is low, resulting in negative equity-bond correlation. If inflation is high, then the bonds' risk mitigation benefit reduces.

3.2 Risk of Not Meeting the Investment Goals over the Long Time Horizon

Volatility is not always the most relevant risk measure. Over longer time horizons, it is more important to consider the probability of meeting the investment objective.

Consider an endowment portfolio with a 5% spending rate. The long-term inflation rate is 2%. To preserve the real value of its capital, the endowment has to generate a total return of at least 7.1% in nominal terms.

Exhibit 9 of the curriculum compares the probability of achieving investment objectives for three portfolios comprised of 70% equities and 30% other asset classes.



- The 70% public equities/30% government bond portfolio has an expected return of 5.7%, which is below the nominal return target of 7.1%. Thus, the probability of achieving the investment objective is significantly less than 50%.
- The 70% public equities/30% private equities portfolio has an expected return of 7.2%, slightly over the return target. Thus, the probability of achieving the investment objective is slightly more than 50%.

As time horizon increases return accumulation (i.e., compounding) becomes more important because returns accumulate proportionally with time; whereas volatility scales with the square root of time.

Therefore, we can conclude that in the long-term alternative investments are better risk mitigators as compared to government bonds.

However, we should also consider and manage the risk of a severe and sustained drawdown. Such an event could significantly reduce a 70% equities and 30% private equities portfolio's ability to meet its long-term objective.

[Refer to Example 1 from the curriculum.](#)

4. Perspectives on the Investment Opportunity Set

In this section, we expand the horizon of the investment opportunity set to also include alternative investments along with the traditional investments: stocks, bonds, and cash. We will look at two approaches: a traditional approach and a risk-based approach and compare the two.

4.1 Traditional Approaches to Asset Classification

A Liquidity-Based Approach to Defining the Opportunity Set

- Under this approach, initial asset allocation can be done using only broad, liquid asset classes. For example, equity, fixed income, and real estate.
- In the second iteration, we can break down the equity/fixed-income/real estate asset allocation based on their liquidity profile into liquid and illiquid categories. For example, equity can be broken down into public equity and L/S equity hedge funds that are liquid, and private equity which is less liquid.

Exhibit 10 of the curriculum illustrates a possible categorization of asset classes using this approach.

	Equity & Equity-Like	Fixed Income & Fixed Income-Like	Real Estate
Marketable/Liquid	Public Equity Long/Short Equity Hedge Funds	Fixed Income Cash	Public Real Estate Commodities
Private/Illiquid	Private Equity	Private Credit	Private Real Estate Private Real Assets

An Approach Based on Expected Performance under Distinct Macroeconomic Regimes

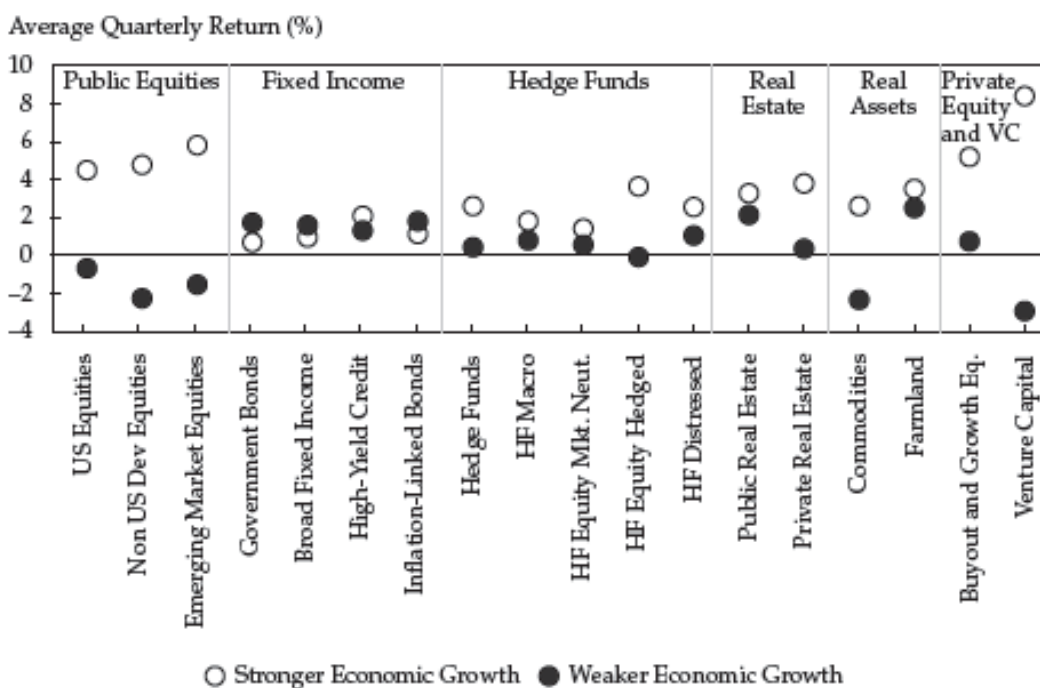
Assets can also be classified based on how they are expected to perform under different macroeconomic conditions.

- Capital growth assets will outperform when the economy is strong. For example, public and private equities will be part of this category.
- Inflation hedging assets will outperform when actual inflation exceeds inflation expectations. For example, real estate and commodities will belong in this category.
- Deflation hedging assets will outperform when the economy is weak, and inflation becomes low or negative. Nominal government bonds are an example of this category.

Exhibit 11 of the curriculum illustrates a possible categorization of asset classes using the macroeconomic environment approach.

		Inflation Environment		
		Deflation	Moderate Inflation	High Inflation
Economic Environment	High Growth		Public Equity Private Equity High-Yield Bonds Private Credit	Real Estate Commodities
	Low Growth/ Recession	Government Bonds		Inflation-Linked Bonds Gold

Exhibit 12 of the curriculum illustrates the performance of various asset classes and alternative strategies under stronger and weaker economic growth environments.



- Fixed income tends to give similar returns under both strong and weak economic environments. Fixed income, government bonds posted slightly higher returns during weaker economic growth periods.
- Equity returns vary significantly depending on the economic environment. For private equity investments, this divergence is even more pronounced.

Understanding how different asset classes perform under distinct macroeconomic environments can help investors create asset allocations to suit their fundamental goals. For example, if an investor has a specific goal to hedge inflation risk, then his portfolio can be dominated by asset classes that are expected to perform well during rising inflation such

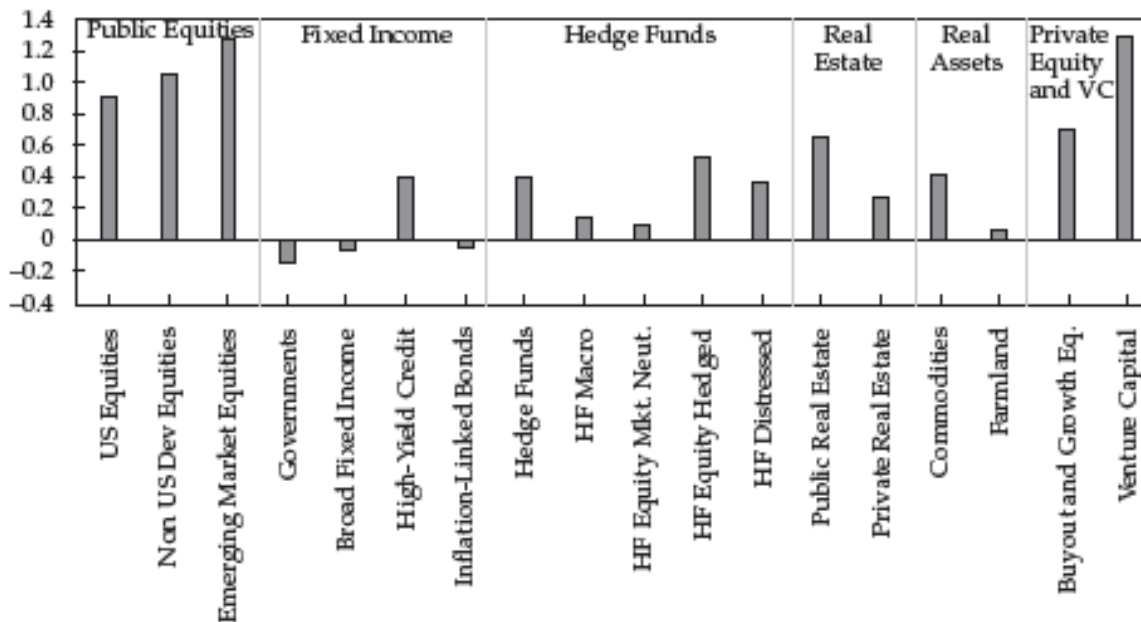
as real estate, commodities, inflation-linked bonds, etc.

4.2 Risk-Based Approaches to Asset Classification

Many traditional and alternative asset classes share similar characteristics that can result in high correlations. For example, consider a risk factor: sensitivity to equity markets.

Exhibit 13 of the curriculum compares the betas of various asset classes to global equities.

Global Equity Beta



- Private equity and VC asset classes have betas similar to public equities. This implies that the correlation between public equities and private equities is high.
- Different hedge fund strategies have significantly different betas.

Asset allocation can be viewed through a risk factor lens to capture these similarities. Apart from sensitivity to equity markets, several other risk factors can be considered, such as:

- Size
- Value
- Liquidity
- Duration
- Inflation
- Credit spread
- Currency

Exhibit 14 of the curriculum illustrates risk factor sensitivities of various asset classes.

Asset Classes	Equity	Size	Value	Liquidity	Nominal Duration	Inflation	Credit Spread	Currency	R-squared
US Equities	1.0								1.00
Non-US Dev Equities	0.9							0.7	0.86
Emerging Mkt Equities	1.1	0.5						0.5	0.66
Government Bonds					4.8				0.96
Broad Fixed Income					4.2		0.6		0.89
High-Yield Credit					4.1		4.2		0.95
Inflation-Linked Bonds					6.6	7.0			0.82
Hedge Funds	0.3	0.1					0.6		0.74
HF Macro	0.2	0.2			1.9	3.1	-0.9	0.1	0.28
HF Equity Mkt. Neut.	0.1								0.14
HF Equity Hedged	0.5								0.72
HF Distressed	0.1	0.2					1.8		0.72
Commodities						18.0		0.8	0.36
Public Real Estate	0.9				4.6	0.9			0.38
Private Real Estate	0.2			0.1		2.4			0.20
Buyout & Growth Equities	0.6	0.2	-0.3	0.1					0.70
Venture Capital	0.8	0.6	-1.8	0.2					0.38

Note: Only statistically significant slopes are displayed in the exhibit. Sources are the same as those for Exhibit 12.

- As expected, equity investments are sensitive to the equity risk factor.
- Fixed income instruments are sensitive to interest rates as indicated by their factor sensitivities to nominal duration.
- Some asset classes such as commodities, public real estate, private real estate, and inflation-linked bonds are sensitive to inflation.
- R-squared should also be considered along with the factor sensitivities to draw an inference. For example, equity market neutral HFs have a low R-squared of 0.14 and a low factor sensitivity of 0.1 to equity. This is expected because the strategy returns depend purely on alpha (the managers' skill) and not on any of the factors listed here.

[Refer to Example 2 from the curriculum.](#)

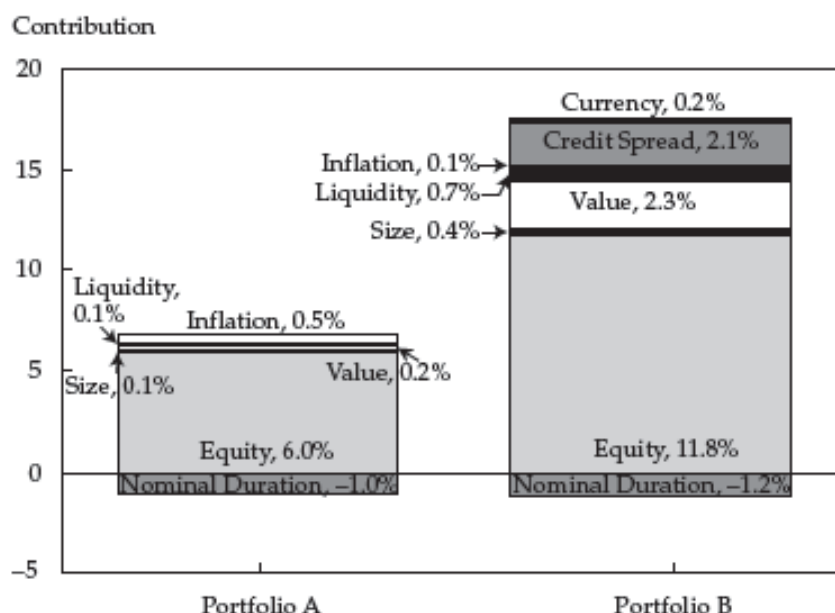
Illustration: Asset Allocation and Risk-Based Approaches

Exhibit 15 of the curriculum shows two investment portfolios, Portfolio A and Portfolio B, with the same high-level asset allocations. However, the underlying investments in the two portfolios are very different. Portfolio A has relatively safer investments, whereas portfolio B has relatively riskier investments.

Broad Asset Classes	Asset Allocation		Underlying Investments		% Contribution to Risk	
	Portfolio A	Portfolio B	Portfolio A	Portfolio B	Portfolio A	Portfolio B
Fixed Income	20%	20%	Government Bonds	High-Yield Bonds	-6.5%	7.6%
Public Equities	20%	20%	US Equities	Non-US Developed Equities	51.4%	18.2%
Hedge Funds	20%	20%	Equity Market Neutral	Long/Short Equity	5.4%	11.1%
Real Assets	20%	20%	Inflation-linked bonds	REITs	0.7%	13.2%
Private Equity	20%	20%	Buyout	Venture Capital	48.9%	49.8%
Total	100%	100%				
				Expected Return	5.3%	8.8%
				Volatility	5.9%	16.5%
				Equity Beta	0.30	0.79

- Due to these difference, Portfolio B has a higher expected return, volatility, and equity beta as compared to Portfolio A.
- The majority of risk for Portfolio A comes from public and private equity.
- About half of the total portfolio risk for Portfolio B comes from private equity. Public equities, hedge funds, and real assets each contribute roughly the same to the total risk of the portfolio.

Let's go one step further and apply the risk factor sensitivities of Exhibit 14 to our hypothetical portfolios. Exhibit 16 of the curriculum shows the absolute contribution to total portfolio risk by risk factor.



- Both portfolios have high exposure to equity risk.
- Portfolio A's risk is almost fully explained by exposure to equity risk.
- About 70% of Portfolio B's risk can be explained by exposure to equity risk. It also has exposure to the size and value factors, due to the allocation to venture capital
- Portfolio B has no direct investment in government bonds, the low duration component of high yield bonds and REITs provides some risk mitigation benefit.

This example illustrates how risk factor sensitivities can be used to evaluate the underlying risk exposures in apparently similar asset allocations.

4.3 Comparing Risk-Based and Traditional Approaches

The following table compares risk-based and traditional approaches to asset allocation.

Traditional Approaches	Risk-Based Approaches
Strengths: They are easy to communicate and implement. They are also relevant for liquidity management and operational considerations.	Strengths: They help identify the common risk factors across all investments. Investors can build an integrated risk framework, leading to more reliable portfolio level risk measurement.

Limitations: They tend to over-estimate portfolio diversification and obscure primary drivers of risk.	Limitations: Risk factor exposures are highly sensitive to the historical look-back period. There are implementation hurdles when converting risk factor targets to mandates as they require considerations such as liquidity planning, rebalancing, etc.
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5. Investment Considerations Relevant to the Decision to Invest in Alternatives

The decision to invest in alternatives requires consideration of many factors, in addition to the risk, return, and correlation characteristics. These factors include:

- properly defining risk characteristics;
- establishing return expectations;
- selection of the appropriate investment vehicle;
- operational liquidity issues;
- expense and fee considerations;
- tax considerations;
- build vs. buy.

5.1 Risk Considerations

Mean-variance optimization (MVO) is commonly used for asset allocation decisions of traditional asset classes. It uses standard deviation as an asset's risk measure. However, standard deviation is a poor measure of risk for alternatives, because many alternatives are illiquid and exhibit non-normal return profiles. Therefore, while using MVO with alternative investments, standard deviations should be given higher values to represent risks of alternative investments.

Most approaches to asset allocation assume that the allocated amount is fully invested in an asset class. However, this assumption is not always true with alternatives. For example, if \$10 million is allocated to private equity, it could take several years for the capital to be called down and invested. Therefore, the actual asset allocation of the portfolio may be different from the modeled asset allocation.

Different strategies have their unique risk and return profiles which are not easy to model. For example:

- Short-only strategy: A short-only strategy has a risk-return distribution that is opposite to a long-only equity fund. It has limited upside potential but unlimited downside risk.
- Option payouts: Some hedge funds use options in their strategies. Since options have non-linear payoffs, it is difficult to apply standard risk measures to these funds.

5.2 Return Expectations

Since alternative investments have a limited return history and considerable idiosyncratic risk compared to traditional asset classes, it is difficult to set return expectations.

A building block approach can be used. Here we begin with the risk-free rate and add returns associated with relevant risk factors, such as equity, liquidity, credit spread, etc. Finally, we add an assumed value for the manager's alpha and subtract fees and taxes. This approach can be applied with some consistency across all alternative assets.

5.3 Investment Vehicle

Several investment vehicles are used to implement alternative investments.

Direct investment in a private (limited) partnership

- This is the most commonly used vehicle.
- A general partner (GP), usually the fund manager, invests a portion of his capital alongside other investors (limited partners) and creates a private limited partnership. The advantage of this structure is that an investor's liability is limited to the amount of capital he has contributed. He is not responsible for the actions of or the debts incurred by the GP.
- The GP controls this partnership and selects and manages the underlying investments. The investors (LPs) have little or no involvement in the fund's operations.
- Since each partnership follows its unique investment strategy, the level of idiosyncratic risk is high. An investor has to invest in multiple partnerships to diversify this idiosyncratic risk.

Fund of funds (FOFs)

- A FOF pools capital from multiple investors and invests it across different alternative investment funds.
- A benefit of this structure is that it provides diversification benefits and operational expertise to select good funds.
- However, this structure has an additional layer of fees as the FOF manager charges an additional fee on top of the fees charged by each constituent fund manager.

SMAs/funds of one:

- Large investors seeking better investment terms than those offered to smaller investors have created a demand for separately managed accounts (SMAs). Where an SMA structure is not practical, fund managers create a 'fund of one' structure – a limited partnership with a single client.
- The main advantage of these structures is that they can be highly customized to suit the investor's requirement, and they provide favorable investment terms.

- The main drawback is that the GP and investor interests may not be aligned.

Mutual funds/UCITS/publicly traded funds:

- Many open-ended mutual funds and UCITS (undertakings for collective investment in transferable securities) have started replicating alternative investment strategies, especially hedge funds.
- These vehicles provide smaller investors access to otherwise inaccessible asset classes.
- However, these vehicles are often subject to regulatory restrictions which can limit the fund manager's ability to implement investment strategies.
- Empirical evidence suggests that the return of these vehicles tends to be lower than direct investments in private limited partnerships.

5.4 Liquidity

Liquidity Risks Associated with the Investment Vehicle

A private limited partnership is the most commonly used investment vehicle used by alternative asset managers. A private placement memorandum (PPM) provides details about the subscription and redemption features of a partnership. Exhibit 17 lists the typical liquidity considerations related to investing in a private limited partnership.

	Subscription	Redemption	Lock-Up
Hedge Funds	<ul style="list-style-type: none"> ■ Typically accept capital on a monthly or quarterly basis. 	<ul style="list-style-type: none"> ■ Quarterly or annual redemptions with 30 to 90 days' notice required. ■ May be subject to a gate limiting the amount of fund or investor assets that can be redeemed at any one redemption date. ■ 10% holdback of the redemption amount pending completion of the annual audit. 	<ul style="list-style-type: none"> ■ Typically one year in the US; shorter in Europe. ■ Redemptions prior to the lock-up period may be permitted but are subject to a penalty, typically 10%.
Private Equity, Private Credit, Real Estate, and Real Asset Funds	<ul style="list-style-type: none"> ■ Funds typically have multiple "closes." The final close for new investors is usually one year after the first close. Committed capital is called for investment in stages over a 3-year investment period. 	<ul style="list-style-type: none"> ■ No redemption provisions. Fund interests may be sold on the secondary market, subject to GP approval. ■ Distributions paid as investments are realized over the life of the fund. Unrealized assets may be distributed in kind to the LP at fund termination. 	<ul style="list-style-type: none"> ■ Typical 10-year life, with GP option to extend fund term 1 to 2 years.

Secondary markets: Some funds allow investors to sell their interests in the secondary markets subject to GP approval. These transactions typically occur at a significant discount

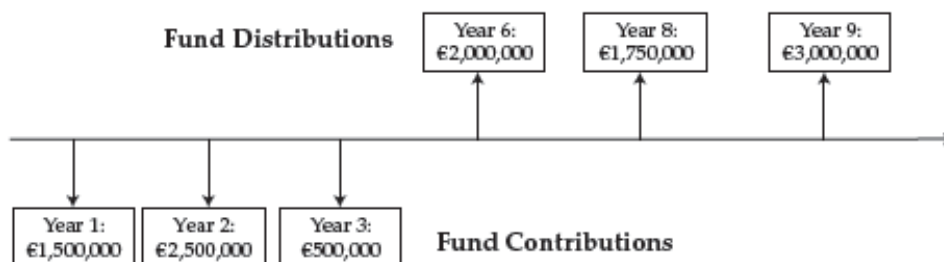
to NAV.

Understanding a drawdown structure: Private equity, private credit, real estate, and real asset funds typically call investors' capital in stages. This investment period typically ranges from three to five years. The following example from the curriculum illustrates a drawdown structure.

The Chan Family Partnership commits €5,000,000 to Uptown Real Estate LP. The fund has a three-year investment period. When fully invested, Uptown expects to hold 12 to 15 properties. The capital call schedule for Uptown may look something like this:

- Year 1: €1,500,000 of the €5,000,000 committed is called, covering three investments
- Year 2: €2,500,000 is called, covering six investments
- Year 3: €500,000 is called, covering two investments
- Year 6: €2,000,000 is distributed by Uptown Real Estate
- More distributions in subsequent years

Expanding on this example, Exhibit 18 shows how the cash flows for our hypothetical fund might operate throughout the fund's life.



Liquidity Risks Associated with the Underlying Investments

Investors should be aware of the potential mismatch between the fund terms and the liquidity profile of instruments held by the fund. A few examples of issues an investor may come across include:

- **Equity-oriented hedge funds:** Say we have an equity-oriented hedge fund that allows monthly redemptions. The fund will typically have a majority of assets in liquid, marketable securities that are suited for monthly redemption. However, the fund may also have several short positions that are illiquid. The GP may place these short positions in a 'side-pocket,' and they will not be subject to the fund's general liquidity terms. Therefore, an investor must carefully evaluate the overall holdings, including side pockets to estimate a liquidity profile for the total portfolio.
- **Event-driven hedge funds:** These strategies typically tend to have longer investment horizons for seeking higher returns. For example, in a merger arbitrage strategy, though the underlying instruments are liquid, the returns depend on the merger event occurring. If investors withdraw funds before the desired event takes place

then the returns will be low. Similarly, a distressed securities' strategy will have a longer investment period because of illiquid distressed assets and a 'workout period' (the time frame over which the negotiations between the creditors and the company are being conducted).

- Relative value hedge funds: These funds try to exploit mispricing between related securities. As it takes time for the market prices to converge, these funds will typically have provisions restricting redemptions under certain scenarios. Such provisions ensure that these funds are not forced to sell securities at an inopportune time. Without such provisions the fund manager may have to focus on securities that they *can* sell (i.e. liquid securities), rather than the securities they *want* to sell resulting in a sub-optimal illiquid portfolio.
- Leverage: If a fund uses leverage, the lenders will be paid first before LPs. Since margin calls from lenders are most likely to happen when the markets are stressed, the LPs liquidity can vanish quickly as the most-liquid securities are sold to meet margin calls.

5.5 Fees and Expenses

Alternative investments have higher fees. They typically charge a 0.5% to 2.5% AUM fee and incentive fees of 10% to 20% of returns. Many funds pass through normal fund expenses such as legal, audit, custodial fees to investors. Some structures, like private equity charge fees on committed capital, not invested capital.

Because of these reasons, there can be significant gap between gross return and net of fee return. A fund may provide a good gross return of 12.6%, but after deducting a 2% management and 20% incentive fee, the net return is just 8.2%.

Investors must therefore carefully evaluate a fund's offer documents to understand the all-in cost of investing in that fund.

5.6 Tax Considerations

Taxes can have an impact on the relative attractiveness of different alternative investments. Investors are concerned with after-tax returns. Therefore, all else equal, they will prefer investments with tax-efficient strategies.

- Some strategies generate more short-term gains relative to long-term gains. This can be problematic because taxes on short-term gains tend to be higher as compared to taxes on long-term gains.
- Some investment vehicles help mitigate potential tax consequences.
- Tax codes in different jurisdictions can favor certain industries and investments. Funds that take advantage of these tax codes are preferable.
- Investors should also consider when they invest in tax-exempt organizations. Some tax-exempt organizations may generate 'unrelated business income,' which is taxable.

5.7 Other Considerations

While investing in alternative investments, other key considerations include:

- Access to top-tier managers: Typically for most strategies, the difference between returns generated by top-tier managers and average managers is substantial. Due to capacity constraints, managers generally limit the number of investors allowed in their funds. Investors should, therefore, consider if they can identify and get access to top-tier managers.
- Effective due diligence: Investors should consider if they have visibility in the fund's operations and have access to key decision makers. Good access to the fund manager will allow investors to make better decisions related to redemption and liquidation. A particularly concerning situation is that if the investor does not have good visibility and investors with good access to the fund manager, redeem early leaving the other investors with poor returns.
- Skills to evaluate and monitor (build vs. buy): Large investors seeking to make their own allocation decisions instead of using a FOF structure should consider if they have the skills and resources in-house to evaluate and monitor an alternative investment program. While making a build vs. buy decision, the investor should consider the cost tradeoffs, the investment expertise of in-house staff, the desire to tailor an investment program to his-specific wants and needs, and the degree of control.

[Refer to Example 3 from the curriculum.](#)

[Refer to Example 4 from the curriculum.](#)

6. Suitability Considerations

Alternative investments are not suitable for all investors. This segment discusses several suitability considerations that are important while investing in alternative investments.

6.1 Investment Horizon

In general, alternative investments are suitable for investors with relatively long investment horizons. The appropriate investment horizon depends on the fund's strategy. For example, equity-based strategies will have relatively shorter horizons. Whereas, strategies related to private real estate, private real assets, and private equity require a recommended time horizon of 15 years or more. These funds typically take 5-7 years to establish positions and another 10 to 12 years to unwind their positions.

6.2 Expertise

A high level of expertise is required while investing in alternative assets. Investors should understand the factors which drive the success or failure of different strategies. Even if the investor is highly experienced, he should recognize that there will be some information asymmetry between the LPs and GPs.

Also, the investment philosophy of the asset owner should be consistent with the principles of alternative investments. For example, investments made in private real estate inherently assume that new investments will be made in undervalued properties. However, if an investor believes that the real estate market is efficient, then this conflict can create potential issues; therefore, such an investor should avoid private real estate investments.

6.3 Governance

A strong governance program is required to ensure that an alternative investment program is structured to meet the needs and objectives of investors. A good governance framework has the following characteristics:

- The long- and short-term objectives of the investment program are clearly articulated.
- Decision rights and responsibilities are allocated to those individuals with the knowledge, capacity, and time required to critically evaluate possible courses of action.
- A formal investment policy has been adopted to govern the day-to-day operations of the investment program.
- A reporting framework is in place to monitor the program's progress toward the agreed-on goals and objectives.

6.4 Transparency

Investors expecting a high level of transparency should avoid alternative investments. These investments tend to have less than 100% transparency. In real estate, private equity, and real asset funds, investors typically allocate funds to a 'blind pool,' i.e. they commit capital for investment in a portfolio of assets that have not yet been identified. Even if the investor analyzes the manager's previous funds, there is no assurance that investments in the new fund will be similar to the previous funds. Also, it is difficult to identify the true risk exposures of the fund. This lack of transparency may result in the GP taking questionable actions.

There are no regulatory reporting requirements for hedge funds and private equity funds. Most hedge fund reports are released quarterly and may indicate the fund's top 10 holdings with a general commentary on the economic environment relevant to these holdings. However, details about every underlying investment are rarely provided.

As compared to hedge funds, private equity funds provide a little more transparency of their holdings, but the level of detail is still low as compared to mutual funds. The investments' report will unlikely explain exposures across geographies, sectors or industries.

Investors should understand the calculation of NAV both from the fund's perspective and the LP's perspective. Since the funds' value and distributions are based on the NAV, funds should ideally use an independent administrator to calculate NAVs.

To mitigate the issue of transparency, some high-quality alternative investment managers engage independent and respected accounting firms to perform annual audits. These audit reports are then shared with the LPs.

[Refer to Example 5 from the curriculum.](#)

7. Asset Allocation Approaches

This section focuses on determining the appropriate asset allocation when the portfolio includes alternative investments in addition to traditional investments. Three main approaches are used for this purpose:

- Monte Carlo simulation
- Optimization techniques
- Risk factor-based approaches

These approaches complement each other. For example, a Monte Carlo simulation can provide simulated non-normal data as output. This data can be used as an input to an optimization algorithm. The optimization algorithm can come up with an asset allocation which can then be fed back to a Monte Carlo simulation. This will help indicate the distribution of long-term returns given a particular asset allocation.

7.1 Statistical Properties and Challenges of Asset Returns

Stale Pricing and Unsmoothing

Several alternative investment categories such as real estate, hedge funds, and private equity have illiquid underlying investments. The value for these investments is determined using appraisal-based valuations. These approaches often result in stale pricing and artificially smoothed returns. The volatility of returns and correlation with other asset classes tend to be understated.

To determine if a return data is artificially smoothed, we can look at the serial correlation. Significant serial correlation values indicate that the returns data is smoothed. Data should be unsmoothed to get a better estimate of volatility.

Exhibit 20 from the curriculum illustrates serial correlation and volatility estimates based on quarterly returns of a broad range of asset classes.

Quarterly Data Dec. 1997–Sept. 2017	Serial Correlation	Volatility (reported returns)	Volatility (unsmoothed)
US Equities	0.03	17.0%	17.7%
Non-US Developed Market Equities	0.08	19.2%	20.8%
Emerging Market Equities	0.17	26.2%	30.8%
Governments	−0.01	4.9%	4.9%
Broad Fixed Income	0.02	3.4%	3.5%
High-Yield Credit	0.34	10.0%	14.3%
Inflation-Linked Bonds	0.12	5.0%	5.7%
Hedge Funds—Aggregate	0.15	8.1%	9.5%
HF Macro	0.08	5.4%	5.9%
HF Equity Market Neutral	0.17	3.5%	4.1%
HF Equity Hedged	0.19	10.7%	13.1%
HF Distressed	0.36	8.9%	13.0%
Commodities	0.14	25.2%	28.8%
Public Real Estate	0.15	20.4%	24.0%
Private Real Estate	0.85	4.6%	13.8%
Private Equity	0.38	10.7%	15.7%

- The serial correlation of public asset classes is generally low. However, private asset classes and hedge funds have higher serial correlations indicating smoothed returns.
- The higher the serial correlations, the larger the difference between smoothed and unsmoothed volatility.
- For example, private real estate has a very high serial correlation value of 0.85. The unsmoothed volatility (13.8%) is, therefore, three times the smoothed volatility (4.6%).

Skewness and Fat Tails

Alternative investments often exhibit return distributions that are left-skewed and have excess kurtosis, which results in fat tails. With such distributions the downside risk becomes particularly concerning.

Exhibit 21 from the curriculum shows the skewness and excess kurtosis parameters of various alternative asset classes.

<i>Unsmoothed</i> Quarterly Data Dec. 1997–Sept. 2017	Skewness	Excess Kurtosis	95% CVaR (Normal Distribution)	95% CVaR (Observed)	99% CVaR (Normal Distribution)	99% CVaR (Observed)
High-Yield Credit	0.18	6.14	–7.9%	–9.8%	–10.8%	–19.7%
Inflation-Linked Bonds	–0.32	1.08	–4.2%	–4.2%	–5.8%	–8.1%
Hedge Funds	–0.17	1.69	–7.6%	–8.6%	–10.3%	–9.7%
HF Macro	0.36	0.85	–4.3%	–4.1%	–6.0%	–5.1%
HF Equity Market Neutral	–1.17	3.55	–2.9%	–3.9%	–4.1%	–5.4%
HF Equity Hedged	0.08	2.24	–10.8%	–10.6%	–14.5%	–12.7%
HF Distressed	–1.25	3.52	–10.8%	–11.1%	–14.5%	–16.9%
Commodities	–0.71	1.62	–28.4%	–30.6%	–36.6%	–50.6%
Public Real Estate	–0.88	4.60	–20.9%	–24.5%	–27.7%	–40.2%
Private Real Estate	–2.80	9.62	–11.3%	–15.4%	–15.3%	–27.9%
Private Equity	–0.46	2.05	–12.2%	–15.7%	–16.7%	–22.6%

Note that distressed hedge funds have a significant negative skewness (–1.25) and excess kurtosis (3.52). Therefore, comparing the 95% CVaR based on a normal distribution with the 95% CVaR, the observed CVaR estimates exceed the normal distribution-based estimates (–11.1% versus –10.8%). This difference becomes even more significant for the 99% CVaR (–16.9% versus –14.5%).

The impact of fat tails can be addressed using advanced mathematical and statistical models such as: time-varying volatility models, regime-switching capture return models, and extreme value theory.

A sound asset allocation process should include the following steps:

1. If the observed return of an asset class has significant autocorrelation, the data should be unsmoothed before use.
2. If the returns are normally distributed then it is appropriate to use MVO.
3. If the returns have negative skewness and fat tails, an optimization technique should be used.

7.2 Monte Carlo Simulation

The Monte Carlo model construction process includes the following steps:

1. Identify relevant variables. For example, asset class returns or risk factors.
2. Establish a quantitative framework to generate ‘realistic’ random scenarios for the selected variables.
3. If using a risk factor approach, the risk factors should be converted to asset returns using a factor-based model.
4. Translate realistic asset class return scenarios into meaningful indicators. For example, for a pension fund, we can simultaneously model the pension assets and pension liabilities to determine how the funding ratio is expected to change over time. For an endowment fund, we can assess if certain asset allocation choices will

improve the probability of meeting the spending rate.

Monte Carlo simulation can be used to:

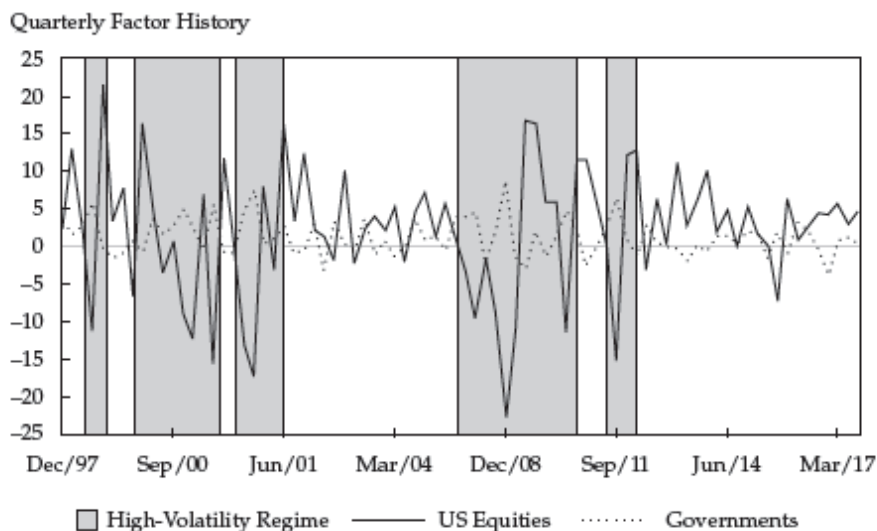
- Generate risk/return scenarios even if the underlying data is non-normally distributed.
- Illustrate simulation-based risk and return characteristics over a long investment horizon.

Simulating Skewed and Fat-Tailed Financial Variables

Non-normal distributions can be analyzed by assuming two possible states of the world. Each state can be individually described using normal distributions, but the combination of these two distributions will be non-normal.

This analysis involves two steps:

Step 1: Estimate the behavior of factors and/or assets in low-volatility regime and high-volatility regime. For example, assume that the capital markets can be described by two distinct regimes - a low-volatility state (Regime 1) and a high-volatility state (Regime 2). Exhibit 23 from the curriculum shows the return history for US equities and government bonds during these two periods.



- Crisis periods such as the 2008 Global Financial Crisis and the 2002 tech bubble burst belong to Regime 2. Other periods belong to Regime 1.
- Both asset classes behave quite differently in the two regimes.

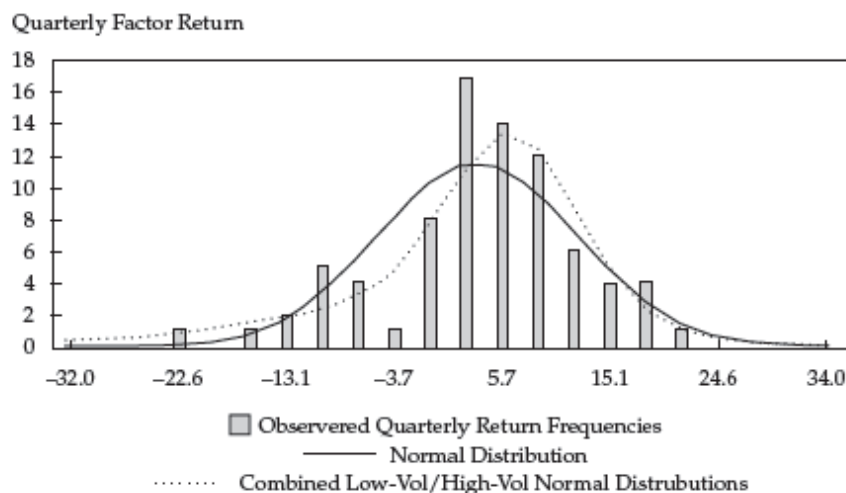
Exhibit 24 from the curriculum calculates the return and volatility statistics for the full period as well for Regime 1 and Regime 2 separately.

	Equities	Government Bonds
Quarterly Average Return	2.1%	1.2%
Quarterly Return Volatility	8.5%	4.5%
Skewness	-0.5	0.6
Kurtosis	0.4	0.4
Average Return in Regime 1	5.1%	0.5%
Average Return in Regime 2	-3.1%	2.4%
Volatility in Regime 1	5.5%	1.9%
Volatility in Regime 2	13.7%	3.8%
Correlation in Regime 1		0.0
Correlation in Regime 2		-0.6

- Equities outperformed government bonds over the full period (2.1 % versus 1.2%); this outperformance can be attributed to Regime 1 (5.1% versus 0.5%). During crisis periods, equities gave negative returns while bonds performed well (-3.1% versus 2.4%).
- Correlation between the two asset classes is significantly negative during crisis periods.

Step 2: Using the data from the previous step, we can generate scenarios using different means and covariances estimated under the two regimes with appropriate probability of occurrence for each regime.

Exhibit 25 shows histograms of equity returns and compares it with a normal distribution (solid line) and the combined distributions obtained from our regime-switching model (dotted line). As the chart illustrates, the combined distribution shows some degree of skewness and fat-tail characteristics which improves the fit to actual observed data.

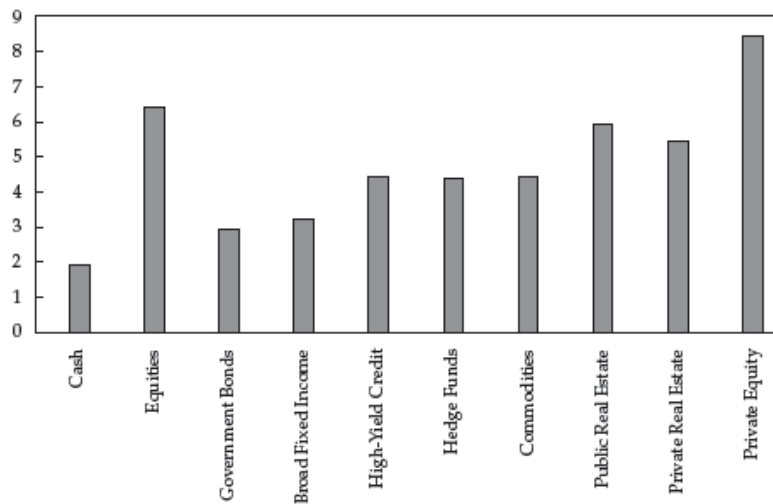


Simulation for Long-Term Horizon Risk Assessment

Monte Carlo simulation can be used to determine the appropriate asset allocation over a

long-term horizon. This concept is illustrated with an example.

Exhibit 26 from the curriculum shows the expected returns for selected asset classes.



In this example, we compare three possible portfolios:

- A portfolio 100% invested in government bonds
- A portfolio allocated 50% to global public equities and 50% to broad fixed income
- A diversified “endowment portfolio” allocated 40% to global public equities, 15% to fixed income, 20% to broad hedge funds, 15% to private equity, 5% to private real estate, and 5% to commodities

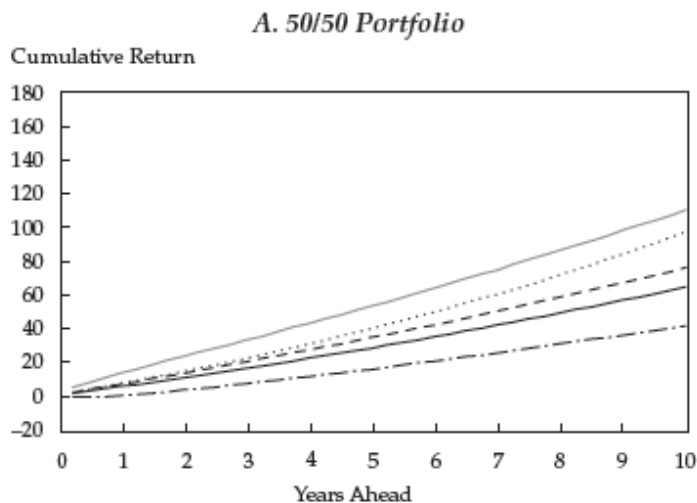
Exhibit 27 shows the risk and return statistics for the three portfolios.

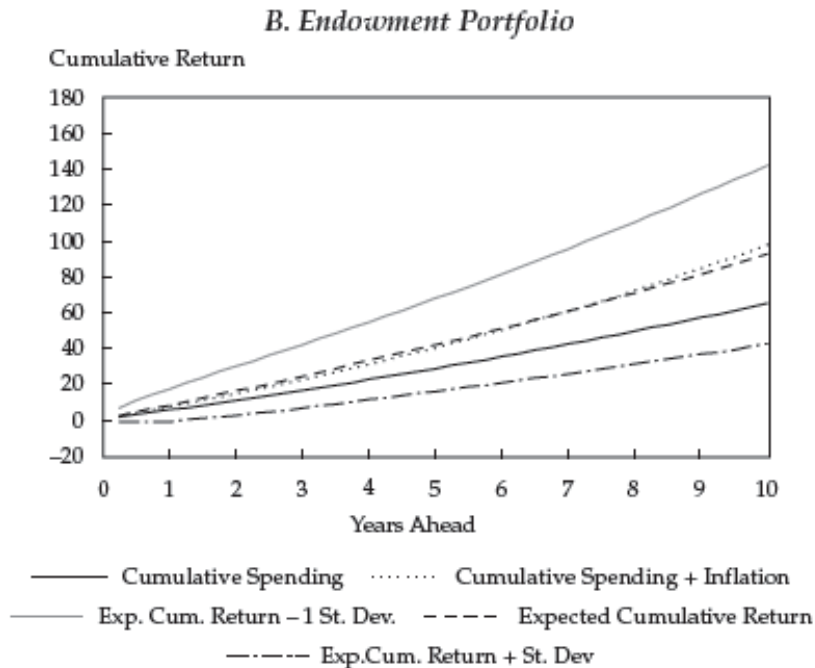
	Government Bond Portfolio	50/50 Portfolio	Endowment Portfolio
Expected Geometric Return over 10 Years	2.3%	5.6%	7.0%
Annual Total Return Volatility	4.2%	6.6%	11.2%
95% VaR over Q/Q (quarter over quarter)	-3.1%	-2.9%	-4.6%
95% VaR over 1 Year	-5.2%	-4.2%	-9.1%
95% CVaR over Q/Q	-4.0%	-3.9%	-6.4%
95% CVaR over 1 Year	-6.9%	-6.6%	-13.1%
99% VaR over Q/Q	-4.5%	-4.6%	-7.5%
99% VaR over 1 Year	-7.9%	-8.1%	-15.6%
99% CVaR over Q/Q	-5.2%	-5.5%	-8.7%
99% CVaR over 1 Year	-9.2%	-10.3%	-18.7%
Worst Drawdown over 10 Years	-19.8%	-22.5%	-36.9%

10-Year Return Distribution	Government Bond Portfolio	50/50 Portfolio	Endowment Portfolio
5% Low	0.0%	2.3%	1.9%
25% Low	1.2%	4.2%	4.8%
50% (Median)	2.3%	5.6%	7.0%
75% High	3.1%	7.0%	9.1%
95% High	4.5%	9.0%	12.2%

The above table shows that as compared to a 50:50 equities and government bond portfolio, an endowment portfolio generates a significantly higher return (7.0% versus 5.6%). However, it is also significantly riskier as indicated by the VaR, CVaR, and worst drawdown measures. This table alone is not sufficient to determine which portfolio is appropriate for a particular investor.

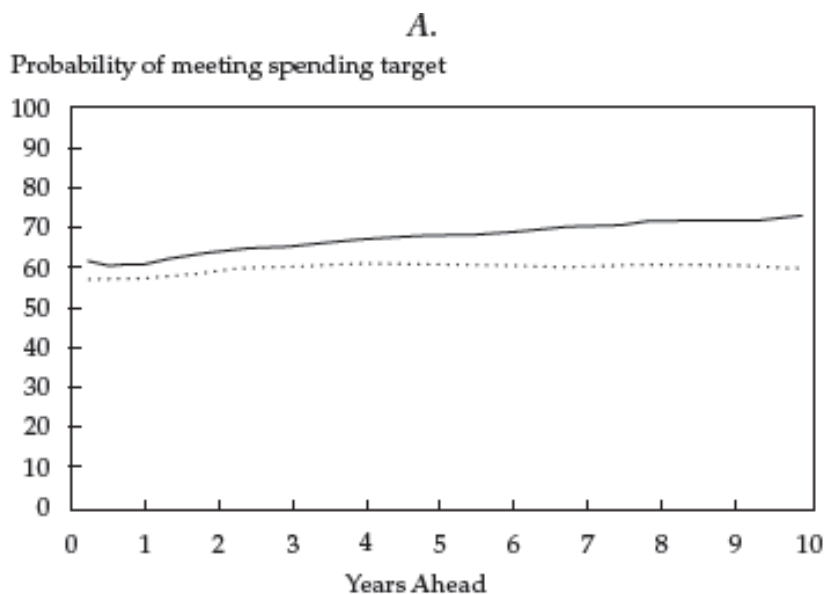
Consider a university endowment fund. Assume that the fund's investment objective is to support a 5% annual spending rate and maintain the purchasing power of its asset base given a 2% inflation rate. Its investment objective, therefore, is to generate a total return of $5\% + 2\% = 7\%$. Exhibit 28 from the curriculum simulates and plots the expected cumulative total return within a ± 1 standard deviation to estimate the likelihood of falling short of the investment objective.

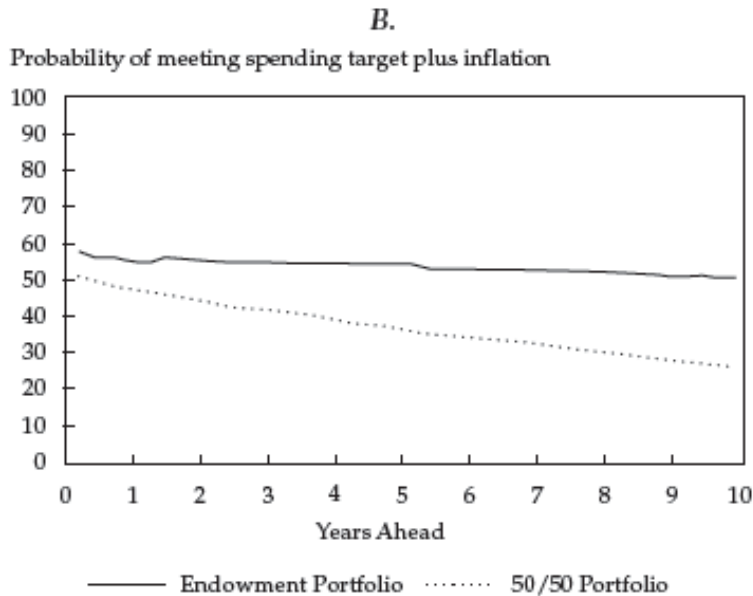




- The 50% equities / 50% government bond portfolio is more likely to fall short of the return target since its median return of 5.6% is less than the nominal return target of 7%.
- The endowment portfolio has a median return of 7% and therefore has a better chance of meeting the investment objective.

Exhibit 29 presents the same information in an alternative format - the probability of meeting the spending rate as well as the spending rate plus inflation at any point in time over the investment horizon





If risk is defined as the probability of not meeting the investment objective, the 50/50 portfolio is riskier than the endowment portfolio (even though it has lower volatility).

7.3 Portfolio Optimization

Mean-Variance Optimization without and with Constraints

Since illiquid alternative asset classes tend to have high returns and low reported risk, an unconstrained MVO will tend to over-allocate to these classes. Therefore, high-risk portfolios constructed using unconstrained MVO will be dominated by private equity. Whereas, low-risk portfolios will be dominated by cash and fixed income.

We see allocations concentrated in a small number of asset classes. To overcome this issue many investors impose minimum and maximum constraints to different asset classes while performing an MVO. For example, we could impose a maximum constraint of 10% to private equity and a minimum constraint of 20% to public equities. This will ensure that high-risk portfolios do not over-allocate to private equity. Similarly, even low-risk portfolios will have a minimum level of public equity.

Mean-CVaR Optimization

Mean-CVaR optimization can be used to determine asset allocations that minimize downside risk rather than simply minimizing volatility. This technique tries to minimize a portfolio's CVaR subject to an expected return target. It is appropriate for cases where down-side risk is of particular concern.

For asset classes such as private equity and hedge funds that have negative skewness and long tails, the asset allocation achieved using this technique will be very different than the one produced by MVO.

[Refer to Example 6 from the curriculum.](#)

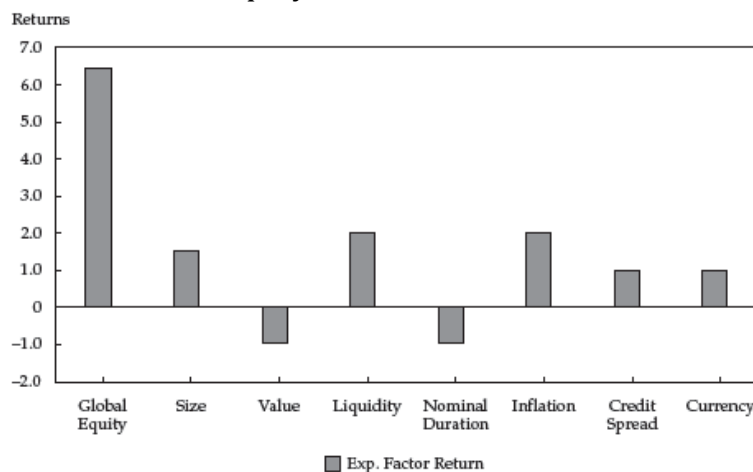
7.4 Risk Factor-Based Optimization

Investors can choose to optimize allocations to risk factors rather than asset classes. However, these allocations must be implemented using asset classes. The asset classes will represent the desired exposures to different risk factors.

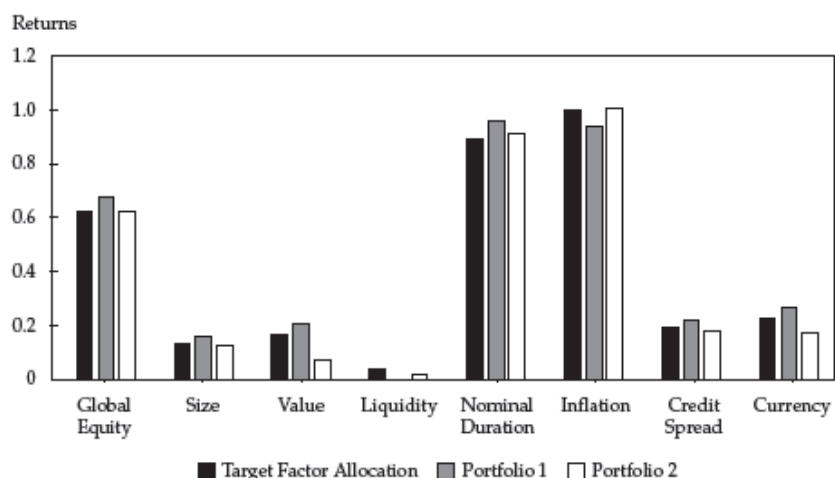
Portfolios with similar risk factor exposures can have very different asset allocations depending on the constraints imposed on these portfolios. For example, consider two portfolios A and B. Portfolio A allows private investment, whereas, Portfolio B does not allow private investments. Both portfolios can be optimized to have the same risk factor exposures, with different asset allocations.

Let's understand risk factor-based optimization using a simple example.

- We are given expected factor returns (in Exhibit 35 below) and want to minimize factor-implied risk subject to a total return target of 6.5%.
- Duration and equity factors have -0.6 correlation.
- Value and equity factors have -0.3 correlation.



Given this information, we run an optimization exercise that gives the following output (Exhibit 36). The black bars represent the optimal target factor exposures.



These allocations must be implemented using asset classes. We consider two possible implementations. Portfolio 1 assumes the investor is limited to public market investments. Portfolio 2 uses both public market investments and private, illiquid investments. Exhibit 37 shows the portfolio allocation details.

	Portfolio 1	Portfolio 2
Domestic Equities; <i>Value Tilt</i>	21.0%	13.0%
Non-Domestic Developed Market Equities; <i>Value Tilt</i>	21.0%	13.0%
Foreign Emerging Market Equities	21.0%	12.0%
Government Bonds	0.0%	5.0%
Broad Fixed Income	10.0%	0.0%
High-Yield Credit	2.0%	3.0%
Inflation-Linked Bonds	7.0%	0.0%
Hedge Funds	15.0%	10.0%
Commodities	3.0%	4.0%
Public Real Estate	0.0%	12.0%
Private Real Estate	0.0%	13.0%
Private Equity	0.0%	15.0%
Total	100.0%	100.0%
Expected Return	6.2%	6.9%
Volatility	13.5%	13.2%

As expected, even though the two portfolios have similar factor exposures, their actual asset allocation is significantly different.

Given these allocations, the actual factor exposures for the two portfolios are shown in Exhibit 36 (grey and white bars).

There are some caveats associated with the risk factor-driven approach that an investor should be aware of:

1. Investors may have different definitions of risk factors. It is important that a common understanding of factor definitions is established among all parties

- participating in the asset allocation exercise.
2. Correlations between risk factors may shift under changing market conditions. Investors should evaluate if the correlations applied in the model are a fair representation of expected correlations over the forecast horizon.
 3. Some factor sensitivities are stable (e.g., nominal interest rate sensitivity of government bonds), while others are very unstable (e.g. inflation sensitivity of commodities). Investors should be careful while forecasting with unstable factor sensitivities.

[Refer to Example 7 from the curriculum.](#)

8. Liquidity Planning

Liquidity planning is particularly important when investing in relatively illiquid alternative investments. We need to understand the liquidity challenges involved while investing in alternative investments and should prepare a strategy to address these challenges. For example, private investments usually require a long-term commitment of 8 – 15 years. During the first few years (the investment period), an investor receives capital calls from the GP, and he needs to ensure that he has sufficient liquidity to meet these calls.

There are three primary considerations associated with private investment liquidity planning:

1. How to achieve and maintain the desired allocation.
2. How to handle capital calls.
3. How to plan for the unexpected.

8.1 Achieving and Maintaining the Strategic Asset Allocation

When working with alternative investments, we need to determine the necessary annual commitments in order to reach and maintain the long-term target asset allocation. Let us understand this concept with a simple example of a liquidity forecasting model.

Example:

An investor has committed £100 million to a PE fund. The contract term is 12 years. 25% is contributed in the first year, and 50% of the remaining commitments are contributed in each of the subsequent years.

The capital contributions in a year can be calculated using the following formula:

Capital Contribution = Rate of Contribution × (Capital Commitment – Paid-in-Capital)

The capital contributions are:

Year 1: £100 million × 25% = £25 million

Year 2: (£100 million – £25 million) × 50% = £37.5 million

Year 3: (£100 million – £25 million – £37.5 million) × 50% = £18.75 million

and so on.

The next step is to forecast the periodic distributions paid to investors. To do this, we need to make certain assumptions. Let's say the fund does not distribute any money in Year 1 or Year 2 but distributes 10% of the prevailing net asset value in Year 3, 20% in Year 4, 30% in Year 5, and 50% of the remaining balance in each of the remaining years. The growth rate is 13%.

The annual amount distributed can be calculated using the following formula:

$$\text{Distributions} = \text{Rate of Distribution at time } t \times [\text{prior NAV} \times (1 + \text{Growth Rate})]$$

where:

$$\text{NAV at time } t = \text{prior NAV} \times (1 + \text{Growth Rate}) + \text{Capital Contribution} - \text{Distributions}$$

Exhibit 38 from the curriculum displays the forecasted annual capital contributions, outstanding commitment forecast, distributions, NAV, and cumulative net cash flow for this PE fund. The distribution rates are set such that the yearly distribution rates would increase fairly slowly.

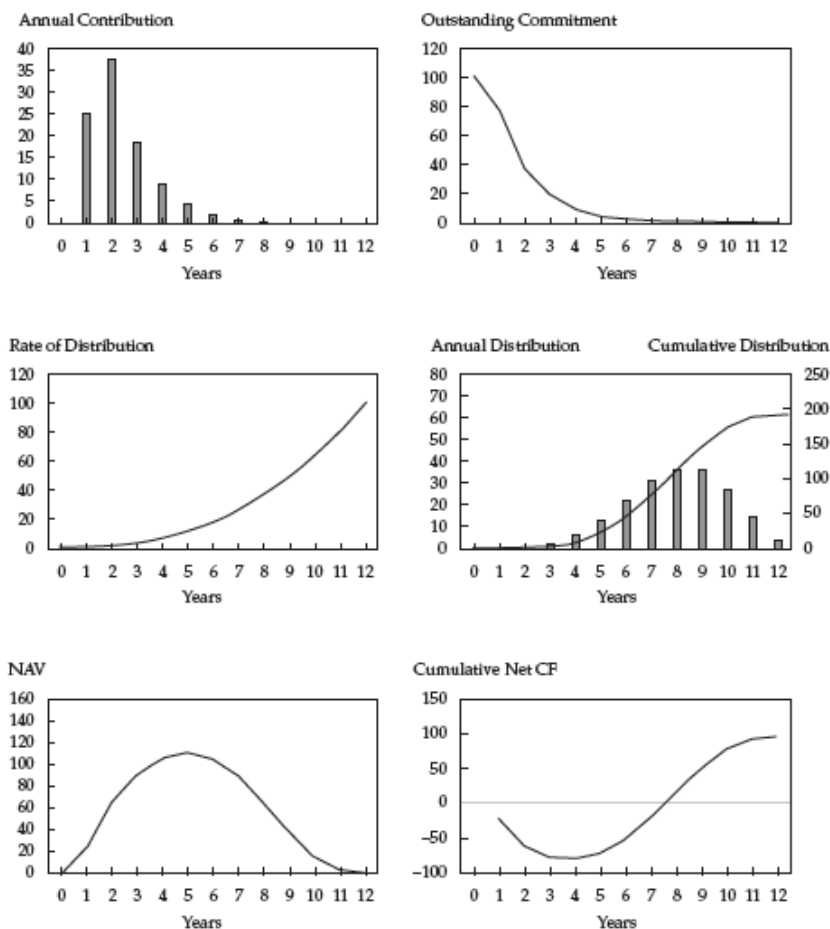
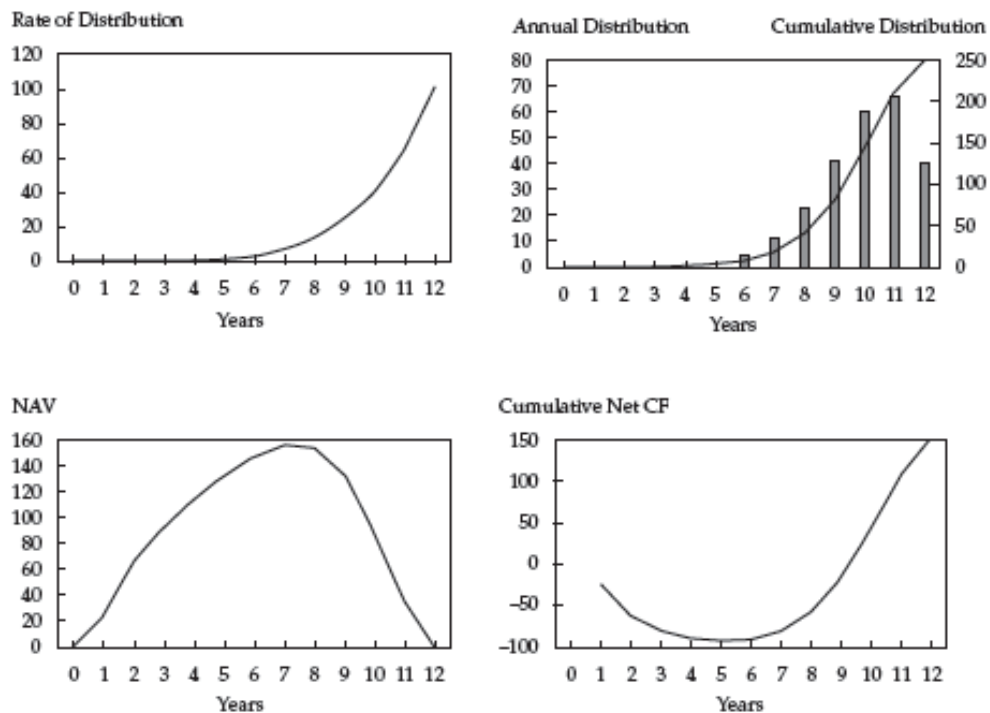


Exhibit 39 shows the corresponding annual distribution rates.

Year	1	2	3	4	5	6	7	8	9	10	11	12
Rate of Distribution	0%	1%	3%	6%	11%	18%	26%	36%	49%	63%	80%	100%

Lower distribution rates in earlier years allows NAV to grow higher. To illustrate this point, we change our assumption such that the distribution rates are very low in the early years and start increasing in the second half of the fund's life. Exhibit 40 shows the new distribution rates and Exhibit 41 shows how the distributions and NAV would change based on the new assumed distribution rates.

Year	1	2	3	4	5	6	7	8	9	10	11	12
Rate of Distribution	0%	0%	0%	0%	1%	3%	7%	13%	24%	40%	65%	100%



As expected, the NAV grows significantly higher in this scenario. However, the cumulative net cash flows stay in the negative zone for a longer time as compared to the previous scenario.

[Refer to Example 8 from the curriculum.](#)

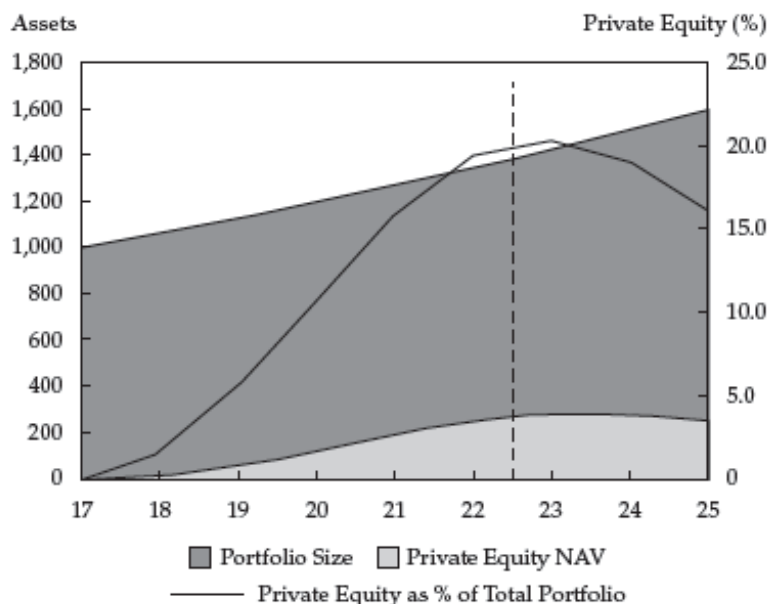
Commitment Pacing

Cash flow and commitment pacing models enable investors to:

- Manage portfolio liquidity

- Set realistic annual commitment targets to reach desired asset allocation

Let's assume that we manage a £1 billion portfolio and our strategic asset allocation target for private equities is 20%. Currently, we have no private equity investments in the portfolio. We assume an aggregate portfolio growth rate of 6% per year. We also use the forecasting model for estimating the investment cash flow and NAV for our private equity investment. Using these assumptions, we can use cash flow and commitment pacing models to determine the annual commitments needed to reach our target allocation. Exhibit 43 shows how private equity investments would grow as a proportion of the overall investment portfolio.



Note that for a reasonable amount of time (2021 onwards), private equity is between 15% to 20% of the total portfolio.

8.2 Managing the Capital Calls

Private investments typically have an initial investment period of three to four years. During the investment period, the GP will make capital calls, and the LP is obligated to fulfill the capital call, often within 30 days of receiving the call notification. It is not practical to keep all the committed (but not yet called) capital in liquid reserves as there is an opportunity cost associated with being out of the markets during the investment period.

Therefore, investors should have a strategy for maintaining asset allocation while waiting for the fund to become fully invested. One approach is to identify and use liquid public market proxies. The committed capital not contributed so far is invested in these proxies and then shifted to the private funds when called. Examples of proxies used include:

- Public equities for private equities
- High-yield bonds for private credit investments

- REITs for real estate investments

These proxies provide exposure to the same risk factors as the target private fund and minimize the investor's opportunity costs.

8.3 Preparing for the Unexpected

The liquidity-planning models described so far depend heavily on assumptions. The estimated cash inflows and outflows correspond to a base case scenario. In reality, the realized cash flows are likely to differ from the forecasts.

In a bear market, GPs may call capital at a higher pace and make distributions at a slower pace than expected. Also, the GP could exercise his option to extend the fund's life.

Therefore, in addition to a base case scenario, investors should also model other scenarios with faster capital calls and slower distribution rates to stay prepared.

[Refer to Example 9 from the curriculum.](#)

9. Monitoring the Investment Program

The monitoring of an alternative investments program is time and labor intensive. Data is difficult to obtain and is not comparable across managers and asset classes.

9.1 Overall Investment Program Monitoring

An alternative investment program should be monitored relative to the goals set up for the program, and not simply relative to a benchmark. For example, a university endowment fund may have a goal to meet spending requirements and preserve the real value of its portfolio. However, the goals and objectives may change. Say the fund initially wanted to generate a nominal return of 7%, but if enrolments are down the university may need more support, and the fund may temporarily need a higher return of say 8%.

Also, market conditions could change. Consider a real estate fund set up with the objective of generating rental income to substitute a portion of the fixed income allocation. If market conditions change such that rents go down substantially, then the objectives of this program will not be met, and adjustments will have to be made.

A third point to consider is that the investment manager may change his strategy. Consider a real estate manager who initially invested across a range of real estate properties. Later, he changed his strategy and prefers investing only in one type of property – office buildings. In such a situation, the investor will have to re-evaluate the fund and determine if it is still suitable to meet his goals.

9.2 Performance Evaluation

There are two common benchmarking approaches to evaluate the performance of alternative investments – custom index proxies and peer group comparisons. However, both approaches have significant limitations.

- Custom index proxies: A global equity index could be used as a proxy for a private equity fund. Since the fund is riskier its return could be benchmarked to say 'global equity index return + 3%'. However, an issue with this approach is that the underlying risk and return characteristics of global equities will be different from the risk and return characteristics of the private equity investments. Such a comparison is not fully suitable.
- Peer group comparisons: Say we are evaluating the performance of hedge fund manager engaged in event-driven strategies. This manager has generated a 6% return over a 5-year period. We want to compare his performance with other managers engaged in the same strategy. Exhibit 44 shows the returns from three different hedge fund index providers.

Strategy	Provider	3-Year Annualized Return (%)	5-Year Annualized Return (%)
		ending December 31, 2017	
Equity Hedge	HFRI	5.7	6.6
	Credit Suisse	4.3	7.1
	Eurekahedge	6.5	7.8
Event-Driven	HFRI	3.8	5.9
	Credit Suisse	0.8	3.7
	Eurekahedge	6.8	7.2

However, an issue here is that reported numbers are different across different index providers due to differences in definitions, weighting methodologies, and other index construction rules. The manager's performance looks good when compared to the Credit Suisse index, but looks poor when compared to the Eurekahedge index.

Also, the manager's ranking within the peer group not only depends on his actions but also on what other managers do.

Another issue faced in performance evaluation is related to the performance measure itself. In the asset management industry, TWR is generally used to measure performance. However, many private equity, credit and real estate funds typically report IRRs instead of TWR. IRRs are sensitive to the timing and magnitude of cash inflows and outflows. Two managers may have similar portfolios but substantially different IRRs depending on their particular capital call and distribution schedule. To address this issue, alternative measures such as multiple on invested capital (MOIC) for private equity have been developed.

$$\text{MOIC} = \frac{\text{Current value of underlying companies} + \text{Distributions}}{\text{Total invested capital}}$$

All else equal, higher MOIC values indicate better fund performance.

Pricing issues also make it difficult to evaluate the performance of alternative investments. Most alternative investments are illiquid and have stale pricing, which can distort reported

risk and return measures.

Ideally, when comparing performances of alternative investments, investors should develop a qualitative understanding of the underlying assets. This can allow investors to gain a better understanding of the performance of an investment manager.

9.3 Monitoring the Firm and the Investment Process

Monitoring the firm and the investment process is particularly important in alternative investment structures where it is not easy to terminate the manager and transfer assets to another manager.

Some areas to monitor include:

- Key person risk: Many alternative investment funds depend on the skills of a few key investment professionals. It is important to ensure that these key persons remain actively engaged in the investment process. Investors should also evaluate the impact on the business if these key persons leave the firm.
- Alignment of interests: Investors should evaluate if the manager's interests are closely aligned with their interests.
- Style drift: Due to changing market conditions, some managers may shift to different strategies. Investors should evaluate how such a change impacts their objectives and if the manager is moving into an area outside his expertise.
- Risk management: Investors should evaluate the risk management practices employed by the fund and periodically check if the fund abides by them.
- Client/asset turnover: A sudden increase or decrease in client or asset turnover is a cause of concern. Investor's should evaluate the reasons for this change and determine how it impacts the fund.
- Client profile: Investors should evaluate the fund's client profile. Several long-term clients are considered positive, whereas clients who are known to redeem at the first sign of trouble are considered negative.
- Service providers: Investors should ensure that the fund has engaged independent and reputable third-party service providers. For example, if the fund has engaged a dubious third-party audit firm, then this is a cause for concern.

[Refer to Example 10 from the curriculum.](#)

Summary

LO.a: Explain the roles that alternative investments play in multi-asset portfolios.

The major benefit of adding alternative investments to a traditional portfolio consisting of stocks and bonds is that they can increase the portfolio's risk-adjusted return. These investments are typically made with the objective of achieving one or more of the following roles: capital growth, income generation, risk diversification, and/or safety

Private equity: When added to a traditional portfolio, the main role of private equity is to enhance returns. This higher return expectation is based on the illiquidity risk associated with private equity investments.

Hedge funds: Hedge fund strategies span the spectrum from risk reducers to return enhancers. Long/short equity strategies provide equity-like returns but with lower exposure to equity premium. Short-biased equity strategies try to generate alpha by going short on overvalued securities. Arbitrage and event-driven strategies deliver equity-like returns with little to no correlation with traditional asset classes.

Real assets: Real assets are generally perceived to provide a hedge against inflation. Timber investments provide both growth and inflation-hedging properties. Commodities serve as a hedge against inflation and provide a differentiated source of alpha. Some commodities such as gold, serve as safe havens in times of crisis. Farmland investing can have a commodity-like profile or a commercial real estate-like profile. Energy investments are usually considered real assets because the investor owns the mineral rights to the commodities which are correlated with inflation. Infrastructure investments usually generate stable/modestly growing income and also tend to have a high correlation with overall inflation.

Commercial real estate: Commercial real estate provides protection against unanticipated inflation. Strategies range from core to opportunistic. Core strategies focus on income generation. Opportunistic strategies focus on capital appreciation.

Private credit: Private credit includes direct lending and distressed investments. Direct lending assets have a bond-like profile. Distressed investments have an equity-like profile.

LO.b: Compare alternative investments and bonds as risk mitigators in relation to a long equity position.

In the short run (when risk is measured in terms of volatility), government bonds are better risk mitigators as compared to alternative assets.

In the long-term (when risk is measured in terms of the probability of meeting the investment objective), alternative investments are better risk mitigators as compared to government bonds.

LO.c: Compare traditional and risk-based approaches to defining the investment

opportunity set, including alternative investments.

The following table compares risk-based and traditional approaches to asset allocation.

Traditional Approaches	Risk-Based Approaches
Strengths: They are easy to communicate and implement. They are also relevant for liquidity management and operational considerations.	Strengths: They help identify the common risk factors across all investments. Investors can build an integrated risk framework, leading to more reliable portfolio level risk measurement.
Limitations: They tend to over-estimate portfolio diversification and obscure primary drivers of risk.	Limitations: Risk factor sensitivities are highly sensitive to the historical look-back period. There are implementation hurdles when converting risk factor targets to mandates as they require considerations such as liquidity planning, rebalancing, etc.

LO.d: Discuss investment considerations that are important in allocating to different types of alternative investments.

Important investment considerations for alternative investments include:

- properly defining risk characteristics
- establishing return expectations
- selection of the appropriate investment vehicle
- operational liquidity issues
- expense and fee considerations
- tax considerations
- other considerations such as access to top-tier managers, effective due diligence, skills to evaluate and monitor.

LO.e: Discuss suitability considerations in allocating to alternative investments.

- In general, alternative investments are suitable for investors with relatively long investment horizons. The appropriate investment horizon depends on the fund's strategy.
- A high level of expertise is required while investing in alternative assets. Investors should understand the factors which drive the success or failure of different strategies.
- A strong governance program is required to ensure that an alternative investment program is structured to meet the needs and objectives of investors.

- Investors expecting a high level of transparency should avoid alternative investments. They tend to have less than 100% transparency.

LO.f: Discuss approaches to asset allocation to alternative investments.

Three main approaches used to determine the appropriate allocation to alternative investments include:

- Monte Carlo simulation
- Optimization techniques
- Risk factor-based approaches

Monte Carlo simulation: The Monte Carlo model construction process includes the following steps:

1. Identify relevant variables.
2. Establish a quantitative framework to generate 'realistic' random scenarios for the selected variables.
3. If using a risk factor approach, the risk factors should be converted to asset returns using a factor-based model.
4. Translate realistic asset class return scenarios into meaningful indicators.

Monte Carlo simulation can be used to:

- Generate risk/return scenarios, even if the underlying data is non-normally distributed.
- Illustrate simulation-based risk and return characteristics over a long investment horizon.

Portfolio Optimization:

- Mean-Variance Optimization without and with Constraints - Since illiquid alternative asset classes tend to have high returns and low reported risk, an unconstrained MVO will tend to over allocate to these classes. Therefore, high risk portfolios constructed using unconstrained MVO will be dominated by private equity. Whereas, low-risk portfolios will be dominated by cash and fixed income. To overcome this issue many investors impose minimum and maximum constraints to different asset classes while performing an MVO.
- Mean-CVaR Optimization – Mean-CVaR optimization can be used to determine asset allocations that minimize downside risk rather than simply minimizing volatility. It is appropriate for cases where down-side risk is of particular concern.

Risk Factor-Based Optimization:

- Investors can choose to optimize allocations to risk factors rather than asset classes. However, these allocations must be implemented using asset classes.
- Portfolios with similar risk factor exposures can have very different asset allocations depending on the constraints imposed on these portfolios.

- There are some caveats associated with the risk factor-driven approach that an investor should be aware of:
 - Investors may have different definitions of risk factors.
 - Correlations between risk factors may shift under changing market conditions.
 - Some factor sensitivities are stable while others are very unstable.

LO.g: Discuss the importance of liquidity planning in allocating to alternative investments.

There are three primary considerations associated with private investment liquidity planning:

1. How to achieve and maintain the desired allocation.
2. How to handle capital calls.
3. How to plan for the unexpected.

Cash flow and commitment pacing models enable investors to:

- Manage portfolio liquidity
- Set realistic annual commitment targets to reach desired asset allocation

LO.h: Discuss considerations in monitoring alternative investment programs.

An alternative investment program should be monitored relative to the goals set up for the program, and not simply relative to a benchmark. An investor should consider that:

- The goals and objectives can change.
- The market conditions can change.
- The investment manager's strategy can change.

There are two common benchmarking approaches to evaluate the performance of alternative investments – custom index proxies and peer group comparisons. However, both approaches have significant limitations.

Another issue faced during performance evaluation is related to the performance measure itself. Many private equity, credit and real estate funds typically report IRRs instead of TWR. IRRs are sensitive to the timing and magnitude of cash inflows and outflows. Two managers may have similar portfolios but substantially different IRRs depending on their particular capital call and distribution schedule.

Pricing issues also make it difficult to evaluate the performance of alternative investments. Most alternative investments are illiquid and have stale pricing which can distort reported risk and return measures.

Monitoring the firm and the investment process is particularly important in alternative investment structures where it is not easy to terminate the manager and transfer assets to another manager. Some areas to monitor include:

- Key person risk

- Alignment of interests
- Style drift
- Risk management
- Client/asset turnover
- Client profile
- Service providers

Examples from the Curriculum

Example 1: Mitigating Equity Risk by Allocating to Hedge Funds or Bonds

The investment committee of a major foundation is concerned about high equity valuations and would like to increase the allocation either to hedge funds or to high-grade, fixed-income assets to diversify equity risk. As the risk manager of this foundation:

1. Discuss the justifications and the limitations of using bonds to mitigate equity risk.
2. Discuss the justifications and the limitations of using hedge funds to mitigate equity risk.

Solution to 1:

- Supporting argument: Bonds have exhibited negative correlation and beta to equities in a low inflation environment, so as long as inflation stays at or below average historical levels, this negative equity–bond correlation should lead to the highest reduction in portfolio volatility.
- Limitations: The negative stock/bond correlation may be temporary, and amid high inflation the stock/bond correlation could turn positive. Furthermore, if bonds' expected return is low, a heavy allocation to bonds may reduce the probability of achieving the foundation's long-term return objectives.

Solution to 2:

- Supporting argument: With a net equity beta of around 0.3–0.4 (see Exhibit 5), hedge funds would reduce an equity-dominated portfolio's overall beta. With higher expected returns than bonds, an allocation to hedge funds would make achieving the long-term return target more feasible.
- Limitations: Although a well-constructed hedge fund portfolio may reduce portfolio volatility and beta, hedge funds are often highly actively managed, levered investment strategies, and individual hedge funds may suffer significant and permanent losses during turbulent times.

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Example 2: Applying Risk Factors for Inflation Hedging

1. The CIO (chief investment officer) of the United Retired Workers Plan would like to reduce inflation risk in the portfolio. Based on the data displayed in Exhibit 14, which asset classes would you recommend as potential inflation-hedging tools?
2. The CIO is not only concerned about inflation but also rising interest rates. Which alternative asset classes would you recommend for consideration?

Solution to 1:

Commodities and inflation-linked bonds have the highest factor sensitivity to inflation, so they are the most obvious candidates. Real estate (both public and private) also has some

potential to protect against inflation. Based on the data presented, macro hedge fund strategies also exhibited a positive inflation beta, but given their active nature, further analysis may be needed before choosing them as inflation-hedging vehicles.

Solution to 2:

Commodities and private real estate would be the likely asset classes to hedge against rising interest rates, given their zero-factor sensitivity to nominal duration. Some of the hedge fund strategies also show zero-factor sensitivity to duration, but the relationship may not hold true in the future given the actively managed nature of hedge funds. Although Exhibit 14 indicates equity strategies (both public and private) also show little to no sensitivity to rising interest rates (duration) bonds and equities have been more highly correlated in the past.

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Example 3: Considerations in Allocating to Alternative Investments

The investment committee (IC) for a small endowment has decided to invest in private equity for the first time and has agreed upon a 10% strategic target. The internal investment team comprises the CIO (chief investment officer) and two analysts. The IC asks the CIO to recommend an implementation plan at the next meeting.

1. What are the options the CIO should include in her report as it relates to vehicles, and what factors might influence the recommendation?
2. The IC provided no guidance as to expectations for when the investment program should reach its 10% target weight. What additional information should the CIO gather before presenting her plan of action?

Solution to 1:

The primary considerations for the CIO include the size of the private equity allocation, the team's expertise with private equity, and the available resources. Because this is a small endowment, it may be difficult to commit enough capital to achieve an adequate level of diversification. The size of the fund's investment team is also likely to be a concern. Unless there are financial resources to add a private equity specialist and/or employ an outside consultant, the fund-of-funds route would likely be the optimal vehicle(s) to implement a diversified private equity program.

Solution to 2:

The CIO should factor in the cash flows and anticipated liquidity profile of the overall endowment in considering the speed with which they would commit to a significant PE program. If, for example, the foundation is embarking on a capital campaign and anticipated distributions are small over the next few years, then commitments may be accelerated after factoring in an appropriate vintage year diversification. (Because private investment returns are very sensitive to the fund's vintage year, it is common for investors

to build up to a full allocation over a period of years, called vintage year diversification.) However, if the rest of the investment program is heavily exposed to illiquid investments (e.g., real estate, certain hedge fund strategies) and anticipated distributions to fund operating expenses are high, the CIO may want to commit at a slower pace.

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Example 4: Considerations in Allocating to Alternative Investments

A \$100 million client of a family office firm has requested that all public securities investments meet certain ESG criteria. The ESG ratings will be provided by an independent third-party firm that provides a rating for most public equities and some fixed-income issuers. Moreover, the family would like to dedicate a percentage of assets to support an “environmental sustainability” impact theme.

1. Which alternative investment strategies may not be suitable for this client given the ESG requirements?
2. What additional information might the family office firm require from the client in order to meet the environmental sustainability threshold?

Solution to 1:

Because the ESG criteria apply to all public securities, most hedge fund strategies would be precluded because they are typically owned in a commingled vehicle, such as a limited partnership or a mutual fund where transparency of holdings is limited and the investor has no influence over the composition of the underlying portfolio. Separate account strategies are available for certain large portfolios, but it is unlikely that a \$100 million client would be eligible for a custom portfolio that would be allocating only a small asset base to any particular fund.

Solution to 2:

The client and the manager would need to agree on a clear definition of environmental sustainability and the types of investments that might qualify for this theme. It is unlikely that most hedge funds, private credit, energy, or infrastructure strategies would be considered to positively impact environmental sustainability. The most likely candidates for consideration could be timber, sustainable farmland, and clean-tech funds under the venture capital category.

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Example 5: Suitability Considerations in Allocating to Alternative Investments

The Christian family office is concerned with investor or manager fraud and so will invest only in separately managed accounts (SMAs).

1. What are the benefits and drawbacks to the use of SMAs?
2. The 75-year-old patriarch of the Christian family would like to consider a significant

private equity allocation in a trust that he oversees on behalf of his youngest daughter. This would be the first alternative investment commitment made with any of the family's assets. The daughter is 40 years old. She will receive one-half of the assets outright upon his death. The remainder of the assets will be held in trust subject to the terms of the trust agreement. List some of the reasons why private equity may or may not be appropriate for this trust.

Solution to 1:

Although an SMA allows for greater transparency and control of capital flows (the manager does not generally have the authority to distribute capital from the client account), it has several potential disadvantages: 1) SMAs are not available or appropriate for many alternative strategies; thus, the requirement to invest via an SMA may limit the ability to develop an optimal alternative investment program. 2) A manager cannot invest alongside the client in the client's SMA. This may reduce the alignment of interest between the manager and the client and may give rise to conflicts of interest as trades are allocated between the SMA and the manager's other funds.

Solution to 2:

- Successful private equity investment requires a long time horizon. Given the patriarch's age, it is likely that half of the trust's assets will be distributed before the private equity program has had time to mature. This may lead to an unintended doubling in the size of the private equity allocation.
- The patriarch has no experience investing in alternative assets. Unless he is willing to commit the time, money, and effort and engage an outside adviser with the relevant expertise and access to top-tier funds, the likelihood of a successful private equity investment program would be low.
- Because the beneficiary of the trust is relatively young, the time horizon of the investment likely matches the profile of the underlying investor. It may be appropriate for the trust to invest in long-dated private equity assets, provided the investment is sized appropriately and the necessary expertise has been retained.

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Example 6: Asset Allocation Recommendation

The CIO (chief investment officer) of the International University Endowment Fund (the Fund) is preparing for the upcoming investment committee (IC) meeting. The Fund's annual asset allocation review is on the agenda, and the CIO plans to propose a new strategic asset allocation for the Fund. Subject to prudent risk-taking, the recommended asset allocation should offer

- the highest expected return and
- the highest probability of achieving the long-term 5% real return target.

The inflation assumption is 2%.

In addition, the risk in the Fund is one factor that is considered when lenders assign a risk rating to the university. The university's primary lender has proposed a loan covenant that would trigger a re-evaluation of the university's creditworthiness if the Fund incurs a loss greater than 20% over any 1-year period.

The investment staff produced the following tables to help the CIO prepare for the meeting.

Alternative	Asset Allocation						
	Cash	Public Equity	Govt	Credit	Hedge Fund	Real Estate	Private Equity
A	5.0%	60.0%	30.0%	5.0%	0.0%	0.0%	0.0%
B	4.0%	50.0%	16.0%	5.0%	10.0%	5.0%	10.0%
C	2.0%	40.0%	8.0%	5.0%	18.0%	7.0%	20.0%
D	1.0%	30.0%	5.0%	4.0%	20.0%	10.0%	30.0%
E	2.0%	40.0%	3.0%	3.0%	15.0%	7.0%	30.0%
F	2.0%	50.0%	3.0%	0.0%	10.0%	5.0%	30.0%
G	1.0%	56.0%	3.0%	0.0%	10.0%	0.0%	30.0%

Alternative	Portfolio Characteristics							
	Expected Return	Volatility	10-Year Horizon:					
			1-Year 99% VaR	1-Year 99% CVaR	5th Percentile Return	95th Percentile Return	Probability of Meeting 5% Real Return	Probability of Purchasing Power Impairment
A	6.0%	9.0%	-12.4%	-15.0%	1.6%	10.5%	37.0%	7.1%
B	6.7%	10.3%	-14.6%	-17.3%	2.0%	11.4%	46.1%	4.3%
C	7.1%	11.1%	-15.8%	-18.8%	2.2%	12.2%	52.1%	3.2%
D	7.4%	11.5%	-16.3%	-19.4%	2.4%	12.6%	56.1%	2.5%
E	7.7%	12.3%	-17.4%	-20.6%	2.4%	13.2%	58.8%	2.8%
F	7.8%	13.0%	-18.5%	-21.8%	2.2%	13.7%	60.8%	3.6%
G	7.9%	13.5%	-19.3%	-22.7%	2.1%	14.1%	61.0%	4.0%

Notes:

- 1-year horizon 99% VaR: the lowest return over any 1-year period at a 99% confidence level (i.e., only a 1% chance to experience a total return below this threshold).
- 1-year horizon 99% CVaR: the expected return if the return falls below the 99% VaR threshold.
- 5th and 95th percentile annualized returns over a 10-year time horizon: a 90% chance that the annualized 10-year total return will fall between these two figures
- probability of purchasing power impairment: as defined by the IC, the probability of losing 40% of the endowment's purchasing power over 10 years after taking gifts to the endowment, spending from the endowment, and total return into account.

1. Which asset allocation is most likely to meet the committee's objective and constraints?

Solution to 1:

Portfolio D. Portfolios E, F, and G have 1-year, 99% CVaRs, which, if realized, would trigger the loan covenant. Portfolio D has the next highest probability of meeting the 5% real return target and the lowest probability of purchasing power impairment. Portfolios A, B, and C have lower probabilities of meeting the return targets and higher probabilities of purchasing power impairment.

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Example 7: Selecting an Asset Allocation Approach

1. You have a new client who has unexpectedly inherited a substantial sum of money. The client is in his early 30s and newly married. He has no children and no other investible assets. What asset allocation approach is most suitable for this client?
2. Your client is a tax-exempt foundation that recently received a bequest doubling its assets to €200 million. There is an outside investment adviser but no dedicated investment staff; however, the six members of the investment committee (IC) are all wealthy, sophisticated investors in their own right. The IC conducts an asset allocation study every three years and reviews the asset allocation at its annual meeting. The current asset allocation is 30% equities, 20% fixed income, 25% private equity, and 25% real estate. Three percent of assets are paid out annually in grants; this expenditure is covered by an annuity purchased some years ago. The foundation's primary investment objective is to maximize returns subject to a maximum level of volatility. A secondary consideration is the desire to avoid a permanent loss of capital. What asset allocation approach is most suitable for this client?

Solution to 1:

Mean-variance optimization with Monte Carlo simulation is most appropriate for this client. He has limited investment expertise, so your first responsibility is to educate him with respect to such basic investment concepts as risk, return, and diversification. A simple MVO approach supplemented with Monte Carlo simulation to illustrate potential upside and downside of an asset allocation choice is mostly likely to serve the asset allocation and investment education needs.

Solution to 2:

Given the sophistication and investment objectives of the IC members, using a mean-CVaR optimization approach is appropriate to determine the asset allocation. This client has a more sophisticated understanding of risk and will appreciate the more nuanced view of risk offered by mean-CVaR optimization. Given the portfolio's exposure to alternative

investments, the asset allocation decision will be enhanced by the more detailed picture of left-tail risk offered by CVaR optimization (the risk of permanent loss) relative to mean–variance optimization. The lack of permanent staff and a once-per-year meeting schedule suggest that a risk factor-based approach may not be appropriate.

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Example 8: Liquidity Planning for Private Investments

1. The NAV of an investor's share in a private renewable energy fund was €30 million at the end of 2020. All capital has been called. The investor expects a 20% distribution to be paid at the end of 2021. The expected growth rate is 12%. What is the expected NAV at year-end 2022?

Solution to 1:

The expected NAV at year-end 2022 is €30,105,600. The expected distribution at the end of 2021 is €6.72 million $[(€30 \text{ million} \times 1.12) \times 20\%]$. The NAV at year-end 2021 is therefore $[(€30 \text{ million} \times 1.12) - 20\%] \times 1.12\% = €30,105,600$.

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Example 9: Private Investments, Asset Allocation, and Liquidity Planning

The Endowment Fund of the University of Guitan (the Fund) has \$750 million in assets. The investment committee (IC) adopted the following strategic asset allocation four years ago. Private investments are at the lower end of the permitted range. To reach the target allocation among private investments, the investment team has made several new commitments recently, and they expect capital calls over the coming year equal to approximately about 20% of the current private asset net asset value.

	Strategic Asset Allocation Target	Permitted Range	Current Asset Allocation	
			(%)	(\$mil)
Cash	2%	0 to 5%	3%	22.5
Public Equities (including long/ short equity)	35%	30 to 40%	35%	262.5
Government Bonds	5%	4 to 10%	7%	52.5
High-Yield Credit	3%	2 to 5%	5%	37.5
Hedge Funds (excluding long/ short equity)	20%	17 to 23%	23%	172.5
Private Real Estate	10%	7 to 13%	8%	60.0
Private Real Assets	5%	3 to 7%	4%	30.0
Private Equity	20%	15 to 22%	15%	112.5
Total				\$750 mil
Expected Return	7.1%			
Expected Volatility	11.1%			
99% CVaR	-18.8%			
Assumed Inflation Rate	2%			

The strategic asset allocation has a 52% probability of meeting the 5% real return target (4% spend rate, 1% principal growth, and 2% inflation).

At its last meeting, the endowment committee of the board approved a temporary increase in the spending rate, raising it from 4% to 5% for the next five years to support the university's efforts to reposition itself in the face of declining enrollments. The spending rate is calculated as a percentage of the Fund's trailing 5-year average value.

The CIO (chief investment officer) has produced a capital market outlook that will guide the fund's tactical asset allocation strategy for the next several quarters. Key elements of the outlook are:

- accommodative central bank policies are ending;
- equity valuation metrics have recently set new highs;
- the economic cycle is at or near its peak (i.e., there is a meaningful probability of rising inflation and a weaker economic environment over the next several quarters); and
- returns will quite likely be lower than what has been experienced over the past five years.

She also developed the following stress scenario based on her capital market outlook:

Return Stress Scenario	
Cash	2%
Public Equities (including l/s equity)	-30%
Government Bonds	-3%
High-Yield Credit	-10%
Hedge Funds (excluding l/s equity)	-8%
Private Real Estate	0%
Private Real Assets	10%
Private Equity	-10%

1. Identify and discuss the liquidity factors that the CIO should consider as she develops her portfolio positioning strategy for the next 12 to 24 months.
2. Recommend and justify a tactical asset allocation strategy for the Fund.

Solution to 1:

- Given the market outlook, it is reasonable to assume cash flows into the fund from existing private investments will be negligible.
- The fund has next-12-month liabilities as follows:
 - Approximately \$37.5 million to the university ($\$750 \text{ million} \times 5\%$). This is a high (conservative) estimate based on an assumption that the trailing 5-year average Fund value is less than the current \$750 million.
 - Approximately \$40.5 million in capital calls from private investment commitments (equally allocated across private real estate, private real assets, and private equity)
 - $[(\$60\text{m} + \$30\text{m} + \$112.5\text{m}) \times 20\%]$
 - Total liabilities next 12 months = \$78 million
- Sources of immediate liquidity:
 - Cash = \$22.5 million
 - Government bonds = \$52.5 million
 - \$73.9 million in total (less than the \$78 million liability)
- Other liquidity:
 - Public equities are at the midpoint of the permitted range. The allocation could be reduced from 35% to 30% and remain within the permitted range. This would free up \$37.5 million ($\$750 \text{ million} \times 5\%$) for reinvestment in more-defensive asset classes or to meet anticipated liquidity needs. However, if the return scenario is realized (equities down 30%), then the equity allocation will fall below the 30% minimum and additional rebalancing will be required.
 - High-yield credit is at the upper end of the allowed range. The allocation could be reduced from the current 5% to 2% or 3%, freeing up an additional \$15 to \$22.5 million. The limited liquidity in high-yield bond markets may make this challenging.

- The hedge fund allocation is at the upper end of the allowed range. The allocation could be reduced from the current 23% to something in the range of 17% to 20% (between the lower end of the band and the target allocation). However, given the required redemption notice (generally 60 to 90 days in advance of the redemption date), if the market weakens the hedge funds might invoke any gates allowed for in their documents.
- Longer term, a temporary increase in the spending rate reduces the probability that the fund will meet its real return target. This objective would be further threatened if the inflation rate does rise as the CIO fears. The liquidity profile of the Fund's investments should prepare for the possibility that, in a bad year, they may be called upon to dip into capital to fund the spending obligation.

Solution to 2:

- The Fund should target the upper end of the ranges for cash and government bonds in light of the current high equity valuations, weakening economic outlook, and threat of rising inflation. Given rising inflation and interest rate concerns, she may also consider shortening the duration of the government bond portfolio.
- The higher cash and bond allocation will also provide the liquidity buffer needed to meet the Fund's liabilities. Additional cash might be justified to fund the known payouts.
- A high allocation to real estate could also be considered a defensive positioning, but the current 8% allocation may rise toward its 13% maximum, even without additional allocations, given the expected decline in the balance of the portfolio. In addition, tactical tilts in private asset classes are difficult to implement because it would take an extended time period to make new commitments and invest the additional capital.
- The allocations to public equities and hedge funds could be reduced to fund the increases in cash and government bonds.

The following table summarizes the proposed allocation and looks at the likely end-of-year allocations if events unfold as forecast.

	Allowed Ranges		Current Allocation	Proposed Allocation		Expected Return Next 12 Months	Allocation 12 Months Forward	
	Lower Limit	Upper Limit		%	\$ (mil)		%	\$ (mil)
Cash	0%	5%	3%	10%	75	2%		0*
Public Equities	30%	40%	35%	30%	225	-30%	25%	157.50
Government Bonds	4%	10%	7%	10%	75	-3%	12%	72.75
High-Yield Credit	2%	5%	5%	5%	37.5	-10%	5%	33.75
Hedge Funds	17%	23%	23%	17%	127.5	-8%	19%	117.30
Private Real Estate	7%	13%	8%	8%	60	0%	12%	72.00
Private Real Assets	3%	7%	4%	5%	37.5	10%	8%	48.75
Private Equity	15%	22%	15%	15%	112.5	-10%	20%	123.75
Total				100%	\$750.0		100%	\$625.80

* Cash paid to fund liabilities (\$37.5 million to the university and \$40.5 million to fund private investment capital calls. Additional cash needs funded from government bond portfolio.

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Example 10: Monitoring Alternative Investment Programs

1. The O'Hara family office determined that the illiquidity risk inherent in private investments is a risk that the family is ill-suited to bear. As a result, they decided several years ago to unwind their private equity program. There are still a few remaining assets in the portfolio. The CIO (chief investment officer) notices that the private equity portfolio has delivered outstanding performance lately, especially relative to other asset classes. He presents the data to his research staff and wants to revisit their decision to stop making new private equity investments. Explain why the investment results that prompted the CIO's comments should not be relied upon.
2. The ZeeZaw family office has been invested in the Warriors Fund, a relatively small distressed debt strategy, which has performed very well for a number of years. In a recent conversation with the portfolio manager, the CIO for ZeeZaw discovered that the Warriors fund will be receiving a significant investment from a large institution within the next few weeks. What are some of the risks that might develop with the Warriors Fund as a result of this new client? What are some other issues that the CIO might want to probe with the Warriors Fund?

Solution to 1:

With small, residual holdings, even a modest change in valuation can result in outsized returns; for example, a \$2,000 investment that gets revalued to \$3,000 would report a nominal return of 50%. The 50% return is not representative of private equity investment as a whole but is merely an artifact of the unwinding process. A more accurate picture of performance must consider the development of the fund IRR over time and consider other performance measures, such as the MOIC.

Solution to 2:

The CIO should investigate whether the fund manager is able to appropriately deploy this new capital consistent with the investment process and types of investments that contributed to the Warriors Fund success. Because the fund was relatively small, a very large influx of capital might force the portfolio manager to make larger investments than is optimal or more investments than they did before. Either change without the appropriate resources could undermine future success. Finally, a large influx of cash could dilute near-term performance, especially if the funds remain undeployed for a significant period of time.

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