# Corporate Issuers

# Capital Investments and Capital Allocation

## Exam Focus

- Capital investments
  - Maintenance, regulatory/compliance, expansion, and other
- Capital allocation process
  - Calculate NPV, IRR, and ROIC
- Capital allocation
  - Principles and behavioral biases and cognitive errors
- Real options
  - Accounting for NPV considering option value and cost



## Capital Investments (Projects)

Have a life span of at least one year:

- **Balance sheet:** initially recorded at cost as long-term asset and presented as a net amount in subsequent years (cost less accumulated depreciation and amortization)
- **Income statement:** recorded as (annual) noncash depreciation or amortization expense is recorded over the useful life, so the amount is "smoothed" over time
- **Cash flow statement:** recorded as cash outflow (cash flow from investing) as incurred

## Going-Concern Projects

Maintenance or replacement capital expenditures

- Project evaluation is often straightforward because it is essentially a cost-benefit analysis (e.g., up-front cost vs. present value of annual savings)
- **Match funding** is often used to equate the expected useful life of the newly acquired assets with the new financing term (avoids rollover risk)
- Annual maintenance costs are often approximated by looking at depreciation/amortization expense; more (less) accurate for assets with shorter (longer) useful lives



## Regulatory Compliance Projects

- Mandatory projects to keep up with evolving regulations (e.g., environmental)
- Cash outlay with no corresponding incremental revenues but avoidance of penalties as well as ability to continue business operations; in some instances, some or all costs could be passed on to customers
- **Opportunities:** barriers to entry for potential new participants, potential to collaborate with regulators to optimize timing of projects, early adoption may provide greater future business certainty, creation of strategic advantage over competitors

## Regulatory Compliance Project: Example

Danske Bank (Danske) in Denmark disclosed that "major deficiencies in controls and governance made it possible to use its Estonian branch for criminal activities, such as money laundering." The scandal arose in 2017 to 2018 based on transactions occurring between 2007 and 2015. It could be the largest money laundering scandal ever to occur in Europe or even worldwide.

**Commentary:**

Had Danske taken steps in the short-term to spend the funds on improving its regulatory compliance, it might have avoided the payment of significant fines, incurrence of legal costs, and reputational damage to the bank.

The incident had the impact of increasing the penalties eight-fold for money laundering in Denmark.



## Expansion Projects

Equity funding (often used by newer companies) is usually more expensive and risky than debt funding (often used by established companies).

- **Risks:** inability to source materials, unexpected production difficulties, significantly under budgeting costs, managing many business lines, additional competition
- **Opportunities:** increase competitiveness, gain new customers and market share (e.g., geography, similar/related goods), stay ahead of competitors

## Expansion Project: Example

Sony Interactive Entertainment (SIE) is a global, leading video game and digital entertainment company based in Japan.

In 2022, it acquired Bungie Inc. (Bungie), an extremely successful US-based video game developer and established partner of SIE.

SIE expansion plans in the acquisition were described as follows: ". . . *will give SIE access to Bungie's world-class approach live game services and technology expertise, furthering SIE's vision to reach billions of players*."




## New Lines of Business Projects

Projects wholly different or only distantly similar to existing business opportunities—could be a (1) start-up technology or business idea, or (2) acquisition of a company in a new industry

- **Risks:** lack of knowledge and experience in operating an unknown business, potential to overpay
- **Opportunities:** special situation with unique growth or innovation potential to greatly increase profits

## New Line of Business Project: Example

Kirin Holding (Kirin) is a well-established producer of alcoholic and non-alcoholic drinks in Japan. In 2019, it takes a controlling interest in Fancl Corp (Fancl), a producer of cosmetics and dietary supplements in Japan with a long track record of success in its industry.

**Commentary:**

The transaction had the objective of combining their research and development capabilities with their strong brands to offer a wide range of products.




## Capital Allocation

Four general steps

1. Idea generation
2. Investment analysis
3. Planning and prioritization
4. Monitoring and post-investment review

# Net Present Value (NPV)

PV of expected future cash inflows—up-front investment cost (cash outflow)

- Future cash inflows are on an after-tax basis and discounted at the required rate of return
- Initial cash outflow assumed to occur at the beginning of period 1 (undiscounted), subsequent cash flows assumed to occur at the end of each period (discounted), unless otherwise stated
- Positive (negative) NPV means the investment should be made (not be made) as it increases (decreases) shareholder wealth
- NPV alone is not sufficient as NPV is only one factor in capital allocation—must also consider competing projects and qualitative factors



# NPV: Example

Assume that Gerhardt Corporation is considering a capital investment of €50 million today that is expected to return after-tax cash flows of €16 million per year for the next four years plus another €20 million in Year 5. If the required rate of return is 10%, what is the NPV of this investment?

$$+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}=$$

## NPV With Unconventional Cash Flow Pattern: Example

Gerhardt Corporation is considering a capital investment of €50 million today with the following estimated cash flow schedule over the next five years (all amounts in millions of euros).

| t | 0 | 1 | 1.5 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| Cash flow | –50 | 10 | –5 | 13 | 16 | 19 | 23 |

Assuming a required rate of return of 10%, what is the NPV of the investment?

$$+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}+\frac{\quad}{\quad}=$$

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## Internal Rate of Return (IRR)

- IRR is solved as the discount rate that equates the NPV of an investment to zero.
- IRR assumes that each cash inflow/outflow occurs at the end of the period and that all periods are evenly spaced.
- YTM in fixed income is an IRR.
- If IRR exceeds the required rate of return (hurdle rate), then invest. Otherwise, do not invest.
  - IRR assumes interim cash flows are reinvested at IRR; in contrast, NPV assumes reinvestment at the required rate of return, which is usually more realistic.

# IRR: Example

Assume that Gerhardt Corporation is considering a capital investment of €50 million today that is expected to return after-tax cash flows of €16 million per year for the next four years plus another €20 million in Year 5. What is the IRR of the investment? Assuming a hurdle rate of 10%, should the capital investment be made?

$$-50 + \frac{16}{1+IRR} + \frac{16}{(1+IRR)^2} + \frac{16}{(1+IRR)^3} + \frac{16}{(1+IRR)^4} + \frac{20}{(1+IRR)^5} = 0$$

- Using BAII+, IRR solves as
- Because IRR the hurdle rate, the investment be made





# Multiple IRRs: Example

$1,000 up-front capital investment today. It is expected to generate after-tax cash flows of $5,000 at the end of Year 1 and –$6,000 at the end of Year 2.

What is the IRR of the investment?

**Solution:**

$$-1{,}000 + \frac{5{,}000}{1+IRR} + \frac{-6{,}000}{(1+IRR)^2} = 0$$

- Because the cash flow signs change multiple times, IRR solves as 100% or 200% and often, the lower value is provided by calculators or spreadsheet programs.
- NPV should be used here instead of IRR.

## NPV vs. IRR

Sometimes, a choice must be made between a project with a higher NPV versus one with a higher IRR.

NPV is the superior measure because it looks at the absolute amount of value added (lost) over a period, so it accounts for size and can be viewed in context of the firm size.

In contrast, IRR only looks at the rate of return, and it does not consider size or the period over which the IRR is earned.




## Return on Invested Capital (ROIC)

Problem: Many companies only issue consolidated financial statements, which does not provide sufficient information to calculate NPV or IRR for a specific project

Solution: ROIC can be used that considers the total invested capital invested in the denominator and after-tax profit in the numerator

$$\text{ROIC} = \frac{\text{after tax operating profit}}{\text{Average invested capital}} = \frac{(1\text{-TR}) \times \text{operating profit}}{\text{Average total LT liabilties}^{*} \text{ and equity}_{t-1}}$$

***** excludes (short-term) working capital items

# ROIC: Example

A company reported 24,395 in after-tax operating profits in 20X2.

Asset information for the company is presented below:

| | 20X2 | 20X1 | | 20X2 | 20X1 |
|---|---|---|---|---|---|
| Cash | 6,802 | 4,364 | Accounts payable | 50,766 | 35,221 |
| Short-term assets | 52,352 | 40,529 | Short-term debt | 5,877 | 21,142 |
| Long-term assets | 279,769 | 287,857 | Long-term debt | 106,597 | 112,257 |
| | | | Share capital | 15,688 | 15,688 |
| | | | Retained earnings | 159,995 | 148,442 |
| Total assets | 338,923 | 332,750 | Total L&E | 338,923 | 332,750 |




# ROIC: Example

Calculate ROIC for 20X2. If the investor required rate of return is 10%, should an investment in the company be considered?

$$\text{ROIC} = \frac{24{,}395}{\left[\frac{(106{,}597 + 15{,}688 + 159{,}995) + (112{,}257 + 15{,}688 + 148{,}442)}{2}\right]} =$$

Although the company is profitable, the required rate of return, so the not consider an investment in the company based on the results of 20X2.

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# Benefits of ROIC

**Data:** does not require internal information to compute (in contrast to project NPV and IRR)

**Capital:** ROIC explicitly considers capital required to earn returns; looks at both profit margin and turnover as methods of improving ROIC

$$\text{ROIC} = \frac{\text{after-tax operating profit}}{\text{average invested capital}} = \frac{\text{after tax operating profit}}{\textit{Sales}} \times \frac{\textit{sales}}{\text{average invested capital}}$$

**Comparison to blended rate of return (WACC)**

ROIC looks at both debt and equity investing and could be compared to the appropriate measure

ROIC > WACC is desirable; ROIC < WACC requires operational improvements to increase profit margins and turnover, for example




# Limitations of ROIC

**Accounting-based measure:** accruals may lead to significant differences between operating profit versus operating cash flow

**Historical:** ROIC looks only at the past and is subject to potentially high annual volatility

**Highly aggregated:** ROIC may hide profitable or unprofitable business segments

**Measurement subjectivity:** "invested capital" may or may not include intangible assets, "excess cash," pension liabilities, or deferred tax liabilities, for example

## Principles of Capital Allocation

**After-tax cash flows**

- Accounting measures of profit are less relevant; instead, consider the tax effects of noncash deductions, such as depreciation

**Incremental cash flows**

- Ignore sunk costs and only consider incremental cash flows that occur with new investment
- Also consider cost savings, opportunity costs, and cannibalization effects

**Timing of cash flows**

- Consider in which period(s) the cash flows occur, their duration, volatility, and any direction changes



## Pitfalls of Capital Allocation: Cognitive Errors

1. Internal forecasting errors
2. Ignoring costs of internal financing
3. Improper treatment of inflation

## Pitfalls of Capital Allocation: Behavioral Biases

1. Anchoring
2. Reliance on accounting measures
3. Pet projects
4. Not considering enough alternatives



## Real Options

Real options, if available, offer alternative courses of actions (depending on future financial information) during a project's life. Such options change the value of capital investments:

1. Timing option
2. Sizing option
3. Flexibility option
4. Fundamental option

## Evaluating Investments With Real Options

**Ignore options:** positive NPV projects in the absence of real options are minimum returns; therefore, such projects should be pursued

**NPV with real options:** NPV (no options) – option cost + option value

**Decision trees and option pricing models:** used when there are future sequential decisions and alternative outcomes for a given investment; NPVs usually computed based on probabilities and expected timing of future outcomes



## Capital Allocation Using a Decision Tree: Example

Assume that Gerhardt Corporation is considering a €500 million outlay for a capital investment in a facility to produce a new product.

- In one year, there is a 60% chance of a successful product launch with a $750 million return and a 40% chance of a product failure with a zero return.
- Assuming a product failure in one year (t=1), then one year later (t=2), there is a 30% chance of an alternative product launch with a $600 million return, a 30% chance of a sale to another firm with a $400 million return, and a 40% chance the facility will be abandoned with a zero return.

Calculate the project NPV without real options using a 10% required rate of return.

## Capital Allocation Using a Decision Tree: Example

NPV with no option:

$$-\$500m + \text{———————} =$$

- pursue project as NPV

NPV with real option:

$$\text{Value of real option} = \text{———————————————————} =$$

- Project NPV = + =
- project as NPV

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## Solutions

## NPV: Example

Assume that Gerhardt Corporation is considering a capital investment of €50 million today that is expected to return after-tax cash flows of €16 million per year for the next four years plus another €20 million in Year 5. If the required rate of return is 10%, what is the NPV of this investment?

$$-50 + \frac{16}{1.10} + \frac{16}{(1.10)^2} + \frac{16}{(1.10)^3} + \frac{16}{(1.10)^4} + \frac{20}{(1.10)^5} = +13.136$$





## NPV With Unconventional Cash Flow Pattern: Example

Gerhardt Corporation is considering a capital investment of €50 million today with the following estimated cash flow schedule over the next five years (all amounts in millions of euros).

| t | 0 | 1 | 1.5 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| Cash flow | –50 | 10 | –5 | 13 | 16 | 19 | 23 |

Assuming a required rate of return of 10%, what is the NPV of the investment?

$$-50 + \frac{10}{1.10} + \frac{-5}{(1.10)^{1.5}} + \frac{13}{(1.10)^2} + \frac{16}{(1.10)^3} + \frac{19}{(1.10)^4} + \frac{23}{(1.10)^5} = +4.78$$

# IRR: Example

Assume that Gerhardt Corporation is considering a capital investment of €50 million today that is expected to return after-tax cash flows of €16 million per year for the next four years plus another €20 million in Year 5. What is the IRR of the investment? Assuming a hurdle rate of 10%, should the capital investment be made?

$$-50 + \frac{16}{1+IRR} + \frac{16}{(1+IRR)^2} + \frac{16}{(1+IRR)^3} + \frac{16}{(1+IRR)^4} + \frac{20}{(1+IRR)^5} = 0$$

- Using BAII+, IRR solves as 19.52%.
- Because IRR exceeds the hurdle rate, the investment should be made.

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# ROIC: Example

Calculate ROIC for 20X2. If the investor required rate of return is 10%, should an investment in the company be considered?

$$\text{ROIC} = \frac{24{,}395}{\left[\frac{(106{,}397 + 15{,}688 + 159{,}995) + (112{,}257 + 15{,}688 + 148{,}442)}{2}\right]} = 0.0873 \text{ or } 8.73\%$$

Although the company is profitable, its ROIC is below the required rate of return, so the investor should not consider an investment in the company based on the results of 20X2.

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# Capital Allocation Using a Decision Tree: Example

NPV with no option:

$$-\$500\text{m} + \frac{(0.6 \times \$750\text{m})}{1.10} = -\$90.91\text{m}$$

- Do not pursue project as NPV < 0

NPV with real option:

$$\text{Value of real option} = \frac{(0.4 \times 0.3 \times \$600\text{m}) + (0.4 \times 0.3 \times \$400\text{m})}{(1.10)^2} = +\$99.17\text{m}$$

- Project NPV = –$90.91 + $99.17 = $8.26m
- Pursue project as NPV > 0