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COURSE MANUAL

C9: Accounting and Finance Course

Module 5

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Contents

Module overview

Welcome to Module 5

This and the remaining modules in this course are related to the finance topic. This module is designed as a high level overview of finance, financial markets and their participants and an introduction to the time value of money, a concept that lies at the heart of finance decision-making.

Opportunities will be given throughout the course for you to use and make appropriate decisions using these concepts. The ultimate object is for you to identify the correct data to make business decisions.

Upon completion of this module you will be able to:

Outcomes

- *Demonstrate* knowledge and understanding of the role of finance in providing information for decision-making purposes.
- *Demonstrate* knowledge and understanding of financial markets and institutions and the role of regulation.
- *Demonstrate* knowledge and application of a range of time value of money related tools and their use in finance decision-making.

Unit 11

Finance, financial markets and managers

Introduction

This unit provides an introduction to the topic of financial management. The finance function is defined and differentiated from accounting. Money and capital markets and their major components are introduced in this unit. This unit summarises the three key activities of the financial manager: financial analysis and planning, investment decisions, and financing decisions. A discussion of the financial manager's goals – maximising shareholder wealth and preserving stakeholder wealth – is discussed. The unit includes discussion of the agency problem – the conflict that exists between managers and owners in a large corporation.

The unit comprises:

- An introduction to the finance topic
- The different types of financial institutions
- Financial market classes
- How financial markets operate
- The role of the financial manager
- An overview of agency theory

Upon completion of this unit you will be able to:

Outcomes

- *Understand* the difference between accounting and finance.
- *Explain* the role of financial institutions in an economy.
- *Describe* the different types of financial institutions.
- *Explain* the difference between a primary and secondary market.
- *Describe* how financial markets operate.
- *Explain* the role of the financial manager.
- *Understand* the conflicts that can arise due to agency theory.

Terminology

Terminology

Finance:	The art and science of managing money. Finance affects all individuals, businesses and governments in the process of the transfer of money through institutions, markets and instruments.
Financial institution:	An organisation that provides financial services for its clients or members.
Financial services:	The area of finance concerned with the design and delivery of advice and financial products to individuals, businesses and government.
Managerial finance:	The management of the firm's funds within the firm. It encompasses the functions of budgeting, financial forecasting, credit administration, investment analysis, and funds procurement for the firm.
Primary market:	That part of the capital markets that deals with the issue of new securities.
Secondary market:	The financial market where previously issued securities and financial instruments such as shares, bonds, options and futures are bought and sold.

Finance and financial management

Importance of cash

Virtually every function within a firm is in some way connected with the receipt or disbursement of cash. The cash relationship may be associated with the generation of sales through the marketing department, the incurring of raw material costs through purchasing, or the wages of production workers. Since finance deals primarily with management of cash for the operation of the firm, everyone involved in the firm's management needs to be knowledgeable of finance to effectively work with employees of the financial departments.

Finance and the financial manager

Finance is often considered a form of applied economics. Firms operate within an economy and must be aware of economic principles, changes in economic activity and economic policy. Principles developed in economic theory are applied to specific areas in finance. From macroeconomics comes the institutional structure in which money and credit flows take place. From microeconomics, finance draws the primary principle used in financial management, marginal analysis. Since this analysis of marginal benefits and costs is a critical component of most

financial decisions, the financial manager needs basic economic knowledge.

The treasurer or financial manager within the organisation must make decisions with respect to handling financial planning, acquisition of fixed assets, obtaining funds to finance fixed assets, managing working capital needs, managing the pension fund, managing foreign exchange and distribution of corporate earnings to owners.

Difference between accounting and finance

Accountants operate on an accrual basis, recognising revenues at the point of sale and expenses when incurred. The financial manager focuses on the actual inflows and outflows of cash.

The accountant primarily gathers and presents financial data; the financial manager devotes attention primarily to decision-making through analysis of financial data.

Types of financial institutions

This section introduces the different types of institutions that play a role in the world's financial systems. There are many different types of institutions, from those that operate on a global scale to those that operate within individual nations.

Before discussing the global financial system and its participants we need to define financial institution. As defined in the terminology section, in its broadest sense, a financial institution is an organisation that provides financial services for its clients or members. Probably the most important financial service provided by financial institutions is in the role of financial intermediary. Most financial institutions are highly regulated by government.

Global financial system

The global financial system (GFS) is the financial system consisting of institutions and regulators that act on the international level, as opposed to those that act on a national or regional level. The main GFS players are: the global institutions, such as International Monetary Fund (IMF) and Bank for International Settlements; national agencies and government departments, for example, central banks and finance ministries; private institutions acting on the global scale, such as banks and hedge funds; and regional institutions like the Eurozone.

International financial institutions

International financial institutions, or IFIs, refers to financial institutions that have been established (or chartered) by more than one country, and hence are subject to international law. Their owners or shareholders are generally national governments, although other international institutions and other organisations occasionally figure as shareholders. The most

prominent IFIs are creations of multiple nations, although some bilateral financial institutions (created by two countries) exist and are technically IFIs. Many of these are multilateral development banks.

The best-known IFIs are the World Bank, the IMF, and the regional development banks.

The following are the main types of IFIs:

Bretton Woods institutions

In 1944, delegates from the Allied Nations gathered at Bretton Woods, United States, to plan a rebuild of the international economic system. The Bretton Woods agreement provided mechanisms for international co-operation in managing the global financial system, out of which the best-known IFIs were established, including the World Bank, the IMF, and the International Finance Corporation.

Regional development banks

The regional development banks consist of several regional institutions that have functions similar to the World Bank group's activities, but with particular focus on a specific region. Shareholders usually consist of the regional countries plus the major donor countries. The best-known of these regional banks cover regions that roughly correspond to the United Nations regional groupings, including the Inter-American Development Bank (which works in the Americas, but primarily for development in Latin America and the Caribbean); the Asian Development Bank; the African Development Bank; and the European Bank for Reconstruction and Development.

Bilateral development banks

Bilateral development banks are financial institutions set up by individual countries to finance development projects in developing countries and emerging markets. Examples include the Netherlands Development Finance Company FMO, and the German Development Bank DEG.

Other regional financial institutions

Several regional groupings of countries have established international financial institutions to finance various projects or activities in areas of mutual interest. The largest and most important of these is the European Investment Bank, an institution established by the members of the European Union. Other examples include the Black Sea Development Bank, the International Investment Bank (established by the countries of the former Soviet Union and Eastern Europe), the Islamic Development Bank and the Nordic Investment Bank.

National financial institutions

Generally there are three major types of financial institutions that operate within countries:

- deposit-taking institutions that accept and manage deposits and make loans, including banks, building societies, credit unions, trust companies, and mortgage loan companies,
- insurance companies and pension funds, and
- brokers, underwriters and investment funds.

All of the above financial institutions facilitate the allocation of financial resources from its source to potential users. Within each country there are potentially a large number of different types of financial institutions that play important roles in the financial system.

Some institutions acquire funds and make them available to users. Others act as middlemen between deficit and surplus units while others invest (manage) funds as agents for their clients.

While the key categories of financial institutions are noted above, there are also government and government-sponsored institutions that carry out regulatory, supervisory and financing functions. Historically, each type has performed a specialised function in financing and investment management.

The role of governments and their regulatory function will be discussed in more detail in the next unit.

How financial markets operate

Financial markets, like any other market, rely on having buyers and sellers who, on the basis of having sufficient knowledge and information, are willing to participate in the buying and selling of goods or services. The price for the good or service is agreed upon by the buyer and seller.

In understanding how financial markets operate we need to understand the role of money.

The role of money

Money can be used in a number of different ways. For example, a savings account provides a safe place (a bank) to keep your money and gain interest on it while you are not using that money. However, the money in the savings account does not sit in a giant vault in the bank, it is used to help other customers buy homes and cars and go to college. When the bank makes a loan, it is drawing on all the money people have put into it.

In this way the bank acts as a financial market place for money. A bank loan can help fuel growth, but one day it will have to be paid back, with interest (a fee to cover the cost of borrowing).

Money is also used by people to make investments. When an investment is made in a company, the investors are giving it a loan (when they buy bonds) or buying a part of that company (when they buy shares). When an investment is made in a company it may use the money to get bigger,

purchase equipment, increase advertising, hire new people, research new products, or any number of other business activities.

Investing in a business

Businesses come in many different sizes and shapes. A business owned and operated by one person is called a sole proprietorship. A sole proprietorship is easy to form and all the profits go to the owner. But a sole proprietorship may not have enough money (called capital) to grow or the owner may be concerned that he or she carries all the risks of operating a business.

A sole proprietor may join with other people to form a partnership, owned by two or more people. There may be more money to invest now, but the owners have to share decision-making power and cash may still be limited. A partnership can also limit risk by making the business itself a legal entity. This way the business may be sued but the partners' homes and money outside the business will be safe.

A company that still wants to grow has several choices. Its first option is to use its profits for capital – called reinvestment. A company, like an individual, can also get money by borrowing from a bank. Like an individual, though, the bank loan has to be paid back with interest, and the bank may limit how much it will lend a business according to the ability of the company to pay it back. A small company will probably only be able to borrow a small amount of money.

For longer-term growth a company may try a different form of borrowing, by issuing bonds. A bond is an IOU from the company to the investors. After a specified amount of time, usually from six months to 30 years, a bond will mature. When this happens the company must pay each individual the amount they invested. The company also pays each investor interest at specific intervals during the years the investor holds the bond.

Another alternative for raising capital is to sell a piece of ownership in the company to the public. Selling shares in the company can generate large amounts of cash that can be used for a variety of purposes. When a company begins to sell shares it is said to "go public". The company will usually hire an investment banker to help it go public by evaluating the company, determining a price for the shares, and serving as an intermediary between the company and the investing public. When a company's share is sold for the first time it is called an initial public offering or IPO and is sold in the primary market. Then when the shareholders want to resell the share, it is sold on a secondary market, such as one of the exchanges. By selling shares the company is transformed from a private business owned by a few people to a public business owned collectively by a large pool of investors.

How investment takes place

A financial market is a place where firms and individuals enter into contracts to sell or buy a specific product such as a share, bond, or futures contract. Buyers seek to buy at the lowest available price and sellers seek to sell at the highest available price. There are a number of different kinds of financial markets, depending on what you want to buy or sell, but all financial markets employ professional people and are regulated.

If you want a loan or a savings account you would go to the bank or credit union, if you want to buy shares, a mutual fund or a bond you go to a securities market. The purpose of a securities market is primarily for business to acquire investment capital. Examples of securities markets include the New York Stock Exchange and the American Stock Exchange. Another securities market is the Over-the-Counter market, where a computer network of dealers buys and sells shares.

Share markets

Share markets grew out of small meetings of people who wanted to buy and sell their shares. These people realised it was much easier to make trades if they were all in the same place at the same time. Today people from all over the world use share markets to buy and sell shares in thousands of different companies.

For example, in the United States, new issues of shares must be registered with the Securities and Exchange Commission (SEC) and in some cases with the State of New York. A prospectus, giving details about a company's operation and the shares to be issued, is printed and distributed to interested parties. Investment bankers buy large quantities of the shares from the company and then resell the shares on an exchange.

A potential buyer places an order with a broker for the shares he or she wishes to purchase. The broker then puts in the order to buy on the appropriate exchange, and the transaction takes place when someone wants to sell and someone wants to purchase the shares at the same price. When you purchase a share you receive a share certificate, the certificate may be transferred from one owner to another or can be held by the broker on behalf of the investor.

Bonds also can be transferred from one owner to another. As with shares, buyers go through brokers and dealers.

Shares, bonds, and futures contracts can also be sold in groups as mutual funds. Mutual funds employ professional managers to make decisions about what to buy and sell.

Futures markets

Futures markets provide a way for business to manage price risks. Buyers can obtain protection against rising prices and sellers can obtain

protection against declining prices through futures contracts. An example is given in the following case study.

Case study / example

In the spring, farmer Jones planted 100 acres of soybeans and he anticipates that in September he will harvest 5,000 bushels. He is concerned about what the prices of soybeans will be in September. If the price falls he will lose money.

To avoid this risk, farmer Jones has his futures broker sell a contract for 5,000 bushels of soybeans for September at the current price. In this way the farmer locks in his September selling price. If the price is higher in September, the farmer will not make as much profit, but if the price has fallen, he will come out ahead.

This process of obtaining price protection is called **hedging**.

Trading in futures carries substantial risk and is complicated by complex kinds of trading options. To realise a profit, it is necessary to be right about both the direction and the timing of a price change. Even experienced investors rarely invest more than a small portion of a total investment portfolio in futures contracts. In fact, in the last few years a number of large and sophisticated investors have made the front pages of newspapers for losing all of their money on one kind of risky futures investment called a **derivative**.

Factors that affect prices and markets

There have been a number of periods in history that saw significant volatility in financial markets. For example, the share market crash that led to the depression in the late 1920s, and, more recently, the share market drops that occurred in 1989 and in 1997 and the banking and credit crisis that began in 2008.

Questions like the following are hard to answer:

- What makes the markets rapidly fall, when hundreds of stock prices fall at once?
- What makes the market strong and causes stock prices to rise?

Few investors can consistently predict the ups and downs of the market or of an individual investment. But investors who are aware of the factors that affect market price are more likely to make sound investment decisions.

Some of these factors include:

- **Actions of investors**: Individual, institutional and mutual fund investors all affect the prices of shares, bonds, and futures by their actions. For example, if a large number of people want to buy a certain share, its price will go up, just as if many people were bidding on an item at an auction.

- **Business conditions**: Both the condition of an individual business and the strength of the industry it is in will affect the price of its share. Profits earned, volume of sales, and even the time of year will all affect how much an investor wants to own a share.
- **Government actions**: The government makes all kinds of decisions that affect both how much an individual share may be worth (for example, new regulations on a business) and what sort of instruments people want to be investing in. The government's interest rates, tax rates, trade policy and budget deficits all have an impact on prices.
- **Economic indicators**: General trends that signal changes in the economy are watched closely by investors to predict what is going to happen next. Indicators include the gross national product (how much production is going on in the country), the inflation rate (how quickly prices are rising), the budget deficit (how much the government is spending) and the unemployment rate. These indicators point to changes in the way ordinary people spend their money and how the economy is likely to perform.
- **International events**: Events around the world, such as changes in currency values, trade barriers, wars, natural disasters and changes in governments, all affect how people think about the value of different investments and about how they should invest in the future.

Today, investments can be purchased around the clock. When the market opens in New York, the Tokyo market has just closed and the London market is half way through its trading day. When prices on one market change all other markets are affected.

Bull and bear markets

A bull market and a bear market are terms used to describe the general market trends.

- A **bull market** is a period during which stock prices are generally rising.
- A **bear market** is a period when stock prices are generally falling.

Each of these markets is driven by investors' perceptions of where the economy and the market are going. If investors feel that they are in a bull market, they will feel confident investing, adding to the growth of the market. However, if investors think that the market is falling they will sell stock at lower prices, continuing the bear market. These trends may quickly change.

Financial markets classes

From the perspective of the firm (or organisation) that needs external funding through either debt or equity or both, there are two market alternatives to be considered – the primary and secondary markets.

Primary market

The primary market is that part of the capital markets that deals with the issue of new securities. Companies, governments or public sector institutions can obtain funding through the sale of new shares (stock) or bond (debt) issues. This is typically done through a syndicate of securities dealers. The process of selling new issues to investors is called underwriting. In the case of a new share issue, this sale is an initial public offering (IPO). Dealers earn a commission that is built into the price of the security offering – though the commission is shown in the prospectus. Primary markets create long-term instruments through which corporate entities borrow from capital market.

The features of primary markets:

- Functions as the market for new long-term equity capital. The primary market is the market where the securities are sold for the first time. Therefore it is sometimes called the new issue market (NIM).
- In a primary issue, the securities are issued by the company directly to investors.
- The company receives the money and issues new security certificates to the investors.
- Primary issues are used by companies for the purpose of setting up new business or for expanding or modernising the existing business.
- The primary market performs the crucial function of facilitating capital formation in the economy.
- The new issue market does not include certain other sources of new long-term external finance, such as loans from financial institutions. Borrowers in the new issue market may be raising capital for converting private capital into public capital; this is known as going public.
- The financial assets sold can only be redeemed by the original holder.

Methods of issuing securities in the primary market are by:

- **Initial public offering:** A new share offering to the public.
- **Rights issue (for existing companies):** A way in which a company can sell new shares in order to raise capital. Shares are offered to existing shareholders in proportion to their current shareholding.

- **Preferential issue (or placements):** This is the sale of securities to a relatively small number of select investors as a way of raising capital. Investors involved in private placements are usually large banks, mutual funds, insurance companies and pension funds. Private placement is the opposite of a public issue, in which securities are made available for sale on the open market.

Secondary market

The secondary market, also known as the aftermarket, is the financial market where previously issued securities and financial instruments such as shares, bonds, options, and futures are bought and sold. The term secondary market is also used to refer to the market for any used goods or assets, or an alternative use for an existing product or asset where the customer base is the second market (for example, corn has been traditionally used primarily for food production and feedstock, but a "second" or "third" market has developed for use in ethanol production). Another common usage of the secondary market term is when it refers to loans that are sold by a mortgage bank to investors, for example in the United States those loans issued by Fannie Mae and Freddie Mac.

With primary issuances of securities or financial instruments, or the primary market, investors purchase the securities directly from issuers, such as companies issuing shares in an IPO or private placement, or directly from the government in the case of treasuries (sometimes referred to as gilts). After the initial issuance, investors can purchase from other investors in the secondary market.

The secondary market for a variety of assets can vary from loans to shares, from centralised (one central place where all trading is conducted), to fragmented (no one central point with many traders connected electronically), and from illiquid to very liquid. The major stock exchanges are the most visible example of liquid secondary markets – in this case, for shares of publicly traded companies. Exchanges such as the New York Stock Exchange, NASDAQ and the American Stock Exchange provide a centralised, liquid secondary market for the investors who own shares that trade on those exchanges. Most bonds and structured products are traded "over the counter," or by phoning the bond desk of a broker-dealer. Loans are sometimes traded online using a loan exchange.

Secondary marketing is vital to an efficient and modern capital market. In the secondary market, securities are sold by and transferred from one investor or speculator to another. It is therefore important that the secondary market be highly liquid (originally, the only way to create this liquidity was for investors and speculators to meet at a fixed place regularly; this is how stock exchanges originated). Generally, the greater the number of investors that participate in a given marketplace and the greater the centralisation of that marketplace the more liquid the market.

Fundamentally, secondary markets connect the investor's preference for liquidity (the investor's desire not to tie up his or her money for a long

period of time, in case the investor needs it to deal with unforeseen circumstances) with the capital user's preference to be able to use the capital for an extended period.

The role of the financial manager

So far in this unit we have discussed global and national financial institutions, primary and secondary markets and an insight into how markets function. From an organisation's perspective, one of the key functions needed to understand all of the aspects discussed so far in this unit is that of the financial manager.

In this section we will discuss the role of the financial manager.

Organisational goals

In all profit-orientated organisations the key indicator of success is the maximisation of shareholder wealth, or value. In most cases this means the maximisation of the firm's share price.

In the case of a publicly quoted company, shareholder wealth is measured by the share price in the financial markets. The major goal of a company's financial manager should be to maximise the value per share of existing shares – "maximising shareholder wealth" or "maximising share price" are other common ways to state this same goal.

Financial manager's key functions

In order to achieve the firm's primary goal of maximising shareholder wealth, the financial manager performs three major functions:

1. financial planning and control (supportive role),
2. the efficient allocation of funds among various assets (investment decisions), and
3. the acquisition of funds on favourable terms (financing decisions).

Financial planning and control must be considered together. For the purposes of control, the financial manager establishes standards, such as budgets for comparing actual performance with planned performance. The preparation of these budgets is a planning function, but their administration is a controlling function. Reporting and controlling have to do with techniques for controlling the operations of the organisation.

Meaningful financial reports are the cornerstone of effective management. Accurate financial data are especially important in international business, where business operations are typically supervised from a distance.

When the financial manager plans for the allocation of funds, the most important task is to invest funds wisely within the firm. Every dollar invested has alternative uses. Therefore, funds should be allocated among

assets in such a way that they will maximise the wealth of the firm's shareholders. Financial managers should consider the wealth of investment opportunities versus risks when they attempt to maximise their organisation's value through investment.

The third role of the financial manager is to acquire funds on favourable terms. If projected cash outflows exceed cash inflows, the financial manager will find it necessary to obtain additional funds from outside the firm. Funds are available from many sources at varying costs, with different maturities and under various types of agreements. The critical role of the financial manager is to determine the combination of financing that most closely suits the planned needs of the organisation. This requires obtaining the optimal balance between low cost and the risk of not being able to pay bills as they become due.

In essence it is the financial manager who contributes specialist financial skills and knowledge to the financial decision-making process. It is a primary task for the financial manager to ensure that the firm's investment and financing decisions, both long-term and short-term, are soundly based and that their outcomes result in an increase in the long-term value not only of shareholders, but of the organisation as a whole.

Agency theory — an overview

In the previous section we highlighted the fact that most profit-orientated organisations have a goal of maximising shareholder wealth and that the financial manager should be making decisions to achieve that overall goal. However, there are occasions when the organisational goal and the goals of management, of which the financial manager is a key component, are not aligned. This misalignment is sometimes explained by agency theory.

Definition

Agency theory states that a company is not a single, unified organisation. Agency theory calls into question the claim that all of the stakeholders in the company, for example, shareholders, managers, and creditors, have a single goal – value creation. Agency theory suggests that, on the contrary, their interests may differ and in some instances may even clash. For example, a manager may wish to defer expenditures thereby achieving a level of profit that protects managements' bonus but the expenditures could lead to increased long-term profitability and enhanced shareholder wealth. Agency theory analyses the consequences of certain financial decisions in terms of risk, profitability and, more generally, the interests of the various parties. Agency theory is the intellectual basis of corporate governance.

Agency problem

An agency problem occurs when the interests of shareholders, the board of directors and/or the management of the company are not perfectly aligned or when these stakeholders conflict. In publicly held companies,

there are a variety of individuals with an interest in the performance of the company. The managers and executives who run the company on a day-to-day basis, the shareholders who own shares, and the board of directors who oversee the company's business development all may have different aims or ideas of how the business can be run. Since each of these entities has a vested interest in the organisation, an agency problem occurs when there is conflict among them.

Executives of an organisation may, for example, be interested in achieving good long-term growth of the company. Since their performance is measured by how the company does in both the short-term and the long run, the decisions they make are based on the goals of generating profit both now and in the future. This may mean they wish to engage in capital expenditures now to secure a possible benefit or gain in the future.

Alternatively, many shareholders may be focused on the immediate earnings and returns of a company, as these are important measures in the valuation of the price of a share on the open market. A shareholder who doesn't intend to hold the company's shares long term may prefer a dividend be paid instead of the funds being reinvested to achieve a long-term gain for the company. This is just one example in which the interests of the shareholders may not be perfectly aligned with those of the corporate governance. A more dramatic example of an agency problem occurs when the corporate executives are focused on maximising their own compensation, sometimes at the expense of the company or shareholders.

The board of directors, as well, may have a difference of opinion from the shareholders or the executives, aiming to take the company in a different direction. The board may have the power to remove a chief executive or manager from power, but the shareholders may disapprove of this decision. Conflicts can arise among all three entities, creating issues that are difficult to resolve.

When an agency problem exists, it can be difficult for a company to find a resolution. Shareholders generally get a vote and can vote with the board of directors against the executives, for example. When the agency problem is resolved in this manner, the executives could end up forced to follow a course of action they do not entirely agree with, because the majority rules.

Measures to minimise the agency problem

Two factors act to prevent or minimise the agency problem: market forces and agency costs.

Market forces

One market force is **major shareholders**, particularly large institutional investors such as managed funds, life insurance companies and pension funds. These holders of large blocks of shares exert pressure on

management to perform. When necessary, they exercise their voting rights as shareholders to replace underperforming management.

Another market force is the **threat of takeover** by another company that believes it can enhance the target firm's value by restructuring its management, operations and financing. The constant threat of a takeover tends to motivate management to act in the best interests of the firm's owners.

Agency costs

To minimise agency problems and contribute to the maximisation of owners' wealth, shareholders incur agency costs. These are the costs of monitoring management behaviour, ensuring against dishonest acts of management and giving managers the financial incentive to maximise share price.

The most popular, and sometimes the most expensive, approach is to structure management compensation to correspond with share price maximisation. The objective is to give managers incentives to act in the best interests of the owners. In addition, the resulting compensation packages allow firms to compete for and hire the best managers available. There are two types of compensation plans:

1. **Incentive plans**. These tie management compensation to share price. The most popular incentive plan is the granting of share options to management. These options allow managers to purchase shares at the exercise price set at the time of the grant. If the market price rises, managers will be rewarded by being able to resell the shares at the higher market price.
2. **Performance plans:** These tie management compensation to measures such as earnings per share (EPS), growth in EPS and other ratios of return. Performance shares, shares given to management as a result of meeting the stated performance goals, are often used in these plans. Another form of performance-based compensation is cash bonuses, cash payments tied to the achievement of certain performance goals.

Activity 5.1

Activity

1. For your country, describe the main financial institutions.
2. Again for your country, list and describe the main sources of funding that are available for businesses.

Activity 5.2

Activity

1. Discuss the two basic differences between finance and accounting.
2. Who are the key participants in the transactions of financial institutions? Who are the net suppliers of funds and who are the net demanders of funds?
3. Who are the key participants in the transactions of financial institutions? What relationship exists between financial institutions and financial markets?
4. Discuss the suggestion that the threat of a hostile takeover can motivate management to act in the best interests of the firm's owners.
5. Discuss the role of the primary and secondary segments of the financial markets.
6. Explain what the two primary activities of the financial manager are that relate to the firm's balance sheet.
7. What is the goal of the firm and therefore of all managers and employees? Discuss how the achievement of this goal is measured.

Unit summary

Summary

In this unit you learned:

- that the finance topic is different from accounting,
- that there are many different types of financial institutions,
- that there is a primary and secondary financial market,
- the basics of how financial markets operate,
- the role of the financial manager, and
- that conflict can arise due to agency theory.

Unit 12

Regulation of markets

Introduction

This unit provides an introduction to the topic of markets and market regulation. The unit discusses the nature of and reasons for statutory regulation. The role of central or reserve banks is discussed as well as the role that is played by stock exchanges.

The unit comprises:

- Statutory regulation
- Central or reserve banks
- Stock exchanges

Upon completion of this unit you will be able to:

Outcomes

- *Explain* the need for statutory regulation.
- *Describe* the different forms of statutory regulation.
- *Explain* the role of central or reserve banks.
- *Understand* the functions of a central or reserve bank.
- *Explain* the role of a stock exchange.
- *Describe* the functions of a stock exchange.

Terminology

Terminology

Central bank:	A public institution that usually issues the currency, regulates the money supply, and controls the interest rates in a country.
Stock exchange:	An entity, which provides “trading” facilities for stockbrokers and traders, to trade shares and other securities.

Statutory regulation

Financial regulation is a form of regulation or supervision, which subjects financial institutions to certain requirements, restrictions and guidelines, aiming to maintain the integrity of the financial system. This may be handled by either a government or non-government organisation.

The specific aims of financial regulators are usually:

- to enforce applicable law,
- to prosecute cases of market misconduct, such as insider trading,
- to license providers of financial services,
- to protect clients, and investigate complaints, and
- to maintain confidence in the financial system.

In most cases, financial regulatory authorities regulate all financial activities. But in some cases, there are specific authorities to regulate each sector of the finance industry, mainly banking, securities, insurance and pensions markets, but in some cases also commodities, futures, and forwards. For example, in Australia, the Australian Prudential Regulation Authority (APRA) supervises banks and insurers, while the Australian Securities and Investments Commission (ASIC) is responsible for enforcing financial services and corporations laws.

Sometimes, more than one institution regulates and supervises the banking market, normally because, apart from regulatory authorities, central banks also regulate the banking industry. For example, in the United States, banking is regulated by a lot of regulators, such as the Federal Reserve System, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency, the National Credit Union Administration and the Office of Thrift Supervision.

In addition, there are associations of financial regulatory authorities. In the European Union, there are the Committee of European Securities Regulators (CESR), the Committee of European Banking Supervisors (CEBS) and the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS).

Also, at a global level, there is the International Organisation of Securities Commissions (IOSCO), the International Association of Insurance Supervisors, the Basel Committee on Banking Supervision, the Joint Forum and the Financial Stability Board.

The structure of financial regulation has changed significantly in the past two decades, as the legal and geographic boundaries between markets in banking, securities, and insurance have become increasingly blurred and globalised.

Central or reserve banks

A central bank, reserve bank, or monetary authority is a public institution that usually issues the currency, regulates the money supply, and controls the interest rates in a country. A central bank often also oversees the commercial banking system within a country's borders. A central bank is distinguished from a normal commercial bank because it has a monopoly on creating the currency of that nation, which is usually that nation's legal tender.

The primary function of a central bank is to provide the nation's money supply, but more active duties include controlling interest rates and acting as a lender of last resort to the banking sector during times of financial crisis. It may also have supervisory powers, to ensure that banks and other financial institutions do not behave recklessly or fraudulently.

Most developed nations today have an "independent" central bank, that is, one which operates under rules designed to prevent political interference. Examples include the European Central Bank (ECB) and the Federal Reserve System in the United States.

Responsibilities

Functions of a central bank (not all functions are carried out by all banks) include:

- implementing monetary policy,
- determining interest rates,
- controlling the nation's entire money supply,
- the government's banker and the bankers' bank ("lender of last resort"),
- managing the country's foreign exchange and gold reserves and the government's stock register,
- regulating and supervising the banking industry, and
- setting the official interest rate – used to manage both inflation and the country's exchange rate – and ensuring that this rate takes effect via a variety of policy mechanisms.

We will now take a look at some of these responsibilities in more depth.

Interest rates

By far the most visible and obvious power of many modern central banks is to influence market interest rates.

The mechanism to move the market towards a "target rate" (whichever specific rate is used) is generally to lend money or borrow money in theoretically unlimited quantities, until the targeted market rate is sufficiently close to the target. Central banks may do so by lending

money to and borrowing money from (taking deposits from) a limited number of qualified banks, or by purchasing and selling bonds.

As an example of how this functions: the Bank of Canada sets a target overnight rate, and a band of plus or minus 0.25 per cent. Qualified banks borrow from each other within this band, but never above or below, because the central bank will always lend to them at the top of the band, and take deposits at the bottom of the band; in principle, the capacity to borrow and lend at the extremes of the band are unlimited.

It is also notable that the target rates are generally short-term rates. The actual rate that borrowers and lenders receive on the market will depend on credit risk, maturity and other factors. For example, a central bank might set a target rate for overnight lending of 4.5 per cent, but rates for (equivalent risk) five-year bonds might be 5 per cent or more. Many central banks have one primary "headline" rate that is quoted as the "central bank rate". In practice, they will have other tools and rates that are used, but only one that is rigorously targeted and enforced.

Open market operations

Through open market operations, a central bank directly influences the money supply in an economy. Each time it buys securities, exchanging money for the security, it raises the money supply. Conversely, selling of securities lowers the money supply. Buying of securities thus amounts to printing new money while lowering supply of the specific security.

The main open market operations are:

- Temporary lending of money for collateral securities (called "reverse operations" or "repurchase operations", otherwise known as the "repo" market). These operations are carried out on a regular basis, where fixed maturity loans (of one week and one month for the ECB) are auctioned off.
- Buying or selling securities ("direct operations") on an ad-hoc basis.
- Foreign exchange operations such as forex swaps.

All of these interventions can also influence the foreign exchange market and thus the exchange rate. For example, the People's Bank of China and the Bank of Japan have, on occasion, bought several hundred billions of US Treasuries, presumably in order to stop the decline of the US dollar against the renminbi and the yen respectively.

Capital requirements

All banks are required to hold a certain percentage of their assets as capital, a rate which may be established by the central bank or the banking supervisor. For international banks, including the central bank members of the Bank for International Settlements, the threshold is 8 per cent of risk-adjusted assets, whereby certain assets (such as government bonds) are considered to have lower risk and are either partially or fully

excluded from total assets for the purposes of calculating capital adequacy. Partly due to concerns about asset inflation and repurchase agreements, capital requirements may be considered more effective than deposit/reserve requirements in preventing indefinite lending: when at the threshold, a bank cannot extend another loan without acquiring further capital on its balance sheet.

Reserve requirements

Most banks are required to hold a percentage of their deposits as reserves. Such legal reserve requirements were introduced in the nineteenth century to reduce the risk of banks overextending themselves and suffering from bank runs, as this could lead to knock-on effects on other banks. As banks proliferated and engaged in more complex transactions and were able to profit from dealings globally on a moment's notice, these practices became mandatory, if only to ensure that there was some limit on the ballooning of money supply. However such limits have become harder to enforce.

Even if reserves were not a legal requirement, prudence would ensure that banks would hold a certain percentage of their assets in the form of cash reserves.

Exchange requirements

To influence the money supply, some central banks may require that some or all foreign exchange receipts (generally from exports) be exchanged for the local currency. The rate that is used to purchase local currency may be market-based or arbitrarily set by the bank. This tool is generally used in countries with non-convertible currencies or partially-convertible currencies. The recipient of the local currency may be allowed to freely dispose of the funds, required to hold the funds with the central bank for some period of time, or allowed to use the funds subject to certain restrictions. In other cases, the ability to hold or use the foreign exchange may be otherwise limited.

In this method, money supply is increased by the central bank when it purchases the foreign currency by issuing (selling) the local currency. The central bank may subsequently reduce the money supply by various means, including selling bonds or foreign exchange interventions.

Margin requirements

In some countries, central banks may have other tools that work indirectly to limit lending practices and otherwise restrict or regulate capital markets. For example, a central bank may regulate margin lending, whereby individuals or companies may borrow against pledged securities. The margin requirement establishes a minimum ratio of the value of the securities to the amount borrowed.

Central banks often have requirements for the quality of assets that may be held by financial institutions; these requirements may act as a limit on the amount of risk and leverage created by the financial system. These

requirements may be direct, such as requiring certain assets to bear certain minimum credit ratings, or indirect, by the central bank lending to counterparties only when security of a certain quality is pledged as collateral.

Banking supervision

In some countries the central bank controls and monitors the banking sector. In other countries banking supervision is carried out by a government department such as the United Kingdom Treasury, or an independent government agency (for example, UK's Financial Services Authority). It examines the banks' balance sheets and behaviour and policies toward consumers. Apart from refinancing, it also provides banks with services such as transfer of funds, bank notes and coins or foreign currency. Thus it is often described as the "bank of banks".

Many countries such as the United States will monitor and control the banking sector through different agencies and for different purposes, although there is usually significant co-operation between the agencies. For example, money-centre banks, deposit-taking institutions, and other types of financial institutions may be subject to different (and occasionally overlapping) regulation. Some types of banking regulation may be delegated to other levels of government, such as state or provincial governments.

Any cartel of banks is particularly closely watched and controlled. Most countries control bank mergers and are wary of concentration in this industry due to the danger of lending bubbles based on a single point of failure, and the credit culture of the few large banks.

Independence

Over the past decade, there has been a trend towards increasing the independence of central banks as a way of improving long-term economic performance.

Advocates of central bank independence argue that a central bank which is too susceptible to political direction or pressure may encourage economic cycles (for example, boom and bust cycles), as politicians may be tempted to boost economic activity in advance of an election, to the detriment of the long-term health of the economy and the country. In this context, independence is usually defined as the central bank's operational and management independence from the government.

Central bank independence can be viewed from four perspectives:

1. Legal
2. Goal
3. Operational
4. Management

Legal independence

The independence of the central bank is enshrined in law. This type of independence is limited in a democratic state; in almost all cases the central bank is accountable at some level to government officials, either through a government minister or directly to a legislature. Even defining degrees of legal independence has proven to be a challenge since legislation typically provides only a framework within which the government and the central bank work out their relationship.

Goal independence

The central bank has the right to set its own policy goals, whether inflation targeting, control of the money supply, or maintaining a fixed exchange rate. While this type of independence is more common, many central banks prefer to announce their policy goals in partnership with the appropriate government departments. This increases the transparency of the policy-setting process and thereby increases the credibility of the goals chosen by providing assurance that they will not be changed without notice. In addition, the setting of common goals by the central bank and the government helps to avoid situations where monetary and fiscal policy are in conflict; a policy combination that is clearly sub-optimal.

Operational independence

The central bank has the independence to determine the best way of achieving its policy goals, including the types of instruments used and the timing of their use. This is the most common form of central bank independence. The granting of independence to the Bank of England in 1997 was, in fact, the granting of operational independence; the inflation target continued to be announced in the Chancellor of the Exchequer's annual budget speech to Parliament.

Management independence

The central bank has the authority to run its own operations (appointing staff, setting budgets, and so on.) without excessive involvement of the government. The other forms of independence are not possible unless the central bank has a significant degree of management independence. One of the most common statistical indicators used as a proxy for central bank independence is the "turn-over-rate" of central bank governors. If a government is in the habit of appointing and replacing the governor frequently, it clearly has the capacity to micro-manage the central bank through its choice of governors.

It is argued that an independent central bank can run a more credible monetary policy, making market expectations more responsive to signals from the central bank. Recently, both the Bank of England (1997) and the European Central Bank have been made independent and follow a set of published inflation targets so that markets know what to expect.

Governments generally have some degree of influence over even independent central banks; the aim of independence is primarily to prevent short-term interference. For example, the chairman of the United States Federal Reserve Bank is appointed by the president of the United States (all nominees for this post are recommended by the owners of the Federal Reserve, as are all the board members), and his choice must be confirmed by the Congress.

International organisations such as the World Bank, the BIS and the IMF are strong supporters of central bank independence. This results, in part, from a belief in the merits of increased independence. The support for independence from the international organisations also derives partly from the connection between increased independence for the central bank and increased transparency in the policy-making process.

Stock exchanges

A stock exchange is an entity that provides trading facilities for stockbrokers and traders, to trade shares and other securities. Stock exchanges also provide facilities for the issue and redemption of securities as well as other financial instruments and capital events including the payment of income and dividends. The securities traded on a stock exchange include shares issued by companies, unit trusts, derivatives, pooled investment products and bonds.

To be able to trade a security on a certain stock exchange, it has to be listed there. Usually there is a central location for recordkeeping, but trade is less and less linked to such a physical place, as modern markets are electronic networks, which gives them advantages of increased speed and reduced cost of transactions. Trade on an exchange is by members only.

The initial offering of shares and bonds to investors is, by definition, done in the primary market and subsequent trading is done in the secondary market. A stock exchange is often the most important component of a stock market. Supply and demand in stock markets is driven by various factors that, as in all free markets, affect the price of shares.

There is usually no requirement to issue shares via the stock exchange itself, nor must shares be subsequently traded on the exchange. Such trading is said to be off exchange or over-the-counter. This is the usual way that derivatives and bonds are traded. Increasingly, stock exchanges are part of a global market for securities.

The role of the stock exchange

Stock exchanges have multiple roles in the economy. This may include the following:

Raising capital for businesses

The stock exchange provides companies with the facility to raise capital for expansion through selling shares to the investing public.

Mobilising savings for investment

When people draw their savings and invest in shares, it is argued that this leads to a more rational allocation of resources. This is because funds, which could have been consumed, or kept in idle deposits with banks, are mobilised and redirected to promote business activity. This results in benefits for several economic sectors such as agriculture, commerce and industry, resulting in stronger economic growth and higher productivity levels of firms.

Facilitating company growth

Companies view acquisitions as an opportunity to expand product lines, increase distribution channels, hedge against volatility, increase its market share, or acquire other necessary business assets. A takeover bid or a merger agreement through the stock market is one of the simplest and most common ways for a company to grow by acquisition.

Profit sharing

Both casual and professional share investors, through dividends and share price increases that may result in capital gains, will share in the wealth of profitable businesses.

Corporate governance

By having a wide and varied scope of owners, companies generally tend to improve on their management standards and efficiency in order to satisfy the demands of these shareholders and the more stringent rules for public corporations imposed by public stock exchanges and the government. Consequently, it is argued that public companies (companies that are owned by shareholders who are members of the general public and trade shares on public exchanges) tend to have better management records than privately held companies (those companies where shares are not publicly traded, often owned by the company founders and/or their families and heirs, or otherwise by a small group of investors).

Despite this claim, some well-documented cases have shown a considerable deficiency in corporate governance on the part of some public companies. Examples of corporate mismanagement include the dotcom bubble in the late 1990s, and the subprime mortgage crisis in 2007–2008.

Companies like Pets.com (2000), Enron Corporation (2001), One.Tel (2001), Sunbeam (2001), Webvan (2001), Adelphia (2002), MCI WorldCom (2002), Parmalat (2003), American International Group (2008), Bear Stearns (2008), Lehman Brothers (2008), General Motors (2009) and Satyam Computer Services (2009) were also heavily criticised for having poor or sub-standard corporate governance despite being listed on a stock exchange.

However, when poor financial, ethical or managerial records are known by the share investors, the shares and the company tend to lose value. In the stock exchanges, shareholders of underperforming firms are often penalised by significant share price decline, and they tend as well to dismiss incompetent management teams.

Creating investment opportunities for small investors

As opposed to other businesses that require huge capital outlay, investing in shares is open to both the large and small stock investors because a person buys the number of shares they can afford. Therefore the stock exchange provides the opportunity for small investors to own shares of the same companies as large investors.

Government capital-raising for development projects

Governments at various levels may decide to borrow money in order to finance infrastructure projects such as sewage and water treatment works or housing estates by selling another category of securities known as bonds. These bonds can be raised through the stock exchange whereby members of the public buy them, thus lending money to the government. The issuance of such bonds can avoid the need to directly tax the citizens in order to finance development, although by securing such bonds with the full faith and credit of the government instead of with collateral, the result is that the government must tax the citizens or otherwise raise additional funds to make any regular coupon payments and refund the principal when the bonds mature.

Barometer of the economy

At the stock exchange, share prices rise and fall depending, largely, on market forces. Share prices tend to rise or remain stable when companies and the economy in general show signs of stability and growth. An economic recession, depression, or financial crisis could eventually lead to a stock market crash. Therefore the movement of share prices and in general of the share indexes can be an indicator of the general trend in the economy.

Listing requirements

Listing requirements are the set of conditions imposed by a given stock exchange upon companies that want to be listed on that exchange. Such conditions sometimes include minimum numbers of shares outstanding, minimum market capitalisation, and minimum annual income.

Companies have to meet the requirements of the exchange in order to have their stocks and shares listed and traded there, but requirements vary by stock exchange. The following are some examples of stock exchanges and some of their listing requirements:

- Bombay Stock Exchange: Bombay Stock Exchange (BSE) has requirements for a minimum market capitalisation of Rs 250 million and minimum public float equivalent to Rs 100 million.
- London Stock Exchange: The main market of the London Stock Exchange has requirements for a minimum market capitalisation (£700,000), three years of audited financial statements, minimum public float (25 per cent) and sufficient working capital for at least 12 months from the date of listing.
- NASDAQ Stock Exchange: To be listed on the NASDAQ, a company must have issued at least 1.25 million shares of stock worth at least US $70 million and must have earned more than US $11 million over the last three years.
- New York Stock Exchange: To be listed on the New York Stock Exchange (NYSE) a company must have issued at least a million shares of stock worth US $100 million and must have earned more than US $10 million over the last three years.

Activity 5.3

Activity

1. For your country:
   a. List and describe the main participants in the regulation of financial institutions.
   b. Establish if the central bank is independent.
   c. List and describe the listing requirements for the principle stock exchange.
2. For the organisation that you are involved with, does it comply with best practice corporate governance guidelines in your country?
3. What actions did the regulatory authorities take in your country as a result of the recent global financial crisis?

Activity 5.4

Activity

1. The following are examples of companies that are listed on more than one stock exchange: BHP Billiton (United Kingdom and Australia), Investec Bank (South Africa and United Kingdom), Rio Tinto Group (United Kingdom and Australia) and Unilever (United Kingdom and Netherlands). These are generally called dual-listed companies. List the reasons why companies might adopt this dual listing.

Unit summary

Summary

In this unit you learned that:

- statutory regulation can play a significant role in financial markets,
- central or reserve banks also can play a significant role in financial markets, and
- stock exchanges facilitate the raising of finance for organisations.

Unit 13

Financial mathematics

Introduction

This unit introduces some important concepts that are applied throughout finance. These concepts are principally around the time value of money, in other words, a dollar today is worth more than a dollar at a future point in time.

This unit also discusses the concepts of interest, both simple and compound, as well as present and future values.

The unit comprises:

- The time value of money
- Simple interest
- Compound interest
- Present values
- Future values

Upon completion of this unit you will be able to:

Outcomes

- *Understand* the importance of the time value of money in decision-making.
- *Calculate* both simple and compound interest.
- *Understand* the concept of future value and present value, their calculation for single amounts, and the relationship between them.
- *Calculate* the future value and the present value of both an ordinary annuity and an annuity due, and the present value of a perpetuity.
- *Calculate* both the future value and the present value of a mixed stream of cash flows.
- *Understand* the effect that compounding interest more frequently than annually has on future value and the effective annual rate of interest.

Terminology

Terminology

Future value:	The amount of money that an investment with a fixed, compounded interest rate will grow to by some future date.
Interest :	The fee charged by a lender to a borrower for the use of borrowed money, usually expressed as an annual percentage of the principal.
Present value:	An amount today that is equivalent to a future payment, or series of payments, that has been discounted by an appropriate interest rate.
Time value of money:	The concept that money available at the present time is worth more than the same amount in the future, due to its potential earning capacity.

Time value of money

Time value of money (TVM) is an important concept in financial management. It can be used to compare investment alternatives and to solve problems involving loans, mortgages, leases, savings and annuities.

TVM is based on the concept that a dollar that you have today is worth more than the promise or expectation that you will receive a dollar in the future. Money that you hold today is worth more because you can invest it and earn interest. After all, you should receive some compensation for foregoing spending. For example, you can invest your dollar for one year at a 6 per cent annual interest rate and accumulate $1.06 at the end of the year.

In other words the *future value* of the dollar is $1.06 given a 6 per cent interest rate and a one-year period. It follows that the *present value* of the $1.06 you expect to receive in one year is only $1.

A key concept of TVM is that a single sum of money or a series of equal, evenly-spaced payments or receipts promised in the future can be converted to an equivalent value today. Conversely, you can determine the value to which a single sum or a series of future payments will grow to at some future date.

In the remaining sections of this unit we will discuss these concepts in more detail.

Simple interest

Simple interest assumes that an investor receives interest on their principal but not on any previous interest earned. For example, if $1,000 is invested at 10 per cent for two years, it will earn $100 of interest in the first year, and then $100 of interest in the second year, so the investment will now be worth $1,200.

Simple interest can be expressed as follows:

Simple Interest = p * i * n

Where:

- **p** = **principal** (original amount borrowed or loaned)
- **i** = **interest rate** for one period
- **n** = **number** of periods.

Case study/example

Example 1: You borrow $10,000 for three years at 5 per cent simple annual interest:

interest = p * i * n = $10,000 * .05 * 3 = $1,500.

Example 2: You borrow $10,000 for 60 days at 5 per cent simple interest per year (assume a 365-day year):

interest = p * i * n = $10,000 * .05 * (60/365) = $82.1917.

More generally, an amount accrued (future value) with simple interest can be calculated as:

- Future value = principal + (principal x interest rate x number of periods).

However, since most investments use compounding interest, the remainder of calculations will focus on compounding interest.

Compound interest

Compounding interest assumes that an investor will earn interest on any previously accrued interest. This is a more realistic scenario than simple interest. Assume $1,000 is invested at 10 per cent for a year (Year 1). At the end of Year 1, the interest earned is $100 ($1,000 x 0.10).

If this interest is retained and added to the original $1,000, the total is $1,100 (1,000 x 1.10).

In Year 2 interest will be earned on the $1,000 investment as well as the Year 1 interest of $100 to accumulate $1,210 [($1,000 x 1.10) + (100 x 1.10)].

Compound interest is calculated each period on the **original principal and all interest accumulated during past periods**. Although the interest

may be stated as a yearly rate, the compounding periods can be yearly, semiannually, quarterly, or even continuously.

You can think of compound interest as a series of back-to-back simple interest contracts. The interest earned in each period is added to the principal of the previous period to become the principal for the next period. For example, you borrow $10,000 for three years at 5 per cent annual interest compounded annually:

interest year 1 = p * i * n = $10,000 * .05 * 1 = $500

interest year 2 = ($p_2 = p_1 + i_1$) * i * n = ($10,000 + $500) * .05 * 1 = $525

interest year 3 = ($p_3 = p_2 + i_2$) * i * n = ($10,500 + $525) *.05 * 1 = $551.25

Total interest earned over the three years = $500 + $525 + $551.25 = $1,576.25**.** Compare this to 1,500 earned over the same number of years using simple interest.

It is possible to have more than one compounding period per year. As the number of compounding periods increase, the total amount accrued by the end of the investment period will also increase since there is a greater opportunity to earn interest on the interest.

The variable **n** in Time Value of Money formulas represents the number of **periods**. It is intentionally not stated in years since each interval must correspond to a compounding period for a single amount or a payment period for an annuity.

The interest rate and number of periods must both be adjusted to reflect the number of compounding periods per year before using them in TVM formulas. For example, if you borrow $1,000 for two years at 12 per cent interest compounded **quarterly**, you must **divide** the interest rate by four to obtain rate of interest per period (i = 3 per cent). You must **multiply** the number of years by four to obtain the total number of periods (n = 8).

The power of compounding can have a huge effect on the accumulation of wealth. The following table shows the results of making a one-time investment of $10,000 for 30 years using 12 per cent simple interest, and 12 per cent interest compounded yearly and quarterly.

Type of interest	Principal plus interest earned
Simple	$46,000.00
Compounded yearly	$299,599.22
Compounded quarterly	$347,109.87

Figure 1

Present value and future value tables

Two of the key concepts in time value of money calculations are present and future values. Both of these concepts are discussed in the next two sections. Both of these concepts involve time-consuming calculations. One of the aids to assist with these calculations is financial tables.

Financial tables include various future and present value interest factors that simplify time value calculations. The values in these tables are easily developed from formulas, with various degrees of rounding. These tables are typically indexed by the number of periods (varies by row) and the interest rate (varies by column). Figure 2 depicts this general layout of financial tables.

Period	1%	2%	3%	4%	5%
1	0.990	0.980	0.971	0.962	0.952
2	0.980	0.961	0.943	0.925	0.907
3	0.971	0.942	0.915	0.889	0.864
4	0.961	0.924	0.888	0.855	0.823
5	0.951	0.906	0.863	0.822	0.784

Figure 2: Present value interest factor of $1 per period at 1% for n periods, PVIF(i,n)

So using the above table, if we wanted to find out the interest factor for four years at a 4 per cent interest rate, its value would be in the shaded area, which is found at the intersection of the four-year row and the 4 per cent column, as shown.

A full set of the four basic financial tables is included in Appendix 1 at the end of this Module.

Present values

Present value is an amount today that is equivalent to a future payment, or series of payments, that has been discounted by an appropriate interest rate. Since money has time value, the present value of a promised future amount is worth less the longer you have to wait to receive it. The difference between the two depends on the number of compounding periods involved and the interest (discount) rate.

Present value of a single amount

The relationship between the present value and future value (see next section) can be expressed as:

$$PV = FV\,[1 / (1 + i)^n]$$

Where

- PV = Present value
- FV = Future value
- i = Interest rate per period
- n = Number of compounding periods

Case study/example

You want to buy a house five years from now for $150,000. Assuming a 6 per cent interest rate compounded **annually**, how much should you invest today to yield $150,000 in five years?

FV = $150,000

i =.06

n = 5

PV = $150,000 [1 / (1 + .06)^5] = $150,000 (1 / 1.3382255776) = $112,088.73

Or the above can be calculated using the present value interest table, PVIF:

- the factor for five periods at 6 per cent is 0.747
- $150,000 x 0.747 = $112,050 (difference is due to rounding)

Or the above can be expressed as follows:

End of Year	1	2	3	4	5
Principal	112,088.73	118,814.05	125,942.89	133,499.46	141,509.43
Interest	6,725.32	7,128.84	7556.57	8,009.97	8,490.57
Total	118,814.05	125,942.89	133,499.46	141,509.43	150,000.00

Figure 3

Case study/example

You find another financial institution that offers an interest rate of 6 per cent compounded semiannually. How much less can you deposit today to yield $150,000 in five years?

Interest is compounded twice per year so you must divide the annual interest rate by two to obtain a rate per period of 3 per cent. Since there are two compounding periods per year, you must multiply the number of years by two to obtain the total number of periods.

FV = $150,000

i = .06/2 = .03

n = 5 * 2 = 10

PV = $150,000 [1 / (1 + .03)10] = $150,000 (1 / 1.343916379) = $111,614.09

Or the above can be calculated using the present value interest table, PVIF:

- the factor for 10 periods at 3 per cent is 0.744
- $150,000 x 0.744 = $111,600 (difference is due to rounding)

Present value of an annuity

An annuity is a series of equal payments or receipts that occur at evenly spaced intervals. Leases and rental payments are examples. The payments or receipts occur at the end of each period for an ordinary annuity while they occur at the beginning of each period for an annuity due.

Present value of an ordinary annuity (PVoa)

The present value of an ordinary annuity (PVoa) is the value of a stream of expected or promised future payments that have been discounted to a single equivalent value today. It is extremely useful for comparing two separate cash flows that differ in some way.

PVoa can also be thought of as the amount you must invest today at a specific interest rate so that when you withdraw an equal amount each period, the original principal and all accumulated interest will be completely exhausted at the end of the annuity.

The present value of an ordinary annuity could be solved by calculating the present value of each payment in the series using the present value formula and then summing the results. A more direct formula is:

$$PVoa = PMT\ [(1 - (1 / (1 + i)^n))/i]$$

Where:

- PVoa = Present value of an ordinary annuity
- PMT = Amount of each payment
- i = Discount rate per period
- n = Number of periods

Case study/example

What amount must you invest today at 6 per cent compounded annually so that you can withdraw $5,000 at the end of each year for the next five years?

PMT = 5,000

i = .06

n = 5

PVoa = $5,000 [(1 - (1 / (1 + .06)^5)) / .06] = $5,000 (4.212364) = $21,061.82

Or the above can be calculated using the present value interest table of an ordinary annuity, PVIFA:

- the factor for five periods at 6 per cent is 4.212
- $5,000 x 4.212 = $21,060 (difference is due to rounding)

Or the above can be expressed as:

Year	1	2	3	4	5
Begin	21,061.82	17,325.53	13,365.06	9,166.96	4,716.98
Interest	1,263.71	1,039.53	801.90	550.02	283.02
Withdraw	-5,000	-5,000	-5,000	-5,000	-5,000
End	17,325.53	13,365.06	9,166.96	4,716.98	.00

Figure 4

Case study/example

In practical problems, you may need to calculate both the present value of an annuity (a stream of future periodic payments) and the present value of a single future amount.

As an example of PVoa, a computer dealer offers to lease a system to you for $50 per month for two years. At the end of two years, you have the option to buy the system for $500. You will pay at the end of each month. He will sell the same system to you for $1,200 cash. If the current interest rate is 12 per cent, which is the better offer?

You can treat this as the sum of two separate calculations:

1. the present value of an ordinary annuity of 24 payments at $50 per monthly period plus
2. the present value of $500 paid as a single amount in two years.

Calculation 1

PMT = 50 per period

i = .12 / 12 = .01 Interest per period (12 per cent annual rate /12 payments per year)

n = 24 number of periods

PVoa = $50 [(1 - (1/ (1.01)^{24})) /.01] = $50 [(1-(1 / 1.26973)) /.01] = $1,062.17

+ Calculation 2

FV = 500 Future value (the lease buy out)

i = .01 Interest per period

n = 24 Number of periods

PV = FV [1 / (1 + i)^{n}] = $500 (1/1.26973) = $393.78

The present value (cost) of the lease is $1,455.95 ($1,062.17 + $393.78). So if taxes are not considered, you would be $255.95 better off paying cash right now if you have it.

Present value of annuity due (PVad)

The present value of an annuity due is identical to an ordinary annuity except that each payment occurs at the beginning of a period rather than at the end. Since each payment occurs one period earlier, we can calculate the present value of an ordinary annuity and then multiply the result by (1 + i).

PVad = PVoa (1+i)

Where:

- PV-ad = Present value of an annuity due
- PV-oa = Present value of an ordinary annuity
- i = Discount rate per period

Case Study/Example

PVad example: What amount must you invest today at 6 per cent interest rate compounded annually so that you can withdraw $5,000 at the **beginning** of each year for the next five years?

PMT = 5,000

i = .06

n = 5

PVoa = 21,061.82 (1.06) = 22,325.53

Or the above can be expressed as follows:

Year	1	2	3	4	5
Begin	22,325.53	18,365.06	14,166.96	9,716.98	5,000.00
Interest	1,039.53	801.90	550.02	283.02	
Withdraw	-5,000.00	-5,000.00	-5,000.00	-5,000.00	-5,000.00
End	18,365.06	14,166.96	9,716.98	5,000.00	.00

Figure 5

Future values

Future value is the amount of money that an investment with a fixed, compounded interest rate will grow to by some future date. The investment can be a single sum deposited at the beginning of the first period, a series of equally-spaced payments (an annuity), or both. Since money has time value, we naturally expect the future value to be greater than the present value. The difference between the two depends on the number of compounding periods involved and the going interest rate.

Future value of a single amount

Future value is the amount of money that an investment made today (the present value) will grow to by some future date. Since money has time value, we naturally expect the future value to be greater than the present value. The difference between the two depends on the number of compounding periods involved and the going interest rate.

The relationship between the future value and present value can be expressed as:

$$FV = PV\ (1 + i)^n$$

Where:

- FV = Future value
- PV = Present value
- i = Interest rate per period
- n = Number of compounding periods

Case Study/Example

You can afford to put $10,000 in a savings account today that pays 6 per cent interest compounded annually. How much will you have five years from now if you make no withdrawals?

PV = 10,000

i = .06

n = 5

$$FV = \$10{,}000\ (1 + .06)^5 = \$10{,}000\ (1.3382255776) = \$13{,}382.26$$

Or the above can be calculated using the future value interest table, FVIF:

- the factor for five periods at 6 per cent is 1.338
- $10,000 x 1.338 = $13,380 (difference is due to rounding)

Or the above can be expressed as follows:

End of Year	1	2	3	4	5
Principal	10,000.00	10,600.00	11,236.00	11,910.16	12,624.77
Interest	600.00	636.00	674.16	714.61	757.49
Total	10,600.00	11,236.00	11,910.16	12,624.77	13,382.26

Figure 6

Case Study/Example

Another financial institution offers to pay 6 per cent compounded **semi-annually**. How much will your $10,000 grow to in five years at this rate?

Interest is compounded twice per year so you must **divide the annual interest rate by two** to obtain a rate per period of 3 per cent. Since there are two compounding periods per year, you must **multiply the number of years by two** to obtain the total number of periods.

PV = 10,000

i = .06 / 2 = .03

n = 5 * 2 = 10

$$FV = \$10,000\ (1 + .03)^{10} = \$10,000\ (1.343916379) = \$13,439.16$$

Or the above can be calculated using the future value interest table, FVIF:

the factor for 10 periods at 3 per cent is 1.344

- $10,000 x 1.344 = $13,440 (difference is due to rounding)

Future value of annuities

As stated previously, an **annuity** is a series of equal payments or receipts that occur at evenly spaced intervals. Leases and rental payments are examples. The payments or receipts occur at the end of each period for an ordinary annuity while they occur at the beginning of each period for an annuity due.

Future value of an ordinary annuity

The future value of an ordinary annuity (FVoa) is the value that a stream of expected or promised future payments will grow to after a given number of periods at a specific compounded interest.

The future value of an ordinary annuity could be solved by calculating the future value of each individual payment in the series using the future value formula and then summing the results. A more direct formula is:

$$FVoa = PMT\ [((1 + i)^n - 1) / i]$$

Where:

- FVoa = Future value of an ordinary annuity
- PMT = Amount of each payment
- i = Interest rate per period
- n = Number of periods

Case study/example

What amount will accumulate if we deposit $5,000 at the **end** of each year for the next five years? Assume an interest of 6 per cent compounded annually.

PMT = 5,000

i = .06

n = 5

FVoa = $5,000 [(1.3382255776 - 1) / .06] = $5,000 (5.637092) = $28,185.46

Or the above can be calculated using the future value interest table of an ordinary annuity, FVIFA:

- the factor for five periods at 6 per cent is 5.637
- $5,000 x 5.637 = $28,185 (difference is due to rounding)

Or the above can be expressed as follows:

Year	1	2	3	4	5
Begin	0	5,000.00	10,300.00	15,918.00	21,873.08
Interest	0	300.00	618.00	955.08	1,312.38
Deposit	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
End	5,000.00	10,300.00	15,918.00	21,873.08	28,185.46

Figure 7

Case study/example

In practical problems, you may need to calculate both the future value of an annuity (a stream of future periodic payments) and the future value of a single amount that you have today.

For example, you are 40 years old and have accumulated $50,000 in your savings account. You can add $100 at the end of each month to your account which pays an interest rate of 6 per cent per year. Will you have enough money to retire in 20 years?

You can treat this as the sum of two separate calculations:

1. the future value of 240 monthly payments of $100 Plus
2. the future value of the $50,000 now in your account.

Calculation 1

PMT = $100 per period

i = .06 / 12 = .005 Interest per period (6 per cent annual rate /12 payments per year)

n = 240 periods

FVoa = $100 [(3.3102 - 1) / .005] = $46,204

+ Calculation 2

PV = $50,000 Present value (the amount you have today)

i = .005 Interest per period

n = 240 Number of periods

FV = PV (1+i)240 = $50,000 (1.005)240 = $165,510.22

After 20 years you will have accumulated $211,714.22 ($46,204.00 + $165,510.22).

Future value of annuity due (FVad)

The future value of an annuity due is identical to an ordinary annuity except that each payment occurs at the beginning of a period rather than at the end. Since each payment occurs one period earlier, we can calculate the present value of an ordinary annuity and then multiply the result by (1 + i).

FVad = FVoa (1+i)

Where:

- FVad = Future value of an annuity due
- FVoa = Future value of an ordinary annuity
- i = Interest rate per period

Case Study/Example

FVad example; What amount will accumulate if we deposit $5,000 at the **beginning** of each year for the next five years? Assume an interest of 6 per cent compounded annually.

PMT = 5,000

i = .06

n = 5

FVoa = $28,185.46 (1.06) = $29,876.59

Or the above can be expressed as follows:

Year	1	2	3	4	5
Begin	0	5,300.00	10,918.00	16,873.08	23,185.46
Deposit	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
Interest	300.00	618.00	955.08	1,312.38	1,691.13
End	5,300.00	10,918.00	16,873.08	23,185.46	29,876.59

Figure 8

Activity 5.5

Activity

1. Calculate the future value of $4,600 received today if it is deposited at 9 per cent for three years.
2. Calculate the present value of $89,000 to be received in 15 years, assuming an opportunity cost of 14 per cent.
3. John has deposited $33,000 today in an account which will earn 5 per cent semi-annually. He plans to leave the funds in this account for seven years earning interest. If the goal of this deposit is to cover a future obligation of $70,000, what recommendation would you make to John?
4. Eco Limited is preparing a five-year plan. Today, sales are $1,000,000. If the growth rate in sales is projected to be 10 per cent over the next five years, what will the dollar amount of sales be in year five?
5. Fred has inherited $6,000. He would like to use this money to go on a cruise with Wilma costing $7,000 for their 10th anniversary celebration which will take place in two years from now. Will Fred have enough money to buy the gift if he deposits his money in an account paying 8 per cent compounded semi-annually?
6. Kay and Arthur are newlyweds and have just purchased a flat for $70,000. Since the flat is very small, they hope to move into a single-family house in five years. How much will their flat be worth in five years if house prices are expected to rise by 8 per cent per annum?
7. Calculate the future value of an annuity of $5,000 each year for eight years, deposited at 6 per cent.
8. Calculate the present value of an annuity of $3,900 each year for four years, assuming an opportunity cost of 10 per cent.

Unit summary

Summary

In this unit you learned that:

- The time value of money is an important concept in finance.
- Simple interest is calculated by applying an interest rate to a principal.
- Compound interest is calculated by applying an interest rate to a principal and accumulated interest.
- Present values can be calculated by discounting a future value at an appropriate discount (or interest) rate.
- Future values can be calculated by compounding a present value at an appropriate interest rate.

Activity feedback

Activity 5.1, 5.3

Your answers will depend on the organisation you choose.

Activity 5.2

1. Discuss the two basic differences between finance and accounting.

   The two differences are in relation to the emphasis on cash flows and decision-making. Accountants use the accrual basis which recognises revenues at the point of sale and expenses when incurred. The financial manager places primary emphasis on cash flows, recognising revenues and expenses only with respect to actual inflows and outflows of cash.

   The accountant devotes the majority of his/her attention to the collection and presentation of financial data, whereas the financial manager evaluates the accountant's statements, develops additional data and makes decisions based on subsequent analyses.

2. Who are the key participants in the transactions of financial institutions? Who are the net suppliers of funds and who are the net demanders of funds?

   The key participants in financial transactions are individuals, businesses, and governments. These parties participate both as suppliers and demanders of funds. Individuals are net suppliers, which means that they save more dollars than they borrow, while both businesses and governments are net demanders since they borrow more than they save. One could say that individuals provide the excess funds required by businesses and governments.

3. Who are the key participants in the transactions of financial institutions? What relationship exists between financial institutions and financial markets?

   Financial markets provide a forum in which suppliers of funds and demanders of loans and investments can transact business directly.

   Financial institutions and financial markets are not independent of each other. It is quite common to find financial institutions actively participating in both the money market and the capital market as both suppliers and demanders of funds. Financial institutions often channel their investments and obtain needed financing through the financial markets. This relationship exists since these institutions must use the structure of the financial marketplace to find a supplier of funds.

4. Discuss the suggestion that the threat of a hostile takeover can motivate management to act in the best interests of the firm's owners

   A hostile takeover is the acquisition of the firm (the target) by another firm or group (the acquirer) that is not supported by management. Hostile takeovers typically occur when the acquirer feels that the target firm is being poorly managed, and, as a result, is undervalued in the marketplace. The acquirer believes that by acquiring the target at its current low price and restructuring its management (by firing and replacing them), operations and financing, it can enhance the firm's value.

5. Discuss the role of the primary and secondary segments of the financial markets.

   The primary market is where securities are initially issued, and is the only market where the issuer is directly involved in the transaction. The secondary market is where pre-owned securities can be traded.

6. Explain what the two primary activities of the financial manager are that relate to the firm's balance sheet.

   The two key activities of the financial manager as related to the firm's balance sheet are:

   a. Making investment decisions: Determining both the most efficient level and the best mix of assets; and

   b. Making financing decisions: Establishing and maintaining the proper mix of short- and long-term financing and raising needed financing in the most economical fashion.

   Making investment decisions concerns the asset side of the balance sheet (current and fixed assets). Making financing decisions deals with the funding or financing side of the balance sheet (current liabilities, long-term debt, and shareholders' equity).

7. What is the goal of the firm and therefore of all managers and employees? Discuss how the achievement of this goal is measured.

   The goal of the firm, and therefore all managers, is to maximise shareholder wealth. This goal is measured by share price; an increasing price per share of common shares relative to the stock market as a whole indicates achievement of this goal.

Activity 5.4

1. Reasons why companies might adopt a dual listing.

   - Tax – there may be capital gains tax or tax issues related to dividends.
   - National pride – a company may wish to keep a presence in a smaller stock exchange as it is seen as an important national symbol but may wish to list in a larger exchange to access capital.

- Investors – investors in the country of origin may be prevented from owning shares in the company should it list solely in another jurisdiction.
- May not require regulatory (anti-competition) consent and also may not require foreign investment approval.

Activity 5.5

1. Calculate the future value of $4,600 received today if it is deposited at 9 per cent for three years.

   $FV = \$4{,}600 \times (1.09)^3 = \$4{,}600(1.295) = \$5{,}957$

2. Calculate the present value of $89,000 to be received in 15 years, assuming an opportunity cost of 14 per cent.

   $PV = \$89{,}000 \times (1/(1.14)^{15}) = \$89{,}000 \times 0.14 = \$12{,}460$

3. John has deposited $33,000 today in an account which will earn 5 per cent semi-annually. He plans to leave the funds in this account for seven years earning interest. If the goal of this deposit is to cover a future obligation of $70,000, what recommendation would you make to John?

   $FV = \$33{,}000 \times (1.05)^{14} = \$33{,}000(1.980) = \$65{,}340$

   John will only have $65,340 at the end of seven years under the stated arrangement. He must find an account with a higher interest rate or deposit a larger sum today.

4. Eco Limited. is preparing a five-year plan. Today, sales are $1,000,000. If the growth rate in sales is projected to be 10 per cent over the next five years, what will the dollar amount of sales be in year five?

   $FV = \$1{,}000{,}000 \times (1.10)^5 = \$1{,}000{,}000(1.611) = \$1{,}611{,}000$

5. Fred has inherited $6,000. He would like to use this money to go on a cruise with Wilma costing $7,000 for their 10th anniversary celebration which will take place two years from now. Will Fred have enough money to buy the gift if he deposits his money in an account paying 8 per cent compounded semi-annually?

   $n = 2,\ m = 2,\ i = 8\%$

   $FV = PV(1+i/m)^{n*m} = 6{,}000 \times (1.04)^4 = \$6{,}000(1.170) = \$7{,}020$

   Yes, Fred will have enough money to afford the cruise.

6. Kay and Arthur are newlyweds and have just purchased a flat for $70,000. Since the flat is very small, they hope to move into a single-family house in five years. How much will their flat be worth in five years if inflation is expected to be 8 per cent?

   $PV = \$70{,}000,\ i = 8\%,\ n = 5$

   $FV = \$70{,}000 \times (1.08)^5 = \$70{,}000(1.469) = \$102{,}830.$

7. Calculate the future value of an annuity of $5,000 each year for eight years, deposited at 6 per cent.

   $FVoa = PMT\ [((1 + i)^n - 1) / i]$

   $FV = 5{,}000[((1+0.06)^8-1/0.06] = \$5{,}000(9.897) = \$49{,}485$

8. Calculate the present value of an annuity of $3,900 each year for four years, assuming an opportunity cost of 10 per cent.

   $PVoa = PMT\ [(1 - (1 / (1 + i)^n)) / i]$

   $PV = \$3{,}900((1 - (1/(1.1)^4))/0.1) = \$3{,}900(3.170) = \$12{,}363$

Appendix 1

Future value interest factor of $1 per period at i% for n periods, FVIF(i,n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785	5.474	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.407
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.172	18.488
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544	7.690	9.024	10.575	12.375	14.463	16.879	19.673	22.901	26.623
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	7.263	8.613	10.197	12.056	14.232	16.777	19.748	23.214	27.252	31.948
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062	9.646	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585	17.000	21.231	26.462	32.919	40.874	50.658	62.669	77.388	95.396
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	22.892	29.960	39.116	50.950	66.212	85.850	111.065	143.371	184.675	237.376
35	1.417	2.000	2.814	3.946	5.516	7.686	10.677	14.785	20.414	28.102	38.575	52.800	72.069	98.100	133.176	180.314	243.503	327.997	440.701	590.668
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884	267.864	378.721	533.869	750.378	1,051.668	1,469.772
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	450.736	700.233	1,083.657	1,670.704	2,566.215	3,927.357	5,988.914	9,100.438

Present value interest factor of $1 per period at i% for n periods, PVIF(i,n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026	0.020	0.015	0.012	0.009	0.007	0.005	0.004
35	0.706	0.500	0.355	0.253	0.181	0.130	0.094	0.068	0.049	0.036	0.026	0.019	0.014	0.010	0.008	0.006	0.004	0.003	0.002	0.002
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.001
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000

Future value interest factor of an ordinary annuity of $1 per period at i% for n periods, FVIFA(i,n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416	16.085	16.786	17.519	18.285	19.086	19.923	20.799
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095	32.393	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672	50.980	55.717	60.925	66.649	72.939	79.850	87.442
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.93
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725	68.394	75.836	84.141	93.406	103.74	115.27	128.12
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749	78.969	88.212	98.603	110.28	123.41	138.17	154.74
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947	91.025	102.44	115.38	130.03	146.63	165.42	186.69
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.41	133.33	155.62	181.87	212.79	249.21	292.10	342.60	402.04	471.98
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.28	136.31	164.49	199.02	241.33	293.20	356.79	434.75	530.31	647.44	790.95	966.71	1,181.9
35	41.660	49.994	60.462	73.652	90.320	111.43	138.24	172.32	215.71	271.02	341.59	431.66	546.68	693.57	881.17	1,120.7	1,426.5	1,816.7	2,314.2	2,948.3
40	48.886	60.402	75.401	95.026	120.80	154.76	199.64	259.06	337.88	442.59	581.83	767.09	1,013.7	1,342.0	1,779.1	2,360.8	3,134.5	4,163.2	5,529.8	7,343.9
50	64.463	84.579	112.80	152.67	209.35	290.34	406.53	573.77	815.08	1,163.9	1,668.8	2,400.0	3,459.5	4,994.5	7,217.7	10,436	15,090	21,813	31,515	45,497

Present value interest factor of an (ordinary) annuity of $1 per period at i% for n periods, PVIFA(i,n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999