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Wiley's Study Guides are written by a team of highly qualified CFA charterholders and leading CFA instructors from around the globe. Our team of CFA experts work collaboratively to produce the best study materials for CFA candidates available today.

Wiley's expert team of contributing authors and instructors is led by Content Director Basit Shajani, CFA. Basit founded online education start-up Élan Guides in 2009 to help address CFA candidates' need for better study materials. As lead writer, lecturer, and curriculum developer, Basit's unique ability to break down complex topics helped the company grow organically to be a leading global provider of CFA Exam prep materials. In January 2014, Élan Guides was acquired by John Wiley & Sons, Inc., where Basit continues his work as Director of CFA Content. Basit graduated magna cum laude from the Wharton School of Business at the University of Pennsylvania with majors in finance and legal studies. He went on to obtain his CFA charter in 2006, passing all three levels on the first attempt. Prior to Élan Guides, Basit ran his own private wealth management business. He is a past president of the Pakistani CFA Society.

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Study Session 10: Corporate Finance: Corporate Governance, Capital Budgeting, and Cost of Capital

READING 34: CORPORATE GOVERNANCE AND ESG: AN INTRODUCTION

LESSON 1: CORPORATE GOVERNANCE AND ESG: AN INTRODUCTION

LOS 34a: Describe corporate governance. Vol 4, pp 5–7

Corporate governance is increasing in its significance with investment professionals and investors. Due to various high-profile accounting scandals and corporate bankruptcies, the importance of understanding the framework that is used to define the rights, roles, and responsibilities of stakeholders continues to grow.

Corporate governance is defined as the system of internal controls and procedures through which individual companies are managed. It aims to minimize and manage conflicts of interest between those within the company and stakeholder. In the 1990s, a couple of different reports helped to shape the landscape of corporate governance. One report, which was the genesis of corporate governance, was the Cadbury Report (named after its chairman). It defined corporate governance as simply "the system by which companies are directed and controlled."

Governance varies by jurisdiction, and reflects influences in either shareholder or stakeholder theory. Shareholder theory leans more toward maximizing shareholder return, while stakeholder theory has a much broader company focus. In stakeholder theory, emphasis is placed on the various stakeholders when taken together, although they have separate interests in the company.

Various reports have been issued in the recent past that continue to place emphasis on corporate governance. There is a global movement toward convergence between jurisdictions of regulations that have similar principles.

LOS 34b: Describe a company's stakeholder groups and compare interests of stakeholder groups. Vol 4, pp 8–10

A stakeholder is any person or group that has an interest in the company. Not all stakeholders' interests are aligned in the same manner, and they often are in conflict with one another. There are approximately seven primary stakeholder groups within a corporation:

1. Shareholders
2. Creditors
3. Employees (managers, executives, other)
4. Board of directors
5. Customers
6. Suppliers
7. Governments/regulators

Shareholders provide capital to the company and are entitled to the company's net value. They are typically focused on those efforts that support growing the profitability of the company and maximizing the value of it. Even though they have little involvement in the company's activities, they elect the board of directors and vote on important resolutions.

Creditors have little influence on the company, other than covenants and restrictions they can put in place as its banks or bondholders. They receive interest and principal payments, and have a primary goal of being repaid through the company's ability to generate cash flow. Creditors look for stability, in contrast to shareholders, who may desire and are willing to tolerate higher risks to obtain higher returns.

Employees have a significant stake in the company's operation, as they are paid salaries as well as other incentives and perquisites for their work. It is in their best interest to protect their position, and to increase their compensation in different time frames through incentives, even though it may not be in the best interest of the company in the short or long term.

The **board of directors** acts in the best interest of the shareholders who elect them. They oversee the operations through monitoring the company and management performance while providing strategic direction.

Customers would like a product that is a good value for the price and is safe to operate. In addition, they desire ongoing support. If done properly, this will increase the future value of the company through greater name recognition, safety records, and sales, but it requires potentially greater cost, which may harm profitability.

Company **suppliers** have a goal of being paid for their services and materials. They are viewed alongside creditors as they see financial stability as an important attribute toward achieving their objective.

The **government and regulators** wish to protect the economy and the interests of the general public. Implementing procedures or guidelines that increase costs or additional burdens on the company can be at odds with other stakeholders. In addition, regulators have an interest in having corporations act within the guidelines of the law on a consistent basis.

Nonprofit organizations tend to differ from those that are for-profit as they do not have shareholders. Stakeholders generally are focused on serving the intended cause while utilizing funds as agreed. These stakeholders include volunteers, donors, organizations, patrons, trustees, employees, board of directors, and others.

LOS 34c: Describe principal–agent and other relationships in corporate governance and the conflicts that may arise in these relationships.

Vol 4, pp 11–13

Key Relationships in Corporate Governance

When a principal hires an agent to act on its behalf, a principal–agent relationship is created. Embedded in the relationship are characteristics involving trust, an expectation of loyalty, and other obligations to act in the best interest of the principal. However, conflicts can occur due to the inherent interests of both parties. Five key relationships to consider for potential conflicts are the following:

1. Shareholder and manager/director relationships
2. Controlling and minority shareholders
3. Manager and board relationships
4. Shareholder versus creditor interests
5. Other stakeholder conflicts

Shareholder and Manager/Director Relationships

Directors and managers are agents of the shareholders. They are given the power to transact business on the shareholders' behalf, with the intent of serving the shareholders' best interest. However, these employees may take on more risk than is warranted to maximize their personal benefits for remuneration and perquisites. They have "information asymmetry" due to their proximity to the business. This situation may weaken the shareholders' control over them, while allowing the employees to make the principals' best interest second priority.

Controlling and Minority Shareholders

Another relationship that may lead to conflicts is between a **controlling** and a **minority** shareholder group who adopt a **straight voting** structure (one vote for each share owned). This framework would clearly allow the controlling group significant power as they hold enough shares to exercise control. Voting on takeover offers that benefit the controlling group and create no value for the minority group has been documented in several high-profile cases. In addition, related-party transactions also become a concern when a controlling group has the power to vote on items that are in their best interest, but not in the minority group's interest.

An equity structure that has multiple share classes in which one class is non-voting (or limited) will create a divergence between ownership and control rights. This has traditionally been called a dual-class structure whereby the founders, executives, and other key insiders control the company by holding the superior voting power.

Manager and Board Relationships

Conflicts between the board of directors and management can arise when limited information is provided to the board. This will reduce the directors' ability to perform their monitoring function. It is particularly pronounced for those who are not involved in day-to-day operations, specifically a non-executive director.

Shareholder versus Creditor Interests

The relationship between shareholders and creditors has the basis for differences due to the risk tolerance and expected return of each side. A shareholder takes additional risk for greater return; however, a creditor looks for stability and lower risk. Increasing leverage creates risk and is at odds with a creditor's desire.

Other Stakeholder Conflicts

Other stakeholder conflicts can arise between various groups. The following are three examples, to name a few:

1. If a company decides to reduce product safety, this can cause a conflict between customers and shareholders, as customers want a safe product, but shareholders want to reduce costs and increase profits.
2. Customers and suppliers may be at conflict when the company extends lenient credit terms to customers. This will affect the ability of the company to repay suppliers on time.
3. If a government reduces the tax burden on a company, that is beneficial for the shareholders but detrimental to the tax base of the government, thereby causing a conflict.

LOS 34d: Describe stakeholder management. Vol 4, pg 14

Stakeholder Management

Identifying the various stakeholder positions and relationships is the basis for managing the potential conflicts that arise. It then requires understanding and prioritizing these positions, and dealing with them in a methodical and logical manner.

The two most important aspects of stakeholder management are effective communication and active engagement. In order to balance the various positions and reduce conflict, a framework is built. The foundation is constructed from the various legal, contractual, organizational, and governmental components that define the rights, responsibilities, and powers of each group.

- The **legal** infrastructure lays out the framework of rights established by law as well as the ease or availability of legal recourse.
- The **contractual** infrastructure is the means used to secure the rights of both parties through contractual agreements between the company and its stakeholders.
- The manner in which the company manages its stakeholder relationships through its governance procedures, internal systems, and practices is the **organizational** structure.
- The regulations imposed on the company are considered the **governmental** infrastructure.

LOS 34e: Describe mechanisms to manage stakeholder relationships and mitigate associated risks. Vol 4, pp 15–19

There is no standard approach to managing stakeholders, and it will vary across companies and cultures. However, there are 10 common elements that are seen among various companies:

1. General meetings
2. Board of directors
3. Audit function
4. Reporting and transparency
5. Remuneration policies
6. Say on pay
7. Contractual agreements with creditors
8. Employee laws and contracts
9. Contractual agreements with customers and suppliers
10. Laws and regulations

General Meetings

One of the most widely adopted practices in mitigating agency problems is the general meeting. Shareholders have the right to participate in these meetings and exercise their voting rights. When they are unable to attend a meeting, they have the ability to have their shares voted by another person they authorize. This is called **proxy voting**. With a **cumulative** voting structure (compared to straight voting), shareholders have the ability

to accumulate and vote all their shares for a single candidate in an election involving more than one director.

At the general annual meetings, shareholders will be presented with the annual audited financial statements as well as an overview of the company's performance and activities. Shareholders are able to better monitor the company through a direct exchange of information. Extraordinary general meetings may be called and could include special resolutions that will require larger voting margins to pass, typically including amendments to bylaws, mergers, and so on.

Board of Directors

The board of directors acts as the link between shareholders and managers, as it is impractical in a complex ownership structure for shareholders to be involved in the direct running of the company. Shareholders will then monitor board activities and exercise their voting power to elect (or remove) members to the board. The main responsibilities of the board include evaluating management performance and assisting in strategy, as well as supervising the audit, control, and risk management functions.

Audit Function

The audit function not only helps to provide assurances that financial statements are properly reported, but also provides a service that evaluates the control environment within a company. It reviews and analyzes the various systems, controls, and policies/procedures that are in place to examine the operations and the manner in which financial information is accumulated. The external auditors are independent from the company and elected by the shareholders (though recommended by the audit committee).

Reporting and Transparency

Due to additional transparency of reported information, shareholders can acquire a great deal of information from various sources. These sources include, but aren't limited to, required filings such as quarterly and yearly reporting, as well as information from social media. This reduces information asymmetry and allows the shareholders to better assess performance of the company and the board.

The handling of related-party transactions has become a point of focus because it may benefit an insider to the detriment of the company due to a related party relationship. It is increasingly common that policies in this area are implemented among companies. These procedures require disclosure of any potential or actual situations, whether direct or indirect. The policies are put in place to reduce issues related to transparency, risk, and management of potential issues.

Remuneration Policies

Another important area requiring management is executive remuneration. Aligning pay with shareholder interests helps to ensure that long-term strategies are implemented that will benefit the overall value of the company. The most common potential issues arise when executives act in the short term ("short-termism") to increase their own pay or take on excessive risk. Some companies have even implemented claw-back provisions whereby they will recover previous remuneration if certain events or misconduct occurs.

Say on Pay

Say on pay is a concept that helps to decrease potential conflicts and issues with shareholders by gaining their insights on the company's remuneration policy. It was first introduced in the United Kingdom in the early 2000s. The implementation varies by country. Some have non-mandatory and non-binding say on pay systems (e.g., Canada) which means the company is required to ask for feedback on renumeration policies, but is not required to act upon it. Those systems that have less force draw criticism because of the limited impact they may have. By contrast, in the Netherlands, the United Kingdom, and China, the system is mandatory and binding. Other systems are found somewhere between the two extremes.

Contractual Agreements with Creditors

Another management tool is the contractual agreement with creditors. The **indenture** is a legal contract that outlines the obligations and rights of issuer and bondholder. Normally, there will be **covenants** within the indenture that identify actions that are both required (e.g., providing periodic financials) and prohibited (e.g., additional or excessive debt). **Collaterals** are another way to further increase the likelihood of repayment through the offering of assets or financial guarantees.

Employee Laws and Contracts

The framework that outlines employee rights is based on labor law. This will vary by geographic area, but will include such items as working hours, hiring and firing, pensions, and other employee benefits. Employment contracts are for the individual and outline the employee's rights and responsibilities; they are not all-encompassing, leaving some discretion within the relationship. Other items such as the code of ethics and human resources documents are intended to outline the relationship in order to manage and mitigate any legal or reputational risks.

Contractual Agreements with Customers and Suppliers

Customers and suppliers have contractual agreements that explain the relationship with the company, including the financial relationship (e.g., price, terms, support, and any guarantee provisions).

Laws and Regulations

The government and regulators seek to protect the public through developing laws and monitoring compliance. Regulations vary by industry and increase with the level of risk that the public is exposed to.

LOS 34f: Describe functions and responsibilities of a company's board of directors and its committees. Vol 4, pp 20–24

The Board of Directors

The board of directors monitors management and the strategic direction of the company, while reporting to shareholders. The makeup of the board depends primarily on the size, structure, and complexity of the company. Diversity of experience, knowledge,

and skill sets gives the board strength. Having business insights in regard to key areas of responsibility, including the following, is key to performing their positions properly:

- Strategy
- Finance
- Audit
- Risk management
- Human resources

A one-tier structure is made of executive (internal) directors and non-executive (external) directors who offer objective insight. A two-tier system has a supervisory board and a management board that are independent of each other. There is a trend to separate the CEO from the chairperson role, which is called the "CEO duality."

The general practice is to elect the entire board simultaneously for a specified term (three years, for example). However, other companies have **staggered boards**, which will break the board into three classes, and have separate elections in consecutive years. This will require several years for shareholders to elect the entire board, thereby limiting their ability to effect major change of control at the company quickly.

The board plays an active role in managing the company through managers, who are given the responsibility for day-to-day operations of the company. The board will establish milestones for the company based on the strategic direction it oversees. In monitoring progress, the board will select, appoint, and terminate the employment of senior management. They thereby play a key role in ensuring leadership continuity.

The board will establish committees to aid in the oversight of key functions. These committees will provide feedback and recommendations. Committees vary by organization; however, six common committees are:

1. Audit committee
2. Governance committee
3. Remuneration committee
4. Nomination committee
5. Risk committee
6. Investment committee

Audit Committee

Given the importance of ensuring the integrity of the financial statements, the board plays a key role in the audit and control systems within the company. This would include setting the overall structure and making certain it is properly implemented. The audit committee can be crucial in this role, as it helps to evaluate the effectiveness of the control system. The audit committee will:

- Review information technology.
- Evaluate policies and procedures.
- Supervise the internal audit group.
- Appoint and evaluate the findings from the external auditors.
- Perform other necessary processes and procedures.

Governance Committee

The governance committee will monitor the adoption and implementation of good corporate governance practices. The committee will determine if the implementation is occurring and will review whether the policies and standards are in compliance with applicable laws and regulations.

Remuneration Committee

Given the role the board plays in its oversight of management, it plays a crucial role in remuneration. In this committee, it will develop and propose policies and present them for approval. It will also deal with other aspects, including setting performance criteria, establishing human resource policies, and setting and overseeing the implementation of various employee benefits.

Nomination Committee

The nomination committee will create the nomination policies and procedures for new board members and executive management. It will recruit new board members who have the needed qualities and experience for the company. In addition, the committee will regularly examine various aspects of the existing board members to determine if their skills, expertise, and performance meet the current and future needs of the company and the board.

Risk Committee

The risk committee plays a critical role in establishing, implementing, and monitoring the appropriate level of risk within the company. The committee seeks to systematically manage existing and potential issues by identifying, assessing, and mitigating risk throughout the enterprise.

Investment Committee

The board is responsible for the strategic direction of the company, and will be involved in large investments. The investment committee will establish and regularly review and update the investment policies. The committee will review and reach conclusions on material investment opportunities, including expansion projects, acquisitions, and major divestitures.

LOS 34g: Describe market and non-market factors that can affect stakeholder relationships and corporate governance. Vol 4, pp 25–27

Stakeholder Relationships and Corporate Governance

There are three **market** factors that affect the stakeholder relationship and corporate governance. They are:

1. Shareholder engagement
2. Shareholder activism
3. Competition and takeover

Shareholder Engagement

The first is **shareholder engagement**. It is a growing trend that companies engage with shareholders on a more frequent basis throughout the year. The additional transparency and information sharing tend to increase management support and reduce the potential for efforts by shareholders to more actively pursue other means to influence outcomes.

Shareholder Activism

Shareholder activism is the second market factor that seeks to modify the behavior within a company. The ultimate goal is to increase shareholder value. It is a more forceful path that seeks to compel the company to act in a particular manner. There are several ways to accomplish this, but they are not available in all countries. Lawsuits can be brought against various groups, including the board of directors, management, and/or controlling shareholders. Raising public awareness to exert pressure on the company is another way, or a proxy battle. Hedge funds tend to draw the largest amount of activism due to their loosely regulated nature.

Competition and Takeover

When shareholders believe the company's performance is not acceptable, they may pursue a more aggressive stance, which leads to the third market factor: competition and takeover. If the company is underperforming a competitor, senior managers may lose their positions and directors can be voted out by shareholders. It is in the best interest of board members and management to maximize the value of the company. However, if not viewed in this manner, a corporate takeover may ensue, which could be a **proxy contest**, a **tender offer**, or a **hostile takeover**.

- In a proxy contest (or proxy fight), shareholders are persuaded to vote for a group seeking to take positions that will control the company's board of directors.
- A tender offer is one that attempts to persuade shareholders to sell their shares to the group seeking to gain control.
- A hostile takeover results when an entity acquires a company without the consent of company management.

In addition, staggering board member terms can dilute shareholder rights, as the entire board cannot be removed immediately.

Non-market factors present an environment that can change governance and its relationship with stakeholders. There are generally three factors:

1. The legal environment
2. Media
3. The corporate governance industry

The Legal Environment

The legal environment varies around the world and offers different protection to the shareholder or creditor. Creditors generally have a better protected position due to the contractual nature of their relationship.

Media

The media have played an important role in bringing attention to various topics to raise the awareness of stakeholders over the years. More recently, social media has become a powerful tool that has leveled the playing field between the company and stakeholders. It has the ability to influence stakeholder relationships instantly and at little cost.

The Corporate Governance Industry

The corporate governance industry has arisen out of the demand for information surrounding the subject. Information wasn't available previously, until the industry was required to change. The reporting services are concentrated and exert significant influence, as corporations must pay attention to their ratings and thus change their behavior if necessary.

LOS 34h: Identify potential risks of poor corporate governance and stakeholder management and identify benefits from effective corporate governance and stakeholder management. Vol 4, pp 28–30

Risks of Poor Corporate Governance and Stakeholder Management

When a company has poor corporate governance, it opens itself up to various risks. In a weak control environment, four potential issues are:

1. Weak control systems
2. Ineffective decision making
3. Legal, regulatory, and reputational risks
4. Default and bankruptcy risks

Weak Control Systems

Poor financial information can lead to many issues, including lack of confidence in financial information and inability to obtain financing, as well as producing poor information internally. These are some of the issues related to a poor control environment due to weak control systems. In addition, the company's ability to catch fraudulent activity or erroneous accounting records is another. Audit deficiencies due to a weak control environment at Enron Corporation led to one of the largest bankruptcies in history.

Ineffective Decision Making

In the absence of sufficient monitoring, there may be information asymmetry, leading to ineffective decision making. This situation would give one stakeholder group an advantage over another group. In particular, if managers have better information, they would have the ability to make decisions for their benefit. This would undermine the board which monitors them, as the board would be unable to act on behalf of the shareholders to maximize corporate value.

Legal, Regulatory, and Reputational Risk

If the company has weaknesses in its implementation of regulatory requirements, it could be exposed to various legal, regulatory, and reputational risks. Legally, the company could be held responsible for non-compliance, which would also bring regulatory risks. In addition, its reputation would be at stake when the information is disseminated almost instantly on one of the various news outlets, including social media.

Default and Bankruptcy Risks

When corporate governance is poor and there is weak management of the creditors' interest, this can lead to poor decision making from management. These decisions can easily affect the company's financial position, which can lead to default and bankruptcy.

Benefits of Effective Governance

Effective governance can lead to four benefits:

1. Operational efficiency
2. Improved control
3. Better operating and financial performance
4. Lower default risk and cost of debt

Operational Efficiency

When a company clarifies the organizational structure that outlines responsibilities, reporting lines, and the internal control environment, employees will have a clear understanding of their perspective duties. This will increase the likelihood that the company will experience operational efficiencies.

Improved Control

Improved control can also be realized, which helps to minimize various risks, including regulatory, legal, and financial risks. This ultimately reduces costs as well.

Better Operating and Financial Performance

With a strong control system, the company can see better operating performance and better information gathering. This leads to improved decision making and can decrease the response time to changes in the market.

Lower Default Risk and Cost of Debt

With a strong governance structure, business and investment risk is reduced. This will help to protect creditors' interests and will ultimately reduce the company's cost of debt and default risk.

LOS 34i: Describe factors relevant to the analysis of corporate governance and stakeholder management. Vol 4, pp 31–35

Analysis of Corporate Governance and Stakeholder Management

Analyzing a company's corporate governance structure is a subjective endeavor. However, there are several potential items that should be considered, as a good structure leads to several benefits in the long-term success of a company. Six key areas of interest are:

1. Economic ownership and voting control
2. Board of directors representation

3. Remuneration and company performance
4. Investors in the company
5. Strength of shareholders' rights
6. Managing long-term risks

Economic Ownership and Voting Control

Evaluating the economic ownership and voting control helps to understand how decisions are made by shareholders. Generally, there is a structure that gives one vote for each share owned. However, there are dual-class systems that split voting rights by different classes. The differences in each setup will have implications, potentially on valuations, as dual-class companies tend to trade at a discount to their peers.

Board of Directors Representation

Evaluating the makeup of the board is another important aspect that should be reviewed. Do the directors have the proper backgrounds and skills to guide the company in the current environment and the future? Having a long-tenured board may have a negative impact on the future success of the company, if it limits the board's diversity and adaptability.

Remuneration and Company Performance

Remuneration is one way to incentivize management to act in the long-term interests of the company. Reviewing compensation programs and ensuring they align with shareholder interests are important. Various warning signs could present themselves, including:

- The lack of equity incentives to align with shareholders
- Little variation in results over multiple years due to inadequate hurdles
- Excessive payouts relative to comparable companies with comparable results
- Strategic implications of incentives that may not be appropriate
- Plans that have not changed with the company's life cycle change

Investors in the Company

Understanding the investor composition gives insights into control and directionality of decisions. If there is a concentrated holding that controls voting, this can dictate how the company is run for the immediate future, and potentially longer. In addition, if the shareholder group has a significant number of experienced activists, this can lean toward a short-term-oriented investor mentality, which can create substantial turnover in a very short period of time.

Strength of Shareholders' Rights

The strength of shareholders' rights is another aspect to consider. The framework of the rights will help determine whether there could be structural obstacles to certain transactions in the company's charter or bylaws. Can shareholders remove board members? Can they convene special stockholder meetings? These and other questions should be answered. Some rights vary by country.

Managing Long-Term Risks

It is important to investigate stakeholder relations and the ability of management to manage long-term risks. When poor, these have had an enormous impact on share value.

One way to assess management quality is by examining patterns of fines, accidents, regulatory issues, and so on. If they are persistent, it is a good indicator there may be an issue.

The analysis of these additional areas that are non-financial in basis is a subjective exercise. However, it provides a basic framework for uncovering incremental insights about a company.

LOS 34j: Describe environmental and social considerations in investment analysis. Vol 4, pp 36–37

Social and environmental considerations are beginning to be thought of more frequently, but have been slower to take hold compared to corporate governance as a factor impacting investing. However, there are many issues that exist in these two realms. Identifying factors that will have a substantial effect on the performance of a company is difficult. Global trends in resource scarcity and societal and environmental changes, as well as other related concerns, are beginning to take a more dominant place in the investment process.

Together with corporate governance in the investment process, this is called **ESG** (environmental, social, governance) **integration**. Even though it was once thought of as being non-financial in nature, as more information becomes available, it is increasingly quantifiable and can be used in the investment process.

The terminology is sometimes confusing, as **sustainable investing** (SI) and **responsible investing** (RI) are used interchangeably with ESG integration. However, SI and RI utilize ESG in their investment process. Historically, there has been an exclusionary process called **socially responsible investing** (SRI) that limits investments in companies whose products are contrary to the ethical and moral values of an investor, such as weapons and tobacco. With **impact investing** (sometimes used as the "I" in SRI), investors seek to meet their specific social and environmental goals with identifiable financial returns.

LOS 34k: Describe how environmental, social, and governance factors may be used in investment analysis. Vol 4, pp 38–39

ESG Market Overview

ESG considerations can be widely defined, but clearly can have a significant impact on the financial outcomes within a company. The 2010 explosion of the *Deepwater Horizon* oil rig in the Gulf of Mexico caused a massive oil spill with various financial costs as well as the loss of human life, marine and wildlife habitat, tourism, and more. Investors are becoming more aware of the various situations that have a negative impact not only on the environment but also on society. In the recent past, Walmart has had several strikes and lawsuits that have cost hundreds of millions of dollars to settle.

Therefore, there is a growing emphasis on investing that utilizes ESG criteria. Some large institutional asset owners embrace the concept of being a **universal owner**. This is a long-term investor with a diversified global portfolio that is linked to economic growth while being exposed to costs resulting from environmental damage. It is thus important to consider various factors while performing investment analysis.

ESG Factors in Investment Analysis

Environmental issues have various financial risks for companies. One of the primary risks is associated with stranded assets. Also referred to as carbon assets, these items are at risk of no longer being economically viable because of changes in regulations or investor sentiment. It is difficult to assess the full impact of such assets. For an energy company, the potential financial risks can be significant, but difficult to quantify as these companies do not provide sufficient information on the existence of these assets.

Material events that impact the environment can be costly in terms of legal and regulatory issues, such as fines and litigation. They very well may include clean-up costs as well as reputational costs. Therefore, in any analysis, it is important to factor in both the risk and the potential costs if an error occurs.

Societal issues can be very broad, including issues within the workplace, human rights, and welfare. They can also include the impact on the community. Companies that incorporate social factors into their business can potentially benefit from a sustainable competitive advantage, as workforce training, safety, turnover, and morale (to name a few) positively impact a company. This can lead to higher productivity and lower costs.

ESG Implementation Methods

The implementation of ESG mandates can include the following three methods:

1. Negative screening
2. Positive screening and best-in-class
3. Thematic investing

Negative Screening

Also referred to as exclusionary screening, **negative screening** is used to exclude certain sectors as defined by the investor, such as fossil fuels, companies with human rights or environmental concerns, or companies that do not align with religious or personal beliefs. This is the most common form of ESG-related investing.

Positive Screening and Best-in-Class

In contrast to negative screening, **positive screening** or **best-in-class** approaches focus on including investments with favorable ESG aspects. This could include companies that promote human dignity, workplace well-being, respect for the environment, and so forth. Best-in-class approaches will evaluate and score companies on ESG criteria and choose those with the highest rating in each industry.

Thematic Investing

Thematic investing is utilized when a strategy is implemented utilizing only one factor to evaluate companies relative to ESG criteria. For example, a thematic approach could include clean water technologies, climate change, energy efficiencies, or a myriad of other specific focuses.

READING 35: CAPITAL BUDGETING

LESSON 1: CAPITAL BUDGETING

Capital budgeting is the process that companies use for making long-term investment decisions (e.g., acquiring new machinery, replacing current machinery, launching new products, and spending on research and development). Capital budgeting is very important because:

- A significant amount of capital is usually tied up in long-term projects. The success of these investments has a significant influence on the future prospects of the company.
- The principles of capital budgeting can also be used in making other operating decisions (e.g., investments in working capital and acquisitions of other companies).
- The valuation principles used in capital budgeting are also applied in security analysis and portfolio management.
- Sound capital budgeting decisions maximize shareholder wealth.

LOS 35a: Describe the capital budgeting process and distinguish among the various categories of capital projects. Vol 4, pp 44–45

The steps typically involved in the capital budgeting process are as follows:

1. Generating ideas: Generating good investment ideas is the most important step in the process. These ideas can be generated from any part of the organization or even from sources outside the company.

2. Analyzing individual proposals: This step involves collecting information to forecast the cash flows of a particular project as accurately as possible. Cash flows are then used to evaluate the feasibility of the project.

3. Planning the capital budget: Projects that are undertaken should fit into the company's overall strategy. Further considerations include the timing of the project's cash flows and availability of company resources.

4. Monitoring and post-auditing: In this step, actual performance is compared to forecasts and the reasons behind any differences are sought. Post-auditing helps monitor the forecasts to improve their accuracy going forward *and* to improve operations to make them more efficient. Concrete ideas for future investments may also abound from this step.

Capital budgeting projects can usually be classified into the following categories:

1. Replacement projects: These projects help in maintaining the normal course of business and do not usually require very thorough analysis. For example, if a piece of equipment becomes obsolete, the decision whether to replace it usually does not require detailed analysis. Replacement decisions that involve replacing existing equipment with more efficient equipment, or with newer technology, usually require more detailed analysis.

2. Expansion projects: These are projects that increase the size of the business. Expansion decisions require more careful consideration compared to simple replacement projects because there are more uncertainties involved.

3. New products and services: Venturing into new products and services brings added uncertainties to the firm's overall operations. These decisions require extremely detailed analysis along with the participation of a lot more people in the decision making process.

4. Regulatory, safety, and environmental projects: These projects are sometimes made mandatory by a governmental agency or some external party. They might not generate any revenues themselves, but may accompany other revenue-generating projects undertaken by the company. Sometimes however, the cost of these obligatory projects is so high that the company may be better off shutting down operations altogether or just closing the part of the business that is related to the project.

5. Other projects: Some projects cannot be analyzed through capital budgeting techniques. They could be pet projects of senior management and so needless or so risky that they are difficult to evaluate and justify using the typical assessment methods. An example of such a decision is the acquisition of a new private jet by the CEO of a company.

LOS 35b: Describe the basic principles of capital budgeting. Vol 4, pp 46–48

Let's go over some important capital budgeting concepts before moving on to the basic principles of capital budgeting.

Sunk costs are those costs that cannot be recovered once they have been incurred. Capital budgeting ignores sunk costs because it is based only on current and future cash flows. An example of a sunk cost is the market research costs incurred by the company to evaluate whether a new product should be launched.

Opportunity cost is the value of the next best alternative that is *foregone* in making the decision to pursue a particular project. For example, if we invest $1 million in a piece of equipment, the opportunity cost of investing in that piece of equipment is the amount that $1 million would have earned in its next most profitable use. Opportunity costs should be *included* in project costs.

An **incremental cash flow** is the additional cash flow realized as a result of a decision. Incremental cash flow equals cash flow with a decision minus the cash flow without the decision.

An **externality** is the effect of an investment decision on things other than the investment itself. Externalities can be positive or negative and, if possible, externalities should be considered in investment decision-making. An example of a negative externality is *cannibalization* as a new product reduces sales of existing products of the company.

A **conventional cash flow stream** is a cash flow stream that consists of an initial outflow followed by a series of inflows. The sign of the cash flows changes only once. For a **nonconventional cash flow stream** however, the initial outflow is not followed by inflows only, but the direction of the flows change from positive to negative again. There is more than one sign change in a nonconventional cash flow stream.

The basic principles (assumptions) of capital budgeting are:

1. **Decisions are based on actual cash flows:** Only incremental cash flows are relevant to the capital budgeting process, while sunk costs are completely ignored. Analysts must also attempt to incorporate the effects of both positive and negative externalities into their analysis.
2. **Timing of cash flows is crucial:** Analysts try to predict exactly when cash flows will occur, as cash flows received earlier in the life of the project are worth more than cash flows received later.
3. **Cash flows are based on opportunity costs:** Projects are evaluated on the incremental cash flows they bring in, over and above the amount they would generate in their next best alternative use (opportunity cost).
4. **Cash flows are analyzed on an after-tax basis:** The impact of taxes on cash flows is always considered before making decisions.
5. **Financing costs are ignored from calculations of operating cash flows:** Financing costs are reflected in the required rate of return from an investment project, so cash flows are not adjusted for these costs. If financing costs were also included in the calculation of net cash flows, analysts would be counting them twice. Therefore, they focus on forecasting operating cash flows and capture costs of capital in the discount rate.
6. **Accounting net income is not used as cash flows for capital budgeting** because accounting net income is subject to noncash charges (e.g., depreciation) and financing charges (e.g., interest expense).

LOS 35c: Explain how the evaluation and selection of capital projects is affected by mutually exclusive projects, project sequencing, and capital rationing. Vol 4, pp 48–49

1. **Independent versus mutually exclusive projects.** Independent projects are those whose cash flows are unrelated. Mutually exclusive projects compete directly with each other for acceptance. If Project A and B are mutually exclusive, the firm may only accept one of them, not both.
2. **Project sequencing.** Many projects can only be undertaken in a certain order, so investing in one project creates the opportunity to invest in other projects in the future. For example, a company might invest in a project today and then invest in a second project after three years if the first project is successful and the economic scenario has not been adversely affected. However, if the initial project does not do so well, or if the economic environment is no longer favorable, the company will not invest in the second project.
3. **Unlimited funds versus capital rationing.** When the company has no constraints on the amount of capital it can raise, it will invest in all profitable projects to maximize shareholder wealth. The need for capital rationing arises when the company has limited funds to invest. If the capital required to invest in all profitable projects exceeds the resources available to the company, it must allocate funds to only the most lucrative projects to ensure that shareholder wealth is maximized.

LOS 35d: Calculate and interpret net present value (NPV), internal rate of return (IRR), payback period, discounted payback period, and profitability index (PI) of a single capital project. Vol 4, pp 48–56

The two most popular measures used to evaluate a single capital project are net present value (NPV) and internal rate of return (IRR).

Net Present Value (NPV)

For a project with one investment outflow, which occurs at the *beginning* of the project, the net present value is the present value of the future after-tax cash flows minus the investment outlay. NPV measures the amount in monetary units that a project is expected to add to shareholder wealth.

$$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - \text{Outlay}$$

where
CF_t = after-tax cash flow at time, t.
r = required rate of return for the investment. This is the firm's cost of capital adjusted for the risk inherent in the project.
Outlay = investment cash outflow at t = 0.

Decision Rules for NPV

- A project should be undertaken if its NPV is greater than zero. Positive NPV projects increase shareholder wealth.
- Projects with a negative NPV decrease shareholder wealth and should not be undertaken.
- A project with an NPV of zero has no impact on shareholder wealth.

Example 1-1: Calculating NPV

Calculate the NPV of a capital project with an initial investment of $30 million. The project generates after-tax cash flows of $10 million at the end of Year 1, $14 million at the end of Year 2, and $18 million at the end of Year 3. The required rate of return is 10%.

Solution

$$NPV = -\$30m + \frac{\$10m}{(1.10)^1} + \frac{\$14m}{(1.10)^2} + \frac{\$18m}{(1.10)^3}$$

$$NPV = -\$30m + \$9.09m + \$11.57m + \$13.52m$$

$$NPV = \$4.184 \text{ million}$$

TI BAII Plus® calculator keystrokes:

Keystrokes	Explanation	Display
[CF][2nd][CE/C]	Clear CF Memory registers	CF0 = 0.0000
30 [+/–][ENTER]	Initial Cash Outlay	CF0 = –30.0000
[↓] 10 [ENTER]	Period 1 cash flow	C01 = 10.0000
[↓] [↓] 14 [ENTER]	Period 2 cash flow	C02 = 14.0000
[↓] [↓] 18 [ENTER]	Period 3 cash flow	C03 = 18.0000
[NPV] 10 [ENTER]	10% discount rate	I = 10
[↓] [CPT]	Calculate NPV	NPV = 4.184

The NPV rule for independent projects recommends investing in a project if the NPV is greater than zero. This project generates a positive NPV of $4.184 million so it should be undertaken.

Internal Rate of Return (IRR)

For an investment project with only one investment outlay that is made at inception, IRR is the discount rate that makes the sum of present values of the future after-tax cash flows equal to the initial investment outlay. Alternatively, IRR is the discount rate that equates the sum of the present values of all after-tax cash flows for a project (inflows and outflows) to zero. Therefore, IRR is the discount rate at which NPV equals zero.

$$\sum_{t=1}^{n} \frac{CF_t}{(1+IRR)^t} = \text{Outlay} \qquad \sum_{t=1}^{n} \frac{CF_t}{(1+IRR)^t} - \text{Outlay} = 0$$

Decision Rules for IRR

- A company should invest in a project if its IRR is *greater* than the required rate of return. When the IRR is greater than the required return, NPV is positive.
- A company should not invest in a project if its IRR is *less* than the required rate of return. When the IRR is lower than the required return, NPV is negative.

Example 1-2: Calculating IRR

Calculate the IRR of a capital project with an initial cost of $30 million. The project generates positive after-tax cash flows of $10 million at the end of Year 1, $14 million at the end of Year 2, and $18 million at the end of Year 3. Determine whether the project should be undertaken given that the required rate of return is 10%.

Solution

$$0 = -\$30\text{m} + \frac{\$10\text{m}}{(1+IRR)^1} + \frac{\$14\text{m}}{(1+IRR)^2} + \frac{\$18\text{m}}{(1+IRR)^3}$$

IRR = **17.02%**

TI BAII Plus® calculator keystrokes:

Keystrokes	Explanation	Display
[CF][2nd][CE|C]	Clear CF Memory registers	CF0 = 0.0000
30 [+/−][ENTER]	Initial Cash Outlay	CF0 = −30.0000
[↓] 10 [ENTER]	Period 1 cash flow	C01 = 10.0000
[↓] [↓] 14 [ENTER]	Period 2 cash flow	C02 = 14.0000
[↓] [↓] 18 [ENTER]	Period 3 cash flow	C03 = 18.0000
[IRR] [CPT]	Calculate IRR	IRR = 17.02%

Decision: The project should be undertaken because its IRR (17.02%) is greater than the required return (10%).

Payback Period

Note that if two projects have the same payback period and identical cash flows after the payback period, the project for which cash flows within the payback period occur earlier would be preferred, as it would have a higher NPV.

A project's payback period equals the time it takes for the initial investment for the project to be recovered through after-tax cash flows from the project. All other things being equal, the best investment is the one with the shortest payback period.

Example 1-3: Calculation of Payback Period

Calculate the payback period for a project that has the following cash flows:

	0	1	2	3	4	5
Year	**$**	**$**	**$**	**$**	**$**	**$**
Cash flow	−1,000	250	300	300	400	500

Solution

First we calculate cumulative cash flows received till the end of each year:

	0	1	2	3	4	5
Year	**$**	**$**	**$**	**$**	**$**	**$**
Cumulative cash flow	−1,000	−750	−450	−150	250	750

The payback for this investment occurs somewhere between the Year 3 and Year 4, where the sign of the cumulative cash flows changes from negative to positive. As of the end of Year 3, the project still needs to recover $150 of the initial outlay. This amount is recovered from the $400 earned over Year 4. The payback period for this investment equals 3 full years plus a fraction of the fourth year. This fraction equals $150 (the amount still not recovered at the end of Year 3) divided by $400 (total amount earned during Year 4). Therefore, the payback period equals 3.375 years.

The Professional model of the TI calculator allows you to calculate the payback period and discounted payback period directly. When NPV is displayed on the screen, repeatedly press the down arrow [↓] key until PB (payback) is displayed and then press CPT (compute).

Also note that if net annual cash flows are equal, the payback period can be easily calculated by dividing project cost by the annual cash flow.

Advantages

- It is simple to calculate and explain.
- It can also be used as an indicator of *liquidity*. A project with a shorter payback period may be more liquid than one that has a longer payback period.

Drawbacks

- It ignores the risk of the project. Cash flows are *not* discounted at the project's required rate of return.
- It ignores cash flows that occur after the payback period is reached.
- It is not a measure of profitability so it cannot be used in isolation to evaluate capital investment projects. The payback period should be used along with the NPV or IRR to ensure that decisions reflect the overall profitability of the project being considered.

Discounted Payback Period

The discounted payback period equals the number of years it takes for cumulative *discounted* cash flows from the project to equal the project's initial investment outlay. A project's discounted payback period will always be *greater* than its payback period because the payback period does not discount the cash flows.

Example 1-4: Calculating the Discounted Payback Period

Assuming a discount rate of 10%, calculate the discounted payback period for a project that has the following cash flows:

Year	0 $	1 $	2 $	3 $	4 $	5 $
Cash flow	−1,000	250	300	300	400	500
Cumulative cash flow	−1,000	−750	−450	−150	250	750
Discounted cash flows	−1,000	227.27	247.93	225.39	273.21	310.46
Cumulative discounted cash flows	−1,000	−772.73	−524.80	−299.41	−26.20	284.26

Solution

$$\text{Discounted payback period} = 4\,\text{full years} + \frac{26.20}{310.46} = \mathbf{4.08\,years}$$

Advantage

- It accounts for the time value of money and risks associated with the project's cash flows.

Drawback

- It ignores cash flows that occur after the payback period is reached. Therefore, it does not consider the overall profitability of the project.

Average Accounting Rate of Return (AAR)

The AAR is the ratio of the project's average net income to its average book value.

$$\text{AAR} = \frac{\text{Average net income}}{\text{Average book value}}$$

Example 1-5: Calculating the Average Accounting Rate of Return

ABC Company invests $150,000 in a piece of equipment that is depreciated straight line over a 5-year period and has zero salvage value. Depreciation expense and net income for the 5 years are given in the table below. Calculate the AAR of the project.

	1	2	3	4	5
Year	**$**	**$**	**$**	**$**	**$**
Depreciation	30,000	30,000	30,000	30,000	30,000
Net income	25,000	27,000	28,000	26,000	26,500

Solution

For the 5-year period, the **average net income** equals:

$(25{,}000 + 27{,}000 + 28{,}000 + 26{,}000 + 26{,}500)/5 = \$26{,}500$

The initial book value of the investment is $150,000. The book value declines (as it is depreciated) by $30,000 every year until it equals zero at the end of 5 years. The **average book value** of the asset equals the average of the beginning-of-project and the end-of-project book values:

$(150{,}000 + 0)/2 = \$75{,}000$

$$\textbf{AAR} = \frac{\text{Average net income}}{\text{Average book value}} = \frac{\$26{,}500}{\$75{,}000} = \textbf{35.33\%}$$

Advantage

- It is easy to understand and easy to calculate.

Drawbacks

- It is based on accounting numbers and not cash flows. Accounting numbers are more susceptible to manipulation than cash flows.
- It does not account for time value of money.
- It does not differentiate between profitable and unprofitable investments accurately as there are no benchmarks for acceptable AARs.

Profitability Index

The profitability index (PI) of an investment equals the present value (PV) of a project's future cash flows divided by the initial investment.

$$\text{PI} = \frac{\text{PV of future cash flows}}{\text{Initial investment}} = 1 + \frac{\text{NPV}}{\text{Initial investment}}$$

The PI equals the *ratio* of discounted future cash flows to the initial investment. NPV equals the *difference* between discounted future cash flows and the initial investment. The PI indicates the value we receive in exchange for one unit of currency invested. It is also known as the "benefit-cost" ratio.

Decision Rules for PI

- A company should invest in a project if its PI is *greater* than 1. The PI is greater than 1 when NPV is positive.
- A company should not invest in a project if its PI is *less* than 1. The PI is less than 1 when NPV is negative.

Example 1-6: Calculating the Profitability Index

Calculate the profitability index of a capital project with an initial cost of $30 million. The project generates after-tax cash flows of $10 million at the end of Year 1, $14 million at the end of Year 2, and $18 million at the end of Year 3. The required rate of return is 10%.

Solution

$$\text{PV of future cash flows} = \frac{\$10\text{m}}{(1.10)^1} + \frac{\$14\text{m}}{(1.10)^2} + \frac{\$18\text{m}}{(1.10)^3} = \mathbf{\$34.18m}$$

Initial cost = **$30m**

$$\text{PI} = \frac{\text{PV of future cash flows}}{\text{Initial investment}} = \frac{\$34.18\text{m}}{\$30\text{m}} = \mathbf{1.14}$$

The project's PI is greater than 1 so the company should invest in the project.

LOS 35e: Explain the NPV profile, compare the NPV and IRR methods when evaluating independent and mutually exclusive projects, and describe the problems associated with each of the evaluation methods. Vol 4, pp 56–62

NPV Profiles

An NPV profile is a graphical illustration of a project's NPV at different discount rates. NPV profiles are downward sloping because as the cost of capital increases, the NPV of an investment falls.

Let's consider two projects, Project A and Project B. The cash flow streams for both projects are given below. For both projects, the required rate of return equals 7%.

Year	0	1	2	3	NPV	IRR
Project A	–$350,000	$425,000	$0	$0	$47,196	21.43%
Project B	–$350,000	$16,000	$16,000	$466,000	$59,323	12.96%

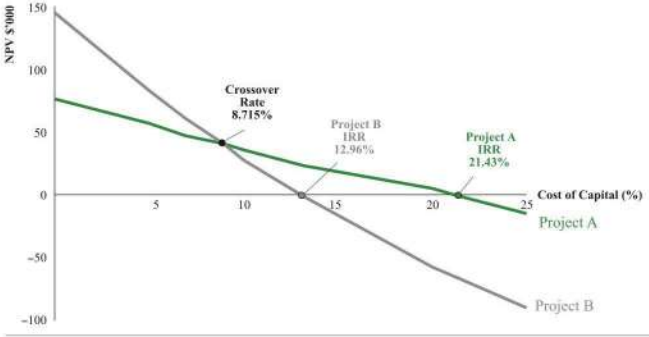
The NPVs of the projects at the various discount rates are listed in Table 1-1.

Table 1-1: Project NPVs

Discount Rate	NPV-Project A	NPV-Project B
%	$	$
0.000	75,000	148,000
5.000	54,762	82,299
7.000	47,196	59,323
8.715	**40,930**	**40,930**
10.000	36,364	27,881
12.960	26,239	0
20.000	4,167	–55,880
21.43	0	–65,712
25.000	–10,000	–88,368

The NPV profiles for the projects are illustrated in Figure 1-1. Discount rates are plotted on the x-axis and NPVs are plotted on the y-axis.

Figure 1-1: NPV Profiles



Analysis of the NPV Profiles

- The NPVs of the projects are equal at a cost of capital of 8.715%. This rate, where the NPVs of the two projects are the same and their NPV profiles intersect, is called the **crossover rate**.
- At discount rates above 8.715% (to the right of the crossover point), the NPV of Project A is greater than the NPV of Project B.
- At discount rates below 8.715% (to the left of the crossover rate), the NPV of Project B is greater than Project A.
- The NPV of Project A at a discount rate of 7% (the company's required rate of return) equals $47,196. The NPV of Project B at 7% equals $59,323.
- A project's IRR equals the discount rate at which its NPV equals 0. This means that a project's IRR is the point where its NPV profile *intersects the x-axis*. Therefore, the IRR of Project A equals 21.43% and that of Project B equals 12.96%.
- Project B has higher total cash flows over its entire life. This is why it has a higher NPV at a discount rate of 0% ($148,000 versus $75,000).
- More of Project B's cash flows come later in its life. This is the reason why the NPV profile for Project B falls faster as the cost of capital increases. At a cost of capital above 8.715%, the effect of Project B's total cash flows being higher is more than offset by the effect of its cash flows coming later.

The crossover rate can be calculated by subtracting the cash flows of one project from the other and then calculating the IRR of the differences.

NPV and IRR Applied to Independent Projects

If Project A and Project B were independent projects and the cost of capital were 7%, the company would accept both projects as they both have positive NPVs and their IRRs exceed the cost of capital (7%).

NPV and IRR Applied to Mutually Exclusive Projects

If the projects are mutually exclusive, the company can only choose one of them. Project A has a higher IRR (21.43% vs. 12.96%), but Project B has a higher NPV ($59,323 vs. $47,196). The conflict in recommendations is due to the *different pattern of cash flows*. Project A receives a lump sum amount of $425,000 in the first year while Project B receives equal cash flows in the first two years and then a lump sum amount of $466,000 in the third year.

When NPV and IRR rank two mutually exclusive projects differently, *the project with the higher NPV must be chosen*. NPV is a better criterion because of its more realistic reinvestment rate assumption.

IRR assumes that interim cash flows received during the project are reinvested at the IRR. This assumption is sometimes rather inappropriate, especially for projects with high IRRs. NPV on the other hand, makes a more realistic assumption that interim cash flows are reinvested at the required rate of return.

Aside from cash flow timing differences, NPV and IRR may also give conflicting project rankings because of *differences in project size*.

Consider two mutually exclusive projects, Project C and Project D, whose cash flows are given below. For both projects, the required rate of return equals 5%. The NPVs and IRRs of the projects are also included in the table below.

Note that while the NPV is theoretically the best method (as it is a direct measure of the expected increase in shareholder wealth) it has a shortcoming in that it does not account for differences in project size.

Project Cash Flows

Year	0	1	2	3	4	5	NPV	IRR
Project C	−1,000	500	500	500	500	500	$1,164.7	41.04%
Project D	−100,000	32,000	32,000	32,000	32,000	32,000	$38,543.3	18.03%

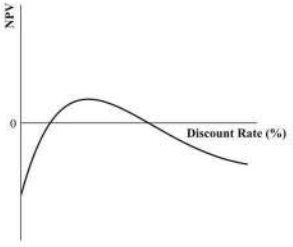
Project C has a higher IRR (41% vs. 18%) but Project D has a higher NPV ($38,543 vs. $1,165). Once again, NPV is the *better* criterion for making the investment decision. NPV represents the absolute increase in shareholder wealth attributable to a particular project. In this case, Project D should be chosen.

Problems with the IRR

The Multiple IRR Problem

A project has a nonconventional cash flow pattern when the initial outflow is not followed by inflows only. The direction of cash flows changes from positive to negative over the project's life (i.e., there is *more than one sign change* in the cash flow stream). Figure 1-2 illustrates the NPV profile of a nonconventional cash flow stream that suffers from the multiple IRR problem. Notice that the NPV profile intersects the x-axis at two different points.

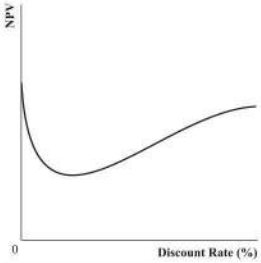
Figure 1-2: NPV Profile for a Project with Multiple IRRs



No IRR Problem

Sometimes cash flow streams have no IRR (i.e., there is no discount rate that results in a zero NPV). Figure 1-3 illustrates the NPV profile of a nonconventional cash flow stream that suffers from the "no IRR" problem. The figure also illustrates that projects with no IRRs may have positive NPVs.

Figure 1-3: NPV Profile for a Project with No IRR



Surveys have studied the relative popularity of various capital budgeting techniques and have found that:

- The payback method is very popular in European countries.
- Larger companies prefer the NPV and IRR methods over the payback method.
- Private corporations use the payback period more often than public companies.
- Companies headed by MBAs have a preference for discounted cash flow techniques.

LOS 35f: Describe expected relations among an investment's NPV, company value, and share price. Vol 4, pg 64

If a company invests in a positive NPV project, the expected addition to shareholder wealth should lead to an increase in the stock price. The following example illustrates this.

Example 1-7: NPV and its Effect on Stock Price

Freeman Corp. is planning to invest $50 million in a new project. The present value of the future after-tax cash flows from the project is estimated to be $75 million. This is new information and is independent of other expectations regarding the company. The company has 5 million shares outstanding and the market price of the company's stock is $100.

What should be the effect of the new project on:

1. The value of the company.
2. The company's stock price.

Solution

NPV of the new project
= $75 million – $50 million = $25 million

Company value before the new project
= 5 million shares × $100 = $500 million

Company value after the new project
= $500 million + $25 million = $525 million

Price/share after the new project
= $525 million/5 million shares = $105

1. The new project will have a positive effect of $25 million on the value of the company (shareholder wealth).
2. The stock price should increase to $105. The positive NPV of the new project should have a positive direct impact on its stock price.

However, the effect of a project's NPV on share prices is not as simple as shown in Example 1-7. The value of a company is determined by valuing its existing investments and adding the expected NPV of its future investments. The impact of the decision to undertake a particular project on a company's stock price will depend on how the actual profitability of the investment differs from the expected profitability of a company's investments. Expected profitability is usually already factored into current market prices.

If the profitability of a positive NPV project that the company is about to undertake is below expectations, stock prices may fall. On the other hand, certain capital projects undertaken by the company may signal that there are other potentially lucrative projects to follow. Taking on a project that brings with it the expectation of even greater future profits from subsequent opportunities may increase stock prices beyond the actual addition to the company value from said project alone.

Capital budgeting processes tell us two things about company management:

1. The extent to which management pursues the goal of shareholder wealth maximization.
2. Management's effectiveness in pursuit of this goal.

READING 36: COST OF CAPITAL

LESSON 1: COST OF CAPITAL

Cost of capital refers to the rate of return that the suppliers or providers of capital require to contribute their capital to the firm. We can also think of the cost of capital as the opportunity cost of funds for the providers of capital. Unless the return offered by a company meets or exceeds the rate that could be earned elsewhere from an investment of similar risk, a potential supplier of capital will not provide capital to the company.

LOS 36a: Calculate and interpret the weighted average cost of capital (WACC) of a company. Vol 4, pg 75

To raise capital, a company can either issue equity or debt (some instruments may have features of both debt and equity). An instrument that is used to obtain financing is called a component, and each component has a different required rate of return, which is known as the component cost of capital. The weighted average of the costs of the various components used by the company to finance its operations is known as the **weighted average cost of capital (WACC)** or the **marginal cost of capital (MCC)**. The WACC is the expected rate of return that investors demand for financing an average risk investment of the company. A company's WACC is calculated using the following formula (See Example 1-1):

$$WACC = (w_d)(r_d)(1-t) + (w_p)(r_p) + (w_e)(r_e)$$

where:
w_d = Proportion of debt that the company uses when it raises new funds
r_d = Before-tax marginal cost of debt
t = Company's marginal tax rate
w_p = Proportion of preferred stock that the company uses when it raises new funds
r_p = Marginal cost of preferred stock
w_e = Proportion of equity that the company uses when it raises new funds
r_e = Marginal cost of equity

Example 1-1: Calculating WACC

Axen Company's capital structure is composed of 40% debt, 5% preferred stock, and 55% common equity. Axen's before-tax cost of debt is 7%, cost of preferred equity is 8%, and cost of common equity is 10%. The company's marginal tax rate is 30%. Calculate Axen's WACC.

Solution

$$WACC = (w_d)(r_d)(1-t) + (w_p)(r_p) + (w_e)(r_e)$$

$$WACC = (0.4)\ (0.07)\ (1-0.3) + (0.05)\ (0.08) + (0.55)\ (0.10) = \mathbf{7.86\%}$$

LOS 36b: Describe how taxes affect the cost of capital from different capital sources. Vol 4, pp 75–76

Let's assume that a company pays $50,000 in interest for a given year. The $50,000 is an expense that the company is allowed to recognize for tax purposes to reduce taxable income. Interest expense reduces the company's profits before tax by $50,000, and assuming a 30% tax rate, reduces profits after tax by only $35,000. This is because interest expense provides a tax shield of $15,000. This tax shield is calculated as interest expense multiplied by the tax rate ($50,000 × 30% = 15,000).

Adjusting for the interest tax shield, the real after-tax cost of debt for the company is not really $50,000, but only $35,000. Tax savings are only realized on payments to holders of debt instruments. Payments to preferred and common stock holders are not expensed on the income statement and do not result in tax savings. Notice that only the cost of debt is adjusted for tax savings in the WACC formula.

LOS 36c: Describe the use of target capital structure in estimating WACC and how target capital structure weights may be determined. Vol 4, pp 76–78

In determining the cost of capital (WACC) for a project, we would ideally want to use the weights of the various components in proportion to their employment in financing the new project. If we assume that the company has a target capital structure and will raise capital in line with its target structure, we should use the target capital structure in calculating WACC.

The target capital structure is the capital structure that the company aims to maintain. The weights used in the calculation of the WACC are the proportions of debt, preferred stock, and equity that the firm hopes to achieve and maintain in its capital structure over time. A simple way to transform a debt-to-equity ratio (D/E) into a weight is to simply divide the ratio by (1 + D/E):

$$\frac{D/E}{1+D/E} = \frac{D}{D+E} = w_d$$
$$w_d + w_e = 1$$

If information about the target capital structure is not easily available, we can use the weights in the company's current capital structure. The weights of the various components should be based on *market values*.

Another option is to examine trends in the company's capital structure over time or statements by management regarding the company's capital structure policy to estimate the target capital structure.

An analyst may also use the average weights of comparable companies' capital structures as the target capital structure for the company. See Examples 1-2 and Example 1-3.

Example 1-2: Calculating Capital Structure Weights

The market values of a company's sources of capital are as follows:

Bonds outstanding	$10 million
Preferred stock	$2 million
Common stock	$38 million
Total capital	**$50 million**

Based on the firm's existing capital structure, what weights should be used to determine the company's WACC?

Solution

Weight of debt = w_d = $10 million/$50 million = 20%
Weight of preferred stock = w_p = $2 million/$50 million = 4%
Weight of common stock = w_e = $38 million/$50 million = 76%

Always check that the weights add up to 1: $w_d + w_e + w_p = 0.2 + 0.04 + 0.76 = 1$

Example 1-3: Estimating Proportions of Capital

The market value of Becker Inc.'s debt is $25 million and the market value of its equity is $35 million.

1. What is the weight of debt and equity in the company's current capital structure?
2. If the company announces that a debt-to-equity ratio of 0.6 reflects its target capital structure, what weights should be assigned to debt and equity in calculating the company's WACC?

Solution

1. Using the current capital structure:

   Weight of debt = w_d = $25 million / ($25 million + $35 million) = 0.417
   Weight of equity = w_e = $35 million / ($25 million + $35 million) = 0.583

2. The weight of debt in the target capital structure is calculated by dividing the target D/E ratio by (1 + D/E):

$$w_d = \frac{D}{D+E} = \frac{D/E}{1+D/E}$$

$$w_d = 0.6/(1+0.6)$$
$$w_d = 0.375$$

$$w_e = 1 - w_d$$
$$w_e = 1 - 0.375 = 0.625$$

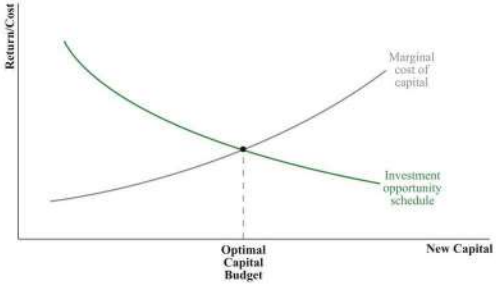
LOS 36d: Explain how the marginal cost of capital and the investment opportunity schedule are used to determine the optimal capital budget.
Vol 4, pp 78–80

A company's **marginal cost of capital (MCC)** *increases* as it raises additional capital. This is because most firms must pay a higher cost to obtain increasing amounts of capital. For example, the more a company borrows, the *greater* the risk that it will be unable to repay its lenders, and therefore, the *higher* the return required by investors.

The profitability of a company's investment opportunities *decreases* as the company makes additional investments. The company prioritizes investments in projects with the highest IRRs. As more resources are invested in the most rewarding projects, remaining opportunities offer lower and lower IRRs. This fact is represented by an **investment opportunity schedule (IOS)** that is downward-sloping.

The **optimal capital budget** occurs at the point where the marginal cost of capital intersects the investment opportunity schedule (see Figure 1-1).

Figure 1-1: Optimal Investment Decision



- The company should raise capital (at the given MCC) and undertake all projects (to earn the given IRR) to the left of the intersection point because these projects enhance shareholder wealth given the cost of financing them.
- To raise capital in excess of the optimal capital budget (to the right of the intersection point) the firm will be required to incur a cost of capital that is greater than the return on available investments. Undertaking these projects, given the MCC, will erode the firm's value.

LOS 36e: Explain the marginal cost of capital's role in determining the net present value of a project. Vol 4, pg 79

The WACC is the discount rate that reflects the average risk of the company. When we choose WACC as the discount rate to evaluate a particular project, we assume that:

- The project under consideration is an average risk project.
- The project will have a constant capital structure (which equals the company's target capital structure) throughout its life.

The cost of capital for a particular project should reflect the risk inherent in that particular project, which will not necessarily be the same as the risk of the company's average project. If the risk of the project under consideration is above or below the average risk of the company's current portfolio of projects, an adjustment is made to the WACC. Specifically:

- If a project has *greater* risk than the firm's existing projects, the WACC is adjusted *upward*.
- If the project has *less* risk than the firm's exiting projects, the WACC is adjusted *downward*.

The WACC or MCC adjusted for the project's level of risk plays an important role in capital budgeting because it is used to calculate the project's NPV.

LESSON 2: COSTS OF THE DIFFERENT SOURCES OF CAPITAL

LOS 36f: Calculate and interpret the cost of debt capital using the yield-to-maturity approach and the debt-rating approach. Vol 4, pp 80–82

The cost of fixed rate capital is the cost of debt financing when a company issues a bond or takes a bank loan. We will discuss two approaches to estimate the before-tax cost of debt (r_d).

1. Yield-to-Maturity Approach

The bond's yield to maturity (YTM) is a measure of the return on the bond assuming that it is purchased at the current market price and held till maturity. It is the yield that equates the present value of bond's expected future cash flows to its current market price. See Example 2-1.

$$P_0 = \left[\sum_{t=1}^{n} \frac{PMT}{\left(1+\frac{r_d}{2}\right)^t}\right] + \frac{FV}{\left(1+\frac{r_d}{2}\right)^n}$$

where:

P_0 = Current market price of the bond.
PMT_t = Interest payment in period t.
r_d = Yield to maturity on BEY basis.
n = Number of periods remaining to maturity.
FV = Par or maturity value of the bond.

This equation assumes that we are considering a semiannual-pay coupon bond so the interim cash flows are discounted at $r_d/2$.

Example 2-1: Calculating the Cost of Debt Using the YTM Approach

Fordova Inc. issues a semiannual-pay bond to finance a new project. The bond has a 10-year term, a par value of $1,000, and offers a 6% coupon rate. Assuming that the bond is issued at $1,010.30 and that the tax rate for the company is 40%, calculate the before-tax and after-tax cost of debt.

Solution

Present value = $1,010.30
Future value = Par = $1,000
Periodic payment = 6%/2 × 1,000 = $30
Number of discounting periods = 10 × 2 = 20

$$P_0 = \left[\sum_{t=1}^{20} \frac{\$30}{\left(1+\frac{r_d}{2}\right)^t}\right] + \frac{1{,}000}{\left(1+\frac{r_d}{2}\right)^n}$$

Or using our calculator:

N = 20; PV = −$1,010.30; FV = $1,000; PMT = $30; CPT I/Y; I/Y = 2.931

The semiannual yield is multiplied by 2 to calculate the bond's YTM on a BEY basis.

The yield to maturity on the bond equals 2.931 × 2 = 5.862%. This is the before-tax cost of debt (r_d).

After-tax cost of debt = $r_d\,(1 - t) = 5.862\,(1 - 0.4) = 3.52\%$

2. Debt-Rating Approach

When a reliable current market price for the company's debt is not available, the before-tax cost of debt can be estimated using the yield on similarly rated bonds that also have similar terms to maturity as the company's existing debt. See Example 2-2.

Example 2-2: Debt-Rating Approach

Alextar Inc. has a capital structure that includes AAA-rated bonds with 10 years to maturity. The yield to maturity on a comparable AAA-rated bond with a similar term to maturity is 6%. Using a tax rate of 40%, calculate Alextar's after-tax cost of debt.

Solution

Alextar's after-tax cost of debt = $r_d(1-t) = 0.06(1-0.4) = 3.6\%$

When using the debt-rating approach, adjustments might have to be made to the before-tax cost of debt of the comparable company. The relative seniority and security of different issues affect ratings and yields, and these factors should be considered when selecting a comparable bond and using its before-tax cost of debt as a proxy for the cost of debt of the company being studied.

Issues in Estimating Cost of Debt

- Fixed-rate versus floating-rate debt: The cost of floating-rate debt is reset periodically based on a reference rate (usually LIBOR) and is therefore, more difficult to estimate than the cost of fixed-rate debt. For floating-rate bonds, analysts may use the current term structure of interest rates and term structure theory to estimate the cost of debt.
- Debt with option-like features: If currently outstanding bonds contain embedded options, an analyst can only use the yield to maturity on these bonds to estimate the cost of debt if she expects similar bonds (with embedded options) to be issued going forward. If however, option-like features are expected to be removed from future debt issues, she should adjust the yield to maturity on existing bonds for their option features, and use the adjusted rate as the company's cost of debt.
- Nonrated debt: If a company does not have any debt outstanding (to be rated) or yields on existing debt are not available (due to lack of relevant current prices), an analyst may not be able to use the YTM or the debt-rating approach to estimate the company's cost of debt.
- Leases: If a company uses leases as a source of finance, the cost of these leases should be included in its cost of capital.

LOS 36g: Calculate and interpret the cost of noncallable, nonconvertible preferred stock. Vol 4, pp 83–84

A company promises to pay dividends at a specified rate to its preferred stock holders. When preferred stock is noncallable and nonconvertible, has no maturity date, and pays dividends at a fixed rate, the value of the preferred stock can be calculated using the perpetuity formula.

$$V_p = D_p / r_p$$

where:
V_p = Current value (price) of preferred stock.
D_p = Preferred stock dividend per share.
r_p = Cost of preferred stock.

Rearranging this equation gives us the formula to calculate the cost of preferred stock (see Example 2-3):

$$r_p = D_p / V_p$$

Example 2-3: Determining the Cost of Preferred Stock

Shirley Inc. has outstanding preferred stock on which it pays a dividend of $10 per share. If the current price of Shirley's preference shares is $100 per share, what is its cost of preferred stock?

Solution

$$r_p = \frac{\$10}{\$100} = 10\%$$

LOS 36h: Calculate and interpret the cost of equity capital using the capital asset pricing model approach, the dividend discount model approach, and the bond-yield-plus risk-premium approach. Vol 4, pp 84–90

The cost of equity is the rate of return required by the holders of a company's common stock. Estimating the cost of equity is difficult due to the uncertainty of future cash flows that common stock holders will receive in terms of their amount and timing.

Three approaches are commonly used to determine the cost of common equity.

1. Capital Asset Pricing Model (CAPM)

The capital asset pricing model (CAPM) states that the expected rate of return from a stock equals the risk-free interest rate plus a premium for bearing risk. See Example 2-4.

We will learn more about the CAPM in Reading 43.

$$r_e = R_F + \beta_i[E(R_M) - R_F]$$

where
$[E(R_M) - R_F]$ = Equity risk premium.
R_M = Expected return on the market.
β_i = Beta of stock. Beta measures the sensitivity of the stock's returns to changes in market returns.
R_F = Risk-free rate.
r_e = Expected return on stock (cost of equity)

Example 2-4: Using CAPM to Estimate the Cost of Equity

Becker Inc.'s equity beta is 1.3. The risk-free rate is 6% and the equity risk premium stands at 10%. What is Becker's cost of equity using the CAPM approach?

Solution

$$r_e = R_F + \beta_i[E(R_M) - R_F]$$
$$r_e = 0.06 + 1.3\ (0.10) = 0.19 \text{ or } 19\%$$

The equity market risk premium, ($R_M - R_F$) can be estimated using a **survey approach** where the average of the forecasts of financial experts is adjusted for the specific stock's systematic (nondiversifiable) risk. We will learn about systematic and unsystematic risks in the Portfolio Management section.

2. Dividend Discount Model Approach

The dividend discount model asserts that the value of a stock equals the present value of its expected future dividends. We will use the constant-growth dividend discount model, (also known as a Gordon growth model) in which dividends grow at a constant rate, to determine the cost of equity. While this model is studied in greater detail in Fixed Income, at this stage we just need to know the following equation, which is used to calculate the price of a stock assuming a constant growth rate in dividends:

$$P_0 = \frac{D_1}{r_e - g}$$

where:
P_0 = current market value of the security.
D_1 = next year's dividend.
r_e = required rate of return on common equity.
g = the firm's expected constant growth rate of dividends.

Rearranging the above equation gives us a formula to calculate the required return on equity:

$$r_e = \frac{D_1}{P_0} + g$$

The growth rate, g, is a very important variable in this model. There are two ways to determine the growth rate. See Example 2-5.

1. Use the forecasted growth rate from a published source or vendor.
2. Calculate a company's sustainable growth rate using the following formula:

$$g = \left(1 - \frac{D}{EPS}\right) \times (ROE)$$

where (1 – (D/EPS)) = Earnings retention rate

We will discuss the calculation of the retention rate in the Equity section.

Example 2-5: Dividend Discount Model Approach

Diamond Inc. has an earnings retention rate of 60% and a return on equity of 20%. Its next year's dividend is forecasted to be $2 per share and the current stock price is $40. What is the company's cost of equity?

Solution

$$g = (\text{Earnings retention rate}) \times (\text{ROE}) = 60\% \times 20\% = 12\%$$

$$\text{Cost of equity} = r_e = \frac{D_1}{P_0} + g$$

$$r_e = \frac{2}{40} + 0.12 = 17\%$$

3. Bond Yield Plus Risk Premium Approach

The bond yield plus risk premium approach is based on the assumption that the cost of capital for riskier cash flows is higher than that of less risky cash flows. Therefore, we calculate the return on equity by adding a risk premium to the before-tax cost of debt. See Example 2-6.

$$r_e = r_d + \text{risk premium}$$

Example 2-6: Cost of Equity Using the Bond Yield Plus Risk Premium Approach

The yield to maturity on Graf Inc.'s long-term debt is 9%. The risk premium is estimated to be 6%. Calculate Graf's cost of equity.

Solution

$$r_e = r_d + \text{risk premium}$$

$$r_e = 9\% + 6\% = 15\%$$

Each of the three approaches to determine a company's cost of equity usually gives a different value. Analysts must use their judgment to decide which model is appropriate to compute a particular company's cost of equity.

LESSON 3: TOPICS IN COST OF CAPITAL ESTIMATION

LOS 36i: Calculate and interpret the beta and cost of capital for a project. Vol 4, pp 90–95

An analyst must estimate a stock's beta when using the CAPM approach to estimate a company's cost of equity. Beta can be calculated by regressing the company's stock's returns against market returns over a given period. The results of the regression will be in the following format:

$$R_i = a + bR_{mt}$$

where:
a = Estimate of the intercept.
b = Estimated slope of the regression (Beta).
R_i = The company's stock's returns.
R_{mt} = Market returns over the given period.

Beta estimates are sensitive to many factors and the following issues should be considered when determining beta:

- Beta estimates are based on historical returns and are therefore sensitive to the length of the estimation period.
- Smaller standard errors are found when betas are estimated using small return intervals (such as daily returns).
- Betas are sensitive to the choice of the market index against which stock returns are regressed.
- Betas are believed to revert toward 1 over time, which implies that the risk of an individual project or firm equals market risk over the long run. Due to "mean reversion," smoothing techniques may be required to adjust calculated betas.
- Small-cap stocks generally have greater risks and returns compared to large-cap stocks. Some experts argue that the betas of small companies should be adjusted upward to reflect greater risk.

While it is fairly simple to use regression to estimate betas for publicly listed companies, (given the ease of access to stock and market return data) determining betas for nonlisted companies or individual projects is quite difficult.

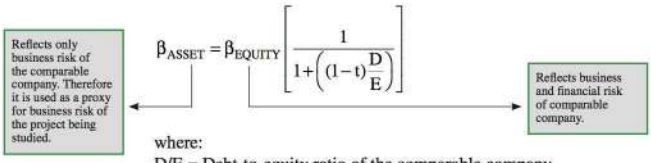
A company or project's beta is exposed to the following systematic (nondiversifiable) risks:

- Business risk comprises of sales risk and operating risk. Sales risk refers to the unpredictability of revenues and operating risk refers to the company's operating cost structure.
- Financial risk refers to the uncertainty of profits and cash flows because of the use of fixed-cost financing sources such as debt and leases. The greater the use of debt financing, the greater the financial risk of the firm.

Analysts use the **pure-play** method to estimate the beta of a particular project or of a company that is not publicly traded. This method requires adjusting a comparable publicly-listed company's beta for differences in financial leverage.

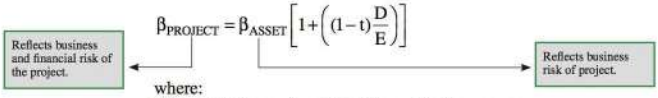
- First we find a comparable company that faces similar business risks as the company or project under study and estimate the equity beta of that company. Betas vary with the level of financial risk in a company. Highly leveraged companies have higher financial risk, which is reflected in their high equity betas.
- To remove all elements of financial risk from the comparable's beta we "unlever" the beta. This unlevered beta reflects only the business risk of the comparable and is known as *asset beta*.
- Finally, we adjust the unlevered beta of the comparable for the level of financial risk (leverage) in the project or company under study.

We use the following formula to estimate the asset beta for the comparable publicly traded firm:



where:
D/E = Debt-to-equity ratio of the comparable company.
t = Marginal tax rate of the comparable company.

To adjust the asset beta of the comparable for the capital structure (financial risk) of the project or company being evaluated, we use the following formula (see Example 3-1):



where:
D/E = Debt-to-equity ratio of the subject company.
t = Marginal tax rate of the subject company.

Example 3-1: Calculation of a Project's Beta and WACC

Rukaiya Inc. is considering an investment in the confectionaries business. Rukaiya has a D/E ratio of 1.5, a before-tax cost of debt of 6%, and a marginal tax rate of 35%. Tastelicious Foods is a publicly traded company that operates only in the confectionaries industry and has a D/E ratio of 2, an equity beta of 0.7, and marginal tax rate of 40%. The risk-free rate is 4.5% and the expected return on the market is 11%. Calculate the appropriate WACC that Rukaiya should use to evaluate the risk of entering the confectionaries business.

Solution

First we calculate Tastelicious Foods' (the reference company's) unlevered (asset) beta, which eliminates the impact of financial risk, and only reflects the business risk of the confectionaries industry.

$$\beta_{ASSET} = \beta_{EQUITY}\left[\frac{1}{1+\left((1-t)\frac{D}{E}\right)}\right]$$

$$\beta_{ASSET} = 0.7\left[\frac{1}{1+((1-0.4)2)}\right] = 0.318$$

Then we "relever" the reference company's beta to reflect Rukaiya's financial risk:

$$\beta_{PROJECT} = \beta_{ASSET}\left[1+\left((1-t)\frac{D}{E}\right)\right]$$

$$\beta_{PROJECT} = 0.318\{1+[(1-0.35)1.5]\} = 0.628$$

Finally, we use the project's cost of equity and the component weights to calculate the WACC of Rukaiya's confectionaries project:

$$\text{Cost of equity} = r_e = 4.5\% + 0.628\,(11\% - 4.5\%) = 8.582\%$$

Rukaiya's D/E ratio is given as 1.5. It has 1.5 units of debt for every unit of equity (the denominator of the D/E ratio is 1). The ratio of debt to equity is 1.5 to 1, or 3:2. The weight for debt in the capital structure is therefore 3/(3+2) or 0.6 [(D/D+E)] and that of equity is 2/(3+2) or 0.4 [E/(D+E)].

$$WACC = (w_d)(r_d)(1-t) + (w_p)(r_p) + (w_e)(r_e)$$

$$WACC = 0.6(0.06)(1-0.35) + 0.4(0.08582) = 5.77\%$$

LOS 36j: Describe uses of country risk premiums in estimating the cost of equity. Vol 4, pp 97–98

Studies have shown that a stock's beta captures the country risk of a stock accurately only in developed markets. Beta does not effectively capture country risk in developing nations. To deal with this problem, the CAPM equation for stocks in developing countries is modified to add a country spread (also called the country equity premium) to the market risk premium.

$$r_e = R_F + \beta\,[E(R_M) - R_F + CRP]$$

The country risk premium (CRP) is calculated as the product of sovereign yield spread and the ratio of the volatility of the developing country's equity market to the volatility of the sovereign bond market denominated in terms of the currency of a developed country. The sovereign yield spread is the difference between the developing country's government bond yield (denominated in the currency of a developed country) and the yield of a similar maturity bond issued by the developed country.

$$\text{Country risk premium} = \text{Sovereign yield spread} \times \frac{\text{Annualized standard deviation of equity index}}{\text{Annualized standard deviation of sovereign bond market in terms of the developed market currency}}$$

The sovereign yield spread captures the general risk of an investment in a particular country. This spread is then adjusted for the volatility of the stock market relative to the bond market. See Example 3-2.

Example 3-2: Using Country Risk Premium to Estimate the Cost of Equity

An analyst wants to calculate the cost of equity for a project in Malaysia. She has the following information:

- The yield on Malaysia's dollar-denominated 10-year government bond is 10%.
- The yield on a 10-year U.S. Treasury bond is 4.2%.
- The annualized standard deviation of Malaysia's stock market is 29%.
- The annualized standard deviation of Malaysia's dollar-denominated 10-year government bond is 20%.
- The project's beta equals 1.1.
- The expected return on the Malaysian equity market is 9%.
- The risk-free rate equals 5%.

Calculate the country risk premium and the cost of equity for this project in Malaysia.

Solution

$$CRP = (0.10 - 0.042)\left(\frac{0.29}{0.20}\right) = 8.41\%$$

$$r_e = R_F + \beta\,[E(R_M) - R_F + CRP]$$

$$r_e = 0.05 + 1.1\,[0.09 - 0.05 + 0.0841] = \mathbf{18.65\%}$$

Malaysia's country risk premium equals 8.41% and the cost of equity for this project equals 18.65%.

LOS 36k: Describe the marginal cost of capital schedule, explain why it may be upward-sloping with respect to additional capital, and calculate and interpret its break-points. Vol 4, pp 99–101

The marginal cost of capital is the cost of the last additional dollar of capital raised by a firm.

A company's marginal cost of capital (MCC) increases as additional capital is raised. This is because of the following reasons:

1. The company may have existing *debt covenants* that restrict it from issuing debt with similar seniority. Subsequent rounds of debt will be subordinated to the senior issue so they will obviously carry more risk, and therefore entail a higher cost.
2. Due to economies of scale in raising a significant amount of a component (debt or equity) of capital in one go, firms may deviate from their target (optimal) capital structure over the short term. These deviations may cause the marginal cost of capital to rise.

The marginal cost of capital schedule shows the WACC at different amounts of total capital. Figure 3-1 illustrates the fact that it is upward sloping. The amount of capital at which the WACC changes is referred to as a **break point**. A break point is calculated using the following formula (see Example 3-3):

$$\text{Break point} = \frac{\text{Amount of capital at which a component's cost of capital changes}}{\text{Proportion of new capital raised from the component}}$$

Example 3-3: Determining Break Points

Charlton Inc. has a target capital structure of 70% equity and 30% debt. The schedule of costs for components of capital for the company is contained in the table below. Calculate the break points and illustrate the marginal cost of capital schedule for Charlton.

Amount of New Debt ($ millions)	After-Tax Cost of Debt	Amount of New Equity ($ millions)	Cost of Equity
0 to 150	3.90%	0 to 300	6.00%
150 to 300	4.40%	300 to 600	7.80%
300 to 450	4.80%	600 to 900	10.00%

Solution

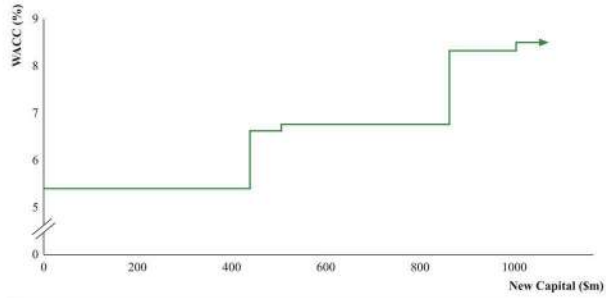
Charlton Inc. will have a break point each time the cost of a component of capital changes. Specifically, its MCC schedule will have four break points.

Break Point	Calculation	Amount
When debt exceeds $150 million	$150 million/0.3	$500 million
When debt exceeds $300 million	$300 million/0.3	$1,000 million
When equity exceeds $300 million	$300 million/0.7	$428.57 million
When equity exceeds $600 million	$600 million/0.7	$857.14 million

The following table shows the company's WACC at the different levels of total capital:

Capital	Equity (70%)	Cost of Equity	Debt (30%)	After-Tax Cost of Debt	WACC
$100.00	70	6%	30	3.90%	5.37%
$428.57	300	7.80%	128.57	3.90%	6.63%
$500.00	350	7.80%	150	4.40%	6.78%
$857.14	600	10.00%	257.14	4.40%	8.32%
$1,000.00	700	10.00%	300	4.80%	8.44%

Figure 3-1: Marginal Cost of Capital Schedule



LOS 36l: Explain and demonstrate the correct treatment of flotation costs. Vol 4, pp 102–104

Flotation costs refer to the fee charged by investment bankers to assist a company in raising new capital. In the case of debt and preferred stock, we do not usually incorporate flotation costs in the estimated cost of capital because the amount of these costs is quite small, often less than 1%. However, for equity issues, flotation costs are usually quite significant.

There are two ways of accounting for flotation costs. The first approach, which is often found in finance textbooks, incorporates flotation costs into the cost of capital. When this approach is applied, the cost of capital is calculated in the following manner (see Example 3-4):

$$r_e = \left[\frac{D_1}{P_0(1-f)}\right] + g$$

where:
f = flotation costs as a percentage of the issue price.

Example 3-4: Accounting for Flotation Costs Directly into the Cost of Equity

Ben Company currently pays a dividend of $1 per share, has a current stock price of $20, and has an expected growth rate of 4%. The company wants to raise equity capital and flotation costs will be 5% of the total issue. Calculate the company's cost of equity:

1. Before it issues new capital.
2. After it issues new capital, including flotation costs in the cost of equity.

Solution

1. Cost of equity before Ben raises new capital:

$$r_e = \frac{D_1}{P_0} + g$$

$$r_e = [\$1(1+0.04)/\$20] + 0.04 = \mathbf{9.2\%}$$

2. Cost of equity after issuance:

$$r_e = \left[\frac{D_1}{P_0(1-f)}\right] + g$$

$$r_e = [\$1(1+0.04)/\$20(1-0.05)] + 0.04 = 9.47\%$$

Ben's cost of equity was 9.2% before it issued new equity. After issuance, when flotation costs are included in cost of equity, the cost rises by 27 basis points to 9.47%.

However, adjusting the cost of capital for flotation costs is incorrect. Flotation costs are a part of the initial cash outlay for a project. Adjusting the cost of capital to account for flotation costs adjusts the present value of *all* future cash flows by a fixed percentage (27 basis points in Example 3-4). This adjustment will not necessarily equal the present value of flotation costs.

Correct Treatment of Flotation Costs

The correct way to account for flotation costs is to adjust the cash flows used in the valuation. We add the estimated dollar amount of flotation costs to the initial cost of the project (see Example 3-5).

Example 3-5: Correct Treatment of Flotation Costs

Alex Company is planning to invest in a project. The following information is provided:

While both approaches to incorporating flotation costs are illustrated, the LOS stresses the correct treatment only

- Initial cash outflow = $75,000.
- Expected future cash flows = $20,000 every year for the next 5 years.
- Alex's before-tax cost of debt = 5%.
- Tax rate = 30%.
- Next year's expected dividend = $1 per share.
- The current price of the stock = $25.
- Expected growth rate = 4%.
- The target capital structure = 70% equity and 30% debt.
- Flotation costs for equity = 4%.

Calculate the NPV of the project after adjusting cash flows to account for flotation costs.

Solution

First, we determine the after-tax cost of debt and equity to calculate the WACC of the project:

Source of Capital	Weight	Formula	After-Tax Cost
Debt	30%	$r_d(1-\text{tax rate})$	0.05 (1 – 0.3) = 3.5%
Equity	70%	$r_e = \frac{D_1}{P_0} + g$	(1/25) + 0.04 = 8%

WACC = 0.3 (3.5%) + 0.70 (8%) = **6.65%**

70% of the investment is financed by using equity. 70% of $75,000 = $52,500

Next, we calculate the dollar amount of flotation costs:

Dollar amount of flotation costs = $52,500 × 4% = $2,100

Finally, we calculate the **NPV** of the project:

Initial cash outflow = Initial outlay for project + Flotation costs = $77,100
Cash inflows = $20,000 for the next 5 years
WACC (discount rate) = 6.65%

$$NPV = -\$77{,}100 + \frac{\$20{,}000}{(1.0665)^1} + \frac{\$20{,}000}{(1.0665)^2} + \frac{\$20{,}000}{(1.0665)^3} + \frac{\$20{,}000}{(1.0665)^4} + \frac{\$20{,}000}{(1.0665)^5}$$

NPV = $5,678.20

Study Session 11: Corporate Finance: Leverage, Dividends and Share Repurchases, and Working Capital Management

READING 37: MEASURES OF LEVERAGE

LESSON 1: MEASURES OF LEVERAGE

LOS 37a: Define and explain leverage, business risk, sales risk, operating risk, and financial risk, and classify a risk. **Vol 4, pp 122–139**

LOS 37b: Calculate and interpret the degree of operating leverage, the degree of financial leverage, and the degree of total leverage. **Vol 4, pp 122–139**

LOS 37c: Analyze the effect of financial leverage on a company's net income and return on equity. **Vol 4, pp 135–136**

Leverage refers to a company's use of fixed costs in conducting business. Fixed costs include:

- Operating costs (e.g., rent and depreciation).
- Financial costs (e.g., interest expense).

Fixed costs are referred to as leverage because they support the company's activities and earnings. It is important for analysts to understand a company's use of leverage for the following reasons:

- Leverage increases the volatility of a company's earnings and cash flows, thereby increasing the risk borne by investors in the company.
- The more significant the use of leverage by the company, the more risky it is and therefore, the higher the discount rate that must be used to value the company.
- A company that is highly leveraged risks significant losses during economic downturns.

Leverage is affected by a company's cost structure. Generally companies incur two types of costs.

- Variable costs vary with the level of production and sales (e.g., raw materials costs and sales commissions).
- Fixed costs remain the same irrespective of the level of production and sales (e.g., depreciation and interest expense).

Let's work with two companies, Blue Horizons and Red Electronics to illustrate the effects of leverage on company value. See Tables 1-1 and 1-2.

Table 1-1: Sales and Cost Information

	Blue Horizons ($)	Red Electronics ($)
Number of units produced and sold	200,000	200,000
Sales price per unit	20	20
Variable cost per unit	7	14
Fixed operating cost	1,000,000	200,000
Fixed financing expense	800,000	200,000

For simplicity, we are ignoring the effects of taxes. However, the general conclusions remain the same even if taxes are included in our analysis.

Table 1-2: Calculation of Net Income

	Blue Horizons $	Red Electronics $
Revenue	4,000,000	4,000,000
Operating costs (fixed + variable)	2,400,000	3,000,000
Operating income	1,600,000	1,000,000
Financing expense	800,000	200,000
Net income	**800,000**	**800,000**

Both companies earned a net income of $800,000. However, it is important to observe that Blue Horizons has a higher proportion of fixed costs (higher leverage) in its cost structure, while Red Electronics has a higher proportion of variable costs.

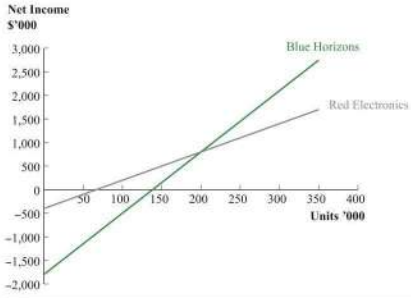
In Table 1-3, we vary the number of units produced and sold by the companies to evaluate the impact of their differing cost structures on net income.

Table 1-3: Net Income in Different Sales Scenarios

	If 150,000 Units are Produced and Sold		If 200,000 Units are Produced and Sold		If 250,000 Units are Produced and Sold	
	Blue Horizons	Red Electronics	Blue Horizons	Red Electronics	Blue Horizons	Red Electronics
Revenue	3,000,000	3,000,000	4,000,000	4,000,000	5,000,000	5,000,000
Operating costs	2,050,000	2,300,000	2,400,000	3,000,000	2,750,000	3,700,000
Operating income	950,000	700,000	1,600,000	1,000,000	2,250,000	1,300,000
Financing expense	800,000	200,000	800,000	200,000	800,000	200,000
Net income	**150,000**	**500,000**	**800,000**	**800,000**	**1,450,000**	**1,100,000**
Percentage change in net income	**–81%**	**–38%**			**81%**	**38%**

Takeaway: The dominance of fixed costs (both operating and financial) in Blue Horizons' cost structure (higher leverage) results in higher earnings volatility. A 25% fluctuation in sales results in an 81% fluctuation in Blue Horizons' net income, but only a 38% fluctuation in Red Electronics' net income. See Figure 1-1.

Figure 1-1: Net Income for Different Numbers of Units Produced and Sold



The greater the degree of leverage for a company, the steeper the slope of the line representing net income. For a given change in the number of units produced and sold, the net income of Blue Horizons will change by a greater amount than that of Red Electronics.

Business Risk and Financial Risk

Business Risk

Business risk refers to the risk associated with a company's operating earnings. Operating earnings are risky because total revenues and costs of sales are both uncertain. Therefore, business risk can be broken down into sales risk and operating risk.

Companies in the same line of business have similar business risk.

Sales risk: The uncertainty associated with total revenue is referred to as sales risk. Revenue is affected by economic conditions, industry dynamics, government regulation, and demographics. See Exhibit 1-1.

Exhibit 1-1: Sales Risk

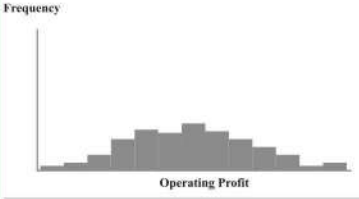
Blue Horizons expects to produce and sell 200,000 units over the coming year, and the standard deviation of units sold is 10,000 units. Further, assume that the selling price per unit is $20 with a standard deviation of $2.

Green Manufacturers has the same cost structure as Blue Horizons and expects to sell the same number of units at the same price as Blue Horizons. However, its standard deviation of units sold is 20,000 units and its price standard deviation is $4.

For simplicity, we have assumed that the fixed operating costs are known with certainty and that units sold follow a normal distribution. Figures 1-2 and 1-3 show the distributions of operating income for the two companies.

Figure 1-2: Operating Income Simulation for Blue Horizons

Figure 1-3: Operating Income Simulation for Green Manufacturers



Figures 1-2 and 1-3 illustrate how a company's profitability is affected by the variability in price and quantity sold. The higher the standard deviation of price and units sold, the wider the distribution of operating profit. The greater volatility in earnings shows that Green Manufacturers has more sales risk than Blue Horizons.

Operating risk: The risk associated with a company's operating cost structure is referred to as operating risk. As shown earlier, a company that has a greater proportion of fixed costs in its cost structure has greater operating risk.

The cost structure of a company generally depends on the type of industry that it operates in. However, companies within the same industry may vary their cost structures by employing different production methods. A company that has a greater proportion of fixed costs relative to variable costs in its cost structure will find it more difficult to adjust its operating costs to changes in sales and is therefore more risky. In order to examine a company's sensitivity of operating income to changes in unit sales, we use the **degree of operating leverage (DOL)**. DOL is the ratio of the percentage change in operating income to the percentage change in units sold.

We assume that the company sells everything that it produces in the same period.

$$\text{DOL} = \frac{\text{Percentage change in operating income}}{\text{Percentage change in units sold}}$$

Table 1-4 illustrates the effects of a 10% increase in the number of units sold on Blue Horizon's operating income:

Table 1-4: Sensitivity of Operating Income to Unit Sales

	Number of Units Produced and Sold		Percentage Change
	200,000	220,000	
Revenues	$4,000,000	$4,400,000	10.00%
Less variable costs	1,400,000	1,540,000	10.00%
Less fixed costs	1,000,000	1,000,000	0.00%
Operating income	$1,600,000	$1,860,000	16.25%

For a 10% increase in revenues, Blue Horizons' operating income increases by 16.25%.

The DOL can also be expressed in terms of its basic elements:

You are not required to derive this formula, but make sure you commit it to memory.

$$DOL = \frac{Q \times (P - V)}{Q \times (P - V) - F}$$

where:
Q = Number of units sold
P = Price per unit
V = Variable operating cost per unit
F = Fixed operating cost
Q × (P – V) = Contribution margin (the amount that units sold contribute to covering fixed costs)
(P – V) = Contribution margin per unit

Looking at the formula for DOL you should realize that if there are no fixed costs, DOL would equal one. This implies that if there are no fixed costs, there would be no operating leverage.

Using the equation above, the DOL for Blue Horizons can be calculated as:

$$DOL \text{ (at 200,000 units)} = \frac{200{,}000 \times (20 - 7)}{200{,}000 \times (20 - 7) - 1{,}000{,}000} = 1.625$$

Interpretation: At 200,000 units, a 1% change in units sold will result in a 1.625% change in Blue Horizons' operating income.

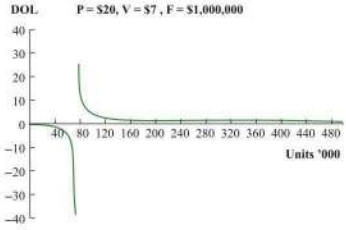
Next, let's calculate Blue Horizons' DOL at a sales volume of 400,000 units.

$$DOL \text{ (at 400,000 units)} = \frac{400{,}000 \times (20 - 7)}{400{,}000 \times (20 - 7) - 1{,}000{,}000} = 1.238$$

Interpretation: At 400,000 units, a 1% change in units sold will result in a 1.238% change in Blue Horizons' operating income. See Figure 1-4.

Conclusion: DOL is different at different levels of sales. If the company is making operating profits, the sensitivity of operating income to changes in units sold decreases at higher sales volumes (in units).

Figure 1-4: Blue Horizons' DOL for Different Number of Units Produced and Sold



Takeaways:

- DOL is negative when operating income (the denominator in the DOL equation) is negative, and is positive when the company earns operating profits.
- Operating income is most sensitive to changes in sales around the point where the company makes zero operating income.
- DOL is undefined when operating income is zero.

The degree of operating leverage is also affected by a company's cost structure. Let's work with Red Electronics, which has a lower proportion of fixed costs in its cost structure relative to Blue Horizons. The DOL of Red Electronics at 200,000 units is calculated as:

$$\text{DOL (at 200,000 units)} = \frac{200{,}000 \times (20-14)}{200{,}000 \times (20-14) - 200{,}000} = 1.2$$

At 200,000 units, a 1% change in units sold will change Red Electronics' operating income by 1.2%.

The point to recognize here is that at 200,000 units, Red Electronics has a lower DOL (1.2) than Blue Horizons (1.625), which implies that its operating income is less sensitive to changes in units sold compared to Blue Horizons. The lower the proportion of fixed costs in a company's cost structure, the less sensitive its operating income is to changes in units sold and therefore, the lower the company's operating risk. The degrees of operating leverage are similar for the two companies at higher quantities sold.

Business risk is composed of operating and sales risk, both of which are largely determined by the industry in which the company operates. It is important to note however, that a company has more control over operating risk than sales risk. This is because it cannot control the number of units it will sell and the price per unit (sales risk), but it does choose the production method it wants to employ (which determines operating risk).

Industries that require a significant initial investment, but less expenditure to make and distribute the product (e.g., pharmaceuticals) have a higher proportion of fixed costs and therefore higher operating leverage. On the other hand, companies that have a significant portion of variable costs in cost of goods sold (e.g., retailers) have relatively low operating leverage.

Most companies produce more than one product, which makes it difficult to obtain a breakdown of costs. In such cases, we can regress the company's operating income (the dependent variable) against changes in sales (the independent variable) over time to estimate the degree of operating leverage. When comparing two companies, the one with a greater slope of the least-square regression would have higher operating leverage.

Financial Risk

Financial risk refers to the risk associated with how a company chooses to finance its operations. If a company chooses to issue debt or acquire assets on long-term leases, it is obligated to make regular payments when due. Failure to perform on these obligations can lead to legal action against the company, so by taking on these fixed obligations the company increases its financial risk. On the other hand, if it uses its retained earnings or issues shares (common equity) to finance operations, the company does not incur fixed obligations. Therefore, the higher the amount of fixed financial costs taken on by a company, the greater its financial risk.

Financial risk can be measured as the sensitivity of cash flows available to owners to changes in operating income. This measure is known as the **degree of financial leverage (DFL)**.

$$\text{DFL} = \frac{\text{Percentage change in net income}}{\text{Percentage change in operating income}}$$

Table 1-5 illustrates the variation in Blue Horizons' net income with different levels of fixed financial costs. We have worked with the base case operating profit scenario (operating profit = $1,600,000) and another scenario where operating profit rises by 20%, to calculate changes in net income.

Table 1-5a: Sensitivity of Net Income to Fixed Financial Costs of $800,000

Fixed Financing Cost = $800,000			Percentage Change
Operating Income	1,600,000	1,920,000	20.00%
Less Interest	800,000	800,000	0.00%
Net Income	**800,000**	**1,120,000**	**40.00%**

Table 1-5b: Sensitivity of Net Income to Fixed Financial Costs of $1,200,000

Fixed Financing Cost = $1,200,000			Percentage Change
Operating Income	1,600,000	1,920,000	20.00%
Less Interest	1,200,000	1,200,000	0.00%
Net Income	**400,000**	**720,000**	**80.00%**

For simplicity we have ignored taxes from this analysis.

Notice that at higher levels of fixed financing costs ($1.2 million versus $800,000) the same percentage change in operating income (20%) leads to a higher percentage change in net income (80% versus 40%). This implication here is that higher fixed financial costs increase the sensitivity of net income to changes in operating income.

The degree of financial leverage (DFL) equation can be simplified into its basic elements as follows:

The factor that adjusts for taxes (1 – t) cancels out. The DFL is not affected by taxes.

$$DFL = \frac{[Q(P-V)-F](1-t)}{[Q(P-V)-F-C](1-t)} = \frac{[Q(P-V)-F]}{[Q(P-V)-F-C]}$$

where:
Q = Number of units sold
P = Price per unit
V = Variable operating cost per unit
F = Fixed operating cost
C = Fixed financial cost
t = Tax rate

Looking at the formula for DFL you should realize that if there are no interest costs, DFL would equal one. This implies that if there are no interest costs, there would be no financial leverage.

Blue Horizons' DFL when operating income is $1.6 million and fixed financial costs are $800,000 is calculated as:

$$DFL = \frac{200{,}000 \times (20-7) - 1{,}000{,}000}{200{,}000 \times (20-7) - 1{,}000{,}000 - 800{,}000} = 2$$

Blue Horizons' DFL when operating income is $1.6 million and fixed financial costs are $1.2 million is calculated as:

$$DFL = \frac{200{,}000 \times (20-7) - 1{,}000{,}000}{200{,}000 \times (20-7) - 1{,}000{,}000 - 1{,}200{,}000} = 4$$

These calculations verify that the higher the use of fixed financing sources by a company, the greater the sensitivity of net income to changes in operating income and therefore the higher the financial risk of the company. Also note that the degree of financial leverage is also different at different levels of operating income.

The degree of financial leverage is usually determined by the company's management. While operating costs are similar among companies in the same industry, capital structures may differ to a greater extent.

Generally, companies with relatively high ratios of tangible assets to total assets or those with revenues that have below-average business cycle sensitivity are able to use more financial leverage than companies with relatively low ratios of tangible assets to total assets or those with revenues that have high business cycle sensitivity. This is because stable revenue streams and assets that can be used as collateral make lenders more comfortable in extending credit to a company. See Example 1-1.

Example 1-1: The Leveraging Role of Debt

Alpha Inc.	
Expected next year's operating earnings ($)	1,000,000
Interest rate on debt	6%
Income tax rate	35%

Scenario A: Alpha has total assets of $5 million and does not use any debt financing.
Scenario B: Alpha has total assets of $5 million, financed by $2.5 million of shareholders' equity and $2.5 million of debt.

Calculate the company's net income and return on equity for the coming year assuming that operating earnings may vary as much as 50% from expectations.

Scenario A: **Total Assets = $5 million** **Shareholders' Equity = $5 million** **Debt = Nil**	**Operating Earnings 50% Lower than Expectations**	**Expected Operating Earnings**	**Operating Earnings 50% Higher than Expectations**
Earnings before interest and taxes	500,000	1,000,000	1,500,000
Interest expense	–	–	–
Earnings before taxes	500,000	1,000,000	1,500,000
Taxes	175,000	350,000	525,000
Net income	**325,000**	**650,000**	**975,000**
Return on equity	**6.50%**	**13.00%**	**19.50%**

Scenario B: **Total Assets = $5 million** **Shareholders' Equity = $2.5 million** **Debt = $2.5 million**	**Operating Earnings 50% Lower than Expectations**	**Expected Operating Earnings**	**Operating Earnings 50% Higher than Expectations**
Earnings before interest and taxes	500,000	1,000,000	1,500,000
Interest expense	150,000	150,000	150,000
Earnings before taxes	350,000	850,000	1,350,000
Taxes	122,500	297,500	472,500
Net income	**227,500**	**552,500**	**877,500**
Return on equity	**9.10%**	**22.10%**	**35.10%**

Takeaway:
The larger the proportion of debt in a company's capital structure, the greater the sensitivity of net income to changes in operating income, and therefore the greater the company's financial risk. Bear in mind that taking on more debt also magnifies earnings upward, if the company is performing well (illustrated by the higher ROEs in Scenario B).

Total Leverage

DOL looks at the sensitivity of operating income to changes in units sold, while DFL looks at the sensitivity of net income to changes in operating income. The degree of total leverage (DTL) looks at the combined effect of operating and financial leverage (i.e., it measures the sensitivity of net income to changes in units produced and sold).

Table 1-6 demonstrates the effects of a 10% change in revenues on Blue Horizons' operating income and net income. Again, we assume that the company sells all that it produces during the same period.

Table 1-6: Total Leverage of Blue Horizons

	Units Produced and Sold		
	180,000	**200,000**	**220,000**
Revenues	3,600,000	4,000,000	4,400,000
Less variable costs	1,260,000	1,400,000	1,540,000
Less fixed operating costs	1,000,000	1,000,000	1,000,000
Operating income	1,340,000	1,600,000	1,860,000
Less interest	800,000	800,000	800,000
Net income	**540,000**	**800,000**	**1,060,000**
Relative to 200,000 units produced and sold			
Percentage change in units sold	−10.00%		10.00%
Percentage change in operating profit	−16.25%		16.25%
Percentage change in net income	−32.50%		32.50%

DTL is calculated as:

$$DTL = \frac{\text{Percentage change in net income}}{\text{Percentage change in the number of units sold}}$$

$$DTL = DOL \times DFL$$

$$DTL = \frac{Q \times (P - V)}{[Q(P - V) - F - C]}$$

where:
Q = Number of units produced and sold
P = Price per unit
V = Variable operating cost per unit
F = Fixed operating cost
C = Fixed financial cost

The DTL for Blue Horizons can be calculated as:

$$DTL = 1.625 \times 2 = 3.25$$

$$DTL = \frac{200{,}000 \times (20 - 7)}{200{,}000 \times (20 - 7) - 1{,}000{,}000 - 800{,}000} = 3.25$$

This implies that a 1% change in the number of units sold will change net income by 3.25%.

Note that DTL is also different at different numbers of units produced and sold. This is because DOL is different at different levels of units produced and sold, while DFL is different at different levels of operating earnings. DTL combines the effects of DOL and DFL.

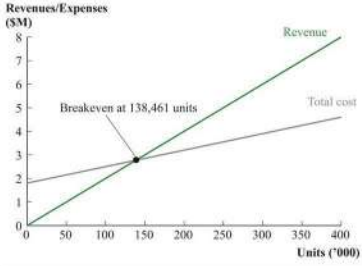
LOS 37d: Calculate the breakeven quantity of sales and determine the company's net income at various sales levels. Vol 4, pp 139–141

LOS 37e: Calculate and interpret the operating breakeven quantity of sales. Vol 4, pp 139–141

Breakeven Points and Operating Breakeven Points

A company's breakeven point occurs at the number of units produced and sold at which its net income equals zero. It is the point at which a company's revenues equal its total costs and the company goes from making losses to making profits. Figure 1-5 plots Blue Horizons' revenues and expenses against the number of units produced and sold.

Figure 1-5: Blue Horizons' Breakeven



The breakeven point for a company occurs when:

$$PQ = VQ + F + C$$

where:
P = Price per unit
Q = Number of units produced and sold
V = Variable cost per unit
F = Fixed operating costs
C = Fixed financial cost

The breakeven number of units can be calculated as:

$$Q_{BE} = \frac{F + C}{P - V}$$

The breakeven number of units for Blue Horizons and Red Electronics can be calculated as:

Blue Horizons:

$$Q_{BE} = \frac{1{,}000{,}000 + 800{,}000}{20 - 7} = 138{,}461 \text{ units}$$

Red Electronics:

$$Q_{BE} = \frac{200{,}000 + 200{,}000}{20 - 14} = 66{,}666 \text{ units}$$

Blue Horizons must produce and sell 138,461 units in order to break even, while Red Electronics must only produce and sell 66,666 units to cover its costs. Blue Horizons must sell a higher number of units to break even because it needs to cover a higher amount of fixed costs. However, once Blue Horizons passes its breakeven point, it earns larger profits than Red Electronics. The implication here is that while greater leverage entails higher risk, it also raises the company's potential for profit.

A breakeven point can also be specified in terms of operating profit, in which case it is known as the operating breakeven point. At this point, revenues equal operating costs. The expression for operating breakeven point is given as:

$$PQ_{OBE} = VQ_{OBE} + F$$

$$Q_{OBE} = \frac{F}{P - V}$$

The operating breakeven points for Blue Horizons and Red Electronics are computed as:

Blue Horizons:

$$Q_{OBE} = \frac{1{,}000{,}000}{20-7} = 76{,}923 \text{ units}$$

Red Electronics:

$$Q_{OBE} = \frac{200{,}000}{20-14} = 33{,}333 \text{ units}$$

Blue Horizons also has a higher operating breakeven point compared to Red Electronics.

Note:
The farther unit sales are from the breakeven point for high-leverage companies, the greater the magnifying effect of leverage.

The Risks of Creditors and Owners Vol 4, pp 100–102

The risk borne by creditors and owners differs because of the different rights and responsibilities associated with their investment in the company.

Creditor claims on the assets of the company are senior to those of equity holders. In return for lending money to the company, creditors demand timely interest and principal payments. Payments to creditors must be made irrespective of whether the company is profitable. Inability to make these payments may lead to the company having to declare bankruptcy. Returns for creditors are predefined; even if the company does very well, they do not see any of the upside.

On the other hand, owners only have a claim on what is left over after all the financial obligations of the company have been met. In return for the lower priority in claims, equity holders enjoy decision-making power in the company and participate in the upside if the company does well.

Legal codes in most countries provide for companies to file for bankruptcy protection. There are two main types of bankruptcy protection.

- Reorganization (Chapter 11), which provides the company temporary protection from creditors so that it can reorganize its capital structure and emerge from bankruptcy as a going concern.
- Liquidation (Chapter 7), which allows for an orderly settlement of the creditors' claims. In this category of bankruptcy, the original business ceases to exist.

Companies with high operating leverage have less flexibility in making changes to their operating structures, so bankruptcy protection does little to help reduce operating costs. On the other hand, companies with high financial leverage can use Chapter 11 protection to change their capital structure and, once the restructuring is complete, emerge as ongoing concerns.

Under both Chapter 7 and Chapter 11, providers of equity capital generally lose out. On the other hand, debt holders typically receive at least a portion of their capital, but only after the period of bankruptcy protection ends.

READING 38: DIVIDENDS AND SHARE REPURCHASES: BASICS

LESSON 1: DIVIDENDS

There are two ways that a company can distribute cash to its shareholders—dividends and share repurchases. Ordinary dividend payments are different from interest payments in that dividend payments are at the company's discretion (i.e., the company is not legally obligated to pay dividends to its shareholders).

Dividends and share repurchases represent the company's payout over the year. A company's payout is a very important analytical consideration because distributions to shareholders are an important component of total return, particularly when stock price volatility is high.

LOS 38a: Describe regular cash dividends, extra dividends, liquidating dividends, stock dividends, stock splits, and reverse stock splits, including their expected effect on shareholders' wealth and a company's financial ratios. Vol 4, pp 152–160

Companies can make dividend payments in a number of ways—cash dividends, stock dividends, and stock splits.

Cash Dividends

Regular Cash Dividends

Most companies pay out cash dividends to shareholders on a regular schedule. Typically, cash dividends are paid on a quarterly basis in the United States, on a semiannual basis in Europe and Japan, and on an annual basis in other Asian markets.

Companies strive to maintain or increase their cash dividend payouts. A company's cash dividend payout record sends important messages about the company to investors and potential investors.

- A record of consistent dividends over an extended period of time indicates that the company is consistently profitable.
- A trend of increasing regular dividends over time indicates that the company is doing well and is willing to share profits with shareholders. This suggests that the company's shares are of high investment quality.
- An increase in a company's regular dividend, especially if unexpected, can send a very strong message out to investors and usually has a positive effect on share price.

Dividend Reinvestment Plans (DRPs)

A dividend reinvestment plan (DRP) is a system that allows investors to reinvest all or a portion of cash dividends received from a company in shares of the company. There are three types of DRPs:

- Open market DRPs, in which the company purchases shares (on behalf of plan participants) from the open market.
- New-issue DRPs or scrip dividend schemes, in which the company issues the additional shares instead of repurchasing them.
- Plans where companies are permitted to obtain additional shares through open-market purchases or new issuances.

Advantages to the Company

- The shareholder base is diversified as smaller investors gain easier access to additional shares in the company. Companies usually prefer a broad and diversified shareholder base.
- They may encourage long-term investment in the company by building investor loyalty to the company.
- New issue DRPs allow companies to raise equity capital without incurring floatation costs.

Advantages to Shareholders

Dollar-cost averaging is the technique of buying a fixed dollar amount of a particular investment on a regular schedule, regardless of the share price. More shares are purchased when prices are low and fewer shares are bought when prices are high.

- Shareholders can accumulate shares in the company using dollar-cost averaging.
- DRPs are a cost-effective means for small investors to purchase additional shares in the company.
- There are no transaction costs associated with obtaining shares through a DRP.
- Shares offered in a DRP are sometimes issued to shareholders at a discount to the market price.

Disadvantages to Shareholders

For these reasons use of such plans may be especially appropriate in a tax-deferred account (in which investment earnings are not taxed), such as certain types of retirement accounts.

- In jurisdictions where capital gains are taxed, investors must keep record of the cost basis of shares received to accurately compute gains and losses when shares are sold. If the shares are obtained at a price that is higher (lower) than the purchase price of the shares originally held, the investor's average cost basis will increase (decrease).
- Cash dividends are fully taxed in the year they are received (even if reinvested). As a result, an investor who participates in a DRP may have to pay tax on cash that he actually does not receive.
- If new shares are issued at a discount, shareholders that do not participate in the DRP tend to suffer dilution.

Extra or Special (Irregular) Dividends

A special dividend refers to a dividend payment by a company that does not usually pay dividends, or a dividend payment on top of the company's regular dividend. Companies use special dividends to distribute more earnings in strong years and to distribute excess cash to shareholders.

Liquidating Dividends

A dividend payment is known as a liquidating dividend when:

- A company goes out of business and its net assets are distributed to shareholders.
- A company sells off a portion of its business and distributes the proceeds to shareholders.
- A company pays out a dividend that is greater than its retained earnings. Such a payment reduces (impairs) the company's stated capital.

Stock Dividends

A stock dividend or a bonus issue occurs when a company issues additional common shares in the company (instead of cash) to shareholders. Example 1-1 illustrates how stock dividends work.

Example 1-1: Illustration of the Effects of Stock Dividends

ABC Company has 10 million shares outstanding. The stock is currently trading for $25, with an EPS of $1.25 and a P/E multiple of 20.

1. Illustrate the effects of a 5% stock dividend on ABC's EPS, stock price, P/E ratio, and total number of shares outstanding.
2. Illustrate the effects of the stock dividend on the total cost, cost-per-share, and total number of shares held for an investor who holds 1,000 shares in ABC which were purchased for $14 each.

Solution

1. Effects of stock dividend on ABC Company:

	Before Dividend	After Dividend
Shares outstanding	10,000,000	(10,000,000)(1.05) = 10,500,000
Earnings per share	$1.25	($1.25)(10,000,000) / 10,500,000 = $1.19
Total market value	$25,000,000	$25,000,000
Stock price	$25	($25)(10,000,000) / 10,500,000 = $23.81
P/E	$25/$1.25 = 20	$23.81/$1.19 = 20

2. Effects of stock dividend on the investor:

	Before Dividend	After Dividend
Shares owned	1,000	(1,000)(1.05) = 1,050
Total cost	$14,000	$14,000
Cost per share	$14	($14)(1,000) / 1,050 = $13.33
Total value of holding	($25)($1,000) = $25,000	($23.81)(1,050) = $25,000

Observations:

- The investor ends up with more shares, which she did not have to pay for.
- The company issues a dividend without spending any cash.
- The market value of the company does not change in response to a stock dividend.
- The investor's average cost per share falls, but the total cost remains unchanged.

Stock dividends do not affect an investor's proportionate ownership of a company. A stock dividend basically just divides the market value of a firm's equity into smaller pieces, but the percentage of the company owned by each shareholder remains the same, as does the market value of each investor's holding. Stock dividends are generally not taxable.

Advantages of Paying Out Stock Dividends

- With more shares outstanding there is a greater chance of more small shareholders owning the stock, which broadens the company's shareholder base.
- Stock dividends could bring the stock's market price into the "optimal range" (believed to lie somewhere between $20 and $80 for U.S. companies), where investors are attracted to the stock.

Differences Between Stock Dividends and Cash Dividends for the Company

Cash dividends reduce assets (cash) and shareholders' equity (retained earnings). When a company pays out cash dividends, not only do liquidity ratios deteriorate, but leverage ratios (e.g., debt-assets and debt-equity ratios) also worsen. On the other hand, stock dividends do not have any effect on a company's capital structure. Retained earnings fall by the value of stock dividends paid, but there is an offsetting increase in contributed capital so there is no change in shareholders' equity. Therefore, stock dividends have no impact on a company's liquidity and solvency ratios.

Stock Splits

Stock splits are similar to stock dividends in that they increase the total number of shares outstanding and have no economic effect on the company. If a company announces a 3-for-1 stock split, it means that each investor will get an additional 2 shares (to make a total of 3) for each share originally held. Example 1-2 illustrates how stock splits work.

Example 1-2: Effects of a Stock Split

XYZ Company has 25 million shares outstanding. The stock is currently trading for $100, with an EPS of $6 and a P/E multiple of 16.67. XYZ pays an annual dividend of $2 per share and earns net income of $150 million for the year.

1. Illustrate the effects of a 2-for-1 stock split on XYZ's EPS, stock price, P/E ratio, dividend payout ratio, dividend yield, and total number of shares outstanding.
2. Illustrate the effects of the stock split on the total cost, cost-per-share, and total number of shares held for an investor who holds 5,000 shares in XYZ which were purchased for $84 each.

Solution

1. Effects of stock split on XYZ Company:

	Before Split	After Split
Shares outstanding	25,000,000	(25,000,000)(2) = 50,000,000
Earnings per share	$6	($6)(25,000,000) / 50,000,000 = $3
Total market value	$2,500,000,000	$2,500,000,000
Stock price	$100	($100)(25,000,000) / 50,000,000 = $50
P/E	$100/6 = 16.67	$50/$3 = 16.67
Dividend per share	$2	($2)(25,000,000) / 50,000,000 = $1
Dividend payout ratio	($2)(25,000,000) / $150,000,000 = 33%	($1)(50,000,000) / $150,000,000 = 33%
Dividend yield	$2/$100 = 2%	$1/$50 = 2%

The dividend yield equals dividend per share divided by price per share.

2. Effects of stock split on the investor:

	Before Dividend	After Dividend
Shares owned	5,000	5,000 × 2 = 10,000
Total cost	$420,000	$420,000
Cost per share	$84	$42
Total value of holding	($100)($5,000) = $500,000	($50)(10,000) = $500,000

Observations:

- The investor ends up with more shares, which she did not have to pay for.
- The company issues a dividend without spending any cash.
- The market value of the company does not change in response to a stock split.
- The investor's average cost per share falls, but the total cost remains unchanged.

From Example 1-2, you should also be able to understand that a 2-for-1 stock split has the same effects as a 100% stock dividend. However, there is one important difference between stock splits and stock dividends. A stock dividend results in a transfer of retained earnings to contributed capital, whereas a stock split has no impact on any shareholders' equity accounts.

Cash dividends result in an outflow of cash (decreasing a company's liquidity ratios and increasing its debt-to-assets ratio) and reduce retained earnings and shareholders' equity (increasing the debt-to-equity ratio). On the other hand, stock dividends, stock splits, and reverse stock splits have no impact on a company's liquidity or leverage ratios. They merely result in a change in the number of shares outstanding.

Companies typically announce stock splits after a period during which the stock price has appreciated significantly to bring it down into a more marketable range. Many investors however, see a stock split announcement as a signal for future stock price appreciation.

A reverse stock split increases the share price and reduces the number of shares outstanding. Similar to stock splits, the aim of a reverse stock split is to bring the stock price into a more marketable range.

Example 1-3: Reverse Stock Split

Glitz Corporation's stock is currently trading at $4.50 per share. The company recently announced a 1-for-10 reverse stock split to support its share price.

All other things remaining the same, calculate the expected stock price after the split. Also comment on the effect of a reverse stock split on shareholder wealth and the investors total cost basis.

Solution

Expected stock price after the reverse stock split = $4.50 × 10 = $45 per share

Theoretically, a reverse stock split should not have any impact on shareholder wealth. The market capitalization of the company and the investor's total cost basis should remain the same. However, stock splits and reverse stock splits might sometimes have a positive or a negative effect on share price depending on how the decision is interpreted by investors. For example, a reverse stock split that results in an increase in the share price and allows the company to retain the advantages of being listed on a leading global exchange may result in an increase in the market capitalization of the company.

LOS 38b: Describe dividend payment chronology, including the significance of declaration, holder-of-record, ex-dividend, and payment dates.

Vol 4, pp 160–163

Declaration date: This is the date on which a company announces a particular dividend. The company also announces the holder-of-record date and the payment date on the declaration date.

The ex-dividend date is determined by the exchange on which the company's shares are listed.

Ex-dividend date: The ex-dividend date is the first day that the share trades without the dividend. Any investor who holds the stock on the ex-dividend date or who purchased it the day before the ex-dividend date is entitled to receive the dividend. On the ex-dividend date, the share price is adjusted for the amount of the dividend. For example, if a stock that has announced a $2/share dividend closes at $100 on the trading day before the ex-dividend date, it will open at $98 on the ex-dividend date. The ex-dividend date is also known as the ex-date.

Holder-of-record date: The holder-of-record date is the date at which a shareholder listed in the company's records will be entitled to receive the upcoming dividend. The length of the period between the holder-of-record date and the ex-dividend date depends on the trade settlement cycle of the particular exchange. For example, in the United States, where trades settle 3 days after execution (T+3 settlement), there is a 2-day gap between the ex-dividend date and the holder-of-record date. The holder-of-record date is also known as the owner-of record date, shareholder-of-record date, record date, date of record, or the date of book closure.

The holder-of-record date is determined by the company itself.

While the time between the ex-date and record date is fixed, the time between other dividend-related dates can vary.

Payment date: The payment date is the date on which the company actually mails out or transfers the dividend payment to shareholders.

Unlike the ex-date and record date, which must fall on a business day, the payment date may fall on a weekday or the weekend.

LESSON 2: SHARE REPURCHASES

LOS 38c: Compare share repurchase methods. Vol 4, pp 164–166

A share repurchase occurs when a company buys back its own shares. Shares that are repurchased by the company are known as Treasury shares and once repurchased are not considered for dividends, voting, or calculating earnings per share.

Share Repurchases Versus Cash Dividends

- Just because a company authorizes a share repurchase, it does not necessarily mean that the company is obligated to go through with the purchase. For cash dividends, once a company announces a dividend, it is committed to paying them.
- Cash dividends are distributed to shareholders in proportion to their ownership percentage. However, repurchases generally do not distribute cash in such a manner.

Unlike stock dividends and stock splits, repurchases entail an outflow of cash from the company. In most developed markets around the world, stock repurchases are becoming more popular as an alternative to cash dividends.

Arguments for Share Repurchases

- They send out a signal to the market that management believes that the company's stock is undervalued, or that management will support the stock price.
- They offer the company flexibility in its cash distributions. A share repurchase does not set the expectation of continued distributions in the future as cash dividends might.
- There is a tax advantage to distributing cash through repurchases in markets where capital gains are taxed at a lower rate than dividends.
- They can be used to limit the increase in the number of shares outstanding when a significant number of employee stock options have been exercised.

Share Repurchase Methods

Buy in the open market: Under this method, the company repurchases shares from the open market. Buying in the open market offers the company flexibility as there is no legal obligation to go through with the entire repurchase once it has been authorized, and the authorization can last for several years. This method is also cost-effective as the company can choose to execute the trades when the price impact is likely to be minimal and when the stock is attractively priced.

Buy back a fixed number of shares at a fixed price: This type of repurchase is known as a fixed price tender offer. The company offers to purchase a fixed number of shares at a fixed price (typically at a premium to the current market price) at a fixed date in the future. If the number of shares offered for sale exceeds the amount of shares that company desires to repurchase, the company will repurchase a pro rata amount from each shareholder who offers her shares for sale. Fixed price tender offers can be accomplished very quickly.

Dutch auction: Instead of specifying a fixed price for all the shares that the company wants to buy back (as is the case in a fixed price tender offer), under a Dutch auction the company specifies a range of acceptable prices. Shareholders who are interested in selling their shares specify their selling price and the amount of shares that they want to sell. The company accepts the lowest bids first and then accepts higher and higher bids until it has repurchased the desired number of shares. Dutch auctions can also be accomplished relatively quickly.

Repurchase by direct negotiation: This occurs when a company negotiates directly with a major shareholder to buy back its shares. This may occur in the following situations:

- A large shareholder wants to sell off its shares and the company wants to prevent the large block of shares from overhanging the market and depressing the share price.
- The company wants to buy out a large shareholder to prevent it from gaining representation on the company's board of directors.

LOS 38d: Calculate and compare the effect of a share repurchase on earnings per share when 1) the repurchase is financed with the company's excess cash and 2) the company uses debt to finance the repurchase.

Vol 4, pp 166–169

Share repurchases have an effect on a company's balance sheet and its income statement. If the repurchase is financed with cash, assets (cash) and shareholders' equity decline, and result in an increase in reported debt ratios. On the income statement, repurchases can increase or decrease EPS depending on how and at what cost the repurchase is financed. See Example 2-1.

Share Repurchases Using Excess Cash

Example 2-1: Share Repurchases with Idle Cash

XS Dough Inc. has 20 million shares outstanding and each share is currently worth $20. The company made $40 million in after-tax profits during 2009 and plans to buy back shares worth $2.2 million at the end of the year. The company believes that it will be able to repurchase the shares at a 10% premium to the current market price. Calculate the impact on 2009 EPS if XS Dough manages to buy back the shares at $22 per share.

Solution

Current EPS = $40 million / 20 million shares = $2 per share

After the repurchase:

Net income remains the same ($40 million)
The total number of shares outstanding falls to 20m – 100,000 = 19.9 million.

Therefore, EPS = $40 million / 19.9 million shares = $2.01 per share

Notice that the company's 2009 EPS rises by approximately 0.503% as a result of the repurchase. Further, the increase in EPS would have been more significant had the company managed to buy back the shares at the current market price ($20) rather than at a 10% premium.

Share Repurchases Using Borrowed Funds

See Example 2-2.

Example 2-2: Share Repurchases Using Borrowed Funds

Starsky Inc. plans to repurchase $16 million worth of stock with borrowed funds. The following information is provided:

Repurchase price	$80
Net income after tax	$150 million
EPS before repurchase	$5

1. What is Starsky's EPS assuming that it finances the repurchase by borrowing at an after-tax interest rate of 6.25%?
2. What is Starsky's EPS assuming that it finances the repurchase by borrowing at an after-tax interest rate of 8%?

Solution

1. Number of shares initially outstanding = Net income / EPS = \$150 million / \$5 = 30 million

   Number of shares repurchased = \$16,000,000 / \$80 = 200,000

   Number of shares outstanding after repurchase = 30,000,000 – 200,000 = 29,800,000

   EPS after the repurchase is calculated as:

   (Net income after tax – After-tax interest expense) / Shares outstanding after repurchase
   = [150,000,000 – (16,000,000 × 0.0625)] / 29,800,000 = \$5

   Notice that Starsky's EPS remains the same after the repurchase if it borrows the funds at 6.25%. This will typically be the case if the company's after-tax cost of borrowing equals its earnings yield.

   Earnings yield = EPS / Stock price = \$5/\$80 = 6.25%

2. EPS after repurchase is calculated as:

   (Net income after tax – After-tax interest expense) / Shares outstanding after repurchase
   = [150,000,000 – (16,000,000 × 0.08)] / 29,800,000 = \$4.99

   When the after-tax cost of borrowing is greater (lower) than the earnings yield, EPS falls (rises) after the repurchase.

Share repurchases may increase, decrease, or have no effect on EPS.

- If the funds used to finance the repurchase are generated internally, a repurchase will increase EPS only if the funds would not have earned the company's cost of capital if they were retained by the company.
- If borrowed funds are used to finance the repurchase, and the after-tax cost of borrowing is greater than the company's earnings yield, EPS will fall.
- If borrowed funds are used to finance the repurchase, and the after-tax cost of borrowing is lower than the company's earnings yield, EPS will rise.

The total return on a stock is composed of capital gains and dividends.

Bear in mind that it would be incorrect to infer that an increase in EPS indicates an increase in shareholder wealth. The cash used to finance the repurchase could as easily have been distributed as a cash dividend. Any capital gains resulting from an increase in EPS from share repurchases may be offset by a decrease in the stock's dividend yield.

LOS 38e: Calculate the effect of a share repurchase on book value per share. Vol 4, pg 169

See Example 2-3.

Example 2-3: The Effect of Share Repurchases on Book Value per Share

The following information relates to two companies that each plan to repurchase $2 million worth of common stock. The only difference between the companies is that Company A has a higher book value of equity and a higher book value per share. Evaluate the impact of the repurchase on the companies' book values per share.

	Company A	Company B
Stock price	$50	$50
Number of shares outstanding	10 million	10 million
Buyback amount	$2 million	$2 million
Book value of equity	$600 million	$200 million

Solution

Book value per share = Book value of equity / Number of shares outstanding

Company A's BV/share = $600m / 10m = $60
Company B's BV/share = $200m / 10m = $20

Both companies repurchase 40,000 shares ($2m/$50) and have 9,960,000 shares outstanding after the repurchase.

After the repurchase:

Company A's BV of equity = $600m − $2m = $598m
Company A's BV/share = $598m / 9.96m = $60.04

Company B's BV of equity = $200m − $2m = $198m
Company B's BV/share = $198m / 9.96m = $19.88

Conclusions:

- When the market price is greater than the book value per share, book value per share will decrease after the repurchase (see change in Company B's BV/share after repurchase).
- When the market price is lower than the book value per share, book value per share will increase after the repurchase (see change in Company A's BV/share after repurchase).

LOS 38f: Explain why a cash dividend and a share repurchase of the same amount are equivalent in terms of the effect on shareholders' wealth, all else being equal. **Vol 4, pp 170–171**

All else being equal, a share repurchase is equivalent to the payment of a cash dividend of an equal amount in terms of its effect on shareholder wealth. Example 2-4 illustrates this.

Example 2-4: Share Repurchase Versus Cash Dividend

Kon Fused Inc. is deciding between distributing $20 million of excess cash to its shareholders through a share repurchase or a special dividend. The company has 10 million shares outstanding and the current market price of its stock is $40. Determine the effects on shareholder wealth under both the distribution methods being considered by the company.

Solution

Cash dividend:

Market value of equity = ($40 × 10 million shares – $20 million) = $380 million

Market price per share after dividend = $380 million / 10 million shares = $38

Once the dividend is distributed ($2 per share) each shareholder gets a $2 dividend and the ex-dividend price of the stock equals $38. Total wealth from the ownership of a single stock equals $40.

Share repurchase:

The company would be able to repurchase 500,000 shares with the $20 million excess cash (at $40/share). The post-repurchase price would remain at $40.

Market value of equity = ($40 × 10 million shares – $20 million) = $380 million

Market price per share after repurchase = $380 million / (10 million shares – 500,000 shares) = $40

If an investor's shares are repurchased, she receives $40 for each share. If she continues to hold the shares, each share is worth $40 in the market.

The takeaway is that the impact on shareholder wealth of distributing cash to shareholders through a share repurchase or a cash dividend is the same. However, the above analysis assumes that:

- Dividends are received as soon as the shares go ex-dividend.
- Tax implications of dividends and repurchases are the same.
- The information content of the two policies does not differ.
- The company can purchase any number of shares at the current market price. If the company must repurchase stock at a premium to the current market price, shareholders whose shares are repurchased benefit, while remaining shareholders suffer a decrease in their wealth.

Concluding Remarks

Many investors believe that on average, share repurchases have a net positive effect on shareholder wealth. Studies have shown that share repurchase announcements have been accompanied by significant positive excess returns around the announcement date, and for the next few years. These findings indicate that management tends to buy back company stock when it is undervalued in the marketplace.

Similarly, unexpected increases in dividends are also frequently associated with positive excess returns.

READING 39: WORKING CAPITAL MANAGEMENT

LESSON 1: WORKING CAPITAL MANAGEMENT

Working capital management deals with short-term aspects of corporate finance activities. Effective working capital management ensures that a company has ready access to funds that are needed for day-to-day expenses and that it invests its assets in the most productive manner at the same time. In this reading we deal with issues associated with managing working capital and look at various methods of evaluating the efficiency of a company's working capital management.

LOS 39a: Describe primary and secondary sources of liquidity and factors that influence a company's liquidity position. Vol 4, pp 183–185

Liquidity management refers to the ability of a company to generate cash when required. Sources of liquidity can be classified as:

- **Primary sources**, which are readily available resources such as cash balances and short-term funds.
- **Secondary sources**, which provide liquidity at a higher cost than primary sources. They include negotiating debt contracts, liquidating assets, or filing for bankruptcy protection.

Using primary sources of liquidity does not usually result in a change in a company's operations. On the other hand, using secondary sources of liquidity may lead to significant changes in the company's financial structure and operations, and may indicate that the company's financial position is deteriorating.

A **drag on liquidity** occurs when there is a delay in cash coming into the company. Major drags on liquidity include:

- Uncollected receivables: The longer receivables are outstanding, the greater the risk that they will not be collected at all.
- Obsolete inventory: If inventory remains unsold for a long period, it might indicate that it is no longer usable.
- Tight credit: Adverse economic conditions can make it difficult for companies to arrange short-term financing.

Drags on liquidity can be dealt with by enforcing strict credit and collection policies.

A **pull on liquidity** occurs when cash leaves the company too quickly. Major pulls on payments include:

- Making payments early instead of waiting until the due date to make them.
- Reduced credit limits as a result of a history of not being able to make payments on time.
- Limits on short-term lines of credit: These can be mandated by the government, market-related, or company-specific.
- Low existing levels of liquidity.

LOS 39b: Compare a company's liquidity measures with those of peer companies. Vol 4, pp 185–190

Creditworthiness is the perceived ability of a borrower to satisfy the payment terms on a borrowing in a timely manner. Liquidity contributes to a company's creditworthiness. See Example 1-1.

Example 1-1: Measuring Liquidity

The following table provides important liquidity ratios of Topaz Inc. along with industry averages. Evaluate the company's liquidity management.

Ratio	2008 Topaz	2008 Industry	2007 Topaz	2007 Industry
Current ratio	1.5	2.2	1	2
Quick ratio	0.8	1	0.5	0.8
Number of days of receivables	40	35	45	30
Number of days of inventory	45	38	48	30
Number of days of payables	36	38	28	36

Solution

The changes in Topaz's ratios over 2008 suggest that its liquidity position has become more comfortable. However, the company still has room to improve, as it is still behind its peers in the industry.

The following **liquidity ratios** are used to evaluate a company's liquidity management:

The current ratio is the ratio of current assets to current liabilities.

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

- A higher current ratio means that a company is better positioned to meet its short-term obligations.
- A current ratio of less than one indicates negative working capital, which might imply that the company faces a liquidity crisis.

The quick ratio (acid-test ratio) is the ratio of quick assets to current liabilities. Quick assets are those that can be readily converted into cash, and exclude inventory (because it is usually the least liquid of current assets).

$$\text{Quick ratio} = \frac{\text{Cash} + \text{Short term marketable investments} + \text{Receivables}}{\text{Current liabilities}}$$

Higher quick and current ratios indicate greater liquidity. However, in order to gauge whether a given quick or current ratio is good or bad, we must look at the trend in ratios, how they compare with ratios of competitors, and available opportunities to invest in more profitable longer-term investments.

Accounts receivable turnover measures how many times, on average, accounts receivable are created by credit sales and collected over a given period. It is desirable to have an accounts receivable turnover close to the industry average.

$$\text{Accounts receivable turnover} = \frac{\text{Credit sales}}{\text{Average receivables}}$$

The number of days of receivables measures how many days it takes, on average, to collect receivables from customers. It is desirable to have a ratio close to the industry average.

$$\text{Number of days of receivables} = \frac{\text{Accounts receivable}}{\text{Average day's sales on credit}}$$

$$= \frac{\text{Accounts receivable}}{\text{Sales on credit / 365}}$$

- A collection period that is too high might imply that customers are too slow in making payments and too much of the company's capital is tied up in accounts receivable.
- A collection period that is too low might suggest that the company's credit policy is too strict, which might hurt sales.

The number of days of receivables must be evaluated in light of the credit terms offered to customers and the relation between sales and extension of credit.

Inventory turnover (TO) is a measure of how often, inventory is created and sold over a period.

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

- An inventory TO ratio that is too high might indicate that the company has too little stock on hand at any given point in time, which might hurt sales.
- A low inventory TO ratio might suggest that the company has too much liquidity tied up in inventory, perhaps because the units held are obsolete.

The number of days of inventory tells us the length of the period that inventory remains with the firm before being sold. It is desirable to have this ratio close to industry norms.

$$\text{Number of days of inventory} = \frac{\text{Inventory}}{\text{Average day's cost of goods sold}}$$

$$= \frac{\text{Inventory}}{\text{Cost of goods sold / 365}}$$

Accounts payables turnover measures how many times the company theoretically pays off creditors over a period.

$$\text{Payables turnover} = \frac{\text{Purchases}}{\text{Average trade payables}}$$

- A high payables turnover ratio might indicate that the company is not making full use of available credit facilities.
- A low ratio could suggest that the company has trouble making payments on time.

The number of days of payables measures how long the company takes to pay its suppliers.

$$\text{Number of days of payables} = \frac{\text{Accounts payable}}{\text{Average day's purchases}} = \frac{\text{Accounts payable}}{\text{Purchases / 365}}$$

The amount for purchases over the year might not be explicitly stated on the financial statements, but it can be calculated using cost of goods sold (COGS) and beginning and ending inventory balances:

$$\text{Purchases} = \text{Ending inventory} + \text{COGS} - \text{Beginning inventory}$$

LOS 39c: Evaluate working capital effectiveness of a company based on its operating and cash conversion cycles and compare the company's effectiveness with that of peer companies. Vol 4, pp 190–191

The **operating cycle** measures the time needed to convert raw materials into cash from sales.

$$\text{Operating cycle} = \text{Number of days of inventory} + \text{Number of days of receivables}$$

The **cash conversion cycle** or the **net operating cycle** is the length of the period from paying suppliers for materials to collecting cash from sales to customers. It can also be calculated as the operating cycle minus the number of days of payables.

$$\text{Net operating cycle} = \text{Number of days of inventory} + \text{Number of days of receivables} - \text{Number of days of payables}$$

Usually, *shorter* cycles are desirable. A conversion cycle that is too long suggests that the company has too much invested in working capital.

For effective management of working capital it is important for a company to accurately forecast cash flows. Forecasts can alert financial managers to potential future cash needs ahead of time, and can provide a standard against which actual performance can be evaluated.

LOS 39d: Describe how different types of cash flows affect a company's net daily cash position. Vol 4, pp 191–193

Most companies prefer keeping a minimum cash balance to run their operations smoothly. Cash may also be needed to cater to unexpected requirements, or to capitalize on lucrative opportunities. Table 1-1 lists the typical elements of a cash flow forecast and classifies them as inflows or outflows. Table 1-2 highlights the important aspects of cash forecasting for different time horizons:

Table 1-1: Examples of Cash Inflows and Outflows[1]

Inflows	Outflows
• Receipts from operations. • Funds transfer from subsidiaries, joint ventures, and third parties. • Maturing investments. • Debt proceeds (short and long term). • Other income items (interest, etc.). • Tax refunds.	• Payables and payroll disbursements. • Funds transfers to subsidiaries. • Investments made. • Debt repayments. • Tax payments. • Interest and dividend payments.

Table 1-2: Aspects of Cash Forecasting[2]

	Short Term	Medium Term	Long Term
Data Frequency	Daily/weekly for 4–6 weeks	Monthly for one year	Annually for 3–5 years
Format	Receipts and disbursements	Receipts and disbursements	Projected financial statements
Techniques	Simple projections	Projection models and averages	Statistical models
Accuracy	Very high	Moderate	Lowest
Reliability	Very high	Fairly high	Not as high
Uses	Daily cash management	Planning financial transactions	Long-range financial position

Many companies face a predictable surge in demand during a particular time during the year or at a particular stage of the business cycle. For example, firms that manufacture electronic gadgets face a surge in demand for their products over the holiday shopping season. These companies have to ship a significant amount of inventory to retailers in advance, but only receive payments for sales once the season is over. As a result, they have to finance the inventory rollout. Once sales revenues come in, they use their surplus liquidity to pay back borrowed amounts and invest the excess. Predicting sales peaks caused by seasonality is very important if the company must borrow funds to cover its needs.

1 - Exhibit 5, Volume 4, CFA Program Curriculum 2017.
2 - Exhibit 6, Volume 4, CFA Program Curriculum 2017.

- If a company sets aside too much money, it will lose out on investment income (opportunity costs).
- If a company sets aside too little, it will incur higher costs to raise funds quickly.

Investing Short-Term Funds

A company maintains a daily cash position to make sure that it has the necessary funds (the target balance) to carry on its day-to-day activities. Short-term investments represent a temporary store for funds that are not needed for financing daily operations. Typical short-term investments that businesses invest their excess cash in are highly liquid and have low risk. Table 1-3 lists some of the major instruments for short-term investments.

Table 1-3: Short-Term Investment Instruments[3]

Instruments	Typical Maturities	Features	Risks
U.S. Treasury Bills (T-bills)	13, 26, and 52 weeks	• Obligations of U.S. government (guaranteed), issued at a discount • Active secondary market • Lowest rates for traded securities	Virtually no risk
Federal agency securities	5–30 days	• Obligations of U.S. federal agencies (e.g., Fannie Mae, Federal Home Loan Board) issued as interest-bearing • Slightly higher yields than T-bills	Slight liquidity risk; insignificant credit risk
Bank certificates of deposit (CDs)	14–365 days	• Bank obligations, issued interest-bearing in $100,000 increments • "Yankee" CDs offer slightly higher yields	Credit and liquidity risk (depending on bank's credit)
Banker's acceptances (BAs)	30–180 days	• Bank obligations for trade transactions (usually foreign), issued at a discount • Investor protected by underlying company and trade flow itself • Small secondary market	Credit and liquidity risk (depending on bank's credit)
Eurodollar time deposits	1–180 days	• Time deposit with bank off-shore (outside United States, such as Bahamas) • Can be CD or straight time deposit (TD) • Interest-bearing investment • Small secondary market for CDs, but not TDs	Credit risk (depending on bank) Very high liquidity risk for TDs
Bank sweep services	1 day	• Service offered by banks that essentially provides interest on checking account balance (usually over a minimum level) • Large number of sweeps are for overnight	Credit and liquidity risk (depending on bank)

3 - Exhibit 7, Volume 4, CFA Program Curriculum 2017.

Table 1-3: (continued)

Instruments	Typical Maturities	Features	Risks
Repurchase agreements (Repos)	1 day+	• Sale of securities with the agreement of the dealer (seller) to buy them back at a future time • Typically over-collateralized at 102% • Often done for very short maturities (< 1 week)	Credit and liquidity risk (depending on dealer)
Commercial paper (CP)	1–270 days	• Unsecured obligations of corporations and financial institutions, issued at discount • Secondary market for large issuers • CP issuers obtain short-term credit ratings	Credit and liquidity risk (depending on credit rating)
Mutual funds and money market mutual funds	Varies	• Money market mutual funds commonly used by smaller businesses • Low yields but high liquidity for money market funds; mutual fund liquidity dependent on underlying securities in fund • Can be linked with bank sweep arrangement	Credit and liquidity risk (depending on fund manager)
Tax-advantaged securities	7, 28, 35, 49, and 90 days	• Preferred stock in many forms, including adjustable rate preferred stocks (ARPs), auction rate preferred stocks (AURPs), and convertible adjustable preferred stocks (CAPs) • Dutch auction often used to set rate • Offer higher yields	Credit and liquidity risk (depending on issuer's credit)

The dividend rate on adjustable-rate preferred stock is reset quarterly in line with market interest rates. These securities offer investors a tax-advantage because a high proportion of the dividend income is exempt from taxes.

When firms need to borrow over the short term, they typically rely on bank overdrafts and commercial paper to meet their needs.

LOS 39e: Calculate and interpret comparable yields on various securities, compare portfolio returns against a standard benchmark, and evaluate a company's short-term investment policy guidelines. Vol 4, pp 193–200

Yields on Short-Term Investments

Since we have already studied various measures of yields in detail in Quantitative Methods, we will not spend much time on them here.

Discount instruments are instruments that are purchased at less than face value, and pay back face value at maturity. See Example 1-2.

Example 1-2: Discount Interest

A discount instrument with a face value of $1,000 pays 5% in interest and has one month remaining till maturity. At what price can the security be purchased today?

Solution

$$\begin{aligned}\text{Purchase price} &= \text{Face value} - \text{Discount in dollars}\\ &= \$1{,}000 - (5\%)(1/12)(\$1{,}000)\\ &= \$1{,}000 - \$4.167 = \mathbf{\$995.83}\end{aligned}$$

The difference between the face value and purchase price ($4.17) is known as **discount interest.**

Interest-bearing securities differ from discounted securities in that the investor pays the face value to purchase the security and receives the face value plus interest at maturity.

Yields on Short-Term Investments

$$\text{Money market yield} = \left(\frac{\text{Face value} - \text{price}}{\text{Price}}\right) \times \left(\frac{360}{\text{Days}}\right) = \text{Holding period yield} \times \left(\frac{360}{\text{Days}}\right)$$

$$\text{Bond equivalent yield} = \left(\frac{\text{Face value} - \text{price}}{\text{Price}}\right) \times \left(\frac{365}{\text{Days}}\right) = \text{Holding period yield} \times \left(\frac{365}{\text{Days}}\right)$$

$$\text{Discount basis yield} = \left(\frac{\text{Face value} - \text{price}}{\text{Face value}}\right) \times \left(\frac{360}{\text{Days}}\right) = \%\ \text{discount} \times \left(\frac{360}{\text{Days}}\right)$$

$$\%\ \text{Discount} = \frac{\text{Face value} - \text{Price}}{\text{Face value}}$$

Notice that the only difference between the money-market yield and discount-basis yield is the denominator. Money-market yield uses the purchase price, so it calculates the return an investor earns on the actual amount invested, over a 360-day year. Discount-basis yield uses the face value in the denominator and annualizes the yield for 360 days. The bond equivalent yield uses the purchase price in the denominator and uses a 365-day year. Notice that this formula for calculating BEY (for short-term instruments) is different from the one used in Quantitative Methods, where the semiannual yield was multiplied by 2 to determine BEY.

Example 1-3: Money-Market Yields, Discount-Basis Yields, and Bond Equivalent Yields

A 90-day US T-bill with a par value of $1,000 is issued at a discount of 8%. Calculate the money market yield, discount-basis yield, and the bond equivalent yield for this security.

Solution

$$\text{Purchase price} = \text{Face value} - \text{Unannualized discount}$$
$$= \$1{,}000 - (8\%)(90/360)(\$1{,}000) = \mathbf{\$980}$$

$$\text{Money market yield} = \left(\frac{\text{Face value} - \text{price}}{\text{Price}}\right) \times \left(\frac{360}{\text{Days}}\right) = \left(\frac{\$1{,}000 - \$980}{\$980}\right) \times \left(\frac{360}{90}\right) = 8.16\%$$

$$\text{Bond equivalent yield} = \left(\frac{\text{Face value} - \text{price}}{\text{Price}}\right) \times \left(\frac{365}{\text{Days}}\right) = \left(\frac{\$1{,}000 - \$980}{\$980}\right) \times \left(\frac{365}{90}\right) = 8.28\%$$

$$\text{Discount basis yield} = \left(\frac{\text{Face value} - \text{price}}{\text{Face value}}\right) \times \left(\frac{360}{\text{Days}}\right) = \left(\frac{\$1{,}000 - \$980}{\$1{,}000}\right) \times \left(\frac{360}{90}\right) = 8.00\%$$

Investment returns are expressed as bond equivalent yields to facilitate comparisons between various investment alternatives. The overall return on a portfolio is calculated as the weighted average of the yields of different assets in the portfolio, where an individual asset's weight is based on the proportion of the portfolio invested in that particular asset.

Investors face several different types of risks, such as credit risk, market risk, liquidity risk, foreign exchange risk, and so on. The key attributes of these risks (i.e., the conditions that lead to them) and the steps that investors may take to mitigate/eliminate associated losses are listed in Table 1-4.

Table 1-4: Types of Investment Risks and Safety Measures[4]

Type of Risk	Key Attributes	Safety Measures
Credit (or default)	• Issuer may default • Issuer could be adversely affected by economy, market • Little secondary market	• Minimize amount • Keep maturities short • Watch for "questionable" names • Emphasize government securities
Market (or interest rate)	• Price or rate changes may adversely affect return • There is no market to sell the maturity to, or there is only a small secondary market	• Keep maturities short • Keep portfolio diverse in terms of maturity, issuers
Liquidity	• Security is difficult or impossible to (re)sell • Security must be held to maturity and cannot be liquidated until then	• Stick with government securities • Look for good secondary market • Keep maturities short
Foreign exchange	• Adverse general market movement against your currency	• Hedge regularly • Keep most in your currency and domestic market (avoid foreign exchange)

Cash Management Investment Strategies

Short-term investment strategies can be categorized as passive or active.

- A passive strategy involves a limited number of transactions, and is based on very few rules for making daily investments. The focus is simply on reinvesting funds as they mature with little attention paid to yields.
- An active strategy involves constant monitoring to exploit profitable opportunities in a wider array of investments. Active strategies call for more involvement, more thorough study, evaluation, forecasts, and a flexible investment policy.
    - *Matching strategies* involve matching the timing of cash outflows with investment maturities. A matching strategy makes use of similar types of investments as passive strategies.
    - *Mismatching strategies* involve intentionally mismatching the timing of cash outflows with investment maturities. A mismatching strategy is riskier and requires very accurate and reliable cash forecasts. This strategy typically involves the use of liquid instruments and derivatives.
    - *Laddering strategies* involve scheduling the maturities of portfolio investments such that maturities are spread out equally over the term of the ladder.

4 - Exhibit 8, Volume 4, CFA Program Curriculum 2017.

Cash Management Investment Policy

Companies with short-term investment portfolios should have a formal, written policy that guides the investment decision-making process. Having such a policy protects the company and its investment manager, and effectively communicates key aspects of the portfolio to investment dealers. An investment policy has the following basic structure:

- The *purpose* of the investment policy states reasons for the existence of the portfolio and describes its general attributes, such as the investment strategy to be followed.
- It identifies the *authorities* who supervise the portfolio managers and details the actions that must be undertaken if the policy is not followed.
- It describes the types of investments that should be considered for inclusion in the portfolio. The policy also contains *restrictions* on the maximum proportion of each type of security in the portfolio and specifies the minimum credit rating of portfolio securities.

The investment policy statement should be evaluated on the basis of how well it meets the goals of short-term investments (i.e., its ability to generate competitive returns without exposing the company to undue risks). The returns on short-term investments in different instruments should be expressed as bond equivalent yields so that various investment options can be easily compared.

LOS 39f: Evaluate a company's management of accounts receivable, inventory, and accounts payable over time and compared to peer companies. Vol 4, pp 201–214

Key Elements of the Trade Credit Granting Process

A company's credit policy can have a significant impact on sales. A company may be able to enhance sales by loosening acceptance criteria, and could end up restricting sales if the terms offered to customers are too strict. An effective credit management system must follow a proper strategy that is tailored to the company's needs and reflects its goals.

Companies offer different forms of credit terms to customers depending on their financial strength, the nature of their relationship with the company, and the type of credit terms offered by competitors. Some of the forms of terms of credit (excluding cash) include:

- Ordinary terms
- Cash before delivery (CBD)
- Cash on delivery (COD)
- Bill-to-bill
- Monthly billing

Credit managers typically use **credit scoring models** to evaluate customers' credit worthiness. These models consider factors such as availability of ready cash, type of organization (i.e., corporation, sole proprietorship, etc.), and how quickly payments are made to suppliers. The benefit of using credit scoring models is that they allow companies to make decisions quickly, and do not require a great deal of paperwork.

Managing Customers' Receipts

A company's cash collection system depends on the types of customers it has and the methods of payment used by them. A good collection system should accelerate payments along with their information content (e.g., customer's name, identification number, etc.). This can best be achieved by establishing an electronic collection network. However, if payments cannot be converted to electronic payments, then companies may use bank lockbox services.

A lockbox system simplifies a company's collection and processing of accounts receivables. Under this system, customers mail their payments to a post office box from where they are collected and processed by the company's bank and deposited into its account. This saves the time for payments to be first processed by the company's accounting system, hence, speeding up cash collection.

Companies may measure the performance for check deposits by calculating the **float factor**, which gives the average number of days it takes deposited checks to clear.

Float factor = Average daily float / Average daily deposit

Float = Amount of money that is in transit between payments made by the customers and funds that can be used by the company

Average daily deposit = Total amount of check deposited / Number of days

Although this measure only tells us the time it takes for checks to clear (and not how long it takes to receive those checks, deposit them, and then have them cleared), it is still very useful as it can be calculated easily for any depository account.

Evaluating Management of Accounts Receivable

An aging schedule classifies accounts receivable according to the length of time that they have been outstanding. Table 1-5 provides an example of an aging schedule. It shows the accounts receivable of ABC Company at the end of the first quarter of 2008.

Table 1-5: ABC's Accounts Receivable Aging Schedule

	January 2008	February 2008	March 2008
Current (1–30 days old)	$15,000	$13,000	$10,000
1–30 days past due	$6,000	$5,000	$9,000
31–60 days past due	$5,000	$4,000	$5,000
61–90 days past due	$3,000	$3,000	$4,000
More than 90 days past due	$2,000	$2,000	$2,000
TOTAL	$31,000	$27,000	$30,000

In Table 1-6, ABC's aging schedule is presented in terms of percentages. This makes it easier to identify changes in the aging schedule over the period. Notice the change in March's aging—a lower proportion of total receivables is in the form of current receivables (33.3%), and a higher proportion of receivables is past due (66.7%). Accounts receivable have not been collected and converted to cash as rapidly in March as they were in January and February.

Table 1-6: ABC's Weighted Average Collection Period

	January 2008	February 2008	March 2008
Current (1–30 days old)	48.4%	48.1%	33.3%
1–30 days past due	19.4%	18.5%	30%
31–60 days past due	16.1%	14.8%	16.7%
61–90 days past due	9.7%	11.1%	13.3%
More than 90 days past due	6.5%	7.4%	6.7%

We can better evaluate the firm's ability to collect its receivables by calculating the **weighted average collection period**, which measures how long it takes a company to collect cash from its customers irrespective of the changes in sales and the level of sales. Exhibit 1-1 shows the calculation of ABC's weighted average collection period for February 2008 and March 2008.

Exhibit 1-1: Calculation of ABC's Weighted Average Collection Period

The average days for collecting receivables in each grouping.

The weighting from the aging schedule.

The product of collection days and weight.

February 2008

	Collection Days	Weight	Weighted days
Current (1–30 days old)	20	48.1%	9.6
31–60 days	40	18.5%	7.4
61–90 days	72	14.8%	10.7
91–120 days	95	11.1%	10.5
121+ days	123	7.4%	9.1
Weighted average collection days			**47.3**

The total of all the weighted days.

March 2008

	Collection Days	Weight	Weighted days
Current (1–30 days old)	24	33.3%	8
31–60 days	45	30%	13.5
61–90 days	78	16.7%	13
91–120 days	102	13.3%	13.6
121+ days	138	6.7%	9.2
Weighted average collection days			**57.3**

The company's weighted average collection period has increased dramatically. An analyst should scrutinize this change and determine whether it is due to an extension of credit terms by the company to promote sales or because major customers are having trouble making payments.

The only drawback of the weighted average collection method is that it requires more information than the number of days of receivables. This information may not be easily available.

Evaluating Inventory Management

The main goal of inventory management is to maintain a level of inventory that ensures smooth delivery of sales without having more than necessary invested in inventory.

- A high level of inventory is undesirable as it inflates storage costs, can result in losses from obsolescence or damage, and can squeeze liquidity from the firm.
- A shortage of inventory, on the other hand, can hurt sales as the company loses out on potential customers.

Companies may have a variety of motives for holding inventory. These include:

- The transactions motive: Inventory is just kept for the planned manufacturing activity.
- The precautionary motive: Inventory is kept to avoid any stock-out losses.
- The speculative motive: Inventory is kept to ensure its availability in the future when prices are expected to increase.

However, companies need to strike a balance in managing their inventory levels (i.e., they need to avoid costs of holding excessive inventory, and at the same time ensure that they hold sufficient stock to avoid hampering sales). Two basic approaches for managing inventory levels are economic order quantity and just-in-time.

- Economic order quantity is the order quantity for inventory that minimizes its total ordering and holding costs. Companies typically use the economic order quantity-reorder point (EOQ-ROP) method, under which the ordering point for inventory is determined on the basis of costs of ordering and carrying inventory, such that total cost associated with inventory is minimized. This method relies on expected demand, which makes it imperative that short-term forecasts are reliable.
- The just-in-time method reduces in-process inventory and associated carrying costs through evaluation of the entire system of delivery of materials and production. Under this method, the reorder point is primarily determined on the basis of historical demand.

We can evaluate a company's inventory management by analyzing the inventory turnover ratio and the number of days of inventory.

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

$$\begin{aligned}\text{Number of days of inventory} &= \frac{\text{Inventory}}{\text{Average days cost of goods sold}} \\ &= \frac{\text{Inventory}}{\text{Cost of goods sold / 365}} \\ &= \frac{365}{\text{Inventory turnover}}\end{aligned}$$

As we have mentioned before, analysts should be careful when interpreting changes in these ratios. Firms in the same industry may have significantly different turnover ratios because of different strategies or product mixes. A decrease in inventory TO for a firm over time could indicate that enough stock is not being sold. On the other hand, a decrease could also indicate that a company wants to reduce the chances of inventory "stock-outs."

Evaluating Management of Accounts Payable

Managing accounts payable is an important part of working capital management, as accounts payable can be a source of working capital for the firm. By paying too early, a company loses out on interest income. If it pays late, the company risks ruining its reputation and relationships with suppliers. Further, penalties and interest charges for late payment can be very significant.

Companies should consider a variety of factors as guidelines for managing their accounts payable effectively. These include:

- Financial organization's centralization: The management of a company's payables is affected by the degree to which its core financial system is centralized or decentralized.
- Number, size, and location of vendors: The sophistication of a company's payables system is affected by its supply chain and how dependent the company is on its trading partners.
- Trade credit and cost of borrowing or alternative cost: The standardization of a company's payables procedures is dependent on the importance of credit to the company and its ability to evaluate trade credit opportunities (e.g., trade discounts).
- Control of disbursement float: The disbursement float (the amount of time between the issuance of a check and its clearance) allows companies to use their funds longer than if they had to fund their checking accounts on the day the checks were mailed.
- Inventory management: Newer management techniques and systems are required to process the increased volume of payments generated through newer inventory control techniques.
- E-commerce and electronic data interchange (EDI): Making payments electronically may be more efficient and cost-effective than making payments through checks. Checks are only more valuable when the value of the disbursement float and interest rates are high.

Evaluating Trade Discounts

A company should review its evaluation of trade discounts periodically. An early payment discount must be availed if the savings from paying suppliers early are greater than the returns that could have been earned by investing the funds instead or greater than the firm's cost of borrowing.

$$\text{Implicit rate} = \text{Cost of trade credit} = \left(1 + \frac{\text{Discount}}{1 - \text{Discount}}\right)^{\left(\frac{365}{\text{Number of days beyond discount period}}\right)} - 1$$

Terms of "2/10 net 30" mean that a 2% discount is available if the amount owed is paid within 10 days; otherwise, the full amount is due by the 30th day. See Example 1-4.

Example 1-4: Evaluating Trade Discounts

Calculate the cost of trade credit if terms are 2/10, net 30 and the account is paid on:

- The 15th day
- The 25th day

Solution

$$\text{Cost of trade credit on the 15th day} = \left(1+\frac{0.02}{1-0.02}\right)^{\left(365/5\right)}-1 = 337.02\%$$

$$\text{Cost of trade credit on the 25th day} = \left(1+\frac{0.02}{1-0.02}\right)^{\left(365/15\right)}-1 = 63.49\%$$

Cost of credit decreases as the company approaches the net day (the 30th day).

The cost of trade credit during the discount window is zero percent, so a company should pay toward the end of the discount period if it wants to avail the discount. Once the discount period expires, the cost of credit rises significantly and then declines as the net day nears. If the company's cost of funds or short-term investment rate is less than the calculated rate, it offers a better return than the company's short-term borrowing rate.

We can evaluate a company's management of payables through its number of days of payables.

$$\text{Number of days of payables} = \frac{\text{Accounts payable}}{\text{Average day's purchases}}$$

$$\frac{\text{Accounts payable}}{\text{Purchases / 365}} = \frac{365}{\text{Payables turnover}}$$

This ratio indicates the number of days, on average, that the company takes to pay its suppliers. The number of days must be compared to the credit terms offered to the company; paying sooner than necessary has costs of credit, and paying late might affect relations with suppliers adversely.

LOS 39g: Evaluate the choices of short-term funding available to a company and recommend a financing method. Vol 4, pp 215–220

Short-term financing is available to companies from various bank and nonbank sources. Table 1-7 lists the primary features of bank sources of finance.

Table 1-7: Bank Sources of Short-Term Finance[5]

Source/Type	Users	Rate Base	Compensation	Other
Uncommitted line	Large corporations		None	Mainly in the U.S.; limited liability
Regular line	All sizes	Prime (U.S.) or base rate (other countries)	Commitment Fees	Common everywhere
Overdraft line	All sizes		Commitment Fees	Mainly outside U.S.
Revolving credit agreement	Larger corporations		Commitment fees plus extra fees	Strongest form (primarily in the U.S.)
Collateralized loan	Small, weak borrowers	Base +	Collateral	Common everywhere
Discounted receivables	Large companies	Varies	Extra fees	More overseas, but some in U.S.
Bankers' acceptances	International companies	Spread over commercial paper	None	Small volume
Factoring	Smaller	Prime ++	Service fees	Special industries

- Uncommitted lines of credit: A bank offers a line of credit to the company for a certain period of time, but reserves the right to refuse to lend. This makes it the weakest and least reliable form of borrowing. Its advantage is that it does not require any compensation other than interest.
- Committed lines of credit (regular lines of credit): These are stronger than uncommitted lines of credit as they require a formal commitment from the bank. Further, they are unsecured and are pre-payable without any penalties. Borrowing rates are negotiated, and are usually stated in terms of a money market rate (such as LIBOR) plus a spread to reflect the borrower's credit worthiness. Note that banks also typically charge a fee for a committed line of credit.
- Revolving credit agreements: These are the strongest form of short-term borrowing facilities. They are similar to regular lines of credit with respect to borrowing rates, compensation, and being unsecured. However, unlike regular lines of credit, they are in effect for multiple years, and may have optional medium-term loan features.

Nonbank sources of short-term finance include nonbank finance companies and commercial paper. Table 1-8 lists the features of these sources.

5 - Exhibit 15 - Panel A, Volume 4, CFA Program Curriculum 2017.

Table 1-8: Nonbank Sources of Short-Term Finance[6]

Source/Type	Users	Rate Base	Compensation	Other
Nonbank finance companies	Small, weak borrowers	Prime + + +	Service fees	Weak credits
Commercial paper	Largest corporations	Money-market sets rate	Back up line of credit, commissions	Lowest rates for short-term funds

Some companies take secured short-term loans, which are known as asset-based loans. These loans are collateralized by current assets of the company (usually receivables and inventory). Companies usually take asset-based loans when they do not have the required credit quality to qualify for bank loans.

Approaches to Short-Term Borrowing

Borrowers should have planned strategies for short-term borrowings. They should:

- Ensure that there is sufficient capacity to handle peak cash needs.
- Maintain sufficient sources of credit to be able to fund ongoing cash requirements.
- Ensure that the rates obtained for these borrowings are cost effective.
- Diversify to have abundant options and not be too reliant on one lender or form of lending.
- Have the ability to manage different maturities in an efficient manner.

Asset-Based Loans

If a company fails to qualify for an unsecured bank loan, it may opt for asset-based loans. These are loans that are collateralized by the company's assets. Assets that are used to secure short-term loans usually include current assets, such as receivables and inventory.

Computing the Costs of Borrowing

Firms must strive to obtain the most cost-effective source of finance. In order to find the best form of short term financing, each of the sources have to be adjusted to a common basis for comparability.

Cost of line of credit (and other sources that require a commitment fee)

$$\text{Line of credit cost} = \frac{\text{Interest} + \text{Commitment fee}}{\text{Loan amount}}$$

Cost of banker's acceptance (and other sources whose costs are stated as "all-inclusive"):

$$\text{Banker's acceptance cost} = \frac{\text{Interest}}{\text{Net proceeds}} = \frac{\text{Interest}}{\text{Loan amount} - \text{Interest}}$$

6 - Exhibit 15 - Panel B, Volume 4, CFA Program Curriculum 2017.

Cost of commercial paper (and sources with dealer's fees and backup fees, which are quoted as all inclusive)

$$\frac{\text{Interest} + \text{Dealer's comission} + \text{Backup cost}}{\text{Loan amount} - \text{Interest}}$$

Example 1-5: Choosing Between Short-Term Borrowing Alternatives

Evaluate which of the following short-term financing choices should be chosen for having the lowest cost. Assume that $1,000,000 will be borrowed for one month.

1. Drawing on a line of credit at 7% with a 0.5% commitment fee on the full amount. One-twelfth of the commitment fee is allocated to each month.
2. A banker's acceptance at 8%, an all-inclusive rate.
3. Commercial paper at 6% with a dealer's commission of 1/4% and a backup line of cost of 1/2 %.

This analysis has been simplified by using a factor of 1/12 to determine the effective interest rate and a factor of 12 to annualize the effective interest rate.

Solution

$$\text{Line of credit cost} = \left(\frac{\text{Interest} + \text{Commitment fee}}{\text{Loan amount}}\right) \times 12$$

$$\text{Line of credit cost} = \left(\frac{(0.07 \times 1{,}000{,}000 \times 1/12) + (0.005 \times 1{,}000{,}000 \times 1/12)}{1{,}000{,}000}\right) \times 12$$

Line of credit cost = 7.5%

$$\text{Banker's acceptance cost} = \left(\frac{\text{Interest}}{\text{Loan amount} - \text{Interest}}\right) \times 12$$

$$\text{Banker's acceptance cost} = \left(\frac{(0.08 \times 1{,}000{,}000 \times 1/12)}{1{,}000{,}000 - (0.08 \times 1{,}000{,}000 \times 1/12)}\right) \times 12$$

Banker's acceptance cost = 8.05%

$$\text{Commercial paper cost} = \left(\frac{\text{Interest} + \text{Dealer's comission} + \text{Backup costs}}{\text{Loan amount} - \text{Interest}}\right) \times 12$$

$$= \left(\frac{(0.06 \times 1{,}000{,}000 \times 1/12) + (0.0025 \times 1{,}000{,}000 \times 1/12) + (0.005 \times 1{,}000{,}000 \times 1/12)}{1{,}000{,}000 - (0.06 \times 1{,}000{,}000 \times 1/12)}\right) \times 12$$

Commercial paper cost = 6.78%

Commercial paper offers the lowest cost source of short-term financing in the given scenario.

Study Session 12: Portfolio Management

READING 40: PORTFOLIO MANAGEMENT: AN OVERVIEW

LESSON 1: PORTFOLIO MANAGEMENT: AN OVERVIEW

LOS 40a: Describe the portfolio approach to investing. Vol 4, pp 233–242

Instead of evaluating each investment in isolation, investment managers should take a portfolio perspective when evaluating an investment. Taking a portfolio perspective means evaluating each investment on the basis of its contribution to the characteristics of the portfolio as a whole.

Reasons for Taking the Portfolio Perspective

Taking the portfolio perspective offers diversification benefits. By not putting all their eggs in one basket (overinvesting in a single security or asset class), individuals can diversify away some of the risk in their investments.

In a later reading, we will learn that portfolio standard deviation tends to be lower than the average standard deviation of its components due to the less than perfectly positive correlation between the returns on its components.

- Portfolios of securities may offer equivalent expected returns with lower volatility of returns (lower risk) compared to individual securities.
- A simple measure of the value of diversification is the diversification ratio. It is the ratio of the standard deviation of an equal-weighted portfolio to the standard deviation of a randomly selected component of the portfolio. The lower the diversification ratio, the greater the risk reduction benefits of diversification, and the greater the portfolio effect.
- The composition of the portfolio (weight of each security held in the portfolio) is an important determinant of the overall level of risk inherent in the portfolio. By varying the weights of the individual securities, investors can arrive at a portfolio that offers the same return as an equally weighted portfolio, but with a lower standard deviation (risk).

Despite the obvious benefits of subscribing to the portfolio perspective when making investments, it is important to note that portfolios do not necessarily provide downside protection. The correlation between the various components of the portfolio can change over time in a manner unfavorable to investors and reduce diversification benefits. For example, in the recent market turmoil (late 2007 to early 2009) all major market indices fell in unison.

LOS 40b: Describe types of investors and distinctive characteristics and needs of each. Vol 4, pp 242–248

LOS 40c: Describe defined contribution and defined benefit pension plans. Vol 4, pp 242–243

Individual Investors

An important thing to note about a defined-contribution plan is that the employee accepts the investment risk in the portfolio.

Individual investors can have a variety of reason for investing (e.g., providing for children's college education, saving for retirement, or starting a business). Most individuals accumulate wealth to provide for their needs during retirement through defined-contribution pension plans, where they contribute a part of their wages to the plan while working.

The investment needs of individuals depend on their broader financial circumstances. Younger investors tend to be more aggressive and look for capital gains, while older investors look to generate a stable income stream to meet retirement needs. See Table 1-1.

Institutional Investors

Defined-benefit pension plans: In a defined-benefit (DB) plan, the employer has an obligation to pay a certain amount to its employees every year once they retire. DB plans are long-term investors and aim to match cash flows from plan assets with the timing of future pension payments (liabilities).

Endowments and foundations: A university endowment is established to provide financial support to the university and its students. A charitable foundation invests the donations that it receives in order to fund grants that are in line with its objectives. Typically, endowments and foundations aim to maintain the inflation-adjusted capital value of their funds, while generating the necessary income to meet their objectives. They are generally established with the intent of having a perpetual useful life and must balance short-term spending needs with long-term capital preservation requirements.

Banks: A bank typically aims to earn a return on its reserves that is greater than the interest that it pays to depositors. In addition to being low risk, a bank's investments must be relatively liquid so that they can be easily sold if depositors need to withdraw funds. In the United States, there are legal restrictions on banks owning equity investments.

Insurance companies: An insurance company writes an insurance policy in return for a premium. These premiums must be invested in a manner that allows the company to meet insurance claims when they arise. Insurance companies are also relatively conservative with their investments as they need to satisfy claims when due. Life insurance companies typically have a longer time horizon than nonlife insurance companies, as they are expected to have to make payments after a longer period.

Investment companies: Investment companies and mutual funds are discussed in detail in a later reading.

Sovereign wealth funds: A sovereign wealth fund (SWF) is a government-owned investment fund. SWFs are usually established to invest revenues from finite revenue sources (e.g., oil) to benefit future generations of citizens or to manage a country's foreign exchange reserves.

Table 1-1: Summary of Investment Needs by Client Type[1]

Client	Time Horizon	Risk Tolerance	Income Needs	Liquidity Needs
Individual investors	Varies by individual	Varies by individual	Varies by individual	Varies by individual
Defined-benefit pension plans	Typically long term	Typically quite high	High for mature funds; low for growing funds	Typically quite low
Endowments and foundations	Very long term	Typically high	To meet spending commitments	Typically quite low
Banks	Short term	Quite low	To pay interest on deposits and operations expenses	High to meet repayment of deposits

1 - Exhibit 14, Volume 4, CFA Program Curriculum 2017

Table 1-1: (*continued*)

Client	Time Horizon	Risk Tolerance	Income Needs	Liquidity Needs
Insurance companies	Short term for property and casualty; long term for life insurance companies	Typically quite low	Typically low	High to meet claims
Investment companies	Varies by fund	Varies by fund	Varies by fund	High to meet redemptions

LOS 40d: Describe the steps in the portfolio management process.

Vol 4, pp 248–252

The portfolio management process involves the following steps:

- Planning
  - Understanding the client's needs.
  - Preparing the investment policy statement (IPS).
- Execution
  - Determining the asset allocation.
  - Analyzing securities.
  - Constructing the portfolio.
- Feedback
  - Monitoring and rebalancing the portfolio.
  - Measuring and reporting performance.

Planning

The planning step involves understanding the client's needs and constraints and developing an investment policy statement (IPS). The IPS is a written document that describes the objectives and constraints of the investor. It may also include a benchmark against which the portfolio manager's performance can be evaluated. An IPS should be reviewed and updated regularly, especially if there has been a drastic change in the client's circumstances.

Execution

Asset allocation: The asset allocation of a portfolio refers to the distribution of investable funds between various asset classes (e.g., equities, fixed-income securities, alternative investments, etc.). Analysts form economic and capital market expectations and allocate funds across asset classes based on how each class is expected to perform in the forecasted scenario. Although decisions regarding which individual securities are chosen do have an effect on portfolio performance, differences in asset allocation explain most of the differences between returns on portfolios.

Security analysis: Analysts use their knowledge of various companies and the industry to identify investments that offer the most attractive risk return characteristics from within each asset class.

Portfolio construction: After determining the target asset allocation and conducting security analysis, the portfolio manager will construct the portfolio in line with the objectives outlined in the IPS. The portfolio must be well diversified and the risk inherent in the portfolio must be in line with the client's risk tolerance level as specified in the IPS.

Once the portfolio manager has decided which securities to purchase and in what amount, she will pass instructions to a trader, who will execute the transactions.

Feedback

Portfolio monitoring and rebalancing: The portfolio must be regularly monitored. Changes in fundamental factors and client circumstances may require changes in the portfolio's composition. Rebalancing may be required when changes in security prices cause a significant change in weights of assets in the portfolio.

Performance measurement and reporting: This step involves measuring the performance of the portfolio relative to the benchmark stated in the IPS and reporting portfolio performance to the client.

LOS 40e: Describe mutual funds and compare them with other pooled investment products. Vol 4, pp 252–259

Pooled Investments

Pooled investments are investments in securities issued by entities that represent ownership in the underlying assets held by those entities. These include:

- Mutual funds and exchange traded funds, in which investors can participate with a relatively small initial investment
- Hedge funds and private equity funds, which may require a minimum investment of U.S. $1 million or more.

Mutual Funds

Mutual funds pool money from several investors and invest these funds in a portfolio of securities. Individuals and institutions invest in mutual funds to obtain diversification benefits and to avail the investment management services of qualified managers. Each investor has a pro-rata share in the income and value of the fund.

The value of a mutual fund is referred to as "net asset value" (NAV), which is calculated on a daily basis based on the closing price of the underlying securities. There are two types of mutual funds:

- *Open-end funds* accept new investment funds and issue new shares at a value equal to the fund's net asset value per share at the time of investment. These funds also allow investors to redeem their investment in the fund at the prevailing net asset value per share.

- *Closed-end funds* accept no new investment money into fund. Shares in the fund are traded in the secondary market so new investors invest in the fund by purchasing shares in the market, and investors liquidate their holdings by selling the shares in the market. Unlike open-end funds, shares of closed-end funds can trade at a discount or premium to the net asset value per share, depending on the demand and supply of shares in the market.

The structure of open-end funds makes it easy for them to grow in size, but it does pose the following problems:

- The portfolio manager needs to manage cash inflows and outflows.
- An inflow of new investment requires the manager to find new investments.
- Funds need to keep cash for redemptions.

Closed-end funds do not face these problems, but as mentioned earlier, they cannot accept new investments.

Mutual funds may also be classified into:

- *Load funds* that charge a percentage fee for investing in the fund and/or for redemptions from the fund on top of an annual fee.
- *No-load funds* that only charge an annual fee based on a percentage of the fund's NAV.

Types of Mutual Funds

- *Money-market funds*: These invest in high-quality, short-term debt instruments. Money-market mutual funds can be divided into tax-free and taxable funds.
- *Bond funds*: These invest in individual bonds and sometimes preference shares as well. Unlike money-market mutual funds, they usually invest in longer term instruments.
- *Stock funds*: These invest in equities and equity indices. Stock mutual funds can be actively or passively managed. Active portfolio management aims to outperform a benchmark portfolio or index by tilting the individual weights of stocks in the portfolio away from their weights in the benchmark. On the other hand, passive management (followed by index funds) aims to track the performance of a benchmark portfolio by attaching the same weights to individual stocks as prescribed by the benchmark.

  Active management entails higher management fees to compensate managers for the research conducted to select mispriced securities. Further, it results in a higher turnover of portfolio securities, which leads to greater capital gains tax liabilities and transaction costs relative to index funds.
- *Hybrid or balanced funds*: These invest in both bonds and equities.

Other Investment Products

Exchange Traded Funds (ETFs)

Exchange traded funds (ETFs) issue shares in a portfolio of securities and are designed to track the performance of a specified index. An ETF purchases a large number of shares in the same proportion as the index it tracks and issues shares in the ETF to investors who want to track the same index.

ETFs combine features of closed-end and open-end mutual funds. They are similar to closed-end funds in that they are traded in the secondary market. However, like open-end funds, their prices stay close to the NAV per share.

ETFs differ from index mutual funds in the following ways:

- Investors in index mutual funds purchase shares directly from the fund, while investors in an ETF purchase shares from other investors (just like buying or selling shares of stock). Investors are allowed to short ETF shares and even purchase them on margin.
- ETFs have lower costs, but unlike index mutual funds, investors do incur brokerage costs when trading ETFs.
- ETFs are constantly traded throughout the business day. Each trade occurs at the prevailing market price at that time. All purchases and redemptions for a mutual fund for a given day occur at the end of a trading day, at the same price.
- ETFs pay out dividends, while index mutual funds usually reinvest dividends.
- The minimum required investment is usually smaller for an ETF.
- ETFs are generally considered to have a tax advantage over index mutual funds.

Separately Managed Accounts (SMAs)

A separately managed account (also called a managed account, wrap account, or individually managed account) is a fund management service for wealthy investors. The portfolio manager manages the account exclusively for the benefit of the client and aims to meet the needs of the client in relation to investment objectives, risk tolerance, and tax situation. The client may also receive personalized investment advice in return for an annual fee.

SMAs differ from mutual funds in the following ways:

- Unlike investors in mutual funds, investors in SMAs directly own the shares and therefore have control over which assets are bought and sold and over the timing of transactions.
- Unlike mutual funds, in which no consideration is given to the tax position of the investor, transactions in SMAs take into account the specific tax needs of the investor.
- The required minimum investment for an SMA is usually much higher than for a mutual fund.

Hedge funds and venture capital funds are discussed in greater detail in Alternative Investments.

Hedge Funds

Hedge funds were originally meant to offer plays against the market and hedge against a downside, usually through short selling and using derivatives. Today, the term hedge funds has evolved to encompass a host of funds that simply look to generate absolute returns for investors (as compared to other funds that define a specific benchmark whose return they try to match or exceed).

- Hedge funds differ from mutual funds in that most hedge funds are exempt from many of the reporting requirements for a typical public investment company.
- They require a minimum investment that is typically U.S. $250,000 for new funds and U.S. $1 million or more for well-established funds.
- They usually place restrictions on investors' ability to make withdrawals from the fund.
- Total management fee also has a performance-based component.

Hedge fund strategies may involve significant risk due to the use of leverage and derivatives. Some of these strategies are discussed below:

- Convertible arbitrage funds purchase securities such as convertible bonds and simultaneously take short positions in related equity securities.
- Dedicated short bias funds take more short positions than long positions.
- Emerging market funds invest in companies in emerging markets by purchasing corporate or sovereign securities.
- Equity market neutral funds eliminate exposure to overall market movements by taking short positions in overvalued securities and long positions (of nearly equal value) in undervalued securities.
- Event driven funds attempt to take advantage of specific company events, such as mergers and acquisitions.
- Fixed-income arbitrage funds take opposing positions in debt securities to profit from arbitrage opportunities and to limit interest rate risk.
- Global macro funds attempt to profit from changes in the overall macroeconomic environment using derivatives on currencies and interest rates.
- Long/short funds go long on securities that are expected to increase in value and short securities that are expected to decrease in value. These differ from equity market neutral funds in that they attempt to profit from movements in the broader market, as well as from identifying overvalued or undervalued securities.

Buyout and Venture Capital Funds

Leveraged buyout (LBO) funds raise money specifically for the purpose of buying public companies, taking them private, and restructuring them to make them more efficient and profitable concerns. The purchase of company shares is usually financed with a significant amount of debt. The idea is to service the debt by increasing the company's cash flow and then to exit the investment through an IPO or sale to another company.

A venture capital (VC) fund does not buy out a company, but provides financing to startups.

Buyout and venture capital funds have the following characteristics:

- They take equity positions in companies and play a very active role in managing those companies.
- The eventual exit strategy is an important consideration when funds evaluate potential investments.

LBO and VC funds are similar to hedge funds in that they have relatively high minimum investment requirements, investors are unable to withdraw money from these funds for a specified period, and management fees have a performance-based component.

READING 41: RISK MANAGEMENT: AN INTRODUCTION

LESSON 1: THE RISK MANAGEMENT PROCESS AND RISK GOVERNANCE

LOS 41a: Define risk management. Vol 4, pp 271–273

The Risk Management Process

Risk encompasses all of the uncertain environmental variables that lead unpredictability of outcomes. Taking risk is an integral part of conducting business and managing investment portfolios. While risk is generally seen in an unfavorable light, the challenge for companies and investment managers lies in carefully choosing, understanding, and managing the risks entailed by their decisions. In the investment management arena, many managers focus on return, which is actually not as easily managed or controlled as risk.

Risk exposure refers to the extent to which the underlying environmental or market risks result in actual risk borne by a business or an investor.

Risk management is the process by which an organization or individual defines the level of risk that should be taken, measures the level of risk actually being taken, and then continually ensures that the latter is consistent with the former, with the aim of maximizing the company's or portfolio's value. Stated differently, risk management refers to all the decisions and actions that must be taken in order to achieve return/performance objectives while taking on an acceptable level of risk.

For example, suppose that a U.S. investor has a long position on the GBP worth £1,000,000. It is expected that an upcoming economic data release will result in the GBP either appreciating or depreciating by exactly 1% versus the USD.

- The risk here is the uncertain result of the announcement, as the USD-denominated value of this investor's GBP position can rise or fall by 1%.
- The risk exposure, in this case, is 1% of £1,000,000 or £10,000.
- Risk management would include quantifying and understanding this risk exposure, deciding whether the investor should bear the risk, how much of the risk exposure she should bear, and then possibly mitigating or modifying this risk.

Very important:

- Risk management is not about minimizing risk. It is about actively understanding and embracing those risks that offer the best chance of achieving an organization's goals with an acceptable chance of failure.
- Risk management is not even about predicting risks. It is about being prepared for (positive or negative) unpredictable events such that their impact would have already been quantified and considered in advance.

Good risk management does not prevent losses, but constantly provides management with the knowledge and insight to navigate as efficiently as possible (in terms of taking risks) toward the goals set by the governing body. Good risk management may also enable managers to more quickly or effectively act in the face of a crisis. But note that even the best risk management may not stop a portfolio from losing money in a bear market or prevent a business from reduced profits in a recession.

LOS 41b: Describe features of a risk management framework.
Vol 4, pp 273–279

A **risk management framework** refers to the infrastructure, process, and analytics required to support the risk management function in an organization. Every organization must have a customized risk management framework based on its individual objectives and requirements. An effective risk management framework should address the following areas:

- Risk governance.
- Risk identification and measurement.
- Risk infrastructure.
- Defined policies and processes.
- Risk monitoring, mitigation, and management.
- Communications.
- Strategic analysis or integration.

Risk governance comes from the board of directors. It is the top-down process and guidance that directs risk management activities to align with the organization's goals and risk appetite. To attain the best results, risk governance should take an enterprise-wide view of risk (enterprise risk management) as opposed to having each business division or segment manage the risks it faces individually. Risk governance is discussed in more detail later in the reading.

Risk identification and measurement form the core of risk management. Risk identification and measurement are an ongoing process that entails analyzing the business or portfolio to identify risk exposures, tracking changes in those risk exposures, calculating risk metrics to gauge the significance of those risks under various scenarios, as well as keeping an eye on the business environment for potential risk drivers. A risk driver refers to any fundamental underlying factor that gives rise to a risk that is relevant to the entity. The different types of risk are discussed later in the reading.

Bear in mind that even though technological innovations have made risk analysis and management more quantitative and timely, technology should be used only in conjunction with experienced business judgment when identifying and measuring risk.

Risk infrastructure refers to the people, systems, and technology required to track risk exposures and conduct quantitative risk analysis. It includes the process (known as risk capture) through which risk exposures are populated in the risk management system, as well as the databases, models, and skilled personnel needed to develop and maintain the risk framework.

Policies and processes translate risk governance into the organization's day-to-day operations and decision-making processes in order to ensure that risky activities are kept in line with the entity's risk tolerance levels. They include commonsense business practices such as updating and protecting data, controlling cash flows, conducting due diligence on investments, and making checklists to support important decisions.

Risk monitoring, mitigation, and management make up one of the most difficult facets of a risk framework.

This facet requires pulling together risk governance, identification and measurement, infrastructure, and policies and processes, and continually reviewing and reevaluating them

in the face of changing risk exposures and risk drivers. Further, it requires recognizing when the entity's risk exposure is not aligned with its predetermined risk tolerance, and then taking action to bring them back into alignment. Risk mitigation and management are discussed in detail toward the end of this reading.

Communication of critical risk issues must happen continuously across all levels of the organization.

- Governance parameters, such as risk tolerances and associated constraints, must be clearly communicated to managers.
- Risk metrics must be reported in a clear and timely manner.

Figure 1-1: The Risk Management Framework in an Enterprise

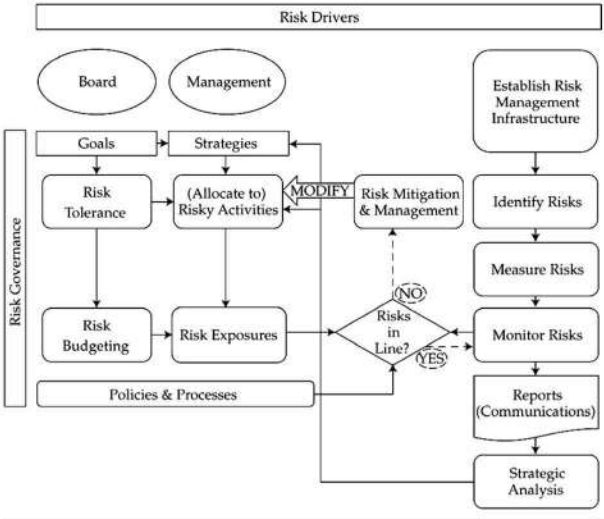


Figure 1-1 illustrates the process of risk management for an enterprise, pulling all the described elements of the risk framework together. Although there are a very high number of risks faced by every organization, most organizations are primarily affected by a small number of key risk drivers, or primary underlying factors that create risk. Along the left side is risk governance, which represents board-level decisions and encompasses and affects the boxes immediately to its right. The governance body, often called a board, defines the goals of the organization and, in turn, decides on its risk tolerance. It may additionally provide guidance on how or where that risk is taken (risk budgeting). The board is also involved in setting high-level policies that will affect most risk management processes. These risk governance activities are a crucial keystone of the risk framework and will be discussed in detail in the next section. When the rest of the risk framework hinges off of these top-down governance elements and is focused on the goals of the entire enterprise (as shown here), the end result is effective enterprise risk management.

- Risk issues must be reviewed and discussed as a standard part of decision making.
- Changes in risk exposures must be discussed so that action can be taken as appropriate.
- There should also be a feedback loop with the governance body so that top-level risk guidance is continually validated/updated and communicated back to the rest of the organization.

Strategic analysis and integration of a risk management framework into the business can help management better understand the how and why of performance and help sort out which activities are adding value and which are not. When it comes to portfolio management, thorough analysis can support better investment decisions and improve risk-adjusted returns.

- It is the governance body or board's responsibility to define the goals of the organization and determine its risk tolerance. The board also sets high-level policies to guide the risk management process.
- Management is responsible for planning and executing value-maximizing strategies that are consistent with the objectives and guidance provided by the board.
- In order to develop a risk management program to support the entity's goals, management must provide the required resources by establishing a risk management infrastructure.
- With processes defined and infrastructure in place, risks are then identified and measured.
- Risks are constantly monitored to ensure that they are not outside the limits set in the risk budget.
- If they are outside these limits, mitigation and management actions must be taken to bring them back into compliance.
- These actions/modifications will result in changes to management's actual allocation of the risk budget to various risky activities. The circle must then be started again to ensure that modified risk exposures are consistent with the entity's policies.
- If they are in line, the process moves forward to continuous monitoring and communicating risk levels.
- Risk management also plays a role in strategic analysis, helping management improve its allocation of capital and the risk budget.

Benefits of Establishing Good Risk Management

An organization is said to have developed an effective **risk culture** when effective risk management is truly integrated at all levels of management and into every step of the decision-making process. An effective risk culture brings the following benefits:

- There is a lower probability of management being surprised by an event, and even if it is a surprise, management has a better idea regarding the extent of the damage.
- There is more discipline leading to better consideration of trade-offs and better risk-return relationships.
- Management is able to respond to unfavorable events more promptly and is able to mitigate losses more effectively.
- There are fewer operational errors from deficiencies in policies and procedures, transparency, and risk awareness.
- There is a stronger level of trust between the governing body and management, which generally results in more effective delegation.

- The company enjoys a better image or reputation because analysts and investors perceive a company as prudent and value-focused.

Together, all these benefits should lead to higher value for the enterprise.

LOS 41c: Define risk governance and describe elements of effective risk governance. Vol 4, pp 279–281

Risk Governance

As mentioned earlier, risk governance is the top-down process and guidance from the board that directs management activities to align with the goals of the overall entity.

An Enterprise View of Risk

The governing body or board performs the following roles within the risk management framework:

- It determines the organization's goals and priorities, which form the basis of enterprise risk management.
- It determines the organization's risk appetite and tolerance; that is, it defines which risks are acceptable, which risks must be mitigated and to what extent, and which risks are unacceptable.
- It is responsible for overseeing risk management to continually ensure that it is functioning properly and is consistent with the goal of maximizing value.

Desirable Properties of Good Risk Governance

- Good risk governance should provide a sense of the worst loss that the organization can manage in various scenarios.
- It should provide clear guidance, but at the same time leave enough flexibility for management to execute strategy.
- The focus should be on enterprise risk management (that focuses on the objectives, health, and value of the organization as a whole). The entire economic balance sheet of the business should be considered, not just individual divisions or departments of the business. For example:
    - A pension fund manager should not just try to maximize the value of assets under management, but should also consider the nature of its liabilities (duration, etc.). Further, the manager should also consider the sponsor's business profile. If the overall business is not performing well, the sponsor will find it more difficult to make contributions to the plan.
    - In the context of portfolio management for individuals, the asset allocation decision should be based on a more holistic analysis rather than a simple exercise in optimizing the risk-return trade-off. For example, if an individual's career is related to real estate, her optimal portfolio should ideally have a lower allocation to real estate than the portfolio of an otherwise identical individual whose human capital is not related to real estate in any way.

- The board should provide a regular forum (e.g., a risk management committee) where the risk framework and key risk issues are discussed at management level. This ensures that risk at the operational level is kept within the boundaries defined by the board.
- It should provide for the appointment of a chief risk officer (CRO) who is responsible for building and implementing the risk framework for the enterprise and managing all related activities. Further, the CRO's insight should be used in making key strategic decisions.

LOS 41d: Explain how risk tolerance affects risk management.
Vol 4, pp 281–283

Risk Tolerance

Risk tolerance identifies the extent to which the entity is willing to experience losses or opportunity costs and to fail meeting its objectives. At the governance level, the idea is not really to select activities that will maximize value or produce the highest returns given an acceptable level of risk (this duty falls on management), but to define the entity's risk appetite.

Defining an organization's risk tolerance calls for answering the following questions:

- What shortfalls within the organization would cause it to fail to achieve critical goals? This question looks to address internal risk factors.
  - For example, a company may identify liquidity and revenue shortfalls as key internal risk drivers. In order to mitigate these risks, it could set tolerance bands on its revenue and cash flow variation.
- What uncertain forces is the organization exposed to? This question focuses on outside risk factors.
  - For example, a company may recognize foreign exchange rate fluctuations and interest rate changes as its primary outside risk drivers. In response, it may then engage in hedging strategies to mitigate or eliminate these risks, depending on how uncomfortable it is with continued exposure to these risks.

Once it has answers to these two questions, the board can define the dimensions of risk it is not willing to accept, and then communicate them throughout the organization (ideally *before* a crisis, not after).

In providing governance guidance, the board should recognize that the organization has certain core competencies, and therefore it should take risks that offer the best chance of success and value creation. Companies should abstain from retaining significant exposure to risks in areas where they do not have expertise by limiting or hedging those non-core risks.

Factors That Affect a Company's Risk Tolerance

- The more dynamic a company is in its ability to respond to adverse events, the higher its risk tolerance.
- The greater the loss a company can bear without impairing its status as a going concern, the higher its risk tolerance.
- The stronger the company's competitive position, the higher its risk tolerance.
- The overall competitive landscape in the industry and the regulatory landscape also influence a company's risk tolerance.

Factors That Should Not Determine Risk Tolerance

There are other factors that should not determine risk tolerance, but unfortunately do in some cases. Personal motivations, beliefs, and agendas of board members (the agency problem), as well as company size, short-term pressures, and management compensation often affect risk tolerance in ways that do not always align with owners' interests.

LOS 41e: Describe risk budgeting and its role in risk governance.

Vol 4, pp 283–286

Risk Budgeting

Risk tolerance focuses on determining the organization's risk appetite and which risks are acceptable or unacceptable. **Risk budgeting** focuses on how risk is taken by quantifying and allocating tolerable risk to various activities and/or investments based on their characteristics. The risk budget provides the means for taking board-level risk tolerance guidance to management decision making and operations.

Risk budgets can be complex and multi-dimensional or simple and one-dimensional.

- Single-dimensional risk measures include standard deviation, beta, value at risk (VaR), and scenario loss.
- Multi-dimensional risk approaches include one where portfolio risk is evaluated based on the risk profiles of underlying asset classes (equity, fixed income, etc.), and another risk-factor approach where exposure to various risk factors is used to capture associated risk premiums (value stocks versus growth stocks).

The benefit of risk budgeting lies in the fact that it forces the organization into thinking about risk trade-offs and fosters a culture where risk is an important consideration in all key decisions. Every step or decision the organization takes is based on the philosophy of maximizing value added while remaining within the confines of its risk tolerance.

LESSON 2: IDENTIFICATION OF RISKS AND MEASURING AND MODIFYING RISKS

LOS 41f: Identify financial and non-financial sources of risk and describe how they may interact. Vol 4, pp 286–295

Identification of Risks

Now that we have understood risk management and risk governance, we move into the implementation side of things, which starts with identification of risks. Risks can be categorized as **financial** or **non-financial risks**.

Financial Risks

Financial risks are those that originate in financial markets, such as changes in prices or interest rates. The primary types of financial risks are market risk, credit risk, and liquidity risk.

- **Market risk** arises from changes in interest rates, stock prices, exchange rates, and commodity prices.
  - Generally speaking, the underlying risk drivers of market risk are fundamental economic conditions or events in the overall economy, the industry, or the company itself.
- **Credit risk** (**default risk** or **counterparty risk**) is the risk of loss if one party fails to pay an amount owed on an obligation (e.g., bond or derivative).
  - Generally speaking, the underlying risk drivers of credit risk tend to be fundamental weakness in the economy or industry, or in demand for a company's products.
- **Liquidity risk** (or **transaction cost risk**) is the risk of a substantial downward valuation adjustment when trying to sell an asset. It refers to the possibility that the seller will have to reduce the price of the asset to a level below its true market value in order to liquidate or sell it.
  - In many transactions, there is a bid–ask spread that is known at the time of purchase. This spread is simply a transaction cost. Liquidity risk would arise if this spread widened when the asset was being sold.
  - Generally speaking, the primary drivers of liquidity risk are (1) changes in market conditions or the market for the individual asset and (2) the size of the position (i.e., large positions are typically more difficult and costly to offload).

Non-Financial Risks

Non-financial risks arise from outside the financial markets. They emanate from a variety of sources, such as the relationship between the organization and its peers, regulators, governments, the environment, suppliers, employees, and customers.

- **Settlement risk** (also known as **Herstatt risk**) is related to default risk, but has more to do with settlement of payments just before a default. For example, consider a forward contract where Party A has committed to purchase 1,000 shares of ABC Company from Party B for a total of $500,000. At expiration, Party A

would be expected to wire the funds, while Party B would transfer the shares. However, if Party A were to wire the funds and Party B were to declare bankruptcy and not transfer the shares, Party A would not be able to recover the money, except perhaps through a slow and tedious bankruptcy process. Essentially, this settlement risk arises from the timing of the payment process, typically due to significant time zone differences.

- **Legal risk** is of two types. First, there is the risk of being sued for something the entity does or fails to do. Second, there is the risk of the terms of a contract not being upheld by the legal system. For example, the company might have a position on a derivative contract with an underlying asset that has witnessed a favorable change in price since initiation of the contract, thereby holding positive value for the company. There is a risk, however, that the counterparty (which has been adversely affected by the price change) refuses to pay up based on some legal issue with the contract. There is always a risk with litigation that even seemingly frivolous arguments can hold up on court.
- **Compliance risk** encompasses **regulatory risk**, **accounting risk**, and **tax risk**. It refers to the risk of the organization incurring significant unexpected costs, back taxes owed, financial restatements, and penalties.
- **Model risk** is the risk of a valuation error resulting from using an incorrectly specified model or improperly using a valid model.
    - **Tail risk** is related to model risk, and can even be viewed as a form of model risk. It refers to the risk of events captured by the tail of a distribution occurring more frequently than expected by the model. The following examples illustrate tail risk:
        - Severe market crashes have occurred more frequently than predicted by the normal distribution (which is commonly used in modeling). While this risk is a part of market risk, it also affects valuations and models if it is not handled correctly.
        - Several quantitative models (e.g., option pricing models) and asset allocation models used in portfolio management use standard deviation, thereby ignoring the existence of fat tails in returns and the asymmetric nature of payoffs. This results in overly simplistic approach toward analyzing market risk.
- **Operational risk** is used to describe all internal risks that arise from the people and processes that work together in an organization to produce its output. Examples include the risk of hackers breaking into the company's computer systems, its computers becoming infected with a virus, programming errors, and bugs. Note that even though the factors that give rise to such risks can arise externally, the risks themselves are largely internal to an organization because it is the organization's responsibility to ensure that its people and processes are functioning efficiently regardless of the threats posed by external forces.

Employees are also major sources of potential internal risks. Examples of risks that arise from employees include senior management manipulating reported financial statements to inflate the company's performance or position, and rogue traders (e.g., Nick Leeson of Barings Bank) undertaking risky speculative transactions without regard for trading limits and controls. Note that the motivation behind these activities may or may not be personal gain (they could be honest mistakes). Either way, employees remain an internal source of risk for companies.

Companies are also threatened by business interruptions, for example, due to inclement weather or security threats. Even though these threats are posed by external forces outside their control, organizations bear the responsibility for establishing internal procedures to deal with related disruptions. For example, airlines are typically able to make the necessary adjustments to their schedules in response to weather-related disruptions.

- **Solvency risk** is the risk that the entity runs out cash, and is therefore unable to survive or succeed, even if it is otherwise solvent. Note that, in practice, solvency risk as defined here is referred to as liquidity risk. For the purpose of the CFA exam, however, bear in mind that liquidity risk is the risk of a valuation shock when trying to sell a security, whereas solvency risk is the risk relating to the cash position of an entity.

While excessive leverage was a key factor in the failure of Lehman Brothers, it was solvency risk that forced the company into bankruptcy. As panic spread across the financial system, Lehman's liquidity disappeared overnight because most funding sources were no longer willing to bear Lehman's counterparty risk. Since the 2008 crisis, businesses have become increasingly wary of poor solvency management, and have taken measures such as using less leverage, securing more stable sources of financing, investing in models to provide more transparency on solvency risk, incorporating solvency risk at an enterprise level in risk governance, and holding more cash equivalents and assets with less liquidity risk.

Moving on to individuals, they also face a number of operational risks. Examples include:

- The risk of burglary or identity theft.
- Health risk. Note that some individuals only take steps to address their financial exposure to health risk (via health insurance) but do not take any proactive steps to directly address the risk (by eating healthy, exercising regularly, etc.).
- Mortality risk, the risk of dying relatively young.
- Property and casualty risks, which are typically insured against.
- Risk of being cheated by a financial adviser.

Interactions between Risks

Some risks can be classified into more than one category. Further, there are several interactions between risks, as illustrated in the examples that follow:

Suppose Party A buys an out-of-the-money put option from Party B. The underlying asset is the return on an equity index. Assume that the put premium takes into account a 3% probability of default on behalf of Party B, and assumes (erroneously) that the possibility of default is independent of the performance of the equity index. In reality, Party B's default risk might rise if the equity market falls. Party A's expected payoff would then be lower than what it initially thought because it actually faces a credit risk that is compounded by market risk. This type of risk interaction is known as wrong-way risk.

Many banks and hedge funds experienced interacting risks during the financial crisis of 2008. Some highly leveraged institutions were battered by movements in the market (i.e., market risk), which interacted with liquidity and solvency risk to infest the entire financial system. The crisis provided an example of systemic risk, as stresses and failures in one

sector transmitted stresses and failures to other sectors, ultimately impacting the entire economy.

Risks interact when it comes to individuals as well. For example, individuals have a tendency to invest more than an "allocatively efficient" amount in their employer's stock (either through employee stock ownership programs or by purchases from the market). This results in highly concentrated portfolios and exposes individuals to a potentially disastrous interaction between market risk and human capital risk. Enron provided an example of this interaction, as many honest employees lost their jobs and a significant chunk of their retirement savings when the company went bankrupt.

The point is that it is important for organizations to recognize that risks interact, and that the interaction is more toxic in stressed market conditions. When different sources of risk come together, the combined risk is almost always nonlinear in that the total risk faced is much greater than the simple sum of the individual risks, and this makes the situation even worse. Unfortunately, most risk models and systems do not directly account for risk interactions. Governance bodies, company management, and financial analysts must be cognizant of the potential risk and damage of risks in combination, and be aware of the dangers of treating risks as separate and unrelated.

LOS 41g: Describe methods for measuring and modifying risk exposures and factors to consider in choosing among the methods. Vol 4, pp 296–309

Measuring and Modifying Risks

Risk Metrics

- **Probability** is a measure of the relative frequency with which one would expect an outcome, series of outcomes, or range of outcomes to occur. On its own, probability does not communicate everything we need to know regarding the risk, such as the magnitude of loss.
- **Standard deviation** measures the range over which a certain percentage of the outcomes would be expected to occur.
    - Standard deviation is not an appropriate measure of risk for non-normal distributions.
    - Standard deviation may not exist for return distributions with fat tails.
    - When it comes to modern portfolio theory, standard deviation captures systematic and non-systematic risk. Since non-systematic risk can easily be diversified away, standard deviation overstates the risk associated with an asset's returns.
- **Beta** is a measure of a security's systematic risk, which is actually the risk that investors can expect to be compensated for in the form of a higher expected return.
    - Formally, beta is a measure of the sensitivity of a security's returns to the returns on the market portfolio.
    - It captures the market risk that a particular asset contributes to a well-diversified portfolio.

When it comes to derivatives, there are several specialized measures of risk. These include the following "Greeks":

- **Delta** measures the sensitivity of the value of a derivative to a small change in the underlying asset.
- **Gamma** captures the impact of relatively large changes in the underlying asset on the value of the derivative.
- **Vega** captures the impact of changes in the volatility of the underlying asset on the value of an option contract.
- **Rho** measures the sensitivity of the value of a derivative contract to changes in interest rates.

These Greeks are discussed in detail at Level II. You will see some of them in the Level I derivatives readings as well.

Other asset classes have their own special metrics to describe risk. For example, the interest rate sensitivity of a fixed-income instrument is measured by **duration**. The point is that each asset class has some risk measures that are specific to it, but with the increased sophistication of financial institutions and global bank capital regulation, there was a need for an approach to measure financial risk across all asset classes. As a result, **value at risk** (or **VaR**) was introduced.

Value at Risk (VaR)

Value at risk or **VaR** is a measure of the size of the tail of the distribution of profits on a portfolio or for an entity. A VaR measure is composed of (1) a currency amount, (2) a time period, and (3) a probability. If a bank states that its VaR is $4 million at 3% for one day, it means that bank expects to lose a minimum of $4 million in one day 3% of the time.

- VaR is a **minimum** extreme loss metric.
- There is no ultimate maximum loss that is stated in the measure. However, the statistics used to compute VaR can be used to estimate average extreme losses.
  - Conditional VaR or CVaR is calculated as the weighted average of all loss outcomes in a statistical distribution that exceed the VaR loss.
  - Expected loss given default (which is used to measure credit risk) measures the average expected loss if the underlying company defaults.
- VaR can be measured in several different ways, resulting in highly diverse estimates.
- VaR is subject to model risk as well.
  - VaR is based on a particular assumption about the probability distribution of returns or profits. If that assumption is incorrect, the VaR estimate will be incorrect.
  - VaR also requires certain inputs. If those inputs are incorrect, the VaR estimate will be incorrect.

VaR can understate actual risk. Under the normal distribution, extreme negative returns are accounted for, but they are offset by extreme positive returns. However, actual historical returns have exhibited a tendency for more extreme negative returns than assumed by the normal distribution (tail risk). In response, statisticians have developed extreme value theory to help them gauge the likelihood of outcomes that exceed those that would normally be expected.

Due to its shortcomings, critics have argued that naive users of VaR can be lulled into a false sense of security. A presumably tolerable VaR can give the illusion that risk is under control, even when it is actually not. Nonetheless, VaR is accepted as a risk measure by most banking regulators and is approved for disclosure purposes in accounting standards.

As with any risk measure, one should supplement VaR with other measures. Two measures in particular that are often used to complement VaR are scenario analysis and stress testing. Although scenario analysis and stress testing can provide useful information (and banks are required to perform them) they are also subject to model risk.

The measures that we have discussed so far all relate primarily to market risk. Credit risk is covered in detail in the fixed income section. Aside from the information provided by credit rating agencies and their own analysis on creditors, risk managers also look at market pricing of credit default swaps (CDSs) to gauge the *ex ante* risk cost of default. Similarly, put options, exotic options, insurance contracts, and other financial instruments can convey important information regarding the cost of default.

Just like credit risk events, operational risk and compliance risk events are relatively rare and potential losses are difficult to quantify. For example:

- If a company's credit card database is hacked, estimating the potential losses would be very difficult. Further, the threat of litigation would exist for years to come.
- Changes in accounting rules, tax rules, and regulations are generally driven by politics, and there are no real numeric measures to quantify these risks.

Nonetheless, risk managers should try to obtain at least a subjective sense of the probability, frequency, and cost of these events, and modify the organization's exposure to these risks accordingly.

Methods of Risk Modification

Once the required analysis has been performed, and the organization has determined which risks it is exposed to and which ones are acceptable/unacceptable and to what degree, the risk management proceeds to align actual risk with acceptable risk.

Note that risk modification is not always an exercise in risk reduction. For example, if a portfolio with a 50–50 equity–cash split sees an outperformance of cash, the weight of cash will outweigh that of equity. The risk manager would then have to rebalance the portfolio by investing more in equity, thereby increasing portfolio risk.

Most risk management, however, does focus on risk reduction or hedging. Hedging can be geared toward reducing the risk to an acceptable level, or eliminating it entirely. We now move to a discussion of methods of risk modification.

Risk Prevention and Avoidance

Avoiding risk completely is difficult. Further, avoiding every risk would be unwise, as the benefits from taking certain risks can outweigh associated costs. For example, an investor may invest her entire retirement savings in cash, but that would come at the cost of giving up protection from inflation and losing out on potentially higher returns.

From the point of view of the risk bearer, every risk taken has a benefit to it. Gambling, for example, carries the risk of substantial financial loss and addiction, but for the consumer who incurs the risk, it is acceptable because of the adequate utility she derives from gambling.

In organizations, the board typically decides which business or investment activities are not worth pursuing based on the organization's goals and the perceived risk-return trade-off. Areas where the board believes management has a better chance of adding value are the ones whose risks are taken, but they are still managed via (1) self-insurance, (2) risk transfer, or (3) risk shifting.

Risk Acceptance: Self-Insurance and Diversification

- Self-insurance refers to retaining exposure to a risk that is considered undesirable but is too costly to eliminate by external means. An example of self-insurance can be found in the banking industry, where self-insurance is obtained by setting aside sufficient capital and loan loss reserves to cover losses.
- Diversification is another form of accepting risk, but it does so in the most efficient manner possible. When it comes to portfolio risk management, diversification is the key to eliminating non-systematic risk, but other forms of risk management may be needed to mitigate other risks.

Risk Transfer

Risk transfer is the process of passing on a risk to another party, usually in the form of an insurance policy. Insurance is a legal contract in which the insurer agrees to compensate the insured from the loss incurred from a specific event in return for a premium payment from the insured.

Insurance companies work on the basis of diversification or pooling of risks. They aim to sell as many policies as possible with risks that have low correlations. Insurance premiums are carefully calculated, and the aim is to have premiums collected exceed expected aggregate losses and operating costs so that the company can earn a profit.

Other than staying away from writing too many policies with similar and potentially correlated risks, insurers manage their risk exposure through the following:

- They may transfer some of the risk to another insurer, a practice known as reinsurance.
- They may write provisions into contracts to exclude coverage of special cases (e.g., a war may nullify insurance coverage in affected areas).
- Most insurance policies also contain provisions to guard against moral hazards, such as suicide or destroying one's own property.

- Some insurance companies have issued bonds (known as catastrophe bonds) that permit them to legally avoid paying principal and/or interest if insurance claims exceed a certain amount. These instruments transfer some of the insurance risk to the investors who buy the bonds.
- It is common for policies to contain a deductible, a monetary amount of the loss that will be covered by the insured before any claims are paid. Deductibles serve the following purposes:
    - Because insurers incur fixed costs for each claim, they benefit if deductibles reduce the number of small claims.
    - Deductibles also encourage good risk management by the insured parties.
    - They offer the insured the opportunity to combine risk transfer with self-insurance and thereby achieve a potentially better trade-off of risk and reward.

For unique risks that are not easy to pool, the insurer would have to bear that risk without the benefit of diversification. Specialized coverage for such risks is offered by institutions such as Lloyds of London. They do so by organizing groups of investors (known as syndicates) who are willing to bear the unique risk for a premium. Institutions that offer specialized coverage are able to attain diversification by insuring several different types of unique (presumably uncorrelated) risks, such as an actor not being able to complete a big-budget movie, and a global sports event being canceled.

Other variations of insurance include the following:

- Surety bonds, where an insurer promises to pay the insured a certain amount of money if a third party fails to fulfill its obligation. They are popular in commercial contracts where one party bears the risk of potentially suffering a huge cost if another party does not perform.
- Fidelity bonds, which cover against losses that result from employee dishonesty.
- Indemnity clauses and hold harmless arrangements, where one of the parties to a contract agrees to hold the other harmless and/or indemnify the other in the event of loss.

Note that in the case of surety and fidelity bonds, the word "bond" does not refer to a debt obligation issued by a borrower to lenders, but instead refers to assuring one party that it bears no risk for the actions of a specified other party.

Risk Shifting

Risk shifting refers to actions that change the distribution of risk outcomes. While risk transfer is typically associated with insurance, risk shifting is associated with derivative contracts and risk modification vehicles. Risk shifting mechanisms are used when the organization wants to modify the probability distribution of returns, or adjust the payoff diagram of its risk exposures.

For example, consider an investor who is bullish on the stock market, but wants to protect herself from losing too much money if the market falls. Such an investor would buy a put option on her portfolio. Without getting into the specifics of options and other derivatives-based hedging strategies (that you will be studying in great depth in the derivatives readings), this strategy will result in her making a slightly smaller profit if the market goes up (due to the cost of purchasing the put option), but will set a floor on the amount she could lose if the market falls.

Types of derivatives, forward commitments versus contingent claims, and derivatives markets are all discussed in detail in the derivatives readings. We will not get into this material here.

How to Choose a Method for Modifying Risk

When deciding on which risk modification method(s) to use, the organization must weigh the costs versus benefits in light of its risk tolerance. For example, many companies operate outside their home countries, which exposes them to foreign exchange risk. Different companies use different approaches to manage this risk.

- Some companies prefer forwards or swaps, others prefer options, while still others use multiple instruments.
- Some companies choose to simply balance their foreign assets and liabilities.
- Some set up operations in foreign countries (as opposed to manufacturing domestically and shipping abroad) so that their costs and revenues are denominated in the same currency. This is another example of how risks interact. Companies must evaluate the trade-off between currency risk and the political and operational risks of operating in a foreign country.

Generally speaking:

- Management should try to avoid risks that lie outside the core competencies of the organization. But, if the potential value added is too great to ignore, then management must at least take adequate precautions.
- Organizations that have large amounts of free cash flow should self-insure as much as possible because self-insurance reduces costs and enables the company to retain flexibility. At the same time, organizations should aim to diversify as much as possible.
- Self-insurance and risk avoidance should be addressed at the board level to ensure consistency and adherence to the organization's risk tolerance.
- Insurance works best when risks can be pooled, but this is not the case for many types of risks, particularly those that can affect a large number of parties at the same time since premiums can be prohibitively high.
- For financial risks that exceed risk appetite, risk shifting is a very common choice. However, risk shifting tools such as derivatives may not be available for all types of risks.

An important point is that the various risk management methods are not equal in terms of the risk reduction and the risk profile that remains. For example:

- Contingent claims, such as insurance or options, offer flexibility in that they leave open the opportunity to profit from favorable movements, while reducing a loss in the case of adverse movements. However, they require a cash payment up front.
- On the other hand, forward commitments lock in an outcome so they provide little flexibility, but they do not require an initial cash payment.

READING 42: PORTFOLIO RISK AND RETURN: PART I

LESSON 1: INVESTMENT CHARACTERISTICS OF ASSETS

LOS 42a: Calculate and interpret major return measures and describe their appropriate uses. Vol 4, pp 318–341

LOS 42b: Describe characteristics of the major asset classes that investors consider in forming portfolios. Vol 4, pp 318–341

LOS 42c: Calculate and interpret the mean, variance, and covariance (or correlation) of asset returns based on historical data. Vol 4, pp 318–341

Financial assets are generally defined by their risk and return characteristics. This makes it easier to value them and simplifies the process of determining which assets should be included in a portfolio.

Return

Financial assets may provide one or both of the following types of returns:

- Periodic income (e.g., dividends and interest income)
- Capital gains or losses resulting from changes in market price.

Holding Period Return

Holding period return is simply the return earned on an investment over a single specified period of time. It is calculated as:

$$R = \frac{P_t - P_{t-1} + D_t}{P_{t-1}} = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{D_t}{P_{t-1}} = \text{Capital gain} + \text{Dividend yield}$$

$$= \frac{P_T + D_T}{P_0} - 1$$

where:
P_t = Price at the end of the period
P_{t-1} = Price at the beginning of the period
D_t = Dividend for the period

Note: We have assumed that the dividend is paid at the end of the period. If the dividend is paid any time before t, we would also have to account for the return earned by investing the dividend for the remainder of the period. This would lead to a higher holding period return.

Holding period returns may also be calculated for more than one period by compounding single period returns:

$$R = \left[(1+R_1)\times(1+R_2)\times\ldots.\times(1+R_n)\right] - 1$$

where:
$R_1, R_2, \ldots, R_n$ are sub-period returns

Arithmetic or Mean Return

The arithmetic or mean return is a simple average of all holding period returns. It is calculated as:

$$R = \frac{R_{i1} + R_{i2} + \ldots + R_{iT}}{T} = \frac{1}{T}\sum_{t=1}^{T} R_{iT}$$

Arithmetic return is easy to calculate and has known statistical properties such as standard deviation, which is used to evaluate the dispersion of observed returns. However, the arithmetic mean return is biased upward as it assumes that the amount invested at the beginning of each period is the same. This bias is particularly severe if holding period returns are a mix of both positive and negative returns.

Geometric Mean Return

Basically, the geometric mean reflects a "buy-and-hold" strategy, whereas the arithmetic mean reflects a constant dollar investment at the beginning of each time period.

The geometric mean return accounts for compounding of returns, and does not assume that the amount invested in each period is the same. The geometric mean is lower than the arithmetic mean (due to the effects of compounding) unless there is no variation in returns, in which case they are equal.

The geometric mean return is calculated as:

$$R = \left\{\left[\left(1+R_1\right)\times\left(1+R_2\right)\times\ldots\times\left(1+R_n\right)\right]^{1/n}\right\} - 1$$

Money-Weighted Return or Internal Rate of Return

Unlike the return measures discussed above, the money-weighted return accounts for the amount of money invested in each period and provides information on the return earned on the actual amount invested. The money-weighted return equals the internal rate of return of an investment.

A drawback of the money-weighted return is that it does not allow for return comparisons between different individuals or different investment opportunities. For example, two investors in the same mutual fund could have different money-weighted returns if they invested varying amounts in different periods.

Example 1-1: Computation of Returns

An analyst gathered the following information regarding a mutual fund's returns over 5 years:

Year	Assets Under Management at the Beginning of the Year	Net Return
1	$40 million	25%
2	$35 million	10%
3	$55 million	−10%
4	$70 million	5%
5	$30 million	20%

1. Calculate the holding period return for the 5-year period.
2. Calculate the arithmetic mean annual return.
3. Calculate the geometric mean annual return. How does it compare with the arithmetic mean annual return?
4. Calculate the money-weighted annual return.

Solution

1. Holding period return = [(1.25) (1.1) (0.9) (1.05) (1.2)] – 1 = 55.93%
2. Arithmetic mean annual return = (0.25 + 0.1 – 0.1 + 0.05 + 0.2) / 5 = 10%
3. Geometric mean annual return = $\{[(1.25)\ (1.1)\ (0.9)\ (1.05)\ (1.2)]^{1/5}\} - 1 = 9.29\%$
4. In order to calculate the money-weighted annual return, we need to determine cash inflows and outflows. From the investor's perspective, amounts invested in the fund are negative cash flows and amounts withdrawn from the fund are positive cash flows. The dollar value of the holdings at the end of the investment horizon is also treated as a cash inflow to the investor.

Year	1	2	3	4	5
Balance from previous year	0	50	38.5	49.5	73.5
Net investment[1]	40	−15	16.5	20.5	−43.5
Net balance at the beginning of year	40	35	55	70	30
Investment return for the year	25%	10%	−10%	5%	20%
Investment gain/loss	10	3.5	−5.5	3.5	6
Balance at the end of year	50	38.5	49.5	73.5	36

*Net investment = Net balance at the beginning of year – Ending balance from previous year.

The following cash flows are used to compute the money-weighted rate of return.

$CF_0 = -\$40$; $CF_1 = \$15$; $CF_2 = -\$16.5$; $CF_3 = -\$20.5$; $CF_4 = \$43.5$; $CF_5 = \$36$

Use the following TI calculator key strokes to calculate the money-weighted annual return:

[CF] [2ND] CE|C]
40 [+/–] [ENTER] [↓]
15 [ENTER] [↓] [↓]
16.5 [+/–] [ENTER] [↓][↓]
20.5 [+/–] [ENTER] [↓][↓]
43.5 [ENTER] [↓] [↓]
36 [ENTER] [IRR] [CPT]
IRR = 7.97%

Annualized Return

An investment may have a term less than one year long. In such cases, the return on the investment is annualized to enable comparisons across investment instruments with different maturities. Annualized returns are calculated as:

$$r_{annual} = (1 + r_{period})^n - 1$$

where:
r = Return on investment
n = Number of periods in a year

The assumption here is that the returns earned over these short investment horizons can be replicated over the year. However, this is not always possible.

Example 1-2: Annualized Returns

An analyst obtained the following rates of return for three investments:

Investment 1 offers a 5.5% return in 120 days
Investment 2 offers a 6.2% return in 16 weeks
Investment 3 offers a 7.3% return in 4 months

Calculate the annualized rates of return for these investments.

Solution

Investment 1:
$R = (1 + 0.055)^{365/120} - 1 = 17.69\%$

Investment 2:
$R = (1 + 0.062)^{52/16} - 1 = 21.59\%$

Investment 3:
$R = (1 + 0.073)^{12/4} - 1 = 23.54\%$

Portfolio Return

The return on a portfolio is simply the weighted average of the returns on individual assets. For example, the return of a two-asset portfolio can be calculated as:

$$R_p = w_1 R_1 + w_2 R_2$$

where:
R_p = Portfolio return
w_1 = Weight of Asset 1
w_2 = Weight of Asset 2
R_1 = Return of Asset 1
R_2 = Return of Asset 2