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CHAPTER 0: FINANCIAL MATHEMATICS

GENERAL NOTES

Introduction

Financial maths concerns the analysis of *cash flows* between two parties subject to a contract. If money is borrowed, there is an initial *cash inflow* to the borrower, but afterwards there will be a *cash outflow* in the form of repayments.

EG: A person borrows $100 and promises to repay the lender $60 after 1 year and $60 after 2 years. Show the resulting cash flows for borrower and lender.

Borrower: $100 received. **Lender:** $120 received back

The extra $20 that the lender receives is compensation for *forgoing current consumption* to *obtain future consumption.* The lender requires compensation for:

The 'Time Value' of Money

The Time Value of Money refers to the idea that the value of money changes over time when invested through interest earned on investment. As a consequence of this, different amounts **cannot be added** at different points in time; in fact, you can only add amounts at the **same point in time.** Therefore, this concept provides the means for valuing *multiple* cash flows at different points in time.

Thus, adding amounts at different points in time infers an interest rate inclusive. Interest rates are determined by factors such as *inflation, CPI & PPI* (Consumer Price Index & Producer Price Index), and there can potentially be a different interest rate for each type of financing transaction. Therefore, an important aspect of valuation is applying the **appropriate interest rate.**

In essence, most financial math formulae are a form of **present value calculation;** that is, these formulae identify the *future cash flows* of a financial instrument and then calculate the value at which the above instrument could be *exchanged for cash today*.

RATE OF RETURN

Every time money is leant, it provides a return when it is later paid back in the form of **interest;** that is, a fee for borrowing money. There are varying interest rates charged relative to security of the loan, with the most secure and largest corporations receiving a **prime rate**; that is, a very low interest level. However, the more unsecure the loan is, the larger the interest rate attached to it. There are two basic types of interest:

SIMPLE INTEREST

When a **simple** interest rate is offered, it infers a rate that is taken as a *proportion of the initial loan amount* eg. 12% p.a. simple = 1% per month = 3% per quarter etc. The quoted rate is often referred to as the **nominal rate.**

Formula: $\textbf{Simple interest rate} = \textbf{PV}(\mathbf{1} + \mathbf{it})$

Where:

- **PV** – principal amount i.e. amount borrowed.
- **i** – interest rate as a percentage of.
- **t** – number of years (periods) elapsed, of fraction thereof.

Simple interest rates are usually associated with **short-term loans** i.e. less than 12 months.

Future Value

In general, the amount repayable, or FUTURE VALUE of a loan quoted as simple interest is given by:

$$\mathbf{FV = PV\left[1 + \left(\frac{f}{365}\right) x\ i\right]}$$

Where:

- **FV –** Future Value (the amount repayable)
- **PV –** Present Value (principal)
- **f –** number of days
- **i –** annual simple interest rate

EXAMPLE: *Calculate the effective annualised return for a $100, 00 investment which earned 6.5% p.a. for 90 days.*

PV = 100, 000; f = 90; i = 0.065 (6.5%). Therefore: **FV = 100, 000[1+(90/365)x0.065) = 101, 602.70**

Present Value

Using the same figures, the PRESENT VALUE of a future loan repayment quoted as simple interest is given by:

$$\mathbf{PV = \frac{FV}{1 + \left(\frac{f}{365}\right) X\ i}}$$

EXAMPLE 1: *Barns and Co Ltd. currently has a non-tradable bank note with a face value i.e. future value of **$500, 000** that will mature in **85 days**. Barns and Co has negotiated with its lender to obtain a loan using the note as security. The lender requires an establishment fee of **$440** and charges **simple interest of 9%** p.a. How much will Barns and Co [1]receive, and what is the [2]total cost of the funds?*

FV = 500, 000; f = 85 (days); i = 0.09 (9%).

$$^{1}\boldsymbol{FV = 500,000\left[1 + \left(\frac{85}{365}\ x\ 0.09\right)\right] = 510,479.45}$$

$$PV = \frac{500{,}000}{1+\left(\frac{85}{365}\right) x\ 0.09} - \mathbf{440} = \$489,\ 295.\ 68.$$

Hence: 500, 000 – 489, 295.68 = $10, 704.32 (cost of funds)

EXAMPLE 2: *A bill with a face value i.e. **future value of $500, 000** and a term to maturity of **180 days** is sold at a yield of **8% p.a**. What are the proceeds of the sale?*

FV = 500, 000; f = 180; i = 0.08 (8%) Therefore, $PV = \frac{500{,}000}{1+\left(\frac{180}{365}\right) X\ 0.08}$ = **481, 022.67**

Under the simple interest rate, when the *Present Value/Principal* is **unknown:**

$$\mathbf{PV} = \frac{\mathbf{I}}{(\frac{\mathbf{f}}{\mathbf{365}} \mathbf{x\ i})}$$

Where:

- **PV –** Present Value/Principal
- **I –** The interest <u>amount</u> paid at end of loan
- **i –** Interest <u>rate</u> p.a.
- **f –** Number of days/periods

When the *Interest Rate* is unknown:

$$\mathbf{i} = \frac{\mathbf{I}}{(\frac{\mathbf{f}}{\mathbf{365}})\mathbf{PV}}$$

Simple Interest rates are usually charged on treasury notes, bills of exchange and promissory notes (see later chapters)

Where:

- **i** – the annual interest rate
- **I** – Interest charge payable at end of loan
- **f** – number of periods/days elapsed
- **PV –** Present Value/Principal amount

NOTE! In the above calculations, the exact number of days must be physically counted.

1. <u>COMPOUND INTEREST</u>

Idea: When a principal amount is invested, it generates interest. This interest is then reinvested, and interest is then generated on that interest. Therefore, compound interest earns interest on both the principal amount **and** upon the interest earned upon interest.

Future Value

Formula (for a period of 'n' years):

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

Where:

- **FV –** Future Value
- **PV –** Present Value
- **i -** interest rate
- **n** – number of compounding periods

EXAMPLE: *Suppose we invest $100, 000 at 10% p.a. with interest payable annually. What is the* ***future value*** *of this investment after 4 years?*

PV = 100, 000; i = 0.1 (10%); n = 4. Therefore: **FV = 100,000(1+0.1)^4 = 146, 410**

Interest component = 46, 410

As compared to **simple interest: FV = PV(1+it) → FV = 100, 000(1+0.1x4) = 140, 000**

Interest component = 40, 000

Therefore, ***compound interest*** provides a greater interest return on an investment than ***simple interest***, leading to the idea that 'small' sums now become much larger sums later.

Present Value

Formula:

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

EXAMPLE: *What is the* ***present value*** *of $1m to be paid in 100 years time if the interest rate is 15% p.a.?*

FV = 1, 000, 000; i = 0.15 (15%); n = 100. Therefore, **PV = 1, 000, 000/(1+0.015)^{100} = $225, 629.45**

Hence, compounding for present value shows that 'large' sums to be paid later are worth only 'small' sums now.

Average Growth Rates

Compound interest is a special case of compound growth where the growth rate is **constant** each period. In compound growth, generally, the growth rate **may change** each period. In practice, growth rates **change from year to year.** We need to be able to calculate the future value and present value of an investment where rates of return change throughout the life of the investment.

The average rate of growth per period over 'n' time periods is:

$$g = (1 + \frac{Value\ at\ end - Value\ at\ beginning}{Value\ at\ beginning})^{\frac{1}{n}} - 1$$

EXAMPLE: *House prices in Melbourne have soared in the past four years. The median price of a house in Clayton at the end of each year is as follows:*

1997 - $122, 000; 1998 - $135, 000; 1999 - $147, 000; 2000 - $185, 000

What is the ***average annual compound growth rate*** *for housing prices over this period?*

$$g = (1 + \frac{185,000 - 122,000}{122,000})^{\frac{1}{3}} - 1 = 0.148869\ i.e.\ 14.89\%$$

Real Interest (after Inflation)

Inflation reduces the purchasing power of money. Therefore, a methodology is required to adjust rates of return to account for the impact of inflation.

Formula:

$$(1+q) = (1+r)(1+p) \longrightarrow r = \frac{(1+q)}{(1+p)} - 1$$

Where:

- ✓ q – quoted interest rate
- ✓ r – real interest rate
- ✓ p – inflation rate

EXAMPLE: *A lender quotes an interest rate of 18% p.a. for an investment. If the inflation rate is currently at 4% p.a., what is the real interest rate earned by the investor?*

q = 0.18(18%); p = 0.04(4%). Therefore; **(1+0.18) = (1+r)(1+0.04) → (1+0.18)/(1+0.04)=1+r → r = (1+0.18)/(1+0.04)-1 = 0.1346 i.e. 13.46%**

Effective and Nominal (Quoted) Interest Rates

To compare interest rate quotations (the nominal interest rate), we refer at an **effective interest rate;** that is, the interest rate that would be received if interest were paid once at the end of the year.

Simple Interest

Formula (converting nominal to effective):

$$i = (1 + \frac{j}{m})^m - 1$$

Where:

- i = effective interest rate per period
- j = nominal interest rate per period
- m = frequency of compounding within period eg. 1 = annually, 2 = semi-annually, 4 = quarterly

EXAMPLE: If the nominal rate is 15% p.a. **payable monthly**, then the effective rate is...

i = (1+0.15/12)^12-1 = 0.1608 (16.08%)

Compound Interest

Future Value

Formula:

$$FV = PV\left(1 + \frac{j}{m}\right)^{n}$$

Present Value

Formula:

$$PV = \frac{FV}{\left(1 + \frac{j}{m}\right)^{n}}$$

Interest Rate

Formula:

$$j = \left[\left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1\right] m$$

Where:

FV = Future Value; PV = Present Value; j = interest rate/annum; n = no. of compounding periods; m = no. of interest payments/annum.

<u>Continuous Compounding</u>

Idea: Continuous compounding refers to the notion that interest is being compounded on the principal amount continually, minutely, or hourly. As the compounding frequency increases for a given nominal interest rate, the higher the interest repayments. However, the interest repayment will eventually reach a maximum with continuous compounding.

Future Value

Formula:

$$FV = PVe^{jT}$$

Present Value

Formula:

$$PV = \frac{FV}{e^{jT}}$$

Where:

- FV = Future Value
- PV = Present Value
- e = base of natural logarithms (=2.71828)
- j = continuously compounded interest rate
- t = number of compounding periods

Continuously Compounded Returns

Formula:

$$R_t = In(P_t/P_{t-1})$$

Where: R_t = The continuously compounding return from time period t-1 (past period) to t (present).

NOTE! P_t/P_{t-1} is referred to as the ***price relative.*** It is the proportional price change from time t-1 to t.

Properties of Continuous Compounding

1) Continuously compounding returns over a period can be added to give a total continuously compounding return.
2) The average continuously compounding return over a period is the average of each individual continuously compounding return.

EXAMPLE: *A stock price has a closing price of* ***$3, $3.25*** and ***$2.90*** *over 3 days. What is the:*

a) ***Continuously compounding return on each day:***
Day 1: In(3.25/3) = 0.0800 i.e. 8%
Day 2: In(2.90/3.25) = -0.1139 i.e. -11.39%
b) ***Total continuously compounding return:*** 0.0800-0.1139 = -0.0339 i.e. -3.39%
c) ***Average continuously compounding return:*** -0.0339/2 = -0.01695 i.e. -1.7%

MULTIPLE CASH FLOWS

Future Value

If, there is an investment over **6 years**, and:

- In the 2nd year, $200 is invested.
- 3.5 years in, $450 is invested.
- 5 years in, $800 is invested.

Assuming the interest rate is 0.09(9% p.a.), the **stream Future Value is** (using FV compounding formula)**:**

200(1+0.09)^4+450(1+0.09)^2.5+800(1+0.09)^1 = **$1,712.50**

Present Value

If there is an investment over **5 years,** and:

- In the 5th year, $800 was invested.
- 3.5 years in, $450 was invested.
- 2 years in, $200 was invested.

Assuming the interest rate is 0.09(9% p.a.), the **stream Present Value is** (using PV compounding formula):

800/(1+0.09)^5+450/(1+0.09)^3.5+200/(1+0.09)^2 = **$1, 021.11**

Net Present Value

The Net Present Value is the sum of all inflows and outflows of cash at their PVs, less the cost of the project. The sum of all PVCFs – Cost = **Net gain in wealth.**

EXAMPLE: *Suppose it cost $2, 000 to purchase the following stream of cash flows, and the discount rate is 7.5%, the net present value of this stream is:*

Cash Flows:

- Year 1: $880 → PV = 880/(1+0.075)^1 = $818.60
- Year 2: $560 → PV = 560/(1+0.075)^2 = $484.59
- Year 3: $420 → PV = 420/(1+0.075)^3 = $338.08
- Year 4: $980 → PV = 980/(1+0.075)^4 = $733.82

} $2, 375.10 - $2, 000 = $375.10 – **NPV!**

As such, since the total present value of the projects inflows outweigh the initial cost of the project, the project should be accepted. In general, should be accepted if NPV is greater/equal to 0.

Internal Rate of Return

If the investment is bond, the IRR is referred to as "yield-to-maturity" or simply the "yield". In a sense, the IRR is the rate of return required to make NPV=0.

Formula: **(SOLVING FOR 'r')**

$$\frac{C1}{1+r} + \frac{C2}{(1+r)^2} + \cdots + \frac{Cn}{(1+r)^n} - C0 = 0$$

Where:

- Cn = Cash flow
- r = rate of return

ANNUITIES

Many financial contracts involve annuities. There are FOUR types of annuities:

1) **Ordinary Annuity**
2) **Annuity-due**
3) **Deferred Annuity**
4) **Ordinary Perpetuity**

The basic annuity is an ordinary annuity. All other types can be related to the ordinary annuity.

1. Ordinary Annuity

Three features of Ordinary Annuities:

a) Equal cash flows.
b) Equal time periods between cash flows.
c) One time period from **"now"** i.e. 't', to first cash flow.

NOTE! All annuities share the first two characteristics.

Present Value

Formula:

$$P = \frac{R}{i}\left[1 - \frac{1}{(1+i)^n}\right]$$

Where:

P – present value of annuity; **R –** annuity p.a.; **i =** interest rate; **n =** no. of periods.

EXAMPLE: *Interest = 8% p.a., find PV of $50 p.a. for 4 years:* $P = \frac{50}{0.08}\left(1 - \frac{1}{(1.08)^4}\right)$ = $165.61

Future Value

Formula:

$$S = \frac{R}{i}\left[(1+i)^n - 1\right]$$

Where:

- **S –** future value of annuity
- **R –** annuity p.a.
- **i –** interest rate
- **n –** number of periods

EXAMPLE: *On 1st Feb, 2001,the sum of $200 is deposited in a savings account* ***each month*** *until 1st Jan, 2004. Assuming an interest rate of 6% p.a., what is the value of this savings plan on 1st Jan, 2003?*

- Effective interest rate = 0.06/12 months = 0.005
- n = 24 (2 years)

Therefore: S = $\frac{200}{0.005}\left[(1 + 0.05)^{24} - 1\right]$ = $5, 086.39

2. Annuity-due

An annuity-due is an annuity whose payment is to be made **immediately,** as opposed to at the end of the period.

Present Value

Formula:

$$P = R + \frac{R}{i}\left[1 - \frac{1}{(1+i)^{n-1}}\right]$$

3. Deferred Annuity

A deferred annuity is an annuity whose payment is made later on its life eg. 4 years in, as opposed to an ordinary annuity, which is after 1 period.

Hence, deferred annuities use the **same formula as ordinary** annuities, but there are two approaches to distinguishing (use example of 4 years in):

1) Consider it as an ordinary annuity of 5 cash flows, deferred 3 periods.
2) Consider as difference between two ordinary annuities, one of 8 cash flows and one of 3 cash flows.

4. Ordinary Perpetuity

An ordinary perpetuity, as the name suggests, is an annuity where the number of time periods is indefinitely large.

Present Value

Formula:

$$P = \frac{R}{i}$$

Where:

- P – Present Value of annuity.
- R – annuity p.a.
- i – interest rate.

EXAMPLE: The present value of $100 received each month for the next 150 years, i = 9%p.a.

P = 100/0.09 = $1, 111.11

NOTE! Exclude the time periods of the annuity i.e. 150 years, because as time increases, the change in value of the annuity approaches 0; that is, change becomes almost negligible.

<u>LOAN REPAYMENT SCHEDULES</u> NOTE! *Refer to Fin. Math Solutions - Tutorial 1 for Formulae*

Many loans require payment in equal amounts at regular time intervals.

Amortising loan

One form of a loan is an ***amortising loan,*** where there are repayments of principal and interest each period. However, to work out how much of the repayment is principal and how much is interest, the following formula must be followed:

$$Interest\ proportion = \frac{Interest}{Repayment}$$

Outstanding Loan Balance at a Given Time

The balance owing, at any time during the life of the loan, must be **equal** to the **present value** of the remaining payments.

Effects of Varying the Interest Rate

If the Interest Rate increases, the borrower has the choice to:

a) Pay a larger percentage of the amount owing per month.
b) Extend the loan period for a certain number of years more.

The opposite is true for lowered interest rates.

The choice made by an investor will depend on their current cash flow position, the requirements of the lender, and the circumstances impacting on the investor's financial goals.

CHAPTER 1: OVERVIEW OF THE FINANCIAL SYSTEM

GENERAL NOTES

Role of the Financial System

The financial system constitutes a mechanism by which people buy and sell financial instruments. It is comprised of *institutions, markets* and *money*. Money is considered the medium through instruments are exchanged.

Financial Markets have 5 roles:

1. *To facilitate the flow of funds*

Key role: To permit the flow and efficient allocation of funds throughout the economy.

Explanation: Financial institutions allow for the flow of funds

- From savers or ***surplus spending units*** **(SSUs);** that is, people with excess funds who choose to invest in the market in exchange for financial instruments. They are considered to be in a **surplus budget position;** that is, their income for the period exceeds their expenditure, and so they have surplus funds to invest.
- To borrowers or ***deficit spending units*** **(DSUs);** that is, people who require these funds in return for financial instruments. They are considered to be in a **deficit budget position;** that is, their expenditure for the period exceeds their income, and so they require funds to meet their expenses.

2. *Provides the mechanism to settle transactions*

The financial system permits the flow of funds through the economy. This occurs through the millions of transactions that are conducted each day. These transactions generate a transfer of funds that must be settled within the system. The mechanism for settling these transactions if provided through the **payments system.** An effective payments system is characterised by its *speed, cost* and *stability*. But to run effectively, such a system would also need to have strong financial institutions and settlement mechanisms among them.

3. *Generates and disseminates financial information*

A financial system has to also provide economic and financial information to allow participants to make informed investment decisions. This information needs to be available in a timely fashion to allow all market participants to have an equal opportunity to act upon it.

Credit ratings play a large role in the provision of information on financial instruments and their use. Credit rating agencies publish assessments on the financial standing of institutions and their securities, giving a rating ranging between AAA to B-. However, several weaknesses have been identified with these credit rating agencies in recent years, including:

- Suggested errors in rating debt products that have since been downgraded or defaulted.
- Allegations that they are too slow in providing information, and reluctant to downgrade organisations.

4. ***Provides the means to transfer and manage risk***

Risk relates to uncertainty and the chance of unexpected outcomes. A key role of the financial system is to manage financial risk and/or transfer risk onto other parties. The financial system provides the mechanisms for doing by including **insurance products,** through **securitisation** – (packaging like-assets and selling them to a third party) and through **derivative products.**

5. ***Provides ways of dealing with <u>incentive problems</u>***

Incentive issues that arise in financial contracts, which the financial system has a role in mitigating include:

- **Information asymmetry** – occurs when the contracting parties do not have equal access to relevant information, placing one party at an advantage eg. If a bank does not have full complete financial details about a borrower (i.e. financial position, credit worthiness), it could result in them selecting and providing a loan to a less than optimal candidate. This is also known as **adverse selection**.
  To mitigate this: Standardised credit procedures are now in place, as well as regulations where both parties have to provide adequate information.

- **Moral hazard –** risk that one party to a contract may *change* their behaviour to the detriment of the other party once the contract is concluded eg. Once insurance is provided on an asset, the covered party may not be as careful to protect the asset.
  To mitigate this: Continuous monitoring of clients and regulations requiring continuous disclosure of information are now being required by companies.

- **Agency problem** – risk that the interests of the shareholders and management aren't aligned, and that managers will look after their own needs and interests whilst neglecting those of the shareholders of the firm.
  To mitigate this: Financial system implements a regulatory environment that promotes alignment, and penalises those who breach their duties.

Potential Moral Hazard – once drivers are insured, they will not be as careful to stick to the speed limit as it will be covered by insurance.

Transferring funds from SSUs to DSUs

The **MOST IMPORTANT** function of the financial system is to *facilitate the flow of funds* from Surplus Spending Units (SSUs) i.e. people with excess funds who choose to invest, such as households, to Deficit Spending Units (DSUs) i.e. people in need of funds, such as businesses and the government.

Process is contained below:

There are two ways funds can be transferred from SSUs to DSUs: Through **direct financing,** and **indirect financing.**

Direct Financing

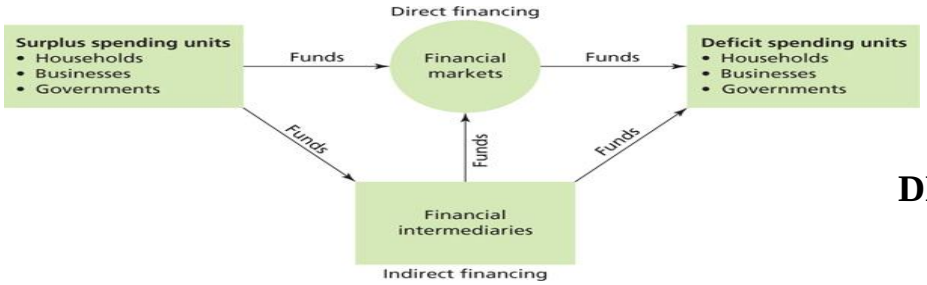
SSUs lend money directly to DSUs, accepting a financial claim in return i.e. an IOU from the borrowing party. This exchange takes place **without an intermediary.** SSUs then hold these financial claims in their portfolios as interest-bearing assets. However, there are several limitations attached to direct financing:

- The *amount saved/invested* i.e. the amount supplied, often doesn't match up with the demand of funds, especially when there is an SSU investing a small amount while a much larger amount is required by a DSU.
- The *timing of funds/cash flows* often don't match up. On the supply side i.e. the amount invested/saved, the timing of investment is usually for only a short period of time. However, on the demand side, DSUs require much longer-term funding to finance their project.

Indirect Financing

As above, *direct financing* not only involves denominations of **very large amounts,** and so few consumers can transact in the market, but also requires DSUs to find SSUs that want direct claims with **precisely** the characteristics they are willing and able to sell.

These problems are resolved through the use of an intermediary, such as a bank, that *purchases direct claims* with one set of characteristics from DSUs, transforming them into *indirect claims* with a different set of characteristics eg. changing the term-to-maturity, denomination, which they then sell off to SSUS. In essence, intermediaries are able to receive various amounts of investment from SSUs, pooling them together to create a denomination which fits the description and required amount for a DSU.



DIRECT V. INDIRECT FINANCING

Benefits of Financial Intermediation (Indirect Financing)

- ✓ **Denomination divisibility –** by pooling together the funds of many individuals and investors ('suppliers'), they are able to facilitate demand of large funds from DSUs.
- ✓ **Currency transformation –** financial intermediaries are able to purchase financial claims denominated in one currency and sell the same financial claims in another currency, thus allowing for investment in foreign currencies.
- ✓ **Maturity flexibility –** financial intermediaries are able create securities with a *wide range of maturities* by buying direct claims issued by DSUs and issuing indirect securities with the precise maturity desired by SSUs.
- ✓ **Credit risk diversification –** by purchasing a wide variety of securities, financial intermediaries are able to diversity their investment and reduce risk.
- ✓ **Liquidity –** many of the financial commodities produced by intermediaries are highly liquid, meaning that securities are able to be resold at a close approximation of their actual value without loss of capital.

Types of Financial Intermediaries

There are many types of financial intermediaries in the economy, but they all have 1 feature in common:

They purchase financial claims with one set of characteristics from DSUs, and sell financial claims with different characteristics to SSUs.

The different financial intermediaries in the economy include:

1. *Banks* – accept deposits, provide loans.

Non-Bank Financial Corporations (NBFCs) – provide the same services as banks**:**

2. *Building societies*
3. *Credit unions*
4. *Money-market corporations*
5. *Finance companies*

Other Financial Institutions

6. *Life insurance companies*
7. *General insurance companies*
8. *Superannuation funds*
9. *Managed funds*
10. *Securitisers*

A list of Financial Intermediaries and their assets are contained below:

Financial intermediary	Number of institutions	Assets ($ billion)
Authorised deposit-taking institutions (ADIs)[a]	211	2409.0
Banks	58	2334.5
Building societies	12	22.1
Credit unions	133	42.5
Other ADIs	8	9.9
Foreign bank representative offices	18	n.a.
General insurers	130	91.0
Life insurers	32	232.9
Friendly societies	24	6.6
Money market corporations	26	123
Finance companies[b]	120	133
Securitisers	n.a.	229
Licensed trustees	292	n.a.
Superannuation entities[c]	6252	673.6
Total	7105	3898.1

International Organisations

In addition to domestic financial institutions, international organisations play a significant role in global financial markets. Organisations include:

Bank of International Settlements (BIS)

Characteristics:

- Encourages international monetary and financial cooperation.
- Acts as a banker for the central banks of countries around the world.
- Plays an important role in maintaining the stability of the global financial system.

World Bank

Characteristics:

- Agency of the UN that aims to reduce poverty/improve living standards in developing nations.
- Provide low and no-interest credit grants to developing countries.

The International Monetary Fund

Asian Development Bank

Characteristics:

- Aims to reduce poverty and improve living conditions and quality of life in Asia-Pacific region.

Types of Financial Markets

Financial markets provide the setting for people buy and sell **financial claims**. There are 4 criteria for these markets:

- **The order/timing** of financial claims
- **Flat form** to trade financial claims
- **Type** of financial claims
- **Time to maturity** of financial claims

Primary markets

Characteristics:

- Setting for **initial selling** of financial claims by DSUs.
- People more likely to purchase financial claim here if don't have to hold on to it forever, or at least until maturity date.

Secondary markets

Characteristics:

- Setting for selling 'used' i.e. **previously issued** financial claims.
- Securities are sold once in primary markets, thereafter in secondary.

Organised markets

Characteristics:

- Once issued, claims can be traded in the secondary market on an **organised security exchange** (such as the ASX – Australian Stock Exchange).
- Provide a **physical meeting place** and facilities for members to conduct transactions under **specific rules/regulations.** These include:
    - Only members of the exchange may use the facilities.
    - Only securities on the exchange may be traded.

Over-the-counter markets

Characteristics:

- **No central location,** unlike organised markets.
- Contains **very strict rules** that must be followed by dealers in the market.

Futures markets

Characteristics:

- Contracts for **future delivery** of securities and commodities are sold here i.e. Futures Contracts

Option markets

Characteristics:

- Options contracts call for one party to perform a **specific act** if called upon by the option buyer/owner.

Foreign exchange markets

Characteristics:

- Setting for buying and selling of **foreign currencies.**

International markets

Characteristics:

- Domestic/overseas firms can borrow or lend large amounts of Australian dollars that have been deposited in **overseas banks.**

Financial markets are then generally classified into either **money** or **capital** markets:

Money Markets

Characteristics:

- Setting for trade of **short-term instruments** i.e. wholesale short-term to maturity claims of **less than 12 months.**
- *Banks* use money markets to adjust liquidity position by borrowing and lending for a short-time.
- *RBA* conducts monetary policy on money markets.
- Financial claims have characteristics very similar to money: **short maturities, highly liquid, low default-risk.**

Money market instruments:

Treasury notes

Characteristics:

- Promissory notes issued on behalf of the **Commonwealth government** by the RBA, allowing the government to borrow money from the money markets.
- Are short-term **discount securities**; that is, securities issued at *less than face value*, with the difference between face value and discount price being the return to the investor.

NOTE! In recent years, the use of T-notes has declined as government budget surpluses have been used to *reduce government debt.*

Commercial paper

Characteristics:

- **Unsecured*** promissory note of a large business.
- Issued by a borrower that undertakes to pay a certain amount of money at a future date.
- **Discount securities** that have a maturity of few to 120 days.
- Because they are unsecured, only companies with **good credit ratings** are able to issue them.

*Unsecured means that if the business were to go bankrupt, the security would be lost entirely as it isn't backed by the bank.

Commercial bills

Characteristics:

- **Largest component** of money market.
- **Most active** secondary market.
- Short-term discount securities.
- Allow borrowers with **good credit ratings** to gain access to funds.
- Includes bills bought by the bank, such as bank-accepted bills, and nonbank bills.

Negotiable certificates of deposit

Characteristics:

- Promissory notes, usually in denominations of **$100,000+**.
- Can be resold in secondary markets.
- Issued by **banks,** and therefore an important source of liquidity for them.

Capital Markets

Characteristics:

- Setting for the buying and selling of **capital goods** eg. buildings, plants, properties.
- These capital goods are financed by **stock/long-term debt instruments.**
- Financial instruments are sold on the capital market if their original term-to-maturity is **one year or more.**
- Securities and instruments sold are **less marketable** with **varying** default levels, and maturities ranging from 5-30 years.
- Financial institutions are the *link* between money markets and capital markets, **borrowing** short-term securities in the money market and **investing** in longer-term capital projects.

Capital Market Instruments:

Shares

Characteristics:

- Represent an **ownership claim** on a company's assets.
- Give holders the **right to share in a company's profits:** the higher a company's net income, the higher return to shareholders.
- On the other hand, shareholders must **share in company's losses.**
- Transactions occur in the *secondary market.*

Corporate bonds

- Represent a claim against a **large company's assets.**
- Returns are **fixed:** receive the amount of interest promised and the repayment of the principal at end of contract.
- Maturities of **5-30 years.**
- Secondary market not as active as that for *equity securities.*

Government bonds

Characteristics:

- Long-term debt obligations of the **government.**
- Used to finance **capital expenditure,** such as schools, highways and airports.
- Long-term maturities of **up to 10 years.**

Mortgages

Characteristics:

- Long-term loans secured by **real estate.**
- **Largest segment** of capital markets in terms of the amount outstanding: >50% in family homes.
- Don't have good secondary markets, but can be **pooled together** to form *mortgage-backed securities*, which have an **active** secondary market.

Financial Market Efficiency

Financial markets are judged on their efficiency through 3 criteria:

1) **Allocational efficiency –** funds are allocated i.e. invested in their highest-valued use; that is, could not have been invested in any other way that would have made society better off.
2) **Informational efficiency –** securities' prices are the best indicators of relative value as they reflect all relevant information about the securities themselves. Actions of analysts and investors ensure that market prices reflect all information relevant to their values at any time**.**
3) **Operational efficiency –** the cost of conduction transactions are as low as possible. Important because fewer transactions would take place, and more other valuable investment projects will be passed up.

Risks faced by Financial Institutions

The buying and selling of financial claims means that financial markets are exposed to several kinds of risk, including:

1) **Credit risk** – the risk that the borrower will fail to make either interest or principal payments.
2) **Interest rate risk –** the risk that a security's price will fluctuate due to changes in the market interest rates.
3) **Liquidity risk –** the risk that financial institutions will be unable to generate sufficient cash inflow to meet required cash outflows. If a financial institution is unable to meet its short-term obligation because of illiquidity, it will fail even if it may be profitable in the long-run
4) **Foreign exchange risk –** the risk that the earnings of a financial institution will fluctuate due to changes in exchange rates.
5) **Political risk –** the risk that the value of a financial institution will fluctuate due to the actions of the government.
6) **Reputational risk –** the risk that negative publicity regarding an institution's business practices could cause a decline in customer base, litigation or revenue reduction.
7) **Environmental risk –** the risk that an adverse impact on the natural environment by the organisation will threaten its value.

Financial institutions can manage their risk by:

- ✓ Diversifying their loans and investments.
- ✓ Carefully analysing the credit ratings of their borrowers.
- ✓ Carefully monitoring their borrowers over time.

CHAPTER 2: THE MONETARY AUTHORITIES

GENERAL NOTES

Origins and role of the central banking authorities

Origins: The central banking system has its roots in the 17th century in Europe, where its original function was to raise funds for the government.

Role: Nowadays, the central bank regulates a nation's money supply and financial institutions in an effort to maintain a stable economic environment and effective payments system.

Further, the function of most central banks is to:

- ✓ **Developing & implementing monetary policy –** i.e. altering money supply in financial system to determine interest rates, and thereby influence inflation, employment & economic growth.
- ✓ **Issuing currency**
- ✓ **Providing banking services for the government –** i.e. acting as the government's bank.
- ✓ **Overseeing the operations of the financial system**
- ✓ **Facilitating the payments system**

Australia's Monetary Authorities

The role of monetary policy in Australia is split between three independent authorities:

The Reserve Bank of Australia (R.B.A.)

Main responsibility: Monetary policy, the payments system, and stability of the financial system.

Primary functions and objectives

The three monetary policy objectives of the RBA, as laid down in law, include contributing to the:

a) Stability of the Australian currency
b) Maintenance of full employment in Australia
c) Economic prosperity and welfare of the Australian people

As a means to achieving such, the RBAs primary functions include:

1. Determining and implementing monetary policy

Monetary policy involves managing the short-term interest rate in pursuit of the above objectives, and thus controlling the inflation rate. This is achieved by altering the money supply in financial markets by buying and selling securities.

2. Issuing Australian currency

The RBA is the sole manufacturer of Australian currency.

3. Overseeing the *payments system* and facilitating its operation

It is the role of the payments system to clear, transfer and settle the millions of funds transacted each day among and between institutions.

The RBA's role in the payments system includes:

- Promoting its efficiency and stability in contributing towards the overall stability of the financial system.
- Providing facilities for the settlement of transactions.
- Acting within the system as the bank of the Australian government.

Outline of the payments system

Each day millions of transactions are settled, which are typically broken into two classes:

1) **High-value transactions:** Include ASX purchases, high monetary value purchases. Transactions are settled individually and cleared in real time.
2) **Low-value transactions:** Includes regular withdrawals and payments eg. Grocery shopping. Transactions are pooled together over the course of the day, with the net positions of each institution settling at the end of the day.

In terms of *low-value transactions:*

When a payment is made, two (or more) financial institutions are involved in settling the transaction. The bank of the payer verifies that there are sufficient funds in their account to meet the transaction (**payments clearing**). Once a payment is cleared between the two institutions i.e. between the bank of the payer and the bank of the payee, it can be settled by transferring funds between the accounts.

The financial institutions however, hold and pool these transactions in **exchange settlement accounts (ESAs).** These institutions ensure that there are sufficient funds to meet payment obligations each day so that when transactions occur, funds are transferred from the ESA of one institution to the ESA of another. At the end of the day, these institutions pool the millions of transactions together and settle them in a batch process. Each institution does so by detailing the obligations accrued during the day against those of other institutions. The 'national collator' (RBA) then compiles these listed obligations, coming to a single net figure for each institution. These figures are entered into **RITS** (*Reserve Bank Information and Transfer System*) for batch settlement at 9am the following morning.

In terms of *high-value transactions:*

The **RTGS** (*Real-Time Gross Settlement*) system simply processes each transaction one by one, settling it if it passes. Those that do not pass the settlement remain the queue to be retested.

4. Acting as the government's banker

This includes managing the issue of government securities.

5. Issuing/providing the market for treasury securities

This includes providing the infrastructure for the issuing of Treasury securities.

6. Managing financial system liquidity and the government's holding of foreign exchange

This involves buying and selling securities and other financial instruments to change the cash level in the system.

Structure of the RBA

The RBA is managed and overseen by the Reserve Bank Board. The board has nine members, including a governor and the secretary to the Department of the Treasury. The board meets 11 times a year (on the first Tuesday of each month except January) to discuss monetary policy. Central to these meetings are decisions on changing the RBA cash rate/interest rate.

Accountability to parliament

While the RBA is independent of parliament, they must nevertheless produce an annual report to give to the federal treasurer, inform the government of monetary policy and actions, and meet regularly with the treasurer. In this sense, they are not truly independent.

However, they are not directly under the authority of the government i.e. independent in the sense that:

a) They are free from political pressures when formulating monetary policy.
b) Government has no control over the election or composition of the RBA board.

Therefore, it may be said that the RBA is independent **within** the Federal Government, not independent **of.**

The Australian Prudential Regulation Authority (A.P.R.A.)

APRA is an independent body that does not report to a government minister. Rather, they are funded by the industries that they supervise.

Main responsibility: Prudential supervision of banks, credit unions, building societies, insurance & superannuation companies, ensuring they operate within certain boundaries of risk.

Other functions of APRA (*under the Australian Prudential Regulation Authority Act, 1998)* include:

"The development, implementation and supervision of prudential regulation that entities have to abide by"

A **major role** of APRA is controlling which institutions are able to conduct banking business within the system. Institutions approved by APRA are known as **ADIs –** *Authorised Deposit-taking Institutions.* If ADIs fail to meet their obligations, taking excessive risk within the system, APRA has the ability to revoke the power of such institutions. It is important ADIs do not take excessive risk because of:

- **Investors' confidence –** maintaining investors confidence and ensuring their investments are returned to them is crucial to future investing.
- **Contagion** – because all banks are interlinked, if one collapses it can have a spill-over effect on other banks, placing those banks in jeopardy. Ensuring excessive risk isn't taken by banks greatly decreases the chances of contagion.
- **Overall stability of the financial system.**

Monitoring such entities to ensure they are complying with legislation and prudential policies – eg. Ensuring that ADIs adhere to an 8% capital adequacy ratio (CAR) so that capital will always be available in times of financial difficulty.

Advising the government on the development of regulation and legislation affecting regulated institutions – eg. The implementation of Basel 2 (to follow) to calculate risk adjusted assets under the CAR.

Governance of APRA

APRA is governed by the APRA Board. Like the RBA, APRA is accountable for its actions in several ways:

1) They must appear regularly before parliamentary committees.
2) They must prepare annual reports for parliament.
3) They must allow audits by the Australian National Audits Office.

The Australian Securities and Investment Commission (A.S.I.C.)

ASIC is the third key regulator in the financial system, regulating financial markets, securities, futures and corporations.

Main responsibility: Enforcement of company & financial services law in protecting consumers, investors & creditors. This includes licensing and monitoring financial markets, advisors, and disclosure and conduct of Australian companies/service providers.

Other key responsibilities of ASIC (under the *Australian Securities and Investments Commission Act, 2001)* include:

- Maintain, facilitate and improve the performance of the financial system and entities within it.
- Promote confident and informed participation by investors and consumers in the financial system.
- Administer law effectively with minimal procedural requirements.
- Act to enforce and give effect to the law.
- Receive, process, and store confidential information.
- Make information about companies and other bodies available to the public as soon as possible.

Organisational structure of ASIC

ASIC is headed by 3 commissioners, appointed by the governor-general on the nomination of the federal treasurer. The commission reports to Commonwealth parliament and the treasurer.

Bank for International Settlements

Based in Basel, Switzerland, the Bank of International Settlements is a monetary authority that influences the global financial system.

Key role of the B.I.S. include:

1. Facilitating the central bank operation worldwide, by providing a meeting place and resources for central banks to meet.
2. Acting as a bank to the central banks, providing services related to their financial operations and serving their financial needs.

Central banking systems around the globe

China

The central bank in China is the *People's Bank of China* (PBOC). Its key responsibilities include:

a) Formulating and implementing monetary policy.
b) Issuing and regulating currency.
c) Developing policy for financial markets.
d) Facilitating interbank borrowings.

The PBOC operates alongside the *China's Bank Regulatory Commission,* which performs a similar role to APRA.

The US Federal Reserve ('the Fed')

The US Federal Reserve, the banking system of the United States, consists of a 7 member board of governors, 12 regional Federal Reserve banks, 3, 000 member commercial banks and the **FOMC –** *Federal Open Market Committee* (which is responsible for monetary policy). However, most of the authority rests with the governors.

The **key roles** of the component parts of the Fed:

12 regional Federal Reserve banks:

- Clear and process cheques.
- Issue Federal Reserve notes
- Act as a depository banks for their districts.
- Participate in making monetary policy.

FOMC – *Federal Open Market Committee*:

- Determines monetary policy, with the Federal Reserve Bank of New York implementing policy day-to-day.

New Zealand

The central banking system is similar to the Australian system. The **RBNZ** – *Reserve Bank of New Zealand*, is responsible for monetary policy, financial stability, issuing New Zealand currency and prudential regulation. There is **no equivalent** of APRA in New Zealand.

CHAPTER 3 & 4: THE RBA & THE LEVEL OF INTEREST RATES

GENERAL NOTES

What are interest rates?

Put simply, the interest rate is the rental price of money; that is, the price of borrowing money for the use of its purchasing power. For the borrower, interest represents the **penalty** for consuming income before it is earned, while for the lender, interest is the **reward** for postponing current consumption. Interest rates are necessary because of the *time value of money* – the present value of money being less than its future value in terms of purchasing power.

Interest rates fulfil an **allocative function** for the economy, allocating funds between SSUs and DSUs. For SSUs:

The real rate of interest

The fundamental determinant of interest rates is the *interaction* of investment (investors) and saving (savers).

For investors:

Interest represents the opportunity to invest in projects that yield additional real output in the future i.e. durable goods. This extra output constitutes a return on investment – the higher the return on investment, the more likely investors are to undertake that project.

Individuals/savers:

AOTBE (All Other Things Being Equal), most people prefer to consume goods sooner rather than later – **positive time preference for consumption.** Most people consume sooner, however, realising that their future consumption may be less because they've forgone the opportunity to save and earn interest on their savings.

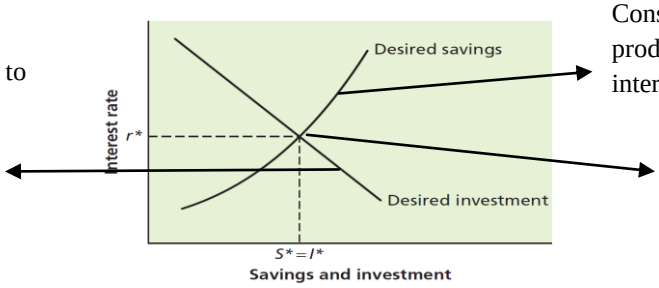
Give the time preference for consumption, the interest rate offered will determine how thrifty people are:

Cyclical nature of interest rates

- If interest rates are **low,** most people will postpone very little consumption for saving.
- ⇨ Thus, to coax people to save, higher interest rates must be offered.
- ⇨ However, the more the interest rate rises, the fewer projects are undertaken by investors as their expected returns will not cover the interest related to its financing.
- ⇨ As a result, the higher the interest rate, the fewer the number of investment projects undertaken.
- ⇨ Interest rates are therefore lowered to induce greater spending, and the cycle begins again.

In sum, the interest rate depends on both the investors' **rate of return** and savers **time preference for consumption.** The graph below is illustrative of the market equilibrium interest rate:

Producers will borrow/invest more if consumers are willing to accept a lower return on their savings through a lowered interest rate.



Consumers/savers will **save more** if producers/investors offer a higher interest rate on savings.

Also known as the **real rate of interest,** equilibrium represents the long-run interest rate in the economy i.e. where savings meet investment.

Theories of change in the interest rate

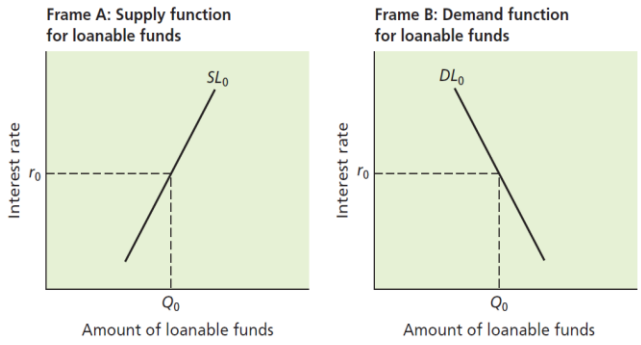
Theory 1: Loanable Funds Theory of Interest

This theory is used to explain how, in the short-run, interest rates depend on the **supply and demand** for loanable funds. In this theory, SSUs supply loanable funds and DSUs demand loanable funds. The various types of SSUs and DSUs are found below:

Supply of loanable funds (SSU)	Demand for loanable funds (DSU)
Consumer savings	Consumer credit purchases
Business savings (depreciation and retained earnings)	Business investment
Federal Government budget surpluses	Federal Government budget deficits
State and local government budget surpluses	State and local government budget deficits
Increases in the money supply (ΔM) by the RBA	

Note that the **RBA** is a source of loanable funds. This is because RBA monetary policy can impact on the supply of funds in the market: when the RBA increases the money supply, the supply of loanable funds is increased; when the RBA decreases the money supply, the supply of loanable funds decreases.

Below are illustrations of the Loanable Funds Theory:

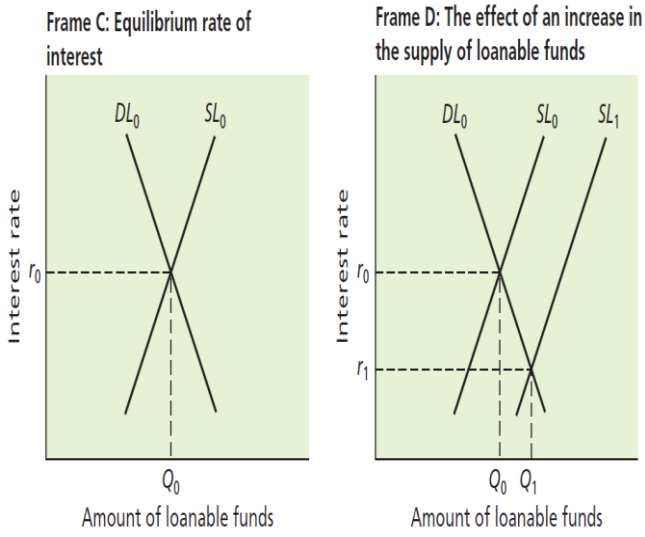


Frame A: The SUPPLY of loanable funds – consumers will save more as interest rates rise, and businesses (producers) will finance investments more when interest rates rise. Therefore:

As interest rates rise, the quantity of supplied loanable funds increases.

Frame B: The DEMAND for loanable funds.

The higher the interest rate, the smaller the quantity demanded for loanable funds.



Frame C: In equilibrium, the supply of loanable funds is equal to the demand for loanable funds. As long as *competitive forces* are allowed to operate, the forces of supply and demand will always bring the interest rate to this point:

If interest rates are ABOVE equilibrium, there is an excess of supplied funds. To entice borrowing, lenders will lower the interest rate, down to equilibrium.

If interest rates are BELOW equilibrium, there will be an excess demand for funds. To decrease demand for funds, the interest rate will be increased. This increases the supply of funds, up to equilibrium.

Frame D: An increase in supply of loanable funds results in a decreased interest rate.

Theory 2: **Price Expectations and Interest Rates**

Changes in the price-level (inflation or deflation) of goods and services affect the realised return lenders receive on their loans, and the cost that borrowers pay for them. Loan contracts MUST incorporate the impact of expected price level changes to avoid **unwarranted transfers** of purchasing power between borrowers and lenders.

To protect against price-level changes in financial contracts, the *nominal rate of interest* is divided into 2 parts:

- The **real rate** of interest in the absence of price level changes.
- The **expected percentage change** in price levels over the life of the loan.

Thus, the following equation is derived, known as the **FISHER EQUATION: NB!!**

$$i = r + \Delta P(e)$$

Where:

- ‘i’ = Nominal interest rate (contract rate)
- ‘r’ = Real rate of interest
- ‘ΔP(e) = Expected percentage change in the average price level (inflation)

However, the **precise** equation is:

$$(1 + i) = (1 + r)(1 + \Delta P)$$

EG: If the real interest rate is 5%, the current inflation rate is 2%* and the forecasted inflation rate is 4%, what is the nominal interest rate?

$$(1+i)=(1+0.5)(1+0.4)=(1.092)$$

i = 1.092 – 1 = 0.92 i.e. **9.2% - nominal interest rate**

***NOTE!** The equation uses the expected price-level change (inflation rate), not the current/actual/reported inflation rate.

The Realised Real Rate of Return

The actual inflation rate more than likely will not equal the expected inflation rate. Therefore, the **realised rate of return** on a loan contract will nearly always differ from the nominal rate agreed upon at the time the loan was made. To account for this change, the realised real rate of return is expressed as:

$$r = i - \Delta P(a)$$

Where:

- ‘r’ = Realised real rate of return
- ‘ΔP(a)’ = Actual rate of inflation over the loan period

As expected, the **interest rate** tends to change with changes in the rate of **inflation**.

NOTE:

If actual inflation at end of loan > expected inflation at the beginning of the loan, the lender will have a **lower** realised rate of return, meaning there was an *unintended transfer of purchasing power* from borrower to lender.

If actual inflation at end < expected inflation at beginning, there was an *unintended transfer of purchasing power* from lender to borrower.

If actual inflation > nominal interest rate, the realised real rate of return is **negative.**

RBA cont.

RBA's influence over interest rates

The RBA influences the interest rate structure of the economy by controlling the **cash rate,** which is the interest rate charged on loans. It is thus the primary cost of short-term loanable funds, and is of particular interest because:

a) It measures the return on the most liquid of financial assets – bank reserves.
b) It is integral to monetary policy.
c) It directly reflects the available resources in the banking system, which impacts on banks' decisions to make loans.

Market Equilibrium Interest Rate

The RBA decides on a cash rate level that is appropriate for the economy at the time. However, it is not simply a matter of decreeing an interest rate. Rather, the interest rate is determined by the supply and demand of funds in the short-term money market, but the **supply side** is manipulated to ensure the actual cash rate corresponds to the level deemed appropriate.

RBA's measurement of the money supply

One of the key roles of the RBA is to *control liquidity* in the financial system, which it does so through management of **ESFs –** *Exchange Settlement Funds.* These are the funds used to settle obligations between financial institutions, as well as between institutions and the RBA (see payments system). By controlling ESFs, the RBA controls the money supply.

There are **three** ways of measuring the money supply:

1. **M1:** Currency + currency accounts at depository institutions.
2. **M3:** M1 (currency + currency accounts) + all other bank deposits of the private, non-bank sector.
3. **Broad money:** M3 (currency + currency accounts + all other bank deposits) + borrowings from the private sector by non-bank financial institutions (NBFIs) – currency and bank deposits of NBFIs.

The money supply can **change** in the following ways:

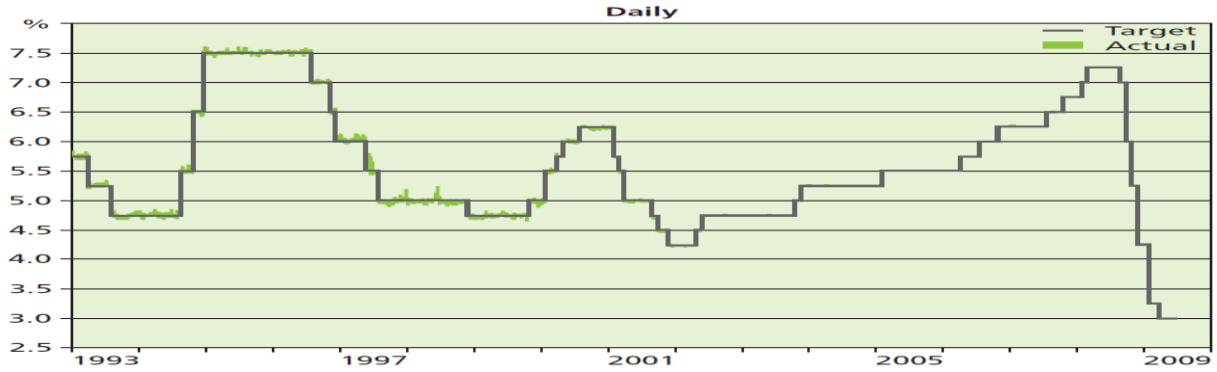
- **Government taxes and spending –** when taxes are paid by the private sector the Commonwealth Government, the money supply falls. However, when the government spends this money on public goods and services eg. Education, roads, money supply increases.
- **Government transactions in CGS (**Commonwealth Government Securities**) –** undertaken by the RBA on behalf of the government, the RBA can increase the money supply in ESAs by either buying or selling CGSs:
    - When Treasury bonds are sold by the government to the markets, the RBA receives the funds, thus decreasing the money supply.
    - When Treasury bonds and notes are bought back by the government, the money leaves the RBA, increasing money supply in the markets, and thus money supply in ESAs.

A further measure employed to manage the supply of ESA funds in order to maintain equilibrium at its target cash rate include:

Managing ESA funds through Open Market operations

Each day, RBA staff estimate the *net settlement obligations* between ESA holders and the RBA (see payments system). The RBA then decides whether the supply of ESA funds needs to be changed to maintain the desired cash rate. It then announces whether it intends to buy or sell securities that day, and market dealers have 15 minutes to communicate their bids or offers for these securities to the RBA. These bids/offers are ranked (from lowest to highest price) and the best deals are accepted to supply the required ESA funds or soak up any excess funds.

As shown below, the RBA has generally been very successful at matching the targeted cash rate with the actual cash rate:



<u>RBA Objectives of Monetary Policy</u>

To review, there are **three** main objectives that the RBA tries to achieve with monetary policy:

Stability of the Australian currency

Price stability refers to stability in the average price of all goods and services in the economy. Thus, in maintaining price stability, the RBA aspires to maintain the average price change of all the products in a large market basket of goods around zero.

Inflation, the continuous rise in the average price level of goods, is inevitable. This affects the economic welfare of individuals, who have less and less purchasing power over time. Further, inflation can result in *unintended transfers of purchasing power* (see page 30). The RBA thus tries to make the real rate of return as stable as possible – if inflation is higher and people are spending more than targeted, they will increase the interest rate, thus decreasing the demand for goods and services i.e. with people having less money to spend, demand decreases, and thus inflation itself also decreases. Thus, inflation and the interest rate have an ***inverse relationship.***

Monetary policy since 1993 has focused on keeping the inflation rate between 2-3% p.a.

Maintenance of full employment in Australia

Full employment implies that every person of working age who wishes to work can find employment. However because there will always be a portion of people transitioning between jobs (*frictional unemployment*) or whose skill levels are mismatched with available jobs (*structural unemployment*), there will always be a **natural rate of unemployment.** Thus, policy makers have decided upon, and aspire to maintain, an unemployment rate of 5%.

Economic prosperity and welfare of the Australian people

Economic growth is expansion and development in an economy, made possible through increased productivity in **labour** (through education & training) **& capital** (application of better technology)**.** The RBA manages its monetary policy so that it contributes to the economic prosperity of Australians through investment in labour and technology.

Conflict amongst Goals

There is a conflict in the short-run between full employment and a stable currency/prices. Essentially, when unemployment decreases, inflation tends to increase (*inverse relationship*). This is shown by the notion that as unemployment decreases, there is more demand for goods and services in the economy because people have more money. Prices are thus driven up due to increased demand, leading to an increase in inflation.

Decreased Demand = Increased Inflation

The RBA must strive to ensure that neither unemployment nor inflation become too high.

Monetary policy transmission and economic activity

Monetary policy typically affects **3** channels of the economy:

Business investment

Essentially, when interest rates change, business spending is affected. For instance, when interest rates rise, the returns on investment in projects fall, and financing costs increase. Therefore, when interest rates rise and the money supply falls, investment in spending falls.

Conversely, when interest rates fall, business spending may rise.

Consumer spending

Essentially, when interest rates change, consumer spending is affected. For instance, when interest rates rise and the money supply falls, borrowing and loan repayments become more expensive, and the value of financial securities fall. This leads to decreased spending.

Conversely, when interest rates fall, consumer spending may rise.