Fundamentals of Finance

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Introduction

Welcome to Fundamentals of Finance, a comprehensive learning manual to introduce first year students to the building blocks that form the foundation of the financial world. Whether you are starting a journey towards a career in finance, business or simply looking to understand how the world of finance works, this book is your starting point. At its core, finance is about making decisions under uncertainty. In this book, you will explore different types of financial markets, institutions and instruments and understand the purposes that they serve. You will discover why a dollar today is worth more than a dollar in the future and learn to apply the valuation principle to evaluate debt and equity instruments. You will gain insights into how investors assess the value of their investment. Risk and returns are two inseparable concepts in finance. Understanding the relationship between the two is essential in making informed investment decisions. You will explore different types of risks and how they can be measured. Finally, you will be introduced to the foreign exchange market, an integral part of our global economy. With this book, you are stepping into the fascinating world of finance, equipped with the knowledge to navigate its complexities.

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I would like to acknowledge that this book draws significant inspirations from various books that I have read and enjoy throughout the years. They are Principles of Corporate Finance by Richard Brealey, Stewart Myers and Frankline Allen and Alex Edmans 14th Edition 2023, Business Finance by Graham Peirson, Rob Brown, Steve Easton, Peter Howard and Sean Pinder 12th Edition, Corporate Finance by John Graham, Chris Adam and Ganesh Gunasingham 3rd edition and Investments by Zvi Bodie, Alex Kane and Alan Marcus 12 edition.

About the Author

Annette Nguyen completed her bachelor degree at the University of Melbourne and subsequently pursue her post graduate studies at Monash University majoring in Finance. She has taught Fundamentals of Finance at Deakin University in the last 11 years. Her research interest are centred around Investments, with a particular focus on asset pricing.

Chapter 1 - Introduction to Finance

Chapter Learning Objectives

After completing this chapter, students should be able to

- Define what finance is about
- Define the corporate objective in relation to maximising the wealth of shareholders
- Understand the different corporate financial decisions and their impacts on the firms value
- Define the different legal form of business organisation and compare the three typical forms of business
- Identify the advantages and disadvantages of each type of business structure

1. What is Finance?

Finance is concerned with the allocation and distribution of monetary capital and risks amongst various entities. It is an

area of study that delves into how individuals, businesses, and institutions value, obtain, and manage their financial resources. Finance can be divided into four broad categories: Corporate Finance, Investments, Financial Markets and Institutions and Personal Finance. Let's explore each of these four areas of Finance:

- Corporate Finance is the study of how corporations make financial decisions in order to maximise their shareholders wealth. Essentially, corporate finance is about how corporations invest in real assets which generate income, how these assets are funded and how the income is distributed to shareholders.
- Investments is the field that examines how individuals and managers allocate their assets over time under conditions of certainty and uncertainty. The goal of investments not only aim to maximise returns but do so in a manner that is consistent with the investor's objectives and tolerance for risk. The investment process often involves valuations, risk and returns analysis, constructing and evaluating portfolio performance.
- Financial Markets and Financial Institutions is the study that focuses on understanding how financial markets operate, the various types of financial instruments that are traded, the structure and functioning of financial institutions and how they all contribute to the broader financial system.
- Personal Finance is a field that examines the financial decisions of an individual or a household. This includes retirement planning, insurance, saving, insurance, tax planning and estate planning. Personal finance involves continuous learning and adjustment to adapt to life changes, economic shifts and individual circumstances.

2. Why study Finance?

Whether your aim is to land a high paying finance careers or not, finance provides you powerful tools to understand and navigate the interplay of market conditions and economic forces. Studying finance is not just about managing money but it is about making critical decisions in a world full of uncertainties. For example, you have probably heard the phrase “There is nothing such as a Free Lunch”. So, in order to earn a return, you have to take some risk. The more risks you take, the higher returns you earn. Finance tells you that not all risks are counted as equal. Some risks will enable you to achieve higher returns, others will not. What about maybe there is a “free” lunch i.e. investment opportunities that offer high returns but very low or no risks. Are these opportunities real? What is their chance of happening or repeating in the future? What about legendary investors such as Warren Buffet, Jim Simons or Peter Thiel? Are they lucky? Do they take higher risks and what risks do they take? What investment strategies do they follow? Finance offers essential insights that help you addressing these questions.

3. How are businesses are formed?

In Australia, in order to operate a business, you need to decide on its structure. Each structure has certain advantages and disadvantages. The most suitable structure for your business should be based on its scale and nature, as well as your preferred management style. When starting or expanding your business, you have the option to select from four fundamental structures:

1. A **sole trader** is a business structure that is known for its

simplicity in setup and operations, offering complete control over assets and business choices. It benefits from minimal reporting obligations and is typically a cost-effective model. Sole traders can file tax returns using their personal tax file number (TFN). However, this structure carries the disadvantage of unlimited liability, meaning personal assets could be at risk if the business faces financial difficulties. Additionally, sole traders are personally responsible for paying tax on all income earned from the business.

2. A **partnership** is a business structure in which two or more individuals manage and operate a business in accordance with the terms and objectives set out in a Partnership Deed. The income or losses are shared among the partners according to the partnership deed.

   The partnership business structure is also known for its ease of establishment and cost-efficiency, often involving less complexity compared to forming a corporation. When forming a partnership, it is necessary to obtain a separate Tax File Number (TFN) for the entity, which is used for all tax-related matters. Additionally, partnerships must acquire an Australian Business Number (ABN) and utilize it in all their business dealings. The partnership itself is not subject to income tax. Instead, the tax responsibility is passed on to the individual partners, who each pay tax on their proportion of the net income generated by the partnership. Finally, if the business's turnover reaches or exceeds $75,000, the partnership must register for the Goods and Services Tax (GST). This structure allows individuals to pool their resources and expertise but also necessitates a high level of mutual trust and clear communication due to the joint responsibility for the

partnership's commitments. There are three principal forms of partnership:

- General Partnership (GP): In this arrangement, all partners participate in the day-to-day management of the business and each partner has joint liability for the debts and obligations of the business. This means that each partner is individually responsible, as well as collectively with other partners, for the liabilities of the partnership.
- Limited Partnership (LP): This form of partnership consists of both general and limited partners. The general partners manage the business and have unlimited liability for its debts, while the limited partners contribute capital and share in the profits but typically do not participate in managing the business. Limited partners' liability is restricted to the amount they have invested in the partnership.
- Incorporated Limited Partnership (ILP): This form of partnership consists of both general and limited partners. The general partners manage the business and have unlimited liability for its debts, while the limited partners contribute capital and share in the profits but typically do not participate in managing the business. Limited partners' liability is restricted to the amount they have invested in the partnership.

3. A **company** is a form of a business structure where it is recognized as an independent legal entity, distinct from its owners or members, setting it apart from sole trader or partnership structures. Functioning much like an individual, a company is capable of incurring debt, initiating legal action, or being subject to legal claims. Shareholders of a company are typically not personally accountable for the company's financial liabilities. Their main financial responsibility is limited to paying any

amount that may be outstanding on their shares if such a payment is requested. However, it's important to note that the company's directors can face personal liability if they do not fulfill their legal duties. Setting up a company can be a complex and costly endeavour. It is generally more suited to those who anticipate fluctuating business income and may benefit from the ability to carry forward losses to offset future profits. This structure is often favoured by those seeking to reinvest earnings into the business or plan for a long-term investment, due to the protections and potential tax advantages it can offer. If the company's turnover reaches or exceeds $75,000, you are required to register for the Goods and Services Tax (GST). Non-profit organizations have a higher threshold set at $150,000 for GST registration.

4. A **trust** is a structure where a trustee carries out the business on behalf of the trust's members (or beneficiaries). In a trust structure, the trustee, who may be an individual or a company, holds and manages the business for the benefit of other parties, known as beneficiaries. This trustee bears full responsibility for all aspects of the trust, including both its income and any losses. Setting up a trust structure is typically costly and complex, often chosen to safeguard business assets for the beneficiaries' advantage. The trustee is charged with the decision-making regarding the distribution of business profits among the beneficiaries. Due to the intricate nature of trusts, establishing one requires significant time, expertise, and careful planning.

The following diagram summarises the key differences between business structures:

	Sole trader	Partnership	Company	Trust
Cost	Low	Medium	Medium to high	High
Complexity of setting up	Simple	Moderate	Complex	Highly complex
Tax obligations	Low	Low	Medium	High
Legal obligations	Low	Low to medium	High	Medium
Owner	You	You and your partners	Company shareholders	Trustee
Responsibility for business decisions	You	You and your partners share	The director(s)	Trustee
Responsibility for debts or losses	You	You and your partners share	Generally, the company	Trustee
Separate bank account needed	No	Yes	Yes	Yes
Extra administration and reporting	No	Yes	Yes	Yes

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4. What is the objective of a corporation?

Shareholders want managers to maximise the market value of the firm. A smart and effective manager makes decision that increase the *current value* of the company's shares, thereby enhancing the wealth of its shareholders. This is known as the principle of shareholder wealth maximisation.

4.1 How do we measure the value of the

firm?

There are various methods for valuing a corporation. One of the most common and straightforward approaches is to calculate the firm's market capitalisation. This is done by multiplying the current share price of the company by its total number of outstanding shares.

This can be calculated using online share market data from sites such as Yahoo Finance. Using data from here, on on 8/01/2023 the market capitalization of Telstra can be calculated as: 3.9050 * 11.55 (billion) = 45.1 billion dollars. Have a look at todays data to see how Telstra's market capitalisation has changed.

There are other methods to measure a company's value, such as using revenue multiples, earnings multiples, or more complex valuation techniques like discounted cash flow analysis. Each method has its own advantages and is suitable for different types of analysis or investment decisions. The choice of valuation method can depend on the nature of the company's business, the availability of financial data, and the specific goals of the valuation.

4.2 Is maximising the value of the firm equivalent to maximising profit?

Maximising the value of a firm and maximising profit are related but not equivalent. Profit is not cash and maximising profit refers to the short-term goal of increasing a company's earnings or profits. It involves strategies to enhance revenue and reduce costs without consideration the risks to future cash flows by doing so.

Maximising the value of the firm is a broader and more long-term objective. It involves increasing the overall worth of the

firm to its shareholders, which encompasses not just current profits but the future cash flows and its associated risks. This approach considers factors like market expansion, innovation, customer loyalty, and brand strength.

In essence, while maximising profit is about making the most money in the short term, maximising the value of the firm is about increasing the overall worth of the business in the long run. The latter includes building sustainable business models, investing in growth opportunities, managing risks effectively, and maintaining a strong reputation, all of which contribute to long-term shareholder value.

4.3 Do managers always maximise the value of the firm and act in the best interests of shareholders?

While managers are expected to act in the best interest of shareholders by maximising the value of the firm, they may not always do so. This discrepancy leads to what is known as agency problems. Agency problems arise when there is a conflict of interest between the needs of the principal (in this case, the shareholders) and the agents (the managers). Since managers are hired to run the company on behalf of the shareholders, their decisions should align with the shareholders' interest in maximising firm value. However, this alignment does not always happen due to several reasons:

- Divergence of goals: Managers may have personal goals that differ from the goal of shareholder wealth maximization. For instance, they might be more interested in expanding the company size to enhance their personal power and status, even if it's not in the best financial interest of the shareholders.

- Risk Preferences: Shareholders typically have diversified portfolios and may prefer riskier strategies that promise higher returns, while managers, whose personal wealth (like stock options, job security) is tied to the company, may prefer safer, less profitable strategies.
- Short-Term Focus: Managers might focus on short-term achievements to enhance their reputation or achieve short-term performance targets, while shareholders generally benefit more from long-term strategic planning and investments.

To mitigate these agency problems, various mechanisms can be employed:

- Performance based incentives: Aligning managers' compensation with shareholder interests, such as granting stock options or bonuses tied to company performance, can encourage managers to work towards maximizing shareholder value.
- Corporate Governance: Effective governance structures, including a strong, independent board of directors, can oversee and limit managerial actions that do not align with shareholder interests.
- Market Discipline: The threat of takeover or shareholder activism can also serve as a check on managerial decisions.
- Regulatory Oversight: Regulations and legal frameworks can set standards for managerial behaviour and protect shareholder rights.

4.4. Does the pursuit of increasing a corporation's shareholder wealth conflict with social objectives?

Maximising the value of the firm and pursuing social objectives can sometimes appear to be in conflict, but actually, they are complementary. Traditionally, maximising shareholder value often focuses primarily on financial returns. This perspective can lead to a perceived conflict with social objectives, as actions beneficial for short-term profits may not align with social or environmental well-being. For example, cost-cutting measures might increase profits but could also lead to reduced workforce welfare or environmental harm.

A more modern approach integrates social objectives into the definition of corporate objective. This perspective, often associated with the concept of Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) criteria, argues that addressing social and environmental issues can be beneficial for long-term corporate objective. Sustainable practices can enhance a company's reputation, improve stakeholder relations, and mitigate risks associated with social and environmental issues, thereby potentially increasing long-term shareholder value.

The stakeholder theory posits that companies should serve not only their shareholders but all stakeholders, including employees, customers, and the community. By addressing the needs and concerns of a broader group, companies can build a more sustainable and ethical business model that, in the long term, can also maximise shareholder value. In summary, short-term profit maximization can conflict with social objectives, but in the long term, integrating social goals may be essential for sustainable profitability and resilience.

4.5 What are the key decisions made by managers to maximise the value of the firm and hence the wealth of its shareholders'?

Managers maximise the firm's value by making a number of key corporate policies. These decisions are considered as key corporate policies because each of them has a direct impact on the firm's value.

The BIG THREE

Image: The big three decisions in companies

1. *Investment decisions*

The investment decision sometimes is referred to as the capital budgeting or capital expenditure (CAPEX). It involves the acquisition, management and disposal of real assets. Real assets are assets that produce cash flows for a corporation through their productive use. These include tangible items like oil fields, land, and factories. Additionally, corporations invest in intangible assets such as research and development (R&D), advertising, and the development of computer software. These

expenditures are considered investments because they contribute to the development of know-how, brand recognition, and reputation.

2. *Financing decisions*

To finance its investments, a corporation can obtain funds either from lenders or from shareholders. When borrowing, the corporation receives cash from lenders and commits to repaying the debt along with interest. If shareholders provide the funding, they are not guaranteed a specific return; instead, they receive any future dividends the company may distribute. The decision of choosing between debt and equity financing is referred to as the capital structure decision. The term “capital” denotes the firm’s sources of long-term financing.

3. *Payout decisions*

Some companies pay dividends to their shareholders, others do not. Payout policy answer a series of questions: “Should the company pay cash to its shareholders, how much and what are the mechanisms a corporation can use to distribute cash to its shareholders”. Corporations pay out cash by distributing dividends or by buying back some of their outstanding shares. Cash rich companies are more inclined to pay dividends whereas growth-oriented companies, often without a history of dividend payments are less likely to initiate such payouts in the near future.

Takeaways and looking ahead

In the first chapter, we delve into on what finance is, why it is important and perhaps interesting at the same time. We start to embark on a journey of someone who is contemplating to open a business and having to decide on the best structure for his/her business. We also explore the corporate objectives. Given manager's goal is to maximise the value of the company and hence the wealth of their shareholder, do they always do so? Is the value maximization objective contradicting with the social objectives and what are the key corporate decisions that will exert a significant influence on the company's value. In the next, chapter, we will examine the concept of Valuations i.e. the time value of money, present and future value.

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Chapter 2 - Present and Future Values

Chapter Learning Objectives

After completing this chapter, students should be able to

- Define and discuss the principle time value of money.
- Define and contrast future and present values.
- Able to move cashflows from the present to the future and vice versa
- Distinguish between compounding versus discounting
- Understand the concept of discount rate.

1. Basic Principles of Finance

In finance, we focus on cashflows, not accounting profit. There are two types of cashflows: cash receipts are denoted as cash inflows while cash payments are denoted as cash outflows. When assessing investment opportunities, financial managers

are not only concerned with the magnitude of the cashflows but also the timing and risks of these expected cashflows. The overarching principle that influences how managers value future cashflows and hence what investment decisions to make is the time value of money which states that “A dollar received today is always worth more than a dollar received in the future”.

1.1 Why is a dollar today always worth more than a dollar in the future?

The reason is money available today can be invested and grow. When someone invests, they expect to be compensated in some form of “returns” but how large should these returns be? There are three components that make up the rate of returns.

First, by investing, the investor is deferring consumption today in anticipation of consuming more in the future. That is, the investment has to grow in real terms in order for the investor to consume more. Second, when an individual’s money is tied up in investments, the value of that money can be eroded by inflation. Thus, the rate of return has to be high enough to also cover the inflation rate. Finally, there may be risks associated with the investment. The future returns on an investment are not guaranteed and there is a possibility of not receiving the expected return, or in worse case scenarios, losing the initial capital. Investments that carry higher risks typically need to offer higher returns to attract investors. Taken together, the invested funds should yield a return that compensates for the delay in consumption, inflation and risk.

Total Return = Inflation rate + Real interest rate + Risk premium

1.2 What about interest rate? Is it a form of return?

Interest refers to the return on debt investment, where the investor lends money to an entity (such as a corporation, government, or financial institution) in exchange for the promise of future repayments. Interest rate is often expressed as a % per annum (p.a).

Example: Suppose you invest $100 in a bank account that pays interest of r = 6% a year. In the first year, what is the interest that you earn and what is the value of your investment?

Answer: In the first year, the interest that you earn will be 0.06 * $100 = $6. The value of your investment will grow to $100 + $6 = $106 or $100 * (1+0.06) = $106.

2. Present and Future Values

2.1 Terminology

Before we proceed, let's introduce some terminology:

- **Nominal interest**: is the stated interest rate on a financial product or investment e.g. 5% p.a.
- **Principal** refers to the amount of borrowing or lending.
- **Time to maturity**: is the duration from the current date until the date when the principal amount of a debt instrument is due to be repaid in full.
- **Present value (PV)** is the current worth of a future sum of money or stream of cash flows given a specific discount rate.
- **Future value (FV)** is the value of a current asset at a

specified date in the future, based on an assumed rate of return over time.

- A **discount rate** refers to the rate of return used to discount future amounts of money, converting them into their equivalent present value.

2.2 Why is it necessary to distinguish between present and future values?

The distinction is crucial because these concepts serve unique purposes in financial decision-making. Present value helps in understanding the current worth of money that will be received or paid in the future which is vital for comparing the value of cash flows occurring at different times. Conversely, future value is used to determine how much a current sum of money will grow overtime. This assists in forecasting the growth of current investments which is crucial for long-term planning and setting realistic financial goals. Both concepts are grounded in the time value of money principle.

Example: Let's say you decide to deposit $100 into an account offering a 5% p.a. After one year, your investment grows to $100 multiplied by (1 + 0.05), which equals $105. Hence, the amount of $105 represents the future value of your $100 investment over a year, at a 5% annual interest rate.

Conversely, the $100 can be considered as the present value of $105, discounted back one year at a 5% annual rate. As an investor, if you know that the interest rate is 5% p.a then you are indifferent between receiving $100 now or $105 one year from now.

The process of going from the present value to the future value is called compounding, whereas the method of translating future amounts back to the present is referred to as discounting.

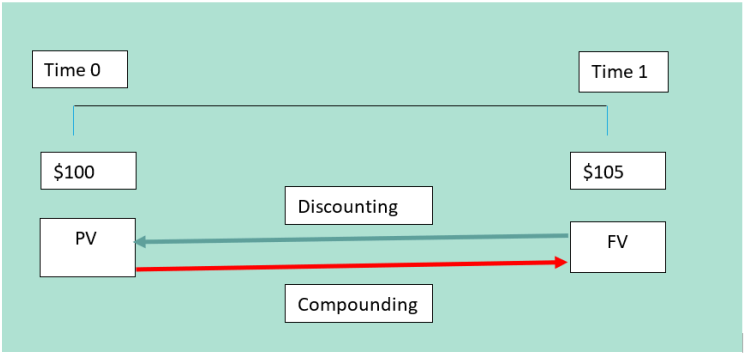


Image: Compounding and Discounting

2.3. Present and Future Values

2.3.1 Calculating present and future value

The methods used to determine present and future values vary based on the kind of interest rate arrangement in place. Broadly speaking, there are two types of interest rate arrangements: simple interest and compound interest.

Simple interest is a method of accruing interest where the interest charge is calculated solely on the principal amount. Interest does not compound, interest earned is not reinvested to earn additional interest. The principal amount remains unchanged throughout the term of the loan or investment. Simple interest is often used in short-term borrowing and lending where the horizon is less than 1 year.

Compound interest is the method by which interest earned on a principal amount is reinvested, so that in subsequent periods, interest is then earned on the new principal, which includes the previously earned interest. This compounding

effect leads to the principal amount growing over time, allowing the investor to earn "interest on interest".

Example: What is the future value of $100 at the end of year 1 with interest rate of 6%?

Interest earned during the year will be $100 * 0.06 = $6. The future value or value at year 1 will be FV1 = $100 + $100 * 0.06 = $106. In this case, both simple and compound interest yield the same results.

Principal = PV = 100

r = 0.06 p.a.

n = 1

FV1 = 100 * (1 + 0.06) = 106

What is the future value of $100 at the end of year 2?

For compound interest, the interest will be calculated on the $106 balance. The interest earned during year 2 will be 0.06 * $106 = $6.36. Hence the future value or value at year 2 will be FV2 = $106 + $106 * 0.06 =112.36.

For simple interest, the interest will be calculated on the initial principal which does not change over time. So, the interest earned during year 2 is still 0.06 * $100 = $6. The future value or value at year 2 will be $106 + $100 * 0.06 = $112.

Principal = PV = 100

r = 0.06 p.a.
n = 2
Compound interest FV2 = FV1 * (1 + 0.06)
= 100 * (1 + 0.06) * (1 + 0.06)
=100 * $(1 + 0.06)^2$
=112.36

Principal = PV = 100

r = 0.06 p.a.
n = 2
Simple interest FV2 = FV1 + 100 * 0.06
= 100 + 100 * 0.06 +100 * 0.06
=100 * (1 + 0.06 * 2)
=112

The difference of $0.36 is due to interest on interest under the compounding interest arrangement.

What is the future value of $100 at the end of year 5?

Year	Compound interest
1	100.00 * (1+0.06) = 106.00
2	106.00 * (1+0.06) = 112.36
3	112.36 * (1+0.06) = 119.10
4	119.10 * (1+0.06) = 126.25
5	126.25 * (1+0.06) = 133.82

$FV = PV\ (1+i)^n = 100 * (1.06)^5 = 133.82$

As the investment horizon increases, the difference in future values between compound and simple interest arrangements becomes wider. This is because compound interest earns interest on the interest already earned, while simple interest only earns interest on the principal amount.

Future value formula for compound and simple interest:

Equation 1:

$$\mathrm{FV}_{compound} = PV \times (1+i)^n$$

Equation 2:

$$FV_{simple} = PV \times (1 + i \times n)$$

Where:

- FV = value of investment at the end of period n
- PV = original principal (P0) or present value
- i = the rate of interest per period
- n = the number of periods

2.3.2 Future value and compounding frequency

Compounding frequency refers to how often the interest on an investment or loan is calculated and added to the principal balance. This frequency can significantly impact the amount of interest accrued over time. The more frequently interest is compounded, the more interest is earned on the interest already accumulated. Common compounding frequencies include:

Annual compounding: Interest is compounded once a year. This is the simplest form of compounding. For example, with an annual interest rate of 5%, $100 compounded annually would grow to $105 after one year.

Semi-annual compounding: Interest is compounded twice a year. Interest is paid and added to the principal two times per year. The interest rate per period is the annual interest rate divided by two since it is the rate that is applied every six months.

For example, with an annual rate of 6%, a principal of $100 would earn 3% interest (half of 6%) in the first six months, and then the new amount ($103) would earn another 3% for the second half of the year.

Quarterly compounding: Interest is compounded four times a year. The annual rate is divided by four, and this rate is applied every quarter.

Monthly compounding: Interest is compounded every month. The annual rate is divided by 12, and this monthly rate is applied to the balance each month.

The formula for compound interest considering different compounding frequencies is:

Equation 3:

$$\mathrm{FV}_n = PV \times (1 + i/m)^{m*n}$$

Where:

- m = Number of compounding periods in a year
- n = Number of years in the entire period

Example: You have $1,000 to invest in a bank account paying an interest of 5% p.a. What is the value of your investment after 10 years if interest is compounded annually, semi-annually, quarterly and monthly.

Answer: i = 0.05, with annual compounding, m = 1, m x n = 10 x 1 =10. The above formula yields a future value of $1,628.89. For semi-annual compounding, the future value is $1,638.62 (m = 2, m x n = 20, i = 0.05/2 = 0.025). Similarly, the future value under quarterly and monthly compounding is $1,643.62 and $1,647.01, respectively. This example demonstrates how more frequent compounding can lead to greater accumulation of wealth due to the “interest on interest” effect.

In fact, the above formula and the one in equation 2 are equivalent. I is the interest rate per period and n is the number

of periods. If nominal interest is 5% p.a but compounding every quarterly then the interest per period is 5%/4 = 1.25%. If the investment horizon is 10 years but interest payment is calculated every quarter then the number of periods in quarters is 40. Note that i and n has to match. If interest is on a per quarter period, the number of periods should also be the number of quarters.

2.3.3 Present value and discounting

The future value is calculated by determining how much the present value will grow to over a certain period. Conversely, the present value is calculated by determining how much a future amount of money worths in terms of today's dollars. The method of converting the future value back to the present is called discounting. In other words, the present value is the discounted value of future cash flows.

Present value can be calculated using equation 4:

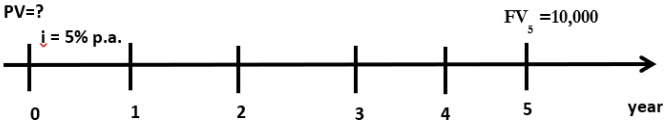
Equation 4:

$$PV = \frac{FV_n}{(1+i)^n}$$

The formula illustrates that as n increases, PV decreases. The value a dollar in the future decreases if it is received later in the future. The higher the discount rate i, the lower the present value. The discount rates reflect the opportunity cost of capital i.e. the potential return that investors forgo when they choose to invest their resources in one option over an alternative. It is the rate of return the investor could have earned by putting his/

her money into the next best investment. Therefore, the higher the discount rate, the less valuable a future dollar is today as investors prefer to receive money sooner rather than later if they can earn a higher return on that money elsewhere.

Example: You're planning a vacation in five years and anticipate it will cost $10,000. Given a 5% annual interest rate from the bank, how much should you deposit now to ensure you have the $10,000 needed for the trip in five years?



Answer: Applying equation 5, where FV5 = $10,000; i= 0.05, n=5.

Equation 5:

$$V = \frac{FV_n}{(1+i)^n}$$

$$= \frac{10,000}{(1+0.05)^5} = \frac{10,000}{1.27628} = \$7,835$$

So, you need to deposit $7,835 into the bank now in order to receive $10,000 in 5 years.

2.3.4 Other applications

Due to the time value of money, cash flows at different times cannot be simply summed up in their nominal amounts. To compare or aggregate them, they must be adjusted to a common point in time, either through discounting to present value or compounding to a future value. For example, if you receive $100 today and another $100 in a year, you can't just add them to say you have $200 at today's value. If the annual interest rate is 5%, the $100 received a year later is actually worth less today. Using discounting, its present value would be around $95.24. So, in today's terms, you would have $195.24, not $200.

From equation 2, if you know future value, interest rate and time periods, you can work out present value. In generally, knowing any three variables will enable you to figure out the fourth one. For example, in 2012, Facebook (now Meta) went public with the price of $38 per share. In 2024, the current price of Meta is $374 per share. What is the annual rate of return did the investors who bought the shares at $38 at the IPO and hold them until January 2024?

Answer: Applying the formula in equation 2 where FV = $374, PV = $38, n = 12. The missing variable is r. $374 = $38 * $(1 + r)^{12}$. $(1+r)^{12}$ =374/38 = 9.8421. (1+ r) = 9.84211/12

R= 1.2099 – 1= 20.99% or 21% per year.

2.4 Annual percentage rate versus effective annual rate

Interest rates in financial markets can be presented in several forms, with the Annual Percentage Rate (APR) being the most common, particularly when dealing with banks. The APR is based on the assumption of once-a-year compounding.

However, this doesn't truly reflect the 'effective' interest rate if we're evaluating loan terms that compound more frequently.

The more precise way to gauge the yearly rate, accounting for the impact of multiple compounding periods within the year, is to use the Effective Annual Rate (EAR). The EAR is essentially the actual yearly growth rate that includes the effects of compounding. This rate provides a genuine measure of the cost associated with borrowing or the real yield from lending when compounding is more frequent than annually.

For example, if a bank quotes an APR of 6% with semi-annual compounding, the EAR would be higher than 6% because the interest is compounded twice a year, not once. To calculate the EAR from the APR in this scenario, you would use the formula to adjust for the effect of compounding. The calculation would show that the EAR is approximately 6.09%, which is the true cost of the loan or the actual yield on an investment over the year, taking into account the compounding effect.

Equation 6: Effective annual rate formula

$$EAR = (1 + \frac{quoted\ annual\ interest\ rate}{m})^{m} - 1 = (1 + \frac{i}{m})^{m} - 1$$

M is the frequency of compounding periods within a single year, indicating how often interest is calculated and added to the balance over that year. Effective Annual Rate (EAR) provides a more precise measure of the annual interest rate, factoring in the effects of the compounding periods.

Example: Suppose your mortgage comes with a stated annual interest rate of 8% per annum; however, the repayments are structured on a monthly basis. You'd want to know the actual yearly interest rate the bank is effectively

applying to your loan. This is determined by calculating the Effective Annual Rate (EAR), which takes into account the monthly compounding of interest.

Applying the above formula where m = 12, APR = 8%, so the monthly interest rate is 8%

$$\text{Monthly Rate} = \frac{0.08}{12} = 0.006667$$

$$EAR = (1 + Monthly)^{12} - 1$$
$$= (1 + 0.006667)^{12} - 1$$
$$= 8.3$$

Quoted versus effective annual interest rate:

Frequency	Quoted Annual Rate	n	Formula	Effective Annual Rate
Annual	10%	1	I	10%
Semi-annual	10%	2	$(1+i/2)^2-1$	10.25%
Monthly	10%	12	$(1+i/12)^{12}-1$	10.47%
Daily	10%	365	$(1+i/365)^{365}-1$	10.5156%
Continuous	10%	∞	e^i-1	10.5171%

Continuous compounding is used in other more advanced finance subjects (such as derivatives).

Takeaways and looking ahead

In this chapter, we define and describe the

implications of the time value of money. We also explore the process of compounding and discounting. Finally, we distinguish between the stated (nominal) annual interest rates, which do not take into account the frequency of compounding within a year, and effective annual interest rates which do reflect compounding effects, thereby offering a true reflection of the annual interest rate.

References:

Graham, J., Smart, S. B., Adam, C., Gunasingham, B. Introduction to Corporate Finance (2nd Asia – Pacific Edition) 2017.

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Chapter 3 - Present and Future Values with Applications

Chapter Learning Objectives

After completing this chapter, students should be able to

- Calculate the present value and future value for multiple cash flows
- Describe how to calculate the present value and future value of an ordinary annuity and annuity due
- Explain what (growing) perpetuities are and calculate the present values of (growing) perpetuities

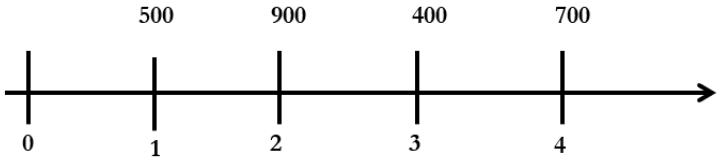
3.1 Mixed cash flow stream

3.1.1 Future value of cash flow streams

Financial managers frequently need to evaluate series of cash flows that occur in future period. From the last chapter, the future value (FV) of a series of cash flows cannot be found by simply summing them up. Each individual cash flow needs to be converted to a common point in time in the future and then sum up. The following example illustrates this principle:

Mary wants to determine the balance in an investment account earning 9% annual interest. She makes the following ends of year deposits as follows: $500 in year 1, $900 in year 2, $400 in year 3, $700 in year 4.

Where i = 9%:



The future value of this stream of cash flow can be found by bringing the value of each of the cash flow to year 4.

$FV = 500\times(1+0.09)^3 + 900\times(1+0.09)^2 + 400\times(1+0.09)^1 + 700$

$= 647.51 + 1069.29 + 436 + 700$

$= \$2,852.8$

3.1.2 Present value of multiple cash flows

Just as with future value, the present value (PV) of multiple cash flows is determined by summing up the present values of each individual cash flow. Each cash flow is discounted back to the current period to reflect its value in today's terms.

For example, if you expect to receive $100 in one year, $200 in two years, and $300 in three years, and the discount rate is 5%, you would discount each of these cash flows back to their present value. The sum of these present values would give you the total current worth of your future cash flows.

Where i = 5%

$PV = 300/(1+0.05)^3 + 200/(1+0.05)^2 + 100/(1+0.05)$

$= 285.71 + 181.41 + 95.24$

$=\$562.36$

3.2 Annuity: A special case of level cash flows

An annuity is a stream of equal periodic cash flows over a stated period of time. This stream of cash flows can represent regular inflows from an investment or outflows as committed expenses that need to occur in the future. Annuities are often associated with retirement income, however, their application is not limited to retirement income. Rather mortgage payments, insurance premium, rent and lease payments can all be classified as annuities.

For a stream of cash flows to be qualified as an annuity, it needs to meet three conditions:

- The amount of cash flows are the same each period.
- The interval between each cash flow is the same.
- The cash flows occur for a fixed amount of time i.e. they do not go on forever.

There are two types of annuity:

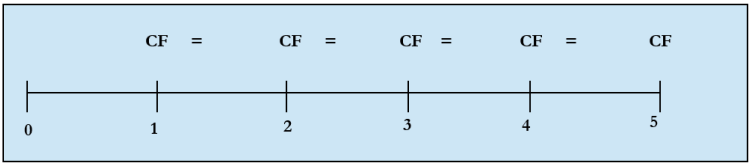
Ordinary annuity: is an annuity where cash flows are received and paid at the end of each period. Example: mortgage repayments, salaries, insurance premiums.

Annuity due: is an annuity where cash flows are received and paid at the beginning of each period. Example: tuition payment, rent.

3.2.1 The future value of an ordinary annuity

The future value of an ordinary annuity refers to the amount of money that will be accumulated in the future when a series of equal payments are made at the end of consecutive periods at a certain interest rate.

Here is the timeline of the cashflows for an ordinary annuity:



To calculate the future value of an ordinary annuity, one option is to bring each of the cash flow to the future i.e. end of period 5 and add them up just like any other stream of cash flow. However, there is a quicker way. The future value of an ordinary annuity can be computed according to the following formula:

Equation 1:

$$FVA = \frac{CF}{i} \times [(1+i)^n - 1]$$
$$= CF \times \frac{(1+i)^n - 1}{i}$$
$$= CF \times \frac{Future\ value\ factor\ - 1}{i}$$

Where:

- FVA: future value of an annuity,
- i: interest rate per period,
- CF: cash flow each period and
- n: number of the periods.

Example: Suppose you are saving for retirement and decide to deposit $1,000 into your retirement fund at the end of each year for the next 20 years. Assume the retirement fund offers an annual interest rate of 5%. At the end of year 20, what is the balance of your retirement account?

Since the deposits are made at the end of each year over a span of 20 years, this pattern of payment qualifies as an ordinary annuity and the formula in Equation 1 can be applied to calculate the accumulate amount at the end of the 20th year. The example also shows that when cash flows happen for a long period of time, bring each cash flow to the future is very time consuming and hence not realistic. Equation 1 offers a far better alternative.

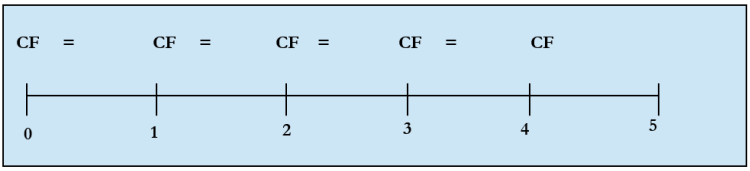
Answer: N = 20, i = 5% and CF = 1000.

Future value factor is $(1 + 0.05)^{20}$ -1 = 1.6533

FV = 1000 * 1.6533/0.05 = $33,066

3.2.2 The future value of an annuity due

For annuity due, the cash flow pattern is very similar to the ordinary annuity. The only difference is each payment occurs at the beginning of the period rather than in the end. The timeline of the cashflows for an annuity due is as follows:



In an annuity due, each payment accrues interest for an additional period compared to an ordinary annuity, because payments in an annuity due are made at the beginning rather than at the end of each period. Consequently, the future value of an annuity due will always exceed the future value of an ordinary annuity when both have identical cash flows and the same duration.

The future value of an annuity due is therefore:

Equation 2:

$$FV = FV of Ordinary Annuity \times (1+i)$$
$$= CF \times \frac{(1+i)^n - 1}{i} \times (1+i)$$

Example: Suppose you are saving for retirement and decide to deposit $1,000 into your retirement fund at the beginning of each year for the next 20 years. Assume the retirement fund offers an annual interest rate of 5%. At the end of year 20, what is the balance of your retirement account?

Answer: The only difference between this example and the above example is the deposit is made at the beginning of each period instead of the end. This stream of cashflow is therefore classified as an annuity due and the future value can be calculated as:

Future value of an annuity due = Future value of an annuity * (1 + i)

= 33,066 * (1+0.05) = $34,719.3

3.2.3 Present value of an ordinary annuity

The present value of an ordinary annuity measures the current worth of a series of future periodic payments at a given interest rate. It answers the question: "How much would I have to invest today to receive a certain payment amount at regular intervals for a specified period, given a particular interest rate?"

The formula for the present value of an ordinary annuity is given by:

Equation 3:

$$PV = PVA = \frac{CF}{i} \times \left[1 - \frac{1}{(1+i)^n}\right]$$

$$= CF \times \frac{1 - 1/(1+i)^n}{i}$$

$$= CF \times \frac{1 - Present\ value\ factor}{i}$$

Example: If you require $5,000 every month to live for the next

20 years starting by next month. How much money should you deposit into your account now if the bank is paying an interest of 6% p.a?

Answer: The sum you need upfront is essentially the present value of an ordinary annuity, with each payment being $5,000. Since the payments are monthly over 20 years, you have a total of 240 payment periods (12 months x 20 years). The monthly interest rate is 0.5% (which is the annual rate of 6% divided by 12 months).

Applying the formula in equation 3, CF = $5,000, $(1 + 0.005)^{240}$ is 0.3021. PV = 5000 (1 – 0.3021)/0.005 =$697,903.86.

In order to receive $5,000 per month starting from the next month, you need to deposit $697,903 today if the bank is paying an interest of 6% p.a.

3.2.4 Present value of an annuity due

Just as with the future value, the present value of an annuity due is obtained by adjusting the present value of an ordinary annuity forward by one additional period.

The formula for the present value of an annuity due can be given by:

Equation 4:

$$PV = PV\ of\ ordinary\ annuity \times (1+i)$$
$$= \frac{CF}{i} \times \left[1 - \frac{1}{(1+i)^n}\right] \times (1+i)$$

Example: Suppose you still require $5000 monthly payment to

fund your lifestyle expenses for the next 20 years with the first payment needed immediately. How much you need to deposit now if the bank is paying an interest of 6% p.a?

Answer: Since the first payment is required immediately, this stream of cashflow is classified as an annuity due. The first payment happens at month 0 while the last payment happens at month 19. The present value of an annuity due can be obtained by compounding the present value of an ordinary annuity one more period.

PV of an annuity due = PV of an ordinary annuity * (1 + i)

= 697,903 * (1+0.005) = $701,595.38.

Similar to future value, the present value of an annuity due is always higher than the present value of an ordinary annuity.

3.2.5 Application of an annuity formula

The application of an annuity extends beyond calculating present and future value. The formula allows investors to establish monthly payment amounts, discern the growth or discount rate necessary to reach a specified future sum, or determine the duration required for an investment to mature to a desired lump sum. The annuity equation comprises four variables; by knowing any three, the remaining one can be deduced by rearranging the equation.

Example: You need $200,000 as a deposit to buy your new home. If the interest rate is 6% p.a and you can only put aside maximum $3,500 per month towards this saving goal. How long will it take you to achieve your initial deposit for your home? Assume the first payment will start 1 month from now.

Answer: $200,000 is the Future Value that your monthly payments will grow to. Interest per period is 0.06/12 = 0.005 or 0.5% per month since each payment is made monthly, what you need is monthly interest rate. $3500 is the amount that you need to pay every month in order to achieve a future lumpsum

of $200,000. Since the first payment commences one month from now, it is an ordinary annuity. What we need to find is the number of periods that required to reach $200,000

Applying the formula in equation 1:

$$FVA = \frac{CF}{i} \times [(1+i)^n - 1]$$

$$200000 = \frac{3500}{0.005}[(1+0.005)^n - 1]$$

$$200000 = 700000\,[(1+0.005)^n - 1]$$

$$[(1+0.005)^n - 1] = 200000/700000$$

$$[(1+0.005)^n - 1] = 0.2857$$

$$(1+0.005)^n = 0.2857 + 1$$

$$1.005n = 1.2857$$

In order to solve for n, we take log on both sides, *n*log(1.005) = log(1.2857), n=log(1.2857)/log(1.005)*. N = 50.39 periods and since each period is 1 month, if each month you put aside $3500 and the bank is paying an interest of 6% per annum, you need to save 50.39 moths or 4.2 years to reach $200,000.

3.3 Perpetuities

3.3.1 Present value of a perpetuity

A perpetuity is defined as a stream of equal cash flows that continue indefinitely. It's a type of annuity that has no end, theoretically lasting forever. For instance, dividend distributions can be regarded as a form of perpetuity since the company is assumed to operate on a going concern basis. Although companies might not exist forever, in the perspective of investors, the lifespan of a company is considered to be indefinite.

A perpetuity does not have a future value since its life is indefinite. The present value of a perpetuity is given by:

Equation 5:

$$PV = \frac{CF}{i}$$

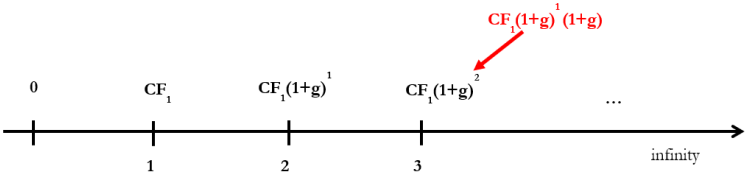
Example: Your grandfather is retiring at the end of next year. He would like to ensure that he and after he dies his heirs, will receive payments of $11,309 a year forever, starting when he retires. If he can invest at 9.9% per annum, how much does your grandfather need to invest NOW to receive the desired cash flow?

Answer: The amount of money he needs to invest now is the present value of the perpetuity where each cashflow is $11,309, interest rate is 9,9% or 0.099.

$$PV = \frac{CF}{i} = \frac{11,309}{0.099} = \$114,232.32$$

3.3.2 Growing Perpetuities

A growing perpetuity is a series of cash flows that increase at a constant rate indefinitely. Unlike a standard perpetuity, which has a fixed cash flow, a growing perpetuity takes into account the growth of the payments over time.



The CF_1 grows at a constant rate (g) year on year forever.

Equation 6:

$$PV\ of\ a\ growing\ perpetuity = \frac{CF_1}{i-g}$$

Example: As a millionaire intending to establish a scholarship in your name, you wish to grant an annual scholarship of $50,000, with the amount increasing by the inflation rate of approximately 3% each year. If the interest rate is 7% p.a, how much do you need to put down today to ensure the scholarship can be sustained indefinitely?

Answer: This is a growing perpetuity since the payment required in the first year is $50,000. In the second year, the required repayment is 50,000 * (1 + 0.03) = $51,500. In the third year, the payment would be 51,500 * 1.03 and so on. The amount that you need to put down today would be the present value of this growing perpetuity where the growth rate is 3% p.a and interest rate is 7% p.a.

$$PV = \frac{CF_1}{i-g} = \frac{50,000}{0.07-0.03} = \$1,250000$$

Takeaways and looking ahead

This chapter wraps up our discussion on the present and future values of single and multiple cash flows. The forthcoming chapter will expand these valuation principles by applying the present and future value formulas to the valuation of more complex financial instruments, namely stocks and bonds. We will examine how these formulas assist investors in making informed decisions about the intrinsic value of these securities, taking into account expected future cash flows and risks.

References:

Graham, J., Smart, S. B., Adam, C., Gunasingham, B. Introduction to Corporate Finance (2nd Asia – Pacific Edition) 2017.

Brealey, R., Myers S. C., Allen F., Edmans, A. Principles of Corporate Finance (14th Edition) 2022.

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Chapter 4 - Financial markets and financial institutions

Chapter Learning Objectives

After completing this chapter, students should be able to

- Understand and distinguish between real assets and financial assets
- Identify the functions of the financial system:
    - o direct flow of funds
    - o indirect flow of funds
- Understand the different types of financial markets, financial institutions, and financial instruments
- Understand the functions of key regulators of Australian financial markets and system

4.1. Real vs financial assets

4.1.1. Real assets

Real assets represent all the elements required for the production of goods and services which a society's members are able to generate. They are the essential building blocks of an economy's wealth, representing the core resources that determine its productive capacity. In the context of a company, real assets are the cornerstone of its ability to produce output. These are the physical or tangible and non-physical or intangible resources that the company utilizes in its operations. The examples of real assets include property, plant and equipment, land, buildings and machines.

Intangible assets: These do not have a physical presence but still needed as part of the production process. They include knowledge, intellectual property i.e. patents, copyrights, trademarks and trade secrets.

From topic 1, we know that investment decisions are vital for any business as they directly impact the company's potential to create value. Making wise investment decisions means identifying which real assets will yield the most favourable cash flows, taking into consideration the costs of obtaining, operating, and improving these assets. These decisions are not confined to initial purchases; they also encompass the continuous process of maintaining existing assets to ensure their ongoing productivity and deciding when and how to upgrade them to respond to technological advancements, market demands, or regulatory requirements. The aim is to optimize the efficiency and profitability of the assets throughout their lifecycle, ensuring that they contribute positively to the company's financial health and competitive position.

4.1.2. Financial assets

Financial assets i.e. financial securities are assets that are created by the law which outlines the rights and obligations of the holder and the issuer. These assets do not contribute directly to the productive capacity of the economy. They represent the claims over the cashflows produced by real assets. Unlike real assets, financial assets are created by the financing decisions. The examples of financial assets include stocks and bonds which represent the claims of the capital providers' claims on the cash flows.

4.2. The financial system

The financial system is a complex network that includes financial markets, institutions and products, all of which play a critical role in the economy. The financial system's primary purpose is to efficiently direct funds from savers, who have excess funds, to borrowers, who have a deficit of funds, thereby facilitating investment in productive ventures, which is critical for economic growth and prosperity. In order for the financial system to have a smooth functioning that allows for free flow of capital and ensures its integrity and stability, there needs to be independent bodies that oversee the financial system. These are regulators who enforce legal requirements, protect consumers, monitor risks and maintain confidence in the financial system.

4.2.1 Financial markets

- Financial markets are physical or virtual venues where financial instruments are traded. Financial markets can be

classified according to different criteria:

- Maturity: money vs capital market
- New and outstanding security: primary vs secondary market
- Asset types: equity, bond, fx and derivatives
- Organisation of transactions: exchange traded vs over the counter.

4.2.1.1 Money markets versus capital market

Money markets provide a platform for the issuance and trading of short-term securities i.e. instruments with maturities of less than 12 months. The money markets are largely composed of institutional investors, such as banks, mutual funds, and corporations, rather than individual investors. These participants either have surplus funds and are looking to earn interest or have a short-term shortage of funds and need to borrow. Unlike stock exchanges, money markets do not have a specific physical trading location. Transactions can be completed over the counter (OTC), through electronic systems, or via telephone. The instruments traded in the money markets include Treasury notes, certificates of deposit, commercial bills, promissory notes, inter-bank loans, and repurchase agreements (repos). Each of these serves a specific function in terms of liquidity management for financial institutions:

- Treasury notes: Short-term debt obligations issued by the government.
- Certificates of deposit (CDs): Term deposits with banks that offer higher interest rates than regular savings accounts.
- Commercial bills: Issued by companies to finance their immediate cash flow needs.
- Promissory notes: Unsecured notes that are used for

financing a wide range of transactions.

- Inter-bank loans: Short-term loans made from one bank to another to manage liquidity.
- Repurchase agreements (Repos): Short-term borrowing for dealers in government securities; the dealer sells the government securities to investors with an agreement to buy them back at a higher price at a later date.

Capital markets facilitate the raising of long-term funds. Here is a breakdown of these markets:

- Equity market: This market is where ownership stakes in companies are issued and traded. Investors who purchase equities are essential providing capital to the firms as owners.
- Corporate debt market: his market is for the issuance and trading of corporate bonds, which are debt securities issued by companies to fund their operations, expansions, or investments. Investors who buy corporate bonds are essentially lending money to the issuing company in return for periodic interest payments and the return of the bond's face value at maturity.
- Government debt market: Governments issue debt securities, such as bonds and treasury bills, to finance budget deficits and fund various projects. These securities are considered to be backed by the full faith and credit of the issuing government, making them one of the safest investment options. They can be traded in both domestic and international capital markets.
- Foreign exchange market: This is a global decentralized market for the trading of currencies. It supports international trade and investment by enabling currency conversion. For example, if a company in one country wants to purchase goods from another country, it can use the foreign exchange market to convert its currency into

the currency of the seller's country.

- Derivative market: Derivatives are financial instruments that derive their value from an underlying asset or benchmark. This market provides instruments like
- futures, forwards, options, and swaps, which are used for hedging against risks or speculating on future movements of the underlying assets. The derivatives market can be used to manage a range of risks, including interest rates, currencies, equities, and credit risks.

4.2.1.2. Primary markets versus secondary market

Primary markets are the financial venues where new securities are created and sold for the first time to investors. Corporations, governments, and other entities who need funding will issue new financial assets to raise capital directly from investors. Investment banks play a crucial role in facilitating this process. They help issuers to determine the price of the new securities and through rigorous marketing strategies, sell the securities to investors. Investors in the primary market can be institutional investors like pension funds and mutual funds, or retail investors. By purchasing the newly issued financial assets, investors provide the issuers with the funds they need. In return, investors receive the financial assets which may represent debt (bonds), equity (stocks), or other financial interests in the company. An example of a primary market is Initial Public Offerings (IPOs) where a company offers its shares to the public for the first time. IPOs can involve equity, but companies also issue debt and other financial assets through similar primary market mechanisms.

Secondary markets are marketplaces where investors buy and sell existing financial assets, those that have already been issued in primary markets. The financial instruments traded in secondary markets are stocks, bonds and other financial

instruments. Unlike primary market, trading in the secondary market does not result in the creation of new assets. It is purely the exchange of ownership of existing securities. The trade is between two investors, and the money involved in the transaction goes from the buyer to the seller, not to the issuing company. The role of secondary market is to provide liquidity for financial assets. This liquidity is crucial because it gives investors the confidence that they can readily convert their assets into cash if needed. By providing liquidity, secondary markets reduce the risk of investing in primary markets. Investors are more likely to purchase new financial assets if they know that they can later sell them in a secondary market. This, in turn, helps primary markets function more effectively as it broadens the investor base and potentially lowers the cost of capital for issuers.

4.2.1.3. Exchange traded markets versus over the counter market

Exchange-traded markets are structured and regulated environments where securities are bought and sold. These markets such as the Australian Stock Exchange (ASX) or the New York stock exchange (NYSE) are characterized by their high level of organization, transparency, and stringent information disclosure requirements. These markets operate under strict regulatory oversight, which ensures fair trading practices and the protection of investors. Regulatory bodies establish rules that govern the operations of these markets and the conduct of all market participants. Issuers of securities in exchange-traded markets are required to provide comprehensive information about their financial health, performance, and any other material information that might affect the value of their securities. This requirement is designed to maintain a high level of transparency and allows investors to

make informed decisions. Trading on exchanges is transparent, meaning that buy and sell orders, prices of securities and completed transactions, are visible to all market participants. This ensures that all participants have access to real-time information regarding market prices, contributing to a fair and competitive market environment.

Over-the-counter (OTC) markets are decentralized markets where trading of financial instruments is facilitated by a network of dealers rather than on a centralized exchange. OTC markets typically operate with less regulatory oversight compared to exchange-traded markets. This can lead to a wider range of products being traded, including those that may not meet the stringent listing requirements of formal exchanges. OTC markets offer more flexibility as the terms of trades are not standardized. This allows for the customization of trade agreements to suit the specific needs of the parties involved. Unlike the centralized nature of exchange trading, OTC markets do not have a physical location or central exchange. Trading occurs directly between parties. Financial institutions or dealers act as market makers by quoting prices at which they will buy (bid) and sell (ask) financial instruments. Dealers hold an inventory of financial instruments to facilitate this trading. Prices in OTC markets can often be negotiated. Since trades do not occur in a public venue, dealers can provide private quotes to clients and may adjust prices based on the size of the transaction or the relationship with the client.

4.2.1.4. Financial markets by products

Equity market: The market where equities, commonly known as shares, are traded is typically referred to as the stock market or equity market. These include ordinary shares, preference shares and hybrid securities. Equities are most commonly traded on organized exchanges, such as the Australian

Securities Exchange (ASX), which provide a platform for buyers and sellers to transact in a regulated and standardized environment.

Bond market: The bond market, also known as the debt market or credit market, is where investors trade bonds, which are long-term debt instruments. These includes corporate bonds and long-term government debt securities. While a significant volume of bond trading occurs over-the-counter (OTC), where trades are negotiated privately between two parties, bonds can also be listed and traded on formal exchanges like the Australian Securities Exchange (ASX). OTC transactions are typically larger and involve institutional investors, whereas exchange trading can offer more accessibility for retail investors.

Foreign exchange market: The currency market, also known as the foreign exchange market or FX market, is a global decentralized marketplace for the trading of currencies. The primary function of the FX market is to enable the conversion of one currency into another. This is necessary for international trade, where businesses and individuals need to pay for goods and services in a foreign currency. The market consists of a network of banks, financial institutions, brokers, and dealers who are licensed to trade in foreign exchange. These participants operate in major financial centres around the world and conduct transactions directly with each other or through electronic trading platforms. The FX market operates 24 hours a day, five days a week, and is the most traded market in the world, with trillions of dollars exchanged daily.

The **derivatives market**: is where financial instruments known as derivatives are traded. These are securities whose value is derived from the value of other underlying financial assets, such as stocks, bonds, commodities, currencies, interest rates, or market indexes. The types of derivative instruments include:

Options: Contracts that give the holder the right, but not the

obligation, to buy or sell an underlying asset at a specified price within a certain time period.

Futures: Standardized contracts traded on an exchange that obligate the buyer to purchase, or the seller to sell, an underlying asset at a predetermined price on a specified future date.

Forwards: Customized contracts between two parties to buy or sell an asset at a specified price on a future date. These are often used for hedging purposes.

Swaps: Contracts to exchange cash flows or other financial instruments for the purpose of exchanging risk (e.g., interest rate risk, currency risk).

4.2.2. Australia's financial institutions

Financial institutions can be divided into three broad categories: financial intermediaries, investing institutions and financial agency institutions.

4.2.2.1 Financial Intermediaries

Intermediated Finance is a key feature of the financial system, providing a more efficient allocation of resources, risk management, and liquidity transformation. It allows for the pooling of funds from many small investors to meet the large capital requirements of borrowers, while also providing security and return for the investors. During this process, the supplier of funds i.e. the investor provide funds to a financial intermediary, such as depositing money in a bank through instruments like a term deposit. The user of the fund (the borrower) is the individual or entity that requires funds for purposes such as buying a house, starting or expanding a business, or other financial needs. They receive funds from the financial

intermediary in the form of loans or other credit arrangements, such as a housing loan. In the middle of the transaction is the financial intermediary i.e. the bank who takes on the role of managing funds between the suppliers and users. With the funds collected from investors, the intermediary extends loans or credit to those in need of funds. In this system, the claims of the supplier of funds (investor) and the user of funds (borrower) are solely with the financial intermediary. The investor does not have a direct claim against the borrower, which means that if the borrower defaults on the loan, the bank is responsible for compensating the investor, not the borrower.

Financial intermediaries refer to institutions who serve as middlemen between parties in financial transactions. These are typically known as ADIs (Authorised deposit taking institutions). As the name implied, these institutions are authorised by a financial regulatory body to accept deposits from the public. Banks, credit unions, and building societies are examples of ADIs. They pool the deposits they receive and use these funds to provide loans or credit to borrowers. The financial intermediary creates a separate contract with each party—the lender (or depositor) and the borrower. Their revenue is earned primarily through the interest spread. This is the difference between the interest rates they charge borrowers for loans and the interest rates they provide to depositors for their savings. For instance, a bank may offer a 1% interest rate on savings accounts but charge 4% interest on home loans, earning a spread of 3%.

4.2.2.2. Investing institutions

Investing institutions are entities that manage and sell investment products to the public and use the pooled funds to invest in a variety of asset classes. Depending on the

regulations, these institutions can invest in both real and financial assets. These institutions include:

Superannuation funds: These funds collect contributions from employers on behalf of employees as well as from fund members directly. They invest these contributions across different asset classes with the goal of providing income benefits for members upon retirement. Common investments include equities, debt securities, real estate, and cash.

Managed funds: These funds pool money from many investors to invest in a diversified portfolio of financial assets. Professional fund managers select and manage these assets on behalf of the investors. Managed funds provide investors with access to a wider range of investments than they might be able to afford or manage on their own.

Private equity firms: These firms invest in private companies that are not listed on a stock market. Investments made by private equity firms are usually long-term and can be high-risk, partly because of the illiquidity of the shares—they are more difficult to sell compared to public equities. Private equity can be classified into two types:

- Venture capital firms (VC): Venture capital firms focus on investing in start-up and early-stage companies with high growth potential. These investments are inherently risky due to the unproven nature of the businesses but can yield high returns if the companies succeed.
- Private equities: In addition to venture capital, private equity also includes buyouts, growth capital, and mezzanine capital. PE investments are characterized by active ownership, where the PE firm seeks to add value to the company through strategic, operational, or managerial improvements.

Hedge funds: are often considered to be higher risk compared to traditional investment funds that are often considered not

suitable for retail investors. Unlike traditional managed funds, which may focus on a diversified portfolio of stocks or bonds, hedge funds often engage in a wide array of investment and trading activities. These can include leveraged investments, short-selling, derivatives trading, and other sophisticated investment strategies. Hedge funds generally operate with less regulatory oversight than other investment vehicles such as mutual funds. This allows them more freedom in their investment decisions, but it also means less protection for investors. They are often only accessible to accredited or qualified investors who have a higher degree of financial literacy and can bear the risk of loss.

General insurance companies: are financial entities that collect premiums from households and businesses and provide a range of insurance policies to protect individuals and businesses against various risks. These include property, motor vehicle and employer's liability insurance. In order to ensure that they have sufficient liquidity to cover claims and operational expenses, general insurance companies invest their assets primarily in short-term financial securities such as deposits, short-term loans, government securities or liquid equities. he investment strategies of general insurance companies are often conservative, emphasizing liquidity and safety due to the nature of their liabilities. They need to ensure that funds are available when claims are made, which can be unpredictable. Consequently, they tend to avoid locking in their assets in long-term or illiquid investments. Their investment decisions are also subject to regulatory guidelines that aim to maintain solvency and protect the interests of the insured parties.

Life insurance companies: unlike general insurance, life insurance companies offer a range of financial products and services, primarily focusing on risk mitigation and financial planning for individuals. The type of products they offer include life insurance which offers financial compensation to

beneficiaries upon the policyholder's death. They also provide accident and disability insurance: which covers for losses due to accidental injuries or disability, which can include lump-sum payments or ongoing income support. To support their long-term liabilities (such as life insurance payouts), life insurance companies tend to invest in a mix of equities and debt securities. Besides traditional insurance, life insurance companies offer investment products that combine investment with insurance coverage, such as annuities. They may also manage superannuation (retirement savings) products, allowing policyholders to invest and grow their funds for retirement.

4.3 Financial regulators

The objectives of regulators are:

Systematic Stability: This refers to the overall health and functioning of the financial system. Systemic stability is achieved when the system is resilient to economic shocks and able to operate without significant crises, such as widespread bank failures or bank runs. A bank run occurs when a large number of depositors withdraw their funds simultaneously, often due to fears that the bank will become insolvent. Ensuring systemic stability is crucial to prevent such crises, which can lead to severe economic and social disruptions.

Deposit Protection: refers to safeguarding the interests of bank depositors, those with small account balances who may not have the financial expertise to fully understand complex banking products and the health of the financial institutions themselves. Asymmetric information is a situation where one party, in this case, the financial institutions have more or better information than depositors. To protect depositors, various mechanisms such as deposit insurance schemes are put in

place, which guarantee to cover deposits up to a certain amount, thereby reducing the risk for individual depositors.

Social objectives: Many financial institutions are profit driven therefore without appropriate mechanisms in place, they will not serve the interest of the public as a whole. The institutions need to be given incentives so that they will engage in behaviours that benefit every members of society. This includes keeping bank fees low to ensure affordability for all segments of society, providing financial support to specific sectors of the economy that may have social value, such as small businesses or industries that create significant employment opportunities. These objectives often align with broader goals such as income redistribution, economic inclusion, and the promotion of equitable growth.

There are three main regulatory bodies in Australia:

- The RBA (Reserve Bank of Australia): The RBA serves as Australia's central bank and its main functions are crucial to the nation's financial system and overall economic performance. The RBA oversees the payment systems to ensure they are safe and efficient, and providing banking services to the government and other financial institutions. The most important function of the RBA is formulating and implementing monetary policy. The main tool the RBA uses for this purpose is setting the cash rate, which is the interest rate on overnight loans in the money market. In the first Tuesday of every month except January, the RBA board meets to decide the outcome of its review of the cash rate and releases a statement that announces any changes to the rate. Changes to the cash rate can influence a range of other interest rates, including those for mortgages and savings, and can thereby affect the behaviour of borrowers and savers, the level of economic activity, and ultimately the rate of inflation. Finally, the RBA monitors and assess the health of the

financial system and work with other regulatory bodies to manage and mitigate systemic risks. The RBA aims to prevent problems that may arise from the financial system, such as bank runs or the collapse of financial institutions, that could have detrimental effects on the economy.

- ASIC (Australian Securities and Investments Commission): is an independent Australian government body that acts as Australia's corporate regulator. Its role is to enforce and regulate company and financial services laws to protect Australian consumers, investors, and creditors. ASIC oversees companies to ensure they adhere to corporate governance standards. Corporate governance involves a set of rules and processes by which a company is directed and controlled, focusing on the internal and external corporate structures with the intention of monitoring the actions of management and directors and thereby mitigating the risks of corporate fraud. For the financial services sector: ASIC supervises and regulates the insurance, banking and superannuation industry to ensure they operate efficiently, honestly and fairly with the aim to promote transparency and market integrity.
- APRA (Australian Prudential Regulation Authority): While ASIC is focused on consumer protection and market integrity, APRA is involved in the prudential oversight of financial institutions. APRA's core function is to oversee banks, credit unions, building societies, general insurance companies, life insurance, and most members of the superannuation industry. It sets standards and supervises institutions to ensure that, under all reasonable circumstances, these financial promises made to consumers are met. APRA ensures that the institutions it supervises manage risks effectively, requiring them to hold sufficient capital and have appropriate risk management frameworks in place to deal with potential

adverse scenarios. APRA is responsible for planning for financial crises and has a role in responding to them if they occur. This includes the power to take control of an institution if its viability is threatened and managing its restructure or orderly exit from the industry if necessary.

Key Takeaways

- This chapter provides an overview of on the operation of the financial system in Australia, the players within the system and the role that they serve. In the forthcoming chapter, we will apply the present and future value formulas to value the two classic financial instruments of the financial market namely, debt and equity.

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Reserve Bank of Australia (rba.gov.au)

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Chapter 5 - Bond market and bond valuation

Chapter Learning Objectives

After completing this chapter, students should be able to

- Understand the fundamental principles of bonds and the bond market.
- Compute the price of a bond and explain the relation between bond prices and interest rate.
- Distinguish between a bond's coupon rate and yield to maturity.
- Explain the concept of interest rate risk, default risk and default risk premium

5.1. What is a bond?

A bond is essentially a form of debt instrument, which can be likened to an "I owe you" note. It represents a formal and

enforceable contract between the issuer, who is the borrower, and the investor, who acts as the lender. This agreement outlines several key components:

- **Par value**: This is also known as the face value or principal of the bond. It is the amount that the issuer agrees to repay the bondholder at the bond's maturity.
- **Coupon rate**: The coupon rate is the interest rate that the bond issuer pays on the bond's face value. It is usually a fixed percentage, expressed as an annual percentage rate (APR). However, there can be variable or floating rates, which are often linked to benchmarks like the LIBOR or inflation indicators.
- **Coupon payment dates**: These are the scheduled dates on which the bond issuer makes interest payments to the bondholder. The payments are typically made on a quarterly or semi-annual basis.
- **Maturity date**: This is the date on which the bond will expire, and the issuer is obligated to pay the par value to the bondholder. Bonds can have varying lengths of maturity, ranging from a few months to several decades.

In the context of bonds, the issuer does not need to know the identity of the bondholder. The bond issuer has a legal obligation to make payments, such as interest or principal repayments, to whom-ever is in possession of the bonds at the time those payments are due. This means that if the bonds are sold or transferred from one investor to another, the issuer's responsibility is to make the due payments to the new holder of the bonds. This anonymous nature of bond ownership allows for easy trading of the bonds on the market, as the transfer of ownership does not require the issuer's direct involvement or notification.

5.1.1 Types of corporate bonds

- **Coupon bonds**: are a type of bond that feature fixed interest payments, known as coupons, which are paid to the bondholder periodically over the bond's lifespan. The rate of these coupon payments is predetermined and remains constant until the bond reaches its maturity date. Upon maturity, the principal amount of the bond is repaid to the bondholder, and the bond is then considered retired or concluded. Coupon bonds often include standard call provisions that are common in many types of bonds. This provision gives the issuer the right, but not the obligation, to pay back the face value of the bond before its maturity date under specific conditions. This can be beneficial for the issuer, particularly if interest rates have fallen since the bond was issued, allowing them to refinance at a lower cost. Coupon payments are often made on an annual or semi-annual basis.
- **Zero coupon bonds**: are bonds that do not offer periodic coupon payments. Instead, investors receive a single payment at the bond's maturity. Since zero-coupon bonds do not provide coupon or interest payments, they are typically sold at a significant discount from their face (or par) value. The difference between the par value and price of the bond represents the interest that accumulates over the life of the bond.
- **Convertible bonds**: are bonds that offer the bondholder the right to convert the bond into a predetermined number of shares of the issuing company's common stock at specific times during the bond's life, usually at the discretion of the bondholder.

5.1.2 Overview of Australian financial market

Have a look at the Figure 1: Australian Financial Markets on this Australian Equity Market Facts page on the RBA website. This depicts the types and historical trends of various financial securities in Australia as a percentage of GDP, indicating their relative size and importance within the economy over time.

The graph depicts a contrasting trend between government bonds and equities. While the proportion of government bonds relative to GDP has generally decreased, the equity market has shown growth, particularly from the 1980s onwards. Corporate bonds have also grown but remain a smaller fraction of the GDP compared to equities and government bonds. Overall, there is a general shift in the Australian financial markets from a strong reliance on government and government-backed bonds in the early 20th century towards a more diversified structure with significant equity and corporate bond markets in the later years.

5.2 Coupon rate versus coupon yield

The bond contract often states the coupon rate and other features of the bond such as par value, time maturity or whether or not the bond is callable. However, it does not specifies the yield to maturity i.e. coupon yield, another variable that determines the price of the bond. So, what is yield to maturity and how it differs from the coupon rate?

Coupon rate determines the annual interest rate that the issuer promises to pay the bondholder on the bond's face value, expressed as a percentage.

$$Coupon\ rate = \frac{Annual\ coupon}{Par\ value}$$

Coupon yield: is the return that an investor can expect to

receive from the bond if it is held until maturity assuming all the coupon payments are reinvested at the same rate.

$$Coupon\ yield = \frac{Annual\ coupon}{Bond\ price}$$

While coupon rate is often fixed, the coupon yield can change over time if the price of the bond changes due to market conditions.

5.3 Bond Valuation

5.3.1 The valuation principle

The value of a financial asset is equal to the present value of all expected future cash flows, discounted at an appropriate discount rate

Equation 1:

$$P = \frac{CF_1}{(1+i)^1} + \frac{CF_2}{(1+i)^2} + \frac{CF_3}{(1+i)^3} + \cdots + \frac{CF_n}{(1+i)^n}$$

Where:

- P = Value (price) of an asset at time 0, present value of the stream of cash flows
- CF_t = cash flow in period *t*
- *i* = the market interest rate (discount rate)
- *n* = number of discounting periods

Based on this formula, the value or price of any financial asset at time 0 can be calculated by forecasting the future cash flows the asset is expected to generate and then discounting these cash flows to their present value using an appropriate discount rate. Let's apply this valuation principle to price a coupon paying bond.

5.3.2 Bond valuation

For a coupon paying bond, the cash flows comprise two components: the coupon payments and the par value component usually paid at the maturity date. The timeline of the cashflows for a coupon bond is depicted as follows:

Given that the coupon payments remain constant and the first payment is made one period after time 0, this series of coupon payments essentially constitutes an ordinary annuity. Consequently, we can apply the present value formula for an ordinary annuity to calculate the current worth of these coupon payments at time 0.

The second component is the par value, the lumpsum that usually paid at maturity. Since it is a one-off payment, we can use the formula for single cash flow to discount it back to present. The price of the bond is the PV of coupons + PV of par value.

Equation 2:

$$P_B = \frac{C}{(1+i)^1} + \frac{C}{(1+i)^2} + \frac{C}{(1+i)^3} + \cdots + \frac{C}{(1+i)^n} + \frac{F_n}{(1+i)^n}$$

The price of the bond then becomes PV of an ordinary annuity + PV of one last single cash flow (or Par value)

Equation 3:

$$P_B = \frac{C}{i} \times \left[1 - \frac{1}{(1+i)^n}\right] + \frac{F_n}{(1+i)^n}$$

where F_n is the par value.

Example: AR Ltd is issuing a 10-year bond with a coupon rate of 8.89 per cent. The interest rate for similar bonds is currently 5.97 per cent. Assuming annual payments and a face value of $1000, what is the present value of the bond?

Answer: Step 1: Outline the cash flows that the financial asset i.e. the bond pays. The coupon payment each period is:

Coupon payment per period = $$\frac{\text{annual coupon rate x Par value}}{\text{number of coupon payment in a year}}$$

$$= \frac{0.0889 \times 1000}{1} = \$88.9$$

So, the cashflows are: 88.9 per year for 10 years and a one-off 1000 at the end of year 10. N = 10 and i = 0.0597. The discount rate is the coupon yield. It reflects the opportunity cost of capital i.e. the return that investors expect from the bond.

$$
\begin{aligned}
P_B &= \frac{C}{i} \times \left[1 - \frac{1}{(1+i)^n}\right] + \frac{F_n}{(1+i)^n} \\
&= \frac{88.9}{0.0597} \times \left[1 - \frac{1}{(1+0.0597)^{10}}\right] + \frac{1000}{(1+0.0597)^{10}} \\
&= \frac{88.9}{0.0597} \times 0.4400 + 559.9776 \\
&= 655.2094 + 559.9776 \\
&= \$1215.19
\end{aligned}
$$

5.3.3 Par, premium and discount bonds

- **Par bonds**: When a bond's coupon rate (C) is equal to the market rate (i), the bond will trade at its face (or par) value. The reason is the market rate i.e. yield to maturity represent the rate of return that investors expect from holding the bond. If investors expect a rate of return of 10% p.a for holding the bond and the coupon rate is also exactly 10%, the bond will be selling at par.
- **Discount bond**: If the coupon rate (C) of a bond is lower than the prevailing market interest rate (i), the bond will be sold at a price below its face (or par) value. The reason is the coupon rate that the bond is offering is less than what investors expect. Therefore, to achieve the required rate of the return, investors will sell the bond driving its price below the par value.
- **Premium bonds**: When a bond's coupon rate (C) exceeds the current market interest rate (i), the bond will be traded at a price higher than its face (or par) value. In this case, the coupon rate that the bond is offering is higher than what investors expect which make investors willing to pay a price that is higher than the par value.

5.3.4 Semi-annual bond valuation

Most corporate bonds make coupon payments semi-annually, meaning twice a year. However, it's a standard practice to quote their coupon rates on an annual basis. This means that even though these bonds pay coupons every six months, the stated coupon rate reflects the interest amount that would be paid over a full year. For instance, if a bond has an annual coupon rate of 4%, it would actually pay 2% every six months. The formula for a semi-annual coupon paying bond is as follows:

Equation 4:

$$P_B = \frac{C/2}{i/2} \times \left[1 - \frac{1}{(1+i/2)^{2n}}\right] + \frac{F_{2n}}{(1+i/2)^{2n}}$$

Since the coupon payment is made every six months if the bond matures in n years, in total, there would be 2n periods. is the par or face value paid in period 2n.

Example: You are interested in investing in a 3-year bond with a face value of $1000 that pays a 6.3 per cent coupon with interest to be received semi-annually. Your required rate of return is 6.6 per cent. What is the most that you would be willing to pay for this bond?

Answer: The coupon rate is 6.3% p.a, since the coupon is paid every six months. The coupon payment each period is 0.063×1000/2 = 31.50. The number of periods is therefore 3×2 = 6. The discount rate each period is 0.066/2 = 0.033 since each period is now 6 months instead of 1 year.

$$P_B = \frac{C/2}{i/2} \times \left[1 - \frac{1}{(1+i/2)^{2n}}\right] + \frac{F_{2n}}{(1+i/2)^{2n}}$$
$$= \frac{63/2}{0.066/2} \times \left[1 - \frac{1}{(1+0.066/2)^{2*3}}\right] + 1000(1+0.066/2)2*3$$
$$= 954.5455 \times (1 - 0.823) + 822.9967$$
$$= 168.9546 + 822.9967$$
$$\$991.9513$$

5.3.5 Zero coupon bond

As the name implied, zero coupon bond has no coupon payment. The only cash flow that the bond pays is the par value. The value of the bond is simply the present value of this final cash flow discounted back to the present using the appropriate discount rate i.e. yield to maturity.

Equation 5:

$$P_B = \frac{F_n}{(1+i)^n}$$

Example: You are thinking to invest in a zero coupon bond that is matures in 6 years with a face value $100,000. How much are you willing to pay for the bond if the current market interest rate for similar bond is 6% p.a?

Answer: Par value is $100,000, n=6 and yield to maturity I = 0.06.

$$P_B = \frac{1000}{(1+0.06)^6} = \$79,406.05$$

5.4 Bond yields

Yield to maturity (YTM): is the rate of return that an investor expects to earn if they hold a bond until its maturity date, and all scheduled coupon and principal payments are made without default. It is used as a discount rate that makes the present value of coupons and principal payments equal to the price of the bond. YTM is not static, it changes in response to changes in market interest rates and other economic factors.

When market interest rates rise, investors expect a higher return from their investments which lead the YTM of existing bonds increases, often resulting in lower bond prices. Conversely, when market interest rates fall, the YTM of existing bonds generally decreases, leading to higher bond prices. This inverse relationship between yield and price is a fundamental principle of bond investing.

Bonds with longer maturities experience greater price fluctuations compared to bonds with shorter maturities for the same level of change in their Yield to Maturity (YTM).

For bonds valuation, since the cash flows are predetermined, the price of the bond largely depends solely on the discount rate (YTM). How do we know what investors required rate of return on a bond is?

Answer: We can invert the yield to maturity from the bond price and once the YTM is obtained, it will enable us to price similar bonds.

Example: Westpac Banking Corporation has a 3-year bond outstanding that pays a 7 per cent coupon and is currently priced at $913.88. What is the yield to maturity of this bond?

Assume semi-annual coupon payments and a par value of $1000.

Answer: Since the coupon is paid semi-annual, the number of periods is 2 x 3 =6. The coupon payment each period is 0.07 x 1000 = 35.

Applying formula in equation 4:

$$913.88 = \frac{70/2}{\mathrm{i}/2} \times \left[1 - \frac{1}{(1+\mathrm{i}/2)^{2*3}}\right] + 1000(1+i/2)2*3$$

$$13.88 = \frac{35}{\mathrm{y}} \times \left[1 - \frac{1}{(1+\mathrm{y})^{6}}\right] + 1000(1+y)6$$

Y denotes yield to maturity or i in equation 4.

Using excel, y = 5.21% so i = 2 x y = 2 x 5.21% = 10.42%.

5.5 Risk of investing in bonds

Investing in bonds, like any other investments involves a number of risks. The two major risks that associated with bonds are:

- **Credit (Default Risk)**: This risk reflects the probability that the bond issuer will be unable to fulfill the debt payment obligations as they fall due. Generally, government bonds have lower credit risks compared to corporate bonds. Credit rating agencies assign ratings to bonds globally, serving as an indicator of their credit risk. These ratings essentially evaluate the likelihood that the bond issuer will default on its debt obligations, including interest payments and the repayment of the principal. A higher rating suggests a lower risk of default, indicating greater financial stability and strength of the issuer. Conversely, a lower rating indicates higher risk, implying a greater chance that the issuer might fail to meet its payment

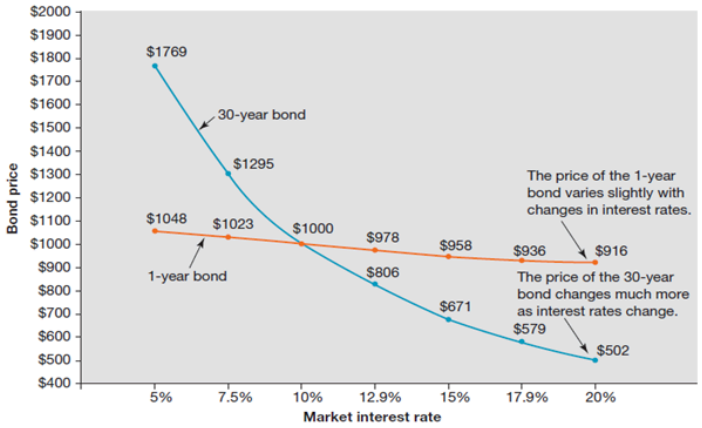
obligations.

- **Interest rate**: Interest rate risk refers to the possibility of incurring losses on investments due to a rise in market interest rates. When interest rates in the market go up, the appeal of holding existing bonds diminishes. This is because new bonds issued in the market offer higher coupons compared to the fixed coupons of existing bonds.

5.5.1 Interest rate risk

When interest rates in the market rise, the Yield to Maturity (YTM) of bonds also increases. This is because YTM is essentially a reflection of the opportunity cost of capital. If interest rates are higher, investors naturally expect greater returns on their investments since they could potentially earn more by investing in other opportunities with higher yields. Consequently, as market interest rates go up, the required rate of return (or discount rate) for existing bonds increases, which in turn lowers their market prices.

The impact of rising interest rates on bond prices, however, is not uniform across all bonds. Generally, bonds with longer maturities are more sensitive to changes in interest rates and will experience greater price reductions compared to shorter-term bonds. This is because the longer the time until a bond's maturity, the longer the period during which the investor is locked into lower coupons relative to the market, thus increasing the bond's interest rate risk. The following picture compares the price of a 1-year bond and a 10-year bond when interest rate changes:



Note: Plots are for a 1-year bond and a 30-year bond with a 10 per cent coupon rate and annual payment.

The graph demonstrates that when market interest rates increase, the prices of both short-term and long-term bonds decrease. However, the extent of the price decline differs significantly between the two. While the short-term bond experiences a relatively minor decrease in price, the long-term bond's price drops much more sharply.

5.5.2 Default risk

As mentioned above, default risk that borrowers may not make the promised payments. It is the risk of losing not just the return on capital but the return of capital i.e. the principal. Therefore, in order to hold bonds that have positive default risk, investors must be paid a premium. Default risk premium (DRP) is the difference between interest rate on a security that has default risk (idr) and the interest rate on a risk-free (irf) security.

$$DRP = i_{dr} - i_{rf}$$

The DRP is essentially the extra return that a bond offering

a default risk pays over a risk-free security, like an Australian Government Bond.

5.5.3 Bond ratings

Moody's Investors Service (Moody's) and Standard & Poor's Global Ratings (S&P) are the two leading credit rating agencies that evaluate the likelihood of borrowers repaying their debts, effectively assessing their creditworthiness. Fitch Group ranks as the third largest in this field. While Moody's and S&P have their own unique rating scales, the meaning behind their ratings is broadly similar.

The highest quality bonds, considered to have the minimal risk of default, are given the top ratings of Aaa by Moody's and AAA by S&P. These ratings reflect the highest level of creditworthiness.

Bonds are categorized as investment-grade if they are rated between Aaa (or AAA) and Baa (or BBB). These ratings suggest a lower risk of default and are typically sought after by conservative investors, including certain institutional investors.

Conversely, bonds rated below Baa (or BBB) are classified as non-investment grade. These include junk bonds, speculative-grade bonds, or high-yield bonds, which carry a higher risk of default but offer higher returns to compensate for this increased risk.

The following table shows the Investment ratings by S & P, Moody and Fitch:

	S & P	Moody	Fitch	Description
Investment Grade				
AAA	AAA	Aaa	AAA	Prime, highest quality, lowest credit risk
AA+	AA+	Aa1	AA+	High quality, very low credit risk
AA	AA	Aa2	AA	
AA-	AA-	Aa3	AA-	
A+	A+	A1	A+	Upper medium grade, low credit risk
A	A	A2	A	
A-	A-	A3	A-	
BBB+	BBB+	Baa1	BBB+	Lower medium grade, moderate credit risk
BBB	BBB	Baa2	BBB	
BBB-	BBB-	Baa3	BBB-	
Non-investment grade (Junk)				
BB+	BB+	Ba1	BB+	Speculative, substantial credit risk
BB	BB	Ba2	BB	
BB-	BB-	Ba3	BB-	
B+	B+	B1	B+	Highly speculative, high credit risk
B	B	B2	B	
B-	B-	B3	B-	
CCC+	CCC+	Caa1	CCC	Substantial risks, extremely speculative
CCC	CCC	Caa2	CCC	
CCC-	CCC-	Caa3	CCC-	
CC	CC	Ca	CC	

C	C	C	C	Extremely high levels of credit risk
D	D		D	Default

5.5.4 Australian bond market

In Australia, most corporate bonds are not traded on the Australian Securities Exchange (ASX), the primary stock exchange in the country. Instead, these bonds are typically traded over-the-counter (OTC). OTC trading means that the bonds are traded in a decentralized manner, often through broker-dealer networks, rather than on a centralized exchange like the ASX. To invest in these corporate bonds, an investor usually needs to go through a broker. The broker executes the order by finding a matching buyer or seller in the OTC market. This method of trading can be less transparent than exchange trading, with prices and availability varying more significantly.

For individual investors looking to invest in bonds through a more familiar and accessible platform, Exchange-traded Treasury Bonds (eTBs) offer an alternative. eTBs are essentially government bonds that are listed and traded on the ASX. They represent an investment in an Australian Government bond, providing the safety and stability associated with government debt. These bonds are more accessible to individual investors and offer benefits like regular interest payments and the return of face value at maturity. eTBs can be bought and sold just like stocks through the ASX, offering transparency, ease of trading, and accessibility that might not be available with OTC corporate bonds.

Takeaways and looking ahead

This chapter provided an overview of bonds and the Australian bond market, detailing how bonds function as a crucial method for companies and other entities to raise capital. As debt securities, bonds involve lending money to the issuer in exchange for regular interest payments and the return of the principal at maturity. We've explored the various aspects of bonds, including their pricing, the relationship between bond prices and interest rates, the distinction between a bond's coupon rate and its yield to maturity, and the risks associated with bond investing, such as interest rate risk and default risk.

In the next chapter, we will shift our focus to the second major channel for companies to raise capital: equity. Equity represents ownership in a company and comes with different characteristics and valuation methods compared to debt securities like bonds. We will explore the different types of equity securities, and the principles behind equity valuation. This will provide a comprehensive understanding of how companies raise capital and how investors can evaluate and invest in these different types of securities

References:

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Brealey, R., Myers S. C., Allen F., Edmans, A. Principles of Corporate Finance (14th Edition) 2022.

Peirson, G., Brown, R., Easton, S., Howard, P., Pinder, S. Business Finance (12th Edition) 2015.

Chapter 6 - Stock market and stock valuation

Chapter Learning Objectives

After completing this chapter, students should be able to

- Understanding the Basics of Stocks and Stock Returns
- Applying the Dividend Discount Model (DDM) to Value Stocks
- Getting to know the landscape of the World's and the Australian stock market
- Exploring investment banking functions and initial public offering (IPO)

6.1 Overview of the share market

Suppose you have $10,000 to invest in 1989 and you decide to put it in the share market. If the average annual rate of return

is 8% p.a., by 2023, you would end up with $147,850. While Australia is an island, separated from the rest of the world, our share market does not seem to behave that way. In fact, our market tracks the trend in the global market very closely and since 2002, we seem to perform better than the global market.

If we are doing so well, why investors from the rest of the world does not seem to pour money into our market? Have a look at this chart from Visual Capitalist showing the break down of the global equity market. Here we can see is that not all markets are created equal. Some are much bigger and hence considered more important than others. The construction of the global market does not involve putting the same amount of money into each market. Rather, market with larger size receives a higher weight.

Once we zoom into the performance of a given stock market, the same feature holds. That is, not all stocks are created equal. Based on their size i.e. market cap, some are more important than others. The performance of the overall stock market largely depends on the performance of the very few. Have a look at this visualisation of the US market return composition by Morningstar to see how the largest companies have changed between 2020 to 2023. How much has the size of the rest of the market changed changed over this time?

6.2 Ordinary vs Preference Shares

6.2.1 What are ordinary shares?

Ordinary shares, also known as common stocks or common equity, represent an ownership stake in a corporation. Individuals holding these shares are essentially part-owners of the company. This ownership represents a residual claimant,

which means shareholders are entitled to a share of the company's earnings after all other obligations have been met.

Those who invest in ordinary shares typically anticipate the receipt of dividends, which are periodic distributions of the company's profits. However, in scenarios where a company defaults on its obligations, debt holders reserve the right to initiate liquidation proceedings, subsequently assuming control over the company's assets to recuperate owed funds. Shareholders on the other hand cannot force the company to go into liquidation. These shareholders are among the last to be considered for repayment. They have to wait until all debts and other financial obligations have been paid to receive the residual claims on the company's assets. This underscores the heightened risk that ordinary shareholders bear, a risk that is counterbalanced by the potential for higher returns over a long-term investment horizon, reflecting the fundamental risk-return trade-off in finance.

Holding shares give investors the right to vote on critical corporate governance issues. Such issues may include strategic decisions like mergers and acquisitions, executive remuneration packages, and the election or removal of board members. Essentially, this voting power enables shareholders to influence the direction and management of the company, something that debt holders do not get to enjoy since debt holders do not own the company.

Another advantage for ordinary shareholders is that their liability is limited. In the worst-case scenario of company failure, the personal financial exposure of shareholders is restricted to the amount of their investment in the company's shares, protecting their other personal assets. Finally, the life of ordinary shares is infinity. Unlike debt securities, which have specified maturity dates when the principal is to be repaid, ordinary shares remain valid as long as the company is in operation. Shareholders can choose to hold on to their shares

indefinitely or sell them on the open market whenever they choose.

6.2.2. What are preference shares?

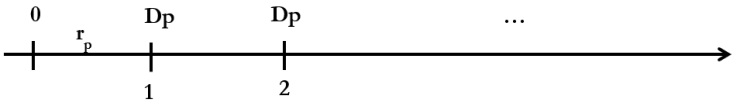
Preference shares, also known as preferred stocks, are a class of equity that exhibits characteristics of both bonds and common stocks. These shares typically offer investors a steady income stream through fixed dividends, which can either be a set amount or a fixed percentage of the company's profits, much like the coupon payment of a bond. Due to their equity nature, preference shares do not have a maturity date. Shareholders of these stocks are entitled to receive annual dividend payments indefinitely, or for as long as they hold the shares. The dividends received by preference shareholders can be classified as a perpetuity and hence one can use the perpetuity formula to ascertain the current value of a preference share. Finally, preferred shareholders have lower ranking compared to bond and other debt holders, but they have higher ranking compared to ordinary shareholders when it comes to profit distribution and claims on assets in the event of liquidation.

6.3 Equity Valuation

6.3.1 Preference share valuation

The valuation principle states that the value of any financial asset is the present value of the future cash flows discounted back to the present using the appropriate discount rate. Since preference shareholders receive a constant stream of dividends

indefinitely, the present value of the preference share can be obtained using a perpetuity formula.



The value of the preference share is then given by:

Equation 1:

$$\mathrm{PS}_0 = \frac{D_p}{r_p}$$

Where:

- PS_0 = Preference share market price
- D_p = Next period's dividend payment
- r_p = Discount rate

Example: Suppose we have a company, ABC Corp., which has issued preference shares that pay an annual fixed dividend of $5 per share. If the current market rate of return for similar preference shares is 6%, what is the price of ABC Corp.'s preference shares?

Answer:

$$PS_0 = \frac{D_p}{r_p}$$

$$= \frac{\$5}{0.06} = \$83$$

6.3.2 How are equity returns are measured?

Investors earn returns from shares not only through dividend payments but also via capital gains or losses. These gains or losses are realized when investors sell their shares at a different price from their purchase cost. The return on investment, therefore, encompasses the change in the share's value over time, alongside any income from dividends received. For each share, the total dollar return is the sum of holding period income and capital gains (losses). Since dividend payment represents the income that the stockholder earns during the holding period,

$$\textbf{Total dollar return} = Div_{t+1} + (P_{t+1} - P_t)$$

In finance, when it comes to return, we do not use dollar returns to evaluate the performance of an investment. The reason is dollar returns depend on the initial capital investment which make it difficult to compare across stocks. For example, suppose you buy 1 share A for $50 per share and sells it for $55 per share, your dollar return would be $5 per share. Meanwhile, you can buy 1 share B for $10 and sell it for $12 per share, your dollar return on share B would be $2 per share but which one is a better investment? Based on just the dollar return alone, A would seem to be a better share but instead of buying 1 share of A, you could have bought 5 shares B for the same $50 and if you do that, you would end up with 5 x 12 =$60 which clearly yields a return that is higher than A.

Therefore, to measure the performance of an investment, we use a percentage return i.e. the rate of return.

The rate of return on investment is given by the following formula:

Equation 2:

$$r = \frac{D_1 + P_1 - P_0}{P_0}$$

If we reorganise the formula, the current value or price of a share can be calculated as:

Equation 3:

$$P_0 = \frac{D_1 + P_1}{(1+r)^1} \text{ or}$$

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{P_1}{(1+r)^1}$$

P_0 is the price of the share at time 0 i.e. now. P_1 denotes the price in the future i.e. period 1 and D_1 is the dividend received during the period and r investors' expected rate of return. Equation 3 corresponds to the present value formula with P1 and D1 represent the future cashflows and r the discount rate.

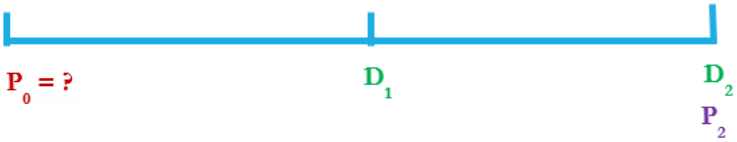
Example: You are thinking whether or not to invest in XYZ Manufacturing Co. where the investment expectations are as follows: an anticipated dividend payment of $2.5 to be received in one year. You expect to be able to sell the share for $30 at the end of the year and investor required rate of return on shares with similar risk is around 8% per year. What is the maximum price you are willing to pay for XYZ manufacturing Co?

Answer: The value of XYZ today is the present value of the future cashflows i.e. the incoming dividend and the potential resale value discounted at the required rate of return of 8% p.a.

$$P_0 = \frac{2.5 + 30}{(1 + 0.08)} = \$30.09$$

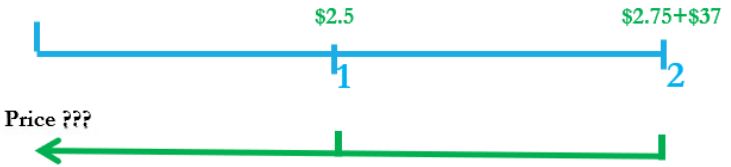
You should be prepared to pay no more than 30.09 for XYZ today. If you pay such price and assume that your cashflows turn out to be as expected, the rate of return you achieve is 8% p.a.

This example assumes that you would only hold the share for 1 year. What if your investment horizon is 2 years. The company announces that the dividend in the first year is $2.5 per share and this dividend will increase by 10% in the following year. You expect to be able to sell the stock at the end of year 2 for $37. How much are you willing to pay for XYZ Co. today?



No matter how long the investment horizon is expanded into the future, the valuation principle still holds. The value of the asset is the present value of all future cashflows where the cashflows are all different.

The dividend in year 2 is $D_2 = D_1 \times (1+0.1) = 2.5 \times 1.1 = 2.75$



Price = PV(dividends) + PV(sale price)

$$= \frac{2.5}{1.08} + \frac{2.75 + 37}{(1.08)^2} = \$36.39$$

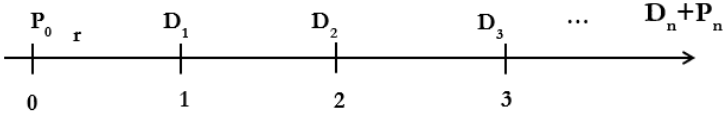
6.3.3 Dividend discount model

The value of the stock today equals to the sum of all of its future cashflows discounted back to their present values. If dividends are the main cashflows that investors get for holding the stock, the fair price of a stock can be computed using the present value of these anticipated dividend payments. To apply the Dividend Discount Model (DDM), it's necessary to make projections about the future dividends a company will pay. These projections often involve simplifying assumptions to handle the uncertainty and variability of future dividends. Two common methods used for this purpose are:

Constant Growth Rate Model: This approach assumes that dividends will grow at a constant rate indefinitely. It can also consider a special case where the growth rate is zero, meaning dividends are expected to remain constant over time.

Variable Growth Rate Model: In contrast, this model allows for dividends to grow at different rates during different periods. It's more flexible and can accommodate various growth patterns, such as a company expecting higher growth in the initial years and lower growth thereafter.

For an ordinary shareholder, the timeline for the cashflows that the shareholder can expect is as follows:



The value of the stock can be calculated by discounting these cashflows i.e. dividends and price to the present using the discount rate r

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \cdots \frac{D_n + P_n}{(1+r)^n}$$

Since Pn, the price of the stock in period n, depends on the present value of the future dividends starting in period n+1, the price of the stock today can be simplified to:

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_\infty}{(1+r)^\infty}$$

If these dividends are the same, the price of the stock can be computed as the present value of a perpetuity. If these dividends are not constant, calculating the price of the stock involves forecasting future dividend until infinity which is extremely difficult to do. However, when dividends are not constant but growing at a constant rate forever then the above formula becomes a perpetuity that grows at a constant rate forever i.e. a growing perpetuity that we cover in chapter 3.

Suppose that D_0 is the dividend paid at time 0. If dividends are growing at a constant rate g then D_1 will be equal to D_0 x (1 + g), $D_2 = D_1$ x (1 + g). Substitute $D_1 = D_0$ x (1 + g) into D_2, we have $D_2 = D_0$ x $(1 + g)^2$. Similarly, $D_3 = D_0$ x $(1 + g)^3$ and so on.

Using the growing perpetuity formula:

Equation 4:

$$\mathrm{PV}_0 = \frac{\mathrm{CF}_1}{r - g} \text{ or}$$

$$P_0 = \frac{D_1}{r - g} = \frac{D_0\,(1 + g)}{r - g}$$

This is known as the Gordon Growth Model. The formula in equation 4 reveals two important points: first, g has to be less than r. The growth rate must be less than the discount rate. If g = r then we have a situation where we have to divide D_1 by 0 which is undefined. If g > r then the price will be negative which is not possible since price can only be 0 under the worst case scenario. It happens when you lose what have invested in, price cannot be negative due to limited liability. Second, the price of the stock today depends on dividends starting from period 1 onwards. The value of a financial asset depends on future cashflows not the cashflows in the past.

Example: Suppose a company, XYZ Corp, just paid a dividend of $3.00. Assume that this dividend is expected to grow at a rate of 4% per year forever, if investors require a return of 15%, how much are you willing to pay for XYZ stock today?

Answer: The price of the stock today depends on dividend in period 1 and onwards so the first thing we need to work out is D1. Since the growth rate is constant at 4% per year, $D_1 = D_0$ x (1 + g). D_1 = $3 x (1 + 0.04) = 3.12.

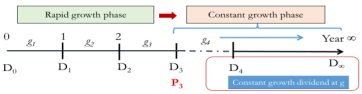
Applying the formula in equation 4, where D_1= 3.12, g= 0.04 and r = 0.15. The price of the stock today is:

$$P_0 = \frac{3.12}{0.15 - 0.04} = \$28.36$$

6.3.4 Two-stage variable growth model

The Gordon Growth Model assumes that dividend will be growing at a constant rate forever which is unrealistic for 2 reasons. First, if the growth rate is consistently higher than some form of long-term average, for example, the global GDP growth rate then it is possible that one day the company will be larger than the world which is not possible. Second, companies have different growth rates during its life cycle. When the company is young, it will be growing at a very rapid rate. As the company matures, the growth rate will be levelling off to a steady state due to either increasing competition or running out of innovations. To make the Gordon model more realistic, we incorporate different stages of growth into the formula.

The following example illustrates a scenario when the company is growing very fast for the first 3 year. From year 4 onwards, the company grows at a smaller but stable rate until infinity.



If price is the present value of future cashflows then

$$P_0 = \frac{D_1}{r-g} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{P_2}{(1+r)^2}$$

If D_1 is growing at a constant growth rate of g then price at time 0 can be calculated based on dividend in time 1

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

In this scenario, the constant growth rate only take effects from year 4 onwards so price at time 3 can be calculated based on dividend in time 4

$$P_3 = \frac{D_4}{r-g}$$

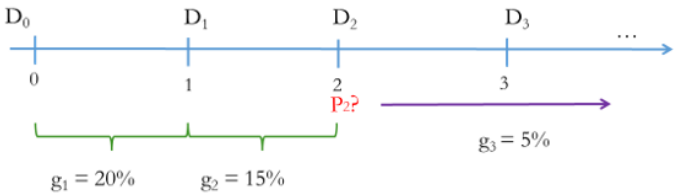
Combining these two effects, the value of the stock at time 0 is therefore given by:

$$P_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \left[\frac{\frac{D_4}{r-g}}{(1+r)^3}\right]$$

The price at time 0 is the present value of a mixed stream of cash flows for the first 3 years and growing perpetuity from year 4 onwards. The last cashflow represents P3 i.e. value of the stock at time 3. We need to discount it by further 3 periods to arrive at the present value.

Example: Suppose a firm is expected to increase dividends by 20% in one year and by 15% in the second year. That is, the first stage of rapid growth lasts for two years. After that dividends will increase at a rate of 5% per year indefinitely. If the last dividend was $1 and the required return is 20%, what is the current price P0? What is the stock price at the end of year 2?

Answer: As with any valuation exercise, the first task involves estimating future cashflows. The timeline of the cashflows is listed as follows:



Since the constant growth rate will start taking effect from dividend in year 3, this allows us to work out the value of the stock at time 2.

$$P_2 = \frac{D_3}{r-g}$$

We know the discount rate r which is 20%, and the constant

growth rate of 5%. However, we do not know dividend in time 3.

The question states that dividend will increase in the first year at 20% so $D_1 = D_0 \times (1 + 0.2)$.

For the second year, dividend will increase further by 15% so $D_2 = D_1 \times (1 + 0.15)$.

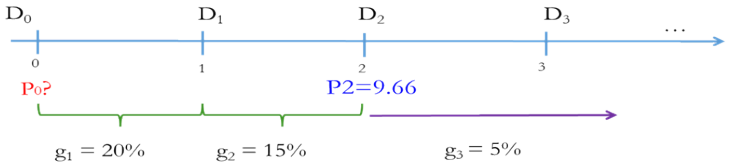
After that, dividend will increase at a rate of 5% forever so $D_3 = D_2 \times (1 + 0.05)$.

$D_3 = D_0 (1 + 0.2) \times (1 + 0.15) \times (1 + 0.05) = 1 \times 1.2 \times 1.15 \times 1.05 = \$1.449$.

Once we have dividend in time 3 and since this dividend will be growing at a constant rate forever, the value of the stock at time 2 is:

$$P_2 = \frac{1.449}{0.2 - 0.05} = 9.66$$

The cashflows for the stock can be simplified as:



The current price of the stock can be computed using D_1, D_2 and P_2 as follows:

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{P_2}{(1+r)^2}$$

$D_0 = 1$

$D_1 = D_0 * (1 + 0.2) = 1(1.2)=1.2$

$D_2 = D_1*(1 + 0.15) = 1*(1.2)*(1.15)=1.38$

$D_3 = D_2*(1 + 0.05) = 1*(1.2)*(1.15)*(1.05)=1.449$

$$P_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{P_2}{(1+r)^2} = \frac{1(1.20)}{1+0.20} + \frac{1(1.20)(1.15)}{(1+0.20)^2} + \frac{9.66}{(1+0.20)^2}$$

$$1 + 0.9583 + 6.7083 = \$8.67$$

6.4 Other approaches to share valuation

The dividend discount model is one of the most popular models used in share valuation. However, this model has a number of limitations. First, the model is not applicable for companies that do not pay dividends. Second, the model relies heavily on projecting future dividends, growth rates for varying phases, and a discount rate. Inaccurate predictions of these variables can lead to a significantly erroneous stock valuation. Essentially, the reliability of the valuation is contingent upon the precision of the input data. Therefore, due to these limitations, an alternative method of stock valuation that employs market comparables is often used. This approach assesses a company's value by comparing it with similar companies in the market.

Among the most commonly used metrics are the P/E (Price-to-Earnings) ratio and the P/S (Price-to-Sales) ratio. The underlying principle of this method is the assumption that comparable firms should exhibit similar P/E ratios. Therefore, if we possess the earnings information for the company of interest, we can estimate its market value by multiplying its earnings by the P/E ratio of its peers.

6.5 Overview of the Australian share market (ASX)

The Australian Securities Exchange (ASX) is a principal financial marketplace in Australia where securities including shares, bonds, derivatives, and other financial instruments are actively traded. As of 2024, there are 2200 companies listed on the ASX with a total market capitalisation of 2.6 trillion dollars with an average daily turnover around 6 billion dollars.

6.5.1 Primary and secondary market

The primary market refers to the sector of the capital market where new securities are created and offered directly to investors by the issuing entities. This is the market where businesses, governments, or public sector institutions can raise capital by selling financial assets such as stocks, bonds, or other instruments to investors for the first time. The funds raised through these sales are typically used for expansion, development projects, or other operational purposes. This infusion of capital from investors to issuers is a fundamental aspect of economic growth and corporate expansion. Investment banks play a crucial role in this process by underwriting these new financial assets and facilitating the Initial Public Offerings (IPOs) or the issuance of new debt. The process is characterized by several stages, including regulatory approval, due diligence, and pricing, before the financial assets are finally made available to the public.

The secondary market on the other hand is where already-issued securities are bought and sold by and to investors. Unlike the primary market where securities are first issued by companies in exchange for capital, the secondary market involves the trading of existing ownership stakes in various financial assets such as stocks, bonds, and other investment instruments. Instead, the secondary market provides a platform for investors to sell to and buy from one another, offering a means to realize the value of their investments. In this market, transactions are facilitated by brokerage firms and do not involve the issuing companies; hence, no new capital is raised for the corporations whose stocks are being traded. A key feature of the secondary market is that it offers liquidity, allowing for financial assets to be quickly converted to cash. This process is crucial for the functionality of the primary market, as investors are more likely to purchase new securities if they know they can later sell them on the secondary market.

Moreover, it enables investors to diversify their portfolios and manage risk more effectively by allowing them to adjust their holdings in response to changes in market conditions or their investment strategies.

6.5.2 Investment banking

Investment banks serve a pivotal role in the financial markets by aiding companies in securing long-term financing. They assist corporations through the complex process of issuing bonds, which is a method of raising debt, as well as conducting Initial Public Offerings (IPOs), the process through which a company's shares are offered to the public in the equity markets for the first time. In addition to helping the companies with capital raising, investment banks also play a significant role in facilitating mergers and acquisitions. They provide strategic advisory services for both buyers and sellers, helping to negotiate deals, structure transactions, and arrange the financing needed to execute mergers or acquisitions.

Investment banks are very different from commercial banks. Commercial banks cater to the day-to-day banking needs of individuals and businesses, offering services such as savings accounts, mortgages, and personal loans. These banks play a vital role in the economic cycle by accepting deposits, which they then lend out, facilitating personal and business financial growth.

Summary and key takeaways

This chapter explores the distinctive characteristics of equities and provides and overview of the Australian share market. We've acquired techniques for valuing stocks by employing methods like the Dividend Discount Model and analyzing market comparables. Shares are high-risk investments, yet they carry the potential for substantial returns. To determine the investment's merit, it's essential to assess if the expected returns from the stock adequately compensate for the risks. Upcoming chapters will broaden our understanding of this dynamic by examining the concepts of risk and return, providing a deeper insight into financial decision-making processes in the context of investing.

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Brealey, R., Myers S. C., Allen F., Edmans, A. Principles of Corporate Finance (14th Edition) 2022.

Peirson, G., Brown, R., Easton, S., Howard, P., Pinder, S. Business Finance (12th Edition) 2015.

Chapter 7 - Risk and Return:

Chapter Learning Objectives

After completing this chapter, students should be able to

- Define and measure realised and expected return on an investment
- Define and calculate measures of risk
- Measure and interpret the expected return and risk of an individual investment
- Explain the relationship between risk and return

7.1. Investment and the rate of return

An investment is the allocation of current money and resources with the hope of achieving greater returns in the future. For instance, buying a share in a company is done with the expectation that the return generated from owning the share will justify the time, the money locked up in the investment

and the risk of the investment. An investment decision should only be executed after considering the risk and return from the investment. Let's first define what constitutes the return of an investment.

The return on an investment measures the performance of the investment over a certain period. It captures the gain and loss that the investor experienced on the investment. There are two component that makes up the total return: the income component i.e. dividends from the stock, coupon (interest) payment from the bond or rental income from properties. The second component is the capital gain (loss) from the investment. It is the increase or decrease in the value of the investment asset itself, which reflects the changes in the price of the asset during the holding period.

Realised return, as the name suggests, is the return from an asset that has been realised. It measures the performance of the asset during a given period, which is the change in cashflows, divided by the initial investment. The realised return takes into account both the capital gain and income components.

Equation 1:

$$R_t = \frac{Asset\ Price_t - Asset\ Price_{t-1} + \mathrm{CF}_2}{Asset\ Price_{t-1}}$$

where:

- R_t Return over the period
- Asset $Price_t$ Price at the end of the period
- Asset $Price_{t-1}$ Price at the end of the previous period
- CF_t Dividend received over the period

Unlike realised return, expected return is the rate of return expected to be earned from the investment over a period. Expected return is about the future, while realised return is about the past. Often, the expected return is also referred to as the required rate of return, signifying the minimum rate of return investors require to justify the risk of their investment and to make the investment attractive to them.

7.2 Risk

7.2.1 Definition of risk

Webster's dictionary defines risk in the context of investments as the potential for an asset, such as stock or commodity, to decrease in value. Risk, in a broader sense, refers to the likelihood that an investment's actual return will fall short of its anticipated return. In the financial markets, since investors dislike risks while prefer assets with high expected returns, investors typically require higher expected returns as compensation for assuming greater levels of risk. The principle is that the more substantial the risk one takes, the greater the return they will demand to justify the possibility of incurring a loss. This dynamic is fundamental to investment strategy and affects how portfolios are constructed, as investors seek to align their risk tolerance with their financial goals.

7.2.2 Measuring expected return and risk

To determine the anticipated return and risk associated with an asset, we employ two methodologies:

Historical data average: This approach involves calculating the average return of the asset over a past period. By analysing historical performance data, investors can get a sense of the asset's average rate of return, which is then used as a basis to estimate future returns. The expected return estimated using the historical average is calculated as:

Equation 2:

$$E(R) = \bar{R} = \frac{\sum_{i=1}^{N} R_i}{N}$$

This process simply involves adding up each return observations and divide by the number of periods. It is just a simple arithmetic average:

Equation 3:

$$= \frac{R_1 + R_2 + R_3 + \ \ldots \ + R_n}{N}$$

Probability distribution method: This technique is applicable when the potential outcomes and their respective probabilities are known. By assigning probabilities to different possible returns, one can calculate the expected return as a weighted average, where each potential return is weighted by its likelihood. This method is more nuanced and can accommodate complex scenarios where returns are

contingent on certain events or conditions. It allows for a more tailored analysis based on specific forecasts or models of future events.

7.2.3. How do we measure risk?

Harry Markowitz in his seminal 1952 “Portfolio Selection” paper measure risk as the standard deviation of an investment’s returns. Standard deviation, a statistical measure, gauges the range of possible outcomes, indicating the volatility of returns.

To find standard deviation, we first need to compute variance and standard deviation can be found by taking the square root of the variance:

Equation 4:

$$Variance = \sigma^2 = \frac{\sum_{t-1}^{N} \left(R_t - \bar{R}\right)^2}{N-1}$$

Intuitively, variance measures the “average” squared distance from expected value i.e. what you expect to get compared to what you might get. Since it is a squared measure, standard deviation or risk is obtained by taking the square root of the variance. Essentially, the wider the deviation from expected value — or the greater the standard deviation — the higher the risk associated with the investment.

Most investors dislike risks or have an aversion to risk; this phenomenon is termed ‘risk aversion.’ Thus, investors typically demand higher expected returns from investments that are

perceived to be riskier. However, how large these compensations for risk should be?

It depends on individual risk preferences, which vary significantly among investors as some are more risk averse than others. In addition, the degree of risk aversion for a given investor can change overtime and can be affected by various factors such as personal financial situations, life stages, past investment experiences, and even broader economic conditions. Understanding this subjective element of investment risk is crucial for both individual investors crafting a personal investment strategy and for financial economists designing models that attempt to predict market behaviour.

7.2.4. Risk premium

An investment with zero risk is called a risk-free asset. An investment which has a risk element is called a risky asset, the higher the risk the higher the expected return. Risk premiums represent the additional returns that riskier investments provide over safer alternatives, such as government bonds. This premium serves as a form of compensation for investors who tolerate the increased uncertainty inherent in riskier assets compared to more secure ones.

Consider the rationale behind an investor's decision to engage in the stock market rather than depositing funds into a bank account. The choice often stems from the expectation that, although the stock market involves more risk, it also typically offers a higher return as a reward for bearing that risk. On average, historical data shows that stocks have yielded a risk premium of approximately 4-6% over Treasury bonds. This premium incentivizes investors to allocate capital to the stock market, accepting the additional risk in anticipation of greater financial rewards.

7.3 Portfolio theory

Modern Portfolio Theory (MPT), introduced by Harry Markowitz in 1952, is a revolutionary approach to investment strategy that extends beyond the merit of individual asset selection to the dynamics of portfolio composition. It's not solely about identifying a good investment but about creating the optimal mix of assets to balance the overall portfolio risk and return.

At the heart of MPT is the concept of diversification. The theory asserts that a portfolio composed of various investments will, on the whole, bear less risk than the sum of the risks of its individual components. This reduction in risk is achieved because the price movements of different assets are not perfectly correlated.

The key question is how do we come up with a "diverse investment"? This brings us to the concept of portfolio.

7.3.1 What is a portfolio?

A portfolio is a collection of assets. A portfolio is formed to reduce risk. Suppose you have $10,000 to invest and you decide to put $3,000 in stock A and $7,000 in stock B. Stock A earns an expected return of 7% p.a. while stock B earns an expected return of 10% p.a. What is the expected return of the portfolio?

Answer: The weight of stock A in the portfolio is 7,000/10,000 = 0.7. A makes up 70 percent of the portfolio and B therefore makes up 30 percent of the portfolio. The weight of all securities that make up the portfolio has to be 1. The expected return of the portfolio is the weighted average of the expected returns of the assets that make up the portfolio. In this case, it is 0.7 x 0.07 +0.3 x 0.1 = 0.052.

7.3.2. How does diversification reduce risk?

The volatility of the portfolio can be reduced if the assets in the portfolio do not perfectly move in the same direction. Suppose you have two assets X and Y and if X goes up 10%, Y goes down by 10% then by investing in both X and Y, you can achieve a portfolio with zero risk. On the other hand, if X goes up by 10%, Y also goes up by 10%, then putting both X and Y in the same portfolios will not eliminate any risk. How much risk you can reduce depends on the co-movement in returns between the assets in the portfolio. The correlation coefficient is a statistical measure that dictates the relationship between two variables. A correlation coefficient only fluctuates between -1 and 1. The lower the correlation coefficient, the greater the diversification benefits. If the correlation is 1, there is no diversification benefit.

Since every company is different, their correlation is not 1 and therefore the more companies you put into a portfolio, the greater the diversification benefits or risk reduction. However, there is a limit to diversification. As the number of companies in the portfolio increases, there is some risk that still remains. This risk is known as systematic risk.

Assets tend to move positively with each other since they are affected by macroeconomic factors that have pervasive impacts on the whole economy. Through diversification, the risk that we can reduce is unsystematic risk, risks that are specific to individual companies. On the other hand, market wide factors that affect all risky assets cannot be diversified away. Risk can be decomposed into two components:

Total risk = Systematic Risk + Firm Specific Risk.

Systematic risk, also known as market risk, is the type of risk that affects the entire market or economy. Examples of systematic risks are interest rate changes, inflation, recessions and wars etc.. Systematic risks cannot be diversified.

Firm specific risk, also known as unsystematic risk, is the type of risk that only affects a specific company or industry.

Examples of unsystematic can include poor management decisions, production capabilities or changes in consumers demand for its products and services.

Since unsystematic risks can be eliminated, the relevant measure of risk should only be systematic risk. If investors wish to hold an undiversified portfolio and hence be exposed to unsystematic risk then that is purely the decision of the investors which the market will not compensate for.

7.3.3 How is systematic risk quantified?

In finance, we measure systematic risk using beta. Beta captures the proportionate movement in the stock returns relative to the returns on the market as a whole. For example, consider a stock with a beta of 1.5. This suggests that if the market return increases by 2% during a specific timeframe, the stock's return is expected to increase by 3% (1.5 times the market movement) in that same timeframe. On the other hand, a stock with a beta of 0.5 implies that if the market return rises by 2%, the stock's return would likely increase by just 1% in that period, showing less sensitivity to market movements.

Stocks with a beta greater than 1 are considered more volatile than the entire market, while those with a beta equal to 1 have volatility that mirrors the market average. Stocks with a beta less than 1 are less volatile in comparison. The market itself has a beta fixed at 1.0. Typically, a stock's beta is found between 0 and 2, although negative betas can occur. Over time, it is observed that betas generally gravitate toward the mean value of 1.0.

7.4. The Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) developed by William Sharpe (1964) provides a description on the relationship between expected return and risk of the asset. According to the CAPM, the only relevant measure of risk is not the variance or the total risk but only the systematic risk component, which is the covariance with the market portfolio, known as beta. The higher the beta, the higher the expected return.

Expected return = Risk free rate + risk premium

Equation 5:

$$E(R_i) = R_f + \beta\,[E(R_m) - R_f]$$

The CAPM provides a useful concept for evaluating investment risks and returns. It suggests that the expected return on a security is equal to the risk-free rate plus a risk premium. The risk premium is determined by the beta of the security, reflecting how much risk the investment adds to a diversified portfolio.

Since beta is computed based the covariance with the market portfolio, we need to define what is the market portfolio. The market portfolio is a portfolio that includes all securities in the market. Since constructing such portfolio is typical costly and hence not feasible, we can get a pretty good proxy for the market portfolio. In Australia, we use the All Ordinaries Index or S&P/ASX 200 Index to proxy for the market portfolio. In the U.S, the S&P500 index or Russell 2000 are often used as the market portfolio.

Once you know the betas of the individual assets that make

up the portfolio, you can calculate the beta of the portfolio as follows:

Equation 6:

$$\beta_{portfolio} = w_1\beta_1 + w_2\beta_2 + w_3\beta_3 + \ \ldots \ + w_n\beta_n$$

Example: Support you have 3 stocks in your portfolio A, B and C. You invest $10,000 in stock A, $15,000 in stock B and $25,000 in stock C. The beta of stock A is 0.8, the beta of stock B is 1.2 while beta of stock C is 1.5. What is the beta of the portfolio?

Answer:

Total Portfolio Value=$10,000+$15,000+$25,000=$50,000.

The weight of stock A is 10,000/50,000 = 0.2.

The weight of stock B is 15,000/50,000 = 0.3

The weight of stock C is 25,000/50,000 = 0.5.

Beta of the portfolio is (0.8×0.2)+(1.2×0.3)+(1.5×0.5) = 1.27.

Summary and Key Takeaways

In this topic, we define risk and expected return of an individual asset. Next, we learn to form portfolio in order to reduce risk. In equilibrium, investors will prefer a well-diversified portfolio since it will give investors the lowest risk for a given level of expected return or the

highest expected return for a given level of risk. When investors hold a well diversified portfolio, what matters is the systematic risk component. A security's expected return only depends on the systematic risk and market risk premium.

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Chapter 8 - Foreign Exchange

Chapter Learning Objectives

After completing this chapter, students should be able to

- Describe the main features of the foreign exchange (FX) market with a particular emphasis on Australia
- Explain the purposes of FX markets
- Interpret exchange rates (direct/indirect quotes, cross rates, and bid-offer quotes)
- Explain the operation of spot and forward FX contracts

8.1 An overview of the foreign exchange market

The foreign exchange market is a global venue for the trading of currencies, allowing participants to convert one type of currency into another. The primary purposes of the foreign

exchange (FX) markets include enabling the settlement of cross-border transactions that stem from international trade activities, investment and financing operations, establishing the relative prices of different currencies, and providing a platform for market participants to hedge against potential losses due to currency value fluctuations.

These markets play a critical role in supporting international business by ensuring that entities can engage in financial transactions in the appropriate currency for their needs. Moreover, the FX markets contribute to the determination of exchange rates, which are vital economic indicators influencing global economic health. Investors and businesses utilize these markets to manage their exposure to foreign exchange risk, ensuring that currency volatility does not adversely impact their financial strategies and operations.

8.1.1 What is an exchange rate?

An exchange rate is the price at which one currency can be exchanged for another. It's an expression of the value of one currency in terms of another. For instance, if the exchange rate between the US dollar (USD) and the euro (EUR) is 1.2, it means that one USD can be exchanged for 1.2 euros. Exchange rates can be influenced by a variety of factors, including economic indicators, market speculation, political stability, and interest rates. The US dollar plays a pivotal role in the world of exchange rates due to several factors:

Reserve Currency: The USD is widely held by governments and institutions as part of their foreign exchange reserves. This widespread use as a reserve currency underpins its significance in global trade and finance.

Benchmark Currency: Many commodities and goods traded on the global market are priced in USD, including oil, gold, and many other raw materials. This means that the dollar is

a benchmark currency against which the value of other currencies is often measured.

Global Trade: The USD is the primary medium of exchange in international trade. For countries that do not have widely traded currencies, the USD serves as the intermediary, enabling easier trade between countries with different currencies.

Financial Markets: The United States hosts some of the world's largest and most liquid financial markets. This makes the USD a dominant currency for international borrowing and investing.

In addition to the USD, The Trade Weighted Index (TWI) is a complex measure that evaluates the Australian Dollar (AUD) against a portfolio of various international currencies. These currencies are selected based on their significance in international trade with Australia. The TWI assigns different weights to each currency, reflecting the proportion of trade that Australia conducts with each respective currency's country of origin.

8.1.2 Pegged versus floating exchange rates

In the aftermath of World War II, the Bretton Woods Agreement and System were established, shaping a new international monetary framework that spanned from the mid-1940s until the early 1970s. This system brought together 44 Allied nations in an unprecedented cooperative effort to manage currency exchange and foster financial stability across nations. At the heart of the Bretton Woods System was the requirement for other countries to peg their currencies to the value of the U.S. dollar. The U.S. dollar, in turn, was linked to gold at a fixed rate of 35 dollars per ounce. This gold standard for the dollar provided a sense of security and stability, as it

guaranteed that the dollar's value was backed by a tangible asset.

However, by 1971, it became evident that the United States did not possess sufficient gold reserves to support the burgeoning supply of dollars worldwide. This discrepancy led to a 'run on the gold reserve' as countries began to doubt the sustainability of the fixed exchange rate and sought to exchange their dollar holdings for gold. Developed countries started to shift from the Bretton Woods System and move towards a floating exchange rate system, where the value of a currency is allowed to fluctuate according to the foreign exchange market. In this new era, exchange rates were no longer fixed to a specific gold quantity or pegged to the dollar. Instead, they were determined by supply and demand dynamics, influenced by factors such as interest rates, economic performance, and geopolitical events.

This transition marked the beginning of modern foreign exchange markets which is a complex global system where currency values are subject to rapid changes and are influenced by a multitude of economic conditions and policies. The shift to floating rates also reflected a broader trend towards liberalized trade and capital flows, setting the stage for the integrated global economy that continues to evolve in the present day.

In today's global economy, most currencies are subject to floating exchange rates, where their values are determined by the forces of market supply and demand. This market-driven approach can lead to greater short-term fluctuations in currency values, as they respond to real-time economic events and sentiment. However, this system also tends to prevent the build-up of imbalances that require large, disruptive adjustments.

For instance, Australia made a significant shift in its monetary policy by allowing the Australian Dollar (AUD) to float on the 12th of December 1983. This transition from a fixed

exchange rate meant that the AUD's value was no longer tied to any specific foreign currency or set of currencies, and instead, its value could change from moment to moment based on trading in the foreign exchange market. This move was aimed at giving the Australian economy greater flexibility to absorb external shocks and to align more closely with the constantly changing conditions of the global economy.

In contrast, some developing countries employ a managed floating rate system. This hybrid approach allows a currency to float in the foreign exchange markets, but the central bank might intervene to stabilize or adjust the currency's value in relation to other currencies. The Chinese Yuan (CNY), for instance, has been managed in such a way that it is loosely pegged to a basket of currencies, allowing the People's Bank of China to guide its valuation while still letting market dynamics play a role.

8.1.3 The role of exchange rates in the economy

Exchange rates hold critical significance within an economy, as they are the determining prices at which a country values its international transactions. They directly affect the local cost of goods and services that are traded in foreign currencies, as well as the domestic valuation of foreign assets and liabilities held by investors within the country.

- **Exporters**: Companies based in Australia that manufacture goods or provide services domestically and then sell these to international customers are subject to exchange rate risk. A rise in the value of the Australian Dollar (AUD) against other currencies can make their products more expensive and less competitive in global markets. Exporters will favour a low exchange rate.

- **Importers**: Businesses that import goods and services to sell within Australia will benefit if AUD appreciates as the same AUD now buys more of the foreign goods. A weaker AUD on the other hand increases the cost of purchasing these foreign goods, affecting profitability.
- **Investors**: Australians investing in international markets, whether in stocks, bonds, or real estate, must consider the impact of exchange rate movements on their investments. If the AUD depreciates against the currency of the investment, the value of the investment in AUD terms increases, and vice versa.
- **Borrowers**: Entities or individuals that take out loans denominated in foreign currencies face risks if the AUD weakens against the currency they must repay their debt in. This could increase the cost of servicing the debt when converted back into AUD.

The influence of exchange rates extends beyond these groups to almost every sector that engages with the global economy, from tourism operators to multinational corporations. It affects decisions ranging from pricing strategies and budget forecasting to international expansions and hedging policies.

8.2. Quotes of foreign exchange

A direct quote in the context of foreign exchange (forex) is the price of one unit of a foreign currency expressed in terms of the local or domestic currency.

In Australia, the value of the Australian dollar is measured as the value of 1 AUD relative to the US Dollar, often abbreviated as AUD/USD. For example, if AUD/USD equals to 0.68, this means that 1 AUD can be exchanged for 0.66 USD or 66 US cents. An increase in this measure reflects an appreciation of the AUD,

while a decrease in AUD/USD reflects the AUD has depreciated against the USD.

8.2.1. Cross rates

Cross rates are exchange rates between two currencies calculated from their common relationships with a third currency, often known as the intermediary currency.

Example: Imagine you are an investor or a traveller looking to exchange EUR for AUD, and there's no direct EUR/AUD quote available. You can calculate the cross rate EUR/AUD using USD as the intermediary currency. EUR/USD = 1.15 (1EUR = 1.15 USD). AUD/USD = 0.77 (1 AUD= 0.77 USD).

EUR/AUD = EUR/USD * USD/AUD. You do not have USD/AUD, what you have is AUD/USD which is 0.77. Therefore, USD/AUD = 1/0.77 = 1.3. EUR/AUD = 1.15 * 1.3 = 1.495. So, 1EUR = 1.495 AUD.

8.2.2 Explaining exchange rate movement

Exchange rates movements are very difficult to predict. There are a number of factors that influence the fluctuations of exchange rates and these factors do not happen in isolation, they often interact with each other which makes exchange rate movements very difficult to predict.

1. **Purchasing Power Parity**: PPP is based on the law of one price which states that in the absence of transaction costs and other barriers to trade, the price of identical goods and services should equalize across different countries when prices are expressed in a common currency. This is because any significant price differences would be eliminated through arbitrage—the practice of buying

goods in a cheaper market to sell them in a more expensive one. In practice, PPP does not hold because of transaction costs, tariffs and other trade barries exist and can prevent the prices of the same goods to be equal. In addition, PPP only applies to tradable goods and not to services such as haircuts.

2. **Expected interest rate parity (EIRP)**: Interest rate parity suggests the difference in interest rates between two countries will be equal to the differential between the forward exchange rate and the spot exchange rate of their currencies. Carry trade is a strategy used by investors where they borrow money in a currency with a low-interest rate and invest it in a currency with a higher interest rate. The goal is to profit from the interest rate differential as long as the exchange rate between the two currencies does not offset the profit from the interest rates. Even though carry trades are based on exploiting the interest rate differentials, they are not reliable predictors of currency movements because currency values are influenced by many factors other than interest rates, including economic data, political events, and market sentiment. Central banks can change interest rates unexpectedly, affecting currency values and carry trade positions or high-interest rate currencies often come with higher risk, which can lead to sudden and sharp "unwinding" of carry trades if the market sentiment changes.
3. **Expected interest rates**: When a country is expected to raise its interest rates, it often leads to an inflow of foreign capital. Investors and international capital tend to seek the highest return, so if they expect a country's interest rates to rise, they might start moving funds into that country's assets in anticipation of higher returns. This increased demand for the country's currency (needed to purchase the local assets) tends to drive up its value.

4. **Terms of trade (ratio of export prices to import prices)**: The terms of trade measure the rate at which a country's exports can be exchanged for imports. An improvement in the terms of trade (where export prices rise relative to import prices) typically generates more revenue from exports relative to the cost of imports. As international buyers purchase a country's exports, they need to acquire the country's currency to make payments, leading to increased demand for that currency on the foreign exchange market. As demand for the currency increases, its value will generally appreciate. If the terms of trade deteriorate (export prices fall or import prices rise), demand for the currency weakens, leading to depreciation. For a country like Australia, which is a major exporter of commodities such as iron ore, coal, and natural gas, the terms of trade are significantly influenced by global commodity prices. When commodity prices are high, Australia's terms of trade improve, strengthening the AUD.
5. **Current account balance**: The current account includes the trade balance (exports and imports of goods and services), net income from abroad (like dividends and interest), and net current transfers (such as foreign aid, remittances). When a country's exports exceed its imports, it has a trade surplus, and there is a higher demand for its currency. This is because foreign buyers need to exchange their currency for the exporting country's currency to pay for the goods or services. This increased demand can cause the currency to appreciate. Conversely, if a country's imports are greater than its exports, it has a trade deficit. This condition means that more of its currency is being used to purchase foreign goods and services than is being brought in by exports. This increased supply of the currency on the global market can lead to depreciation.
6. **RBA intervention**: Central banks may intervene in foreign

exchange markets to influence the value of their currency. This is typically done to counteract excessive volatility or misalignments that are not consistent with the country's economic fundamentals. If a central bank believes its currency is undervalued and has depreciated too much due to market overshooting or speculation, it may intervene by buying its own currency. This demand can prop up the currency's value. Conversely, if the currency is deemed to be overvalued, the central bank may sell its own currency to push down its value, making exports more competitive. Interventions are generally large in scale to ensure they have the necessary impact on the market. However, they tend to be infrequent to maintain the market credibility of the central bank and avoid the expectation that the central bank will always act to correct movements in the exchange rate.

7. **Speculation**: Speculation in the context of foreign exchange (FX) refers to the act of trading currencies with the aim of making a profit from fluctuations in exchange rates. Speculators do not necessarily intend to take delivery of the currency; instead, they seek to predict and capitalize on market movements.

Takeaway and Summary

In this chapter, we have defined some of the

terminology and functions regarding the foreign exchange market. We also explore the role that the forex market plays in the economy and grasp the underlying principles that drives changes in exchange rates.

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