

# Introduction & Measuring Output: GDP

Week 1

## Lecture 1.1 Introduction and GDP

### Topics:

1. Administration - staff, assessment, etc.
2. Why are we here?
3. Introduction to National Accounts and GDP

### Definitions:

- **Gross Domestic Product (GDP):** market value of the final goods and services produced in a country (region) during a given time period

### Why are we here?

- Macroeconomics is an important subject:
  - **Understand political** debates
  - Useful for **employment** in **policy institutions**
  - Useful for **business decisions** - is it a good time to invest?
  - Useful for **personal decisions** - is it a good time to buy a house, fixed or variable interest rates
- As an academic field, many unanswered questions:
  - How should we think about Greece and Eurozone problems?
  - How should we think about **public debt** and **national debt**?
  - Have **long run economic growth** rates declined in recent years?
- Topics
  - **Measurement** - how do we evaluate the performance of the economy?
  - Understand **short run fluctuations** in the economy - what causes fluctuations in economic activity in the short run
  - Understand **long run growth** - what are theories associated with long run growth?
  - **International macro issues** - how does the international economy affect domestic outcomes?

### What will we learn?:

- To achieve this understanding, this course will introduce you to **basic models** that economists use to understand the world:
  - **Short run** model built on **demand** and **fixed prices**
    - *also known as the Keynesian model*
  - **Medium run** model in which both **quantity** and **price change**
  - **Long run** model that explains **changes in output per capita over time**
    - *where prices are perfectly flexible*
- The correct model to use depends upon the question at hand

### Importance of Measurement in Economics:

- Economics as a **science**
  - Tremendous **advances** in the 20th century
  - Advances in macroeconomics built upon **improvements in measuring state of the economy**
  - Empirical observation → theories → validation or rejection of theory
  - Rejection of theory leads to **new theories to explain data**

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### National Accounts: GDP:

- **Gross Domestic Product (GDP):** market value of the final goods and services produced in a country (region) during a given time period
- Basically, a **measure of market activity**
- What GDP may be used for:
  - document changes in the pace of **economic activity**
  - allow **international comparisons**
  - tell us about the composition of **production, expenditure and income**
  - shed light on changes in **employment, hours worked, and productivity**
- The economy is a complex system. Hence,  
*"it is necessary to find methods for systematic summarizing and aggregating of a reality which, on the micro level, is endlessly complicated. A system for national accounts is a method of achieving simplification and an overview."*
  - Press Release on awarding Richard Stone the 1984 Nobel Prize in Economics

### Market Value of GDP:

- Aggregate across a range of goods and services by considering **market value of these goods**
- **Avoids** some forms of production
  - Household production: cleaning services, child raising, cooking
  - Activities of the underground economy
- **Government production** often has **no market price** so it is valued at cost of production (defense, education, health)

### Final Goods and Services in GDP:

- **GDP** is concerned with the production of **final goods and services**
- **Avoiding intermediate goods** that are used up in production avoids double counting
  - *e.g. wheat (farmer) to flour (miller) to bread (baker)*
- **Does not count goods** that are **produced in the past and resold** today
  - *e.g. second-hand houses or other durable goods*
- **Financial assets** are **not a good or service**
- Produced in a country (region) during a given time period
  - **Goods produced** by Australian companies or individuals overseas are not included in GDP
  - Typical time period is a quarter

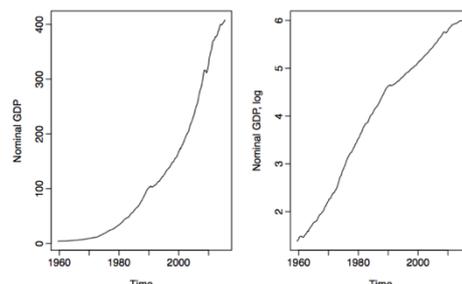


Figure: Nominal GDP and Nominal GDP, log scale. Source: ABS data

## Lecture 1.2 Gross Domestic Product

### Topics:

1. Measuring GDP: Income, Expenditure and Production Approach
2. Real and Nominal GDP
3. GDP and Welfare

### National Accounts: GDP:

- Methods of **estimating GDP**
  - Production
    - where value is added at each stage of the production process
    - e.g. farmer -> miller -> baker, among each stage of this process, they are adding value until the end product
  - Expenditure
  - Income
- These measures **should, in theory, be equivalent but typically vary** by a small amount
  - **Output** produced is sold at **market prices** so must **equal expenditure**
  - **Expenditure on output** becomes **income to the producers** of that good (either capital income or labour income)
  - **Equivalent** due to treatment of unsold inventories
    - e.g. an example of when these measures can vary is when a car is produced in December 2016 and then sold in February 2017, for national accounts it is simply presumed that it is unsold inventory in 2016 and then sold in 2017

### Circular Flow of Income:

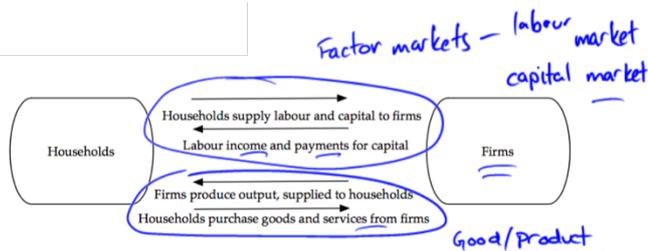


Figure: Circular Flow of Income in 2-Sector Economy

- households supply resources to firms and firms repay them back etc.
- two markets: labour market and goods market
- **Two types of transactions** take place:
  1. **Households** receive **labour and capital income** for supplying factors of production (labour-capital markets)
  2. **Firms** receive revenue by **selling** goods and services to households (goods market)

### Measuring GDP: Income Method:

- Every **transaction of a final good** transfers **money from consumer to producer**
  - This money becomes income to those involved in the production process
  - **Workers** earn **labour income**
  - **Owners of capital**, earn **capital income or profits**
  - Some measurement difficulties involved: owner-workers

$$Y = wL + rK$$

- $w$ : wage rate
- $L$ : labour employed
- $r$ : interest rate
- $K$ : capital stock

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### Real GDP:

- Our focus has been on nominal GDP
  - **Not particularly useful** for comparisons over **time**
  - Changes in nominal GDP capture both quantity and price changes
- Solution: **Real GDP adjusts for price changes**
- **Traditional method** to calculate Real GDP
  - Use a **price in a base year** to calculate **value of output in a given year**
  - Pros: simple and intuitive, captures changes in economic activity over time
  - Cons: **base year prices may not reflect product composition** over time
    - Preferences may change over time
    - Shift consumption to less expensive goods
    - New goods are introduced over time
- Constructing real GDP
  - Define **base year as time 0**
  - We wish to measure GDP over time,  $t = \{0, 1, 2, \dots, T\}$
  - **Price of good  $i$  in period  $t$**  is defined as  $p_{it}$
  - **Quantity of good  $i$  produced in period  $t$**  defined as  $q_{it}$
  - Value of **goods produced in period 0** (base year) is  $\sum_i p_{i0} q_{i0}$
  - Index value in period  $i$  is

$$\text{Real GDP} = \frac{\sum_i p_{i0} q_{it}}{\sum_i p_{i0} q_{i0}}$$

Example: 2 goods, A, B.

Then our def<sup>n</sup> of real GDP becomes

$$\frac{p_{A0} \cdot q_{At} + p_{B0} \cdot q_{Bt}}{p_{A0} \cdot q_{A0} + p_{B0} \cdot q_{B0}} = \frac{X_t}{X_0}$$

Note:

$$\frac{X_t - X_0}{X_0} = \text{percentage change between period } t \text{ and period } 0$$

$$\rightarrow \frac{X_t}{X_0} = \frac{X_0}{X_0} + \text{percentage change between period } t \text{ and period } 0$$

### Chain weighted prices

- Adopted to **prevent prices reflecting outdated bundle of goods**
- The value of a chain-weighted index in period  $n$ :

$$\frac{\sum_i p_{i0} q_{i1}}{\sum_i p_{i0} q_{i0}} \times \frac{\sum_i p_{i1} q_{i2}}{\sum_i p_{i1} q_{i1}} \times \dots \times \frac{\sum_i p_{in-1} q_{in}}{\sum_i p_{in-1} q_{in-1}}$$

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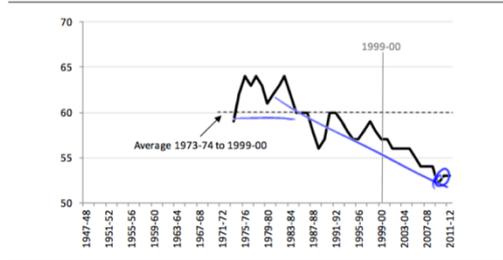
Handwritten notes: "GDP value of output in period 1 evaluated at period 0 prices", "nominal GDP, 0", "nominal GDP 1", "1+ % change in output 0-1", "1+ % change in output 1-2".

$$1 = \frac{wL}{y} + \frac{rK}{y}$$

- $\frac{wL}{y}$ : the labour share of income
- $\frac{rK}{y}$ : the capital share of income

- Participants in the economy

Figure 3.3 The labour income share in Australia's market sector<sup>a</sup> per cent



<sup>a</sup> 12-industry market sector.  
Data source: ABS (Cat. no. 5260.0.55.002).

Figure: Labour share in Australia over time. Source: Parham, 2013

↳ workers      capital share ↑

- decline in the labour share of income with increase in the capital share of income
- apparent through changes in equality shown through the national accounts

Measuring GDP: Expenditure Method:

- Participants in the economy
  - breaks down consumption through different aspects of consumers
  - **Household** sector - consumption C
    - if someone buys a television that was imported from Japan, this is excluded by subtracting imports
  - **Business** sector - investment I
  - **Government** sector - does not include transfer payments G
    - transfer payments are like unemployment benefits or pensions
  - **Overseas** sector - exports minus imports X - M
- **National income accounting identity:**

$$Y = C + I + G + X - M$$

Relative sizes of key components of GDP in 2014

Country	Consumption %	Investment %
Australia	73.3	27
China	50.1	46
South Korea	65.5	29
Vietnam	69.9	27

- China is skewed towards investment as the Chinese government consumes a lot such as road developments

- consumption includes both private and government
- investment includes both private and government

Measuring GDP: Production Method:

- Referred to as a **value added approach**
  - Value added as a concept
  - **Sum up the amount of valued added by all producers in the economy**
- Relationship between measures:
  - In theory, different measures should lead to equivalent values
  - In practice, **different surveys are used in different approaches** so always some statistical discrepancy

- Other measurement issues:
  - **Seasonal** or non-seasonal data
  - Adjustment for **population size**
  - Adjustment for **number of workers**
  - **Comparisons across countries**

Real GDP over time:

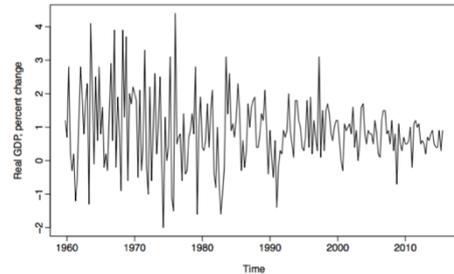


Figure: Output growth in Australia. Source: Australian Bureau of Statistics

- from 1960s-1980s, its very volatile and after the 1980s, it becomes significantly less volatile
  - this can be a result of better policy or other factors

Real GDP and welfare:

- What is the relationship between **welfare and GDP?**
  - Evidence comes from happiness surveys
  - Easterlin Paradox - Easterlin (1974) argues that
    - within a **country**, **higher income translates into higher subjective happiness**
    - for **poor countries**, **higher incomes translates into higher subjective happiness**
    - for **richer countries**, **higher income does not translate into higher subjective happiness**
- These findings are challenged by Stevenson and Wolfers (2013): they find a **positive relationship between happiness and income**

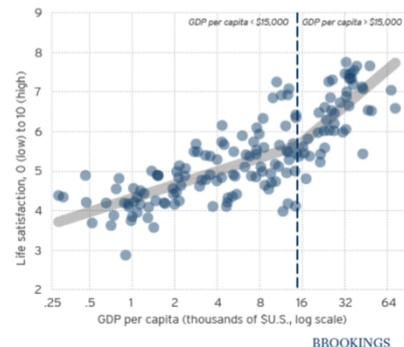


Figure: Brookings Institute

- Many good reasons why GDP should not be treated as a **good measure of welfare**
  - Leisure time
  - Non-market activity
  - Environment and resource depletion
  - Quality of life
  - Poverty and inequality

## Readings: Ch. 1.1-1.3

- 1.1 When Is The Economy Performing Well?
- 1.2 Gross Domestic Product: Measuring The Nation's Output
- 1.3 Real GDP Is Not The Same As Economic Wellbeing

### Definitions:

- **Growth Theory:** the study of the long-run growth performance of economies.
- **Short-Run Business Cycle:** the name given by economists to the tendency for economies to pass through periods of economic expansion followed by economic contraction.
- **Inflation and Deflation:** the tendency for the general level of prices in an economy to change over time. inflation occurs when prices rise over time; deflation is a situation in which prices fall over time
- **Public Debt:** the amount owed by the government to the non-government sector.
- **Foreign Debt:** the amount owed by the nation to other countries
- **Gross Domestic Product (GDP):** the market value of the final goods and services produced in a country during a given period.
- **Comparative Advantage:** everyone does best when each person concentrates on the activities for which his or her opportunity cost is lowest.
- **Opportunity Cost:** the value of the next-best alternative to taking a particular action
- **Final Goods or Services:** goods or services consumed by the ultimate user—because they are the end products of the production process they are counted as part of gdp.
- **Intermediate Goods or Services:** goods or services used up in the production of final goods and services and therefore not counted as part of gdp.
- **Expenditure, or Consumption:** spending by households on goods and services such as food, clothing and entertainment. investment spending by firms on final goods and services, primarily capital goods and housing.
- **Government Purchases:** purchases by federal, state and local governments of final goods and services. government purchases do not include transfer payments, which are payments made by the government in return for which no current goods or services are received, nor do they include interest paid on the government debt.
- **Net Exports:** exports minus imports.
- **National Income Accounting Identity:** a mathematical relation that shows how gdp is equal to the sum of expenditure on consumption, investment, government purchases and net exports
- **Real GDP:** a measure of gdp in which the quantities produced are valued at the prices in a base year rather than at current prices; real gdp measures the actual physical volume of production.
- **Nominal GDP:** a measure of gdp in which the quantities produced are valued at current-year prices; nominal gdp measures the current dollar value of production

A macro-economy is performing well if it:

1. raises living standards in the long run
2. avoids extremes of short-run macroeconomic performance
3. maintains the real value of the currency
4. ensures sustainable levels of public and foreign debt
5. balances current expenditure against the need to provide resources for the future
6. provides employment for all individuals seeking work

### Expenditure components of GDP

COMPONENT	DEFINITION	SUBCATEGORIES
<b>CONSUMPTION</b>	Spending by households on goods and services such as food, clothing and entertainment.	<ul style="list-style-type: none"> <li>• <b>Durables:</b> Long-lived consumer goods such as cars and furniture. Note that new houses are not treated as consumer durables but as part of investment.</li> <li>• <b>Non-durables:</b> Shorter-lived goods like food and clothing. Services, everything from haircuts and taxi rides to legal, financial and educational services.</li> </ul>
<b>INVESTMENT</b>	Spending by firms on final goods and services, primarily capital goods and housing.	<ul style="list-style-type: none"> <li>• <b>Business fixed investment:</b> The purchase by firms of new capital goods such as machinery, factories and office buildings. (Remember that for the purposes of calculating GDP, long-lived capital goods are treated as final goods rather than as intermediate goods.) Firms buy capital goods to increase their capacity to produce.</li> <li>• <b>Residential investment:</b> The construction of new homes and apartment buildings. For GDP accounting purposes, residential investment is treated as an investment by the business sector, which then sells the homes to households.</li> <li>• <b>Inventory investment:</b> The addition of unsold goods to company inventories. In other words, the goods that a firm produces but does not sell during the current period are treated, for accounting purposes, as if the firm had bought those goods from itself. (This convention guarantees that production equals expenditure.)</li> </ul>
<b>GOVERNMENT EXPENDITURE</b>	Purchases by federal, state, and local governments of final goods, such as fighter planes, and services, such as teaching in public schools. Government purchases do not include transfer payments, which are payments made by the government in return for which no current goods or services are received. Examples of transfer payments (which, again, are not included in government purchases) are Social Security benefits, unemployment benefits, pensions paid to government workers and welfare payments. Interest paid on the government debt is also excluded from government purchases.	
<b>NET EXPORTS</b>	<b>Exports minus imports</b> Exports are domestically produced final goods and services that are sold abroad. Imports are purchases by domestic buyers of goods and services that were produced abroad. Imports are subtracted from exports to find the net amount of spending on domestically produced goods and services.	

### The Circular Flow Of Income



*The circular flow of income in a two-sector economy traces the flows of income, expenditure and production of resources between households and firms.*

- 1.2 Gross Domestic Product: Measuring The Nation's Output
  - A nation's GDP is a measure of the final value of goods and services produced in that country over a particular period of time. Economists closely monitor GDP, as the value of production is one of the most fundamental measures we have of the economy's performance.
  - Since GDP comprises thousands and thousands of diverse commodities, a common unit of measurement must be found to enable a single measure of the value of production to be calculated. Prices—market values—provide such a common measurement unit, since we conventionally express the value of commodities in terms of its price. Problems arise with commodities that are valuable but not traded in markets and which therefore do not have a market price.
  - GDP measures only the final value of goods and services. This means that the value of intermediate goods, on their own, are counted in GDP only to the extent that they form part of the final value of goods and services. To ensure that only the final value of goods and services is counted, at each stage of the production process only the value added to the inputs is counted in GDP.
  - An alternative to measuring GDP by the value-added method is to calculate the total expenditure on final goods and services that occurs in an economy over some time period. As unsold output is counted as inventory investment expenditure, this gives a figure that corresponds to the value of final goods and services sold.

### 1.1 Gross Domestic Product: Measuring The Nation's Output

- For a variety of reasons it is a mistake to equate a nation's real GDP with the welfare of its citizens. These reasons essentially relate to the fact that not all of the factors that contribute to people's quality of life are measured in GDP. Examples would include leisure time, non-market activities, the quality of the environment and the degree of poverty and income inequality. However, GDP is believed to be positively related to these factors, so monitoring GDP does give some insight into people's general economic wellbeing.
- As the value of final goods and services is paid out to the factors of production, labour and capital, GDP can also be valued by adding together the incomes that are earned in the economy over a particular period of time.
- Nominal GDP measures the final value of goods and services at current market prices. Real GDP measures the final value of goods and services using current quantities but the prices that prevailed in some past period. The advantage of using real GDP is that, unlike nominal GDP, it does not change if only the price of output has changed. Changes in real GDP occur only if the actual quantity of goods and services produced in the economy changes.



# Inflation And Interest Rates & Saving, Wealth and Investment

Week 2

## Lecture 2.3 Inflation and Interest Rates

### Topics:

1. Measurement and costs of inflation
2. Interest rates

### Definitions:

- **RBA:** Reserve Bank of Australia
- **Consumer Price Index:** measures the cost of purchasing a specified basket of goods and services relative to a base year
- **Inflation:** the rate of change of prices
- **Realised Real Interest Rates:** this describes the actual return on investment

### Why do we care about inflation?

- Inflation has **costs upon the economy** when **high**
- Inflation provides **information** about the **performance of the economy**
- Key **macro models** we will study will try and explain **output, inflation and interest rates**
  - *instead of price and quantity in microeconomics*
- **RBA Act** sets out three goals for the RBA (Reserve Bank of Australia)
  - **stability of the currency**
    - *mainly stable inflation and stable currency exchange rate*
  - maintenance of **full employment**
  - the economic **prosperity and welfare** of the people of Australia
    - *stable inflation and employment often leads to this*

### Measuring the Price Level

- **Consumer Price Index:** measures the cost of purchasing a specified basket of goods and services relative to a base year
  - Requires collecting **data on prices over time**
    - *data is mainly collected through surveys*
  - Requires collecting data on **household expenditure** to select a reasonable basket of goods and services
  - In Australia, collected on a quarterly basis
- If there are  $i$  goods in the economy, indexed by  $i \in (1, 2, 3, \dots, I)$ 
  - $p_{i0}$ : price of good  $i$  in the base period
  - $q_{i0}$ : quantity of good  $i$  purchased in base period
    - *also known as a basket of goods or services purchased by consumers*
  - $p_{it}$ : price of good  $i$  in period  $t$
  - $q_{it}$ : quantity of good  $i$  purchased in period  $t$
- **Expenditure in base year** on goods is:
  - $P_0 = \sum p_{i0}q_{i0}$
- The amount of **expenditure required to consume base year** consumption bundle in period  $t$ 
  - $P_t = \sum p_{it}q_{i0}$ 
    - *keep prices variable and quantity of goods fixed*
- To create an index, the **value of the CPI in period  $t$**  is
  - $\frac{P_t}{P_0}$
  - In this case, the **value** of the price index in the **base year** is **1**
  - Sometimes this is **scaled so that 100** is the value of the CPI in the base year
    - $\frac{P_t}{P_0} \times 100 = \frac{P_0}{P_0} = CPI = 1$

...continued.

### Measuring Inflation:

- **Bias** in measuring inflation
  - **Composition of goods changes over time**, typically away from goods that are becoming relatively more expensive
  - **Difficult in measuring product quality**
    - *e.g. computers: between now and ten years ago, computers might have costed \$2000 as some do now, however the quality was significantly poorer*

### Costs of Inflation:

- Likely to be **small for low inflation** but can be **substantial for larger rates** of inflation
  - Noise in the price system
  - **Tax system is nominal - bracket creep**
    - *due to the bracket system of income tax, the tax burden might increase by not adjusting these brackets alongside inflation*
  - **Redistribution of wealth**
    - *e.g. such as a housing loan where if inflation increases, the money is less valuable to the bank; if inflation decreases, it is less valuable to the loan-taker*
  - **Planning difficulties**
    - *e.g. investment project with upfront costs, its profitability depends on inflation and if it is volatile, the investment is more risky*
  - **Menu costs**
    - *e.g. with hyperinflation, a café may have to change its menu daily*
  - **Shoe leather costs** - hold too little cash
    - *e.g. if inflation is high there will be more money in the bank than cash and vice versa*

### Interest Rates - Nominal and Real:

- **Investing in financial assets** typically requires a **return on investment**
  - **Key price in an economy:** the price of saving income today
  - If we **invest \$1** in an asset and the **nominal interest rate is  $i$**  then I receive  **$\$1 + i$**
  - More relevant is what happens to purchasing power due to investment?
    - Typically, the **price level rises** over time so  **$\$1$  today is not equal to  $\$1$  tomorrow**
- Calculating the **real interest rate**
  - **Invest at time 0** and receive return of  **$1 + i$**  at **time 1**
  - **Price level at time 0 is  $P_0$**  and at **time 1 is  $P_1$**
  - **$\$1$  in time 0** purchases  $\frac{1}{P_0}$  units of consumption bundle
  - **$\$1 + i$  wealth** purchases  $\frac{1+i}{P_1}$  units of consumption bundle at time 1
- **The real rate of interest is**
  - $1 + r = \frac{1+i}{\frac{P_1}{P_0}} = \frac{1+i}{1+\pi}$ 
    - $\frac{1+i}{P_1}$ : quantity of goods and services purchased in period 1 if I invest
    - $1/P_0$ :  $g + s$  purchased at time 0 if I don't invest
    - where  $\frac{P_1}{P_0}$  is equal to  $1 + \pi$  and  $\pi$  is the inflation rate

Inflation:

- **Inflation:** the rate of change of prices
- **Annual rate of inflation**
  - $100 \times \left( \frac{CPI_t - CPI_{t-4}}{CPI_{t-4}} \right)$
  - $t-4$  is the CPI a year ago as CPI is calculated quarterly in Australia
- **Quarterly rate of inflation**
  - $100 \times \left( \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \right)$
- Quarterly vs annual inflation
  - **quarterly** inflation focuses upon **most recent information** while **annual** inflation is typically **less volatile**

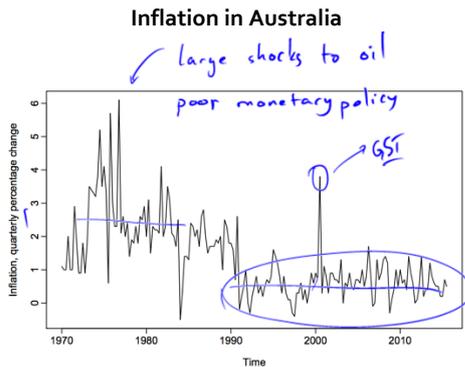


Figure: Inflation in Australia. Source: ABS

• **Fischer equation**

$$- 1 + r = \frac{1+i}{1+\pi}$$

- as an approximation:  $r \approx i = \pi$

- this is appropriate as long as  $i$  and  $\pi$  are small values

Real Interest Rates - Realised vs Expected:

- **Realised Real Interest Rates:** this describes the actual return on investment
  - $r = i - \pi$
- And **expected real interest rate:**
  - $r = i - \pi^e$
  - where  $\pi^e$  is the **expected rate of inflation**. The expected real interest rate determines economic decisions

**Interest Rates**

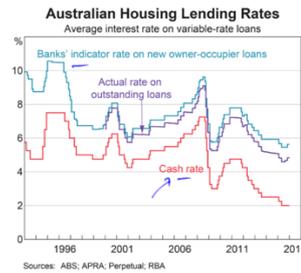


Figure: Lending interest rates. Source: RBA Chart Pack

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**Lecture 2.4**  
Saving and Investment

Topics:

1. Consumption, saving and wealth
2. Investment

Definitions:

- **Wealth:** an individual's assets (financial and real) less an individual's liabilities
- **Capital stock:** the stock of durable goods that exist at a point in time that can be used as part of the production process
- **Investment:** new expenditure on durable goods that add to the capital stock (includes inventory investment)

**Household Behaviour: Consumption and Saving**

After-Tax Income:

- **After-tax income** an individual earns can be either used for
  - **Current consumption**
  - **Saved** for future use - future consumption or bequest
  - $\rightarrow$  Consumption and saving are connected
    - if you don't consume then you save and vice versa
- **Wealth:** an individual's assets (financial and real) less an individual's liabilities
  - e.g. of financial asset is bank account, cash or stocks
  - e.g. of real asset is a house
  - **Saving** adds to an individual's **wealth**
  - Wealth has an impact **upon** economic **decisions**
  - **Stock versus flow** distinction
- Stock vs Flow
  - **stock** can be **measured without the consideration of time**
    - e.g. **wealth** is a stock value as it does not take time into account

...continued.

National Saving in an Open Economy

- Can analyse an **open economy**
  - $Y = C + I + G + (X - M)$
- Retain definition of **saving** as income less consumption (private and public)
  - $Y - C - G = I + (X - M)$
  - where  $Y - C - G =$  national saving
  - therefore,
  - $S - I = X - M$
  - therefore, if  $S \geq I \rightarrow X \geq M$
  - Nota bene: in an open economy **saving less investment equals exports less imports**

**Investment and Capital Stock**

Investment and Capital Stock:

- **Capital stock:** the stock of durable goods that exist at a point in time that can be used as part of the production process
- **Investment:** new expenditure on durable goods that add to the capital stock (includes inventory investment)
  - investment is often measured dollar per unit of time
- The standard relationship between capital and investment:
  - $K_{t+1} = (1 + \delta)K_t + I_t$
  - $\delta$ : depreciation rate
  - $K$ : capital stock
  - $I$ : investment expenditure

- **flow** can only be **measured within a certain time period**
  - e.g. **savings is a flow** as it can increase and decrease, **varying with time and interest rates**
- the **water analogy** can be used as **stock values are like water in a lake** that can be **precisely measured** whereas **flow values are in a river**, constantly moving and changing

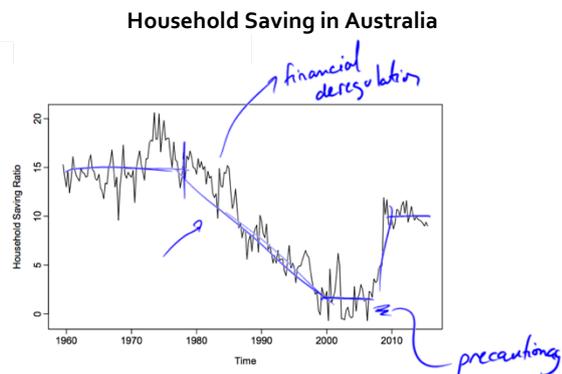


Figure: Household saving rate in Australia

*financial deregulation leads to more borrowing*

#### Reasons for Saving:

- Different **incentives**
  - **Lifecycle saving** - **borrow** money when **income is low** and **save** money when **income is relatively high**
  - **Precautionary saving** - saving for **unexpected events**
  - **Bequest saving** - for saving for the **next generation**
- **Determinants** of saving:
  - Real interest rates: **opportunity cost**
    - *real amount of income opportunity out of consumption*
    - *i.e. how much to forgo in the future*
  - **Demographics** - the age structure is important
  - Beliefs about **future events**
    - e.g. *after the Global Financial Crisis, savings increased*
  - **Behavioural economics**: temptation and self-control
    - subtext

#### National Saving:

- Other **sectors of the economy** can save:
  - **Firms**: revenue less wages, other costs and dividends
    - *dividends = retained profits*
  - **Government**: taxation revenue less expenditure

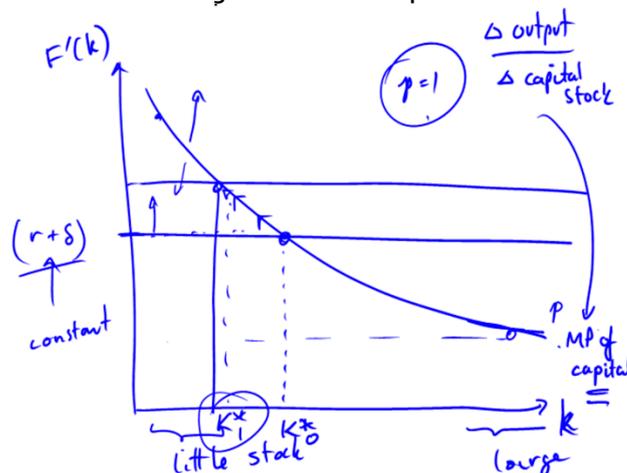
#### National Saving in a Closed Economy:

- Examine a **closed economy** - that is **no trade**
  - $Y = C + I + G$
  - *as there is no trade,  $X = 0$  and  $M = 0$*
  - Consider both C and G consumption expenditure
    - $I = Y - C - G$
- Define **national saving, S** as **income less private and public consumption expenditure**
  - $Y - C - G = S$
- Punchline: in a closed economy **saving is equal to investment**
  - if  $I = Y - C - G$  and  $S = Y - C - G$
  - $S = I$
- Can analyse savings by **public** or **private sector**
  - $S = Y - C - G - T + T = (Y - C - T) + (T - G)$ 
    - $Y - C - T$ : *private saving*
    - $T - G$ : *public saving*
    - $Y - T$ : *income after tax*
  - Here, T is taxes less transfer and interest payments by the government to private sector
  - $T - G$  is budget surplus
  - Private saving is by households and firms

#### Determinants of Investment:

- Standard assumption: **firms** base investment decisions to **maximise profits** or a **cost-benefit analysis**
  - **Capital is costly to acquire** - firms must pay an **interest rate,  $r$**  plus **depreciation cost,  $\delta$**  for using capital
  - But **more capital stock increases output,  $y = F(k)$**
  - Assume output is sold at a fixed price  $p$
- Profit maximization problem of firm:
  - $\Pi = pF(k) - (r + \delta)k$ 
    - where  $(r + \delta)k$  is the **cost of hiring capital** and  $pF(k)$  is **price x output = revenue**
  - with first order condition:
    - $pF'(k) - (r + \delta) = 0$ 
      - where  $pF'(k) = \frac{dF(k)}{dk}$
- Determinants of investment
  - Marginal product of capital
  - Output price relative to capital price
  - The real interest rate
  - The rate of depreciation

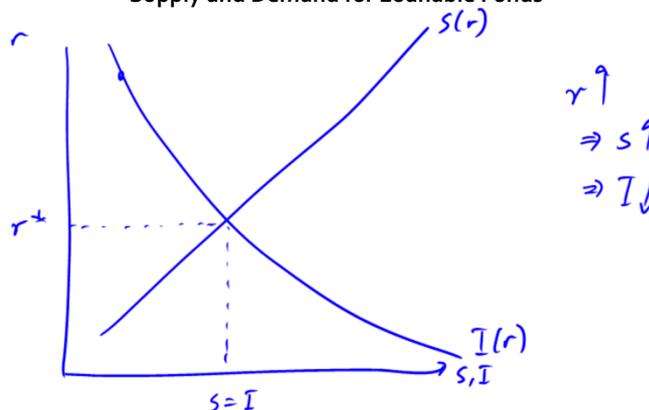
#### Marginal Product of Capital



#### Market for Loanable Funds:

- There are some individuals in the economy that wish to save, and some to invest
  - Interest rate is essentially the price associated with savings and investment to ensure market equilibrium
  - Individuals increase saving as the real interest rate rises
  - Firms reduce investment as the real interest rate rises

#### Supply and Demand for Loanable Funds



- 1.4 The Consumer Price Index: Measuring The Price Level
- 2.1 Saving and Wealth
- 2.2 Why Do People Save?
- 2.3 National Saving And Its Components
- 2.4 Is Low Household Saving A Problem?
- 2.5 Investment And Capital Formation
- 2.6 Saving, Investment And Financial Markets

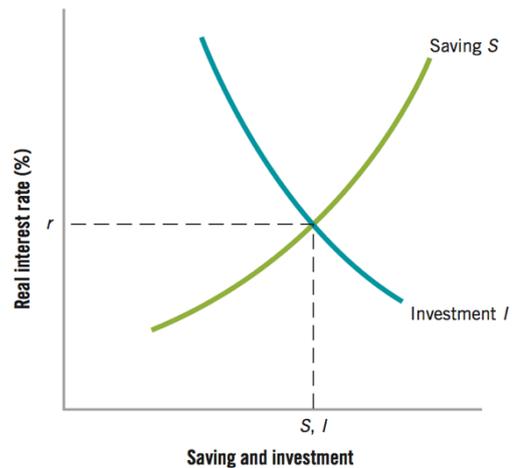
Definitions:

- **Quality Adjustment Bias:** The bias that causes measured inflation to overstate changes in the cost of living caused by the failure to adjust adequately for improvements in the quality of goods and services.
- **Nominal Interest Rate:** The percentage increase in the nominal, or dollar, value of a financial asset
- **Saving:** Current income minus spending on current needs.
- **Saving rate** The proportion of total income devoted to saving. In a closed economy, this is equivalent to the investment rate.
- **Assets:** Anything of value that one owns.
- **Liabilities** The debts one owes.
- **Wealth** The value of assets minus liabilities
- **Flow:** A measure that is defined per unit of time.
- **Stock:** A measure that is defined at a point in time
- **Capital Gains:** Increases in the value of existing assets.
- **Capital Losses:** Decreases in the value of existing assets.
- **Lifecycle Saving:** Saving to meet long-term objectives, such as retirement, university attendance or the purchase of a home.
- **Precautionary Saving:** Saving for protection against unexpected setbacks, such as the loss of a job or a medical emergency.
- **Bequest Saving:** Saving done for the purpose of leaving an inheritance
- **Private Saving:** The saving of the private sector of the economy is equal to the after-tax income of the private sector minus consumption expenditures ( $Y - T - C$ ); private saving can be further broken down into household saving and business saving.
- **Public Saving:** The saving of the government sector is equal to net tax payments minus government purchases ( $T - G$ ).
- **Government Budget Deficit:** The excess of government spending over tax collections.
- **Government Budget Surplus:** The excess of government tax collections over government spending; the government budget surplus equals public saving.

1.4 The Consumer Price Index: Measuring The Price Level

- The **basic tool for measuring inflation** is the **consumer price index**, or **CPI**. The CPI measures the **cost of purchasing a fixed basket of goods and services in any period relative to the cost of the same basket of goods and services in a base year**.
- The **inflation rate** is the **annual percentage rate of change in the price level as measured by a price index such as the CPI**.
- The **public** sometimes **confuses increases in the relative prices** for specific goods or services **with inflation**, which is an **increase in the general price level**.
- **Inflation** imposes a number of **true costs** on the economy, including **'shoe-leather' costs**, which are **the real resources that are wasted as people try to economise on cash holdings**; **'noise' in the price system**; **distortions** of the tax system; **unexpected redistributions** of wealth; and **interference with long-run planning**. Because of these costs, most economists agree that **sustained economic growth** is more likely if **inflation is low and stable**.

Supply and Demand of Savings



**Savings** are supplied by households, firms and the government, and **demand**ed by borrowers wishing to invest in new capital goods. The **supply of saving (S) increases** with the real interest rate, and the **demand for saving by investors (I) decreases** with the real interest rate. In **financial market equilibrium**, the **real interest rate** takes the value that **equates** the **quantity of saving supplied and demanded**.

ex. The Link Between Saving and Wealth

THE LINK BETWEEN SAVING AND WEALTH

Mary saves \$80 per week. How does this saving affect her wealth? Does the change in her wealth depend on whether Mary uses her saving to accumulate assets or to pay down her liabilities?

Mary could use the \$80 she saved this week to increase her assets—for example, by adding the \$80 to her cheque account—or to reduce her liabilities—for example, by paying down her credit card balance. Suppose she adds the \$80 to her cheque account, increasing her assets by \$80. Since her liabilities are unchanged, her wealth also increases by \$80, to \$3110 (see Table 2.1).

If Mary decides to use the \$80 she saved this week to pay down her credit card balance, she reduces it from \$250 to \$170. That action would reduce her liabilities by \$80, leaving her assets unchanged. Since wealth equals assets minus liabilities, reducing her liabilities by \$80 increases her wealth by \$80, to \$3110. Thus, saving \$80 per week raises Mary's stock of wealth by \$80 a week, regardless of whether she uses her saving to increase her assets or reduce her liabilities.

ex. By How Much Does A High Saving Rate Enhance A Family's Future Living Standard?

The Spends and the Thrifts are similar families, except that the Spends save 5 per cent of their income each year and the Thrifts save 20 per cent. The two families began to save in 1980 and plan to continue until retirement in the year 2015. Both families earn \$40 000 a year in real terms in the labour market, and both put their saving in a mutual fund that has yielded a real return of 8 per cent per year, a return they expect to continue into the future. Compare the amount that the two families consume in each year from 1980 to 2015, and compare the families' wealth at retirement.

In the first year, 1980, the Spends saved \$2000 (5 per cent of their \$40 000 income) and consumed \$38 000 (95 per cent of \$40 000). The Thrifts saved \$8000 in 1980 (20 per cent of \$40 000) and hence consumed only \$32 000 in that year—\$6000 less than the Spends. In 1981 the Thrifts' income was \$40 640, the extra \$640 representing the 8 per cent return on their \$8000 saving. The Spends saw their income grow by only \$160 (8 per cent of their saving of \$2000) in 1981. With an income of \$40 640, the Thrifts consumed \$32 512 in 1981 (80 per cent of \$40 640) compared to \$38 152 (95 per cent of \$40 160) for the Spends. The consumption gap between the two families, which started out at \$6000, thus fell to \$5640 after one year.

Because of the more rapid increase in the Thrifts' wealth and hence interest income, each year the Thrifts' income grew faster than the Spends'; each year the Thrifts continued to save 20 per cent of their higher incomes compared to only 5 per cent for the Spends. Figure 2.5 shows the paths followed by the consumption spending of the two families. You can see that the Thrifts' consumption, though starting at a lower level, grows relatively more quickly. By 1995 the Thrifts had overtaken the Spends, and from that point onward the amount by which the Thrifts outspent the Spends grew with each passing year. Even though the Spends continued to consume 95 per cent of their income each year, their income grew so slowly that, by 2000, they were consuming nearly \$3000 a year less than the Thrifts (\$41 158 a year versus \$43 957). And by the time the two families retire, in 2015, the Thrifts will be consuming more than \$12 000 per year more than the Spends (\$55 774 versus \$43 698). Even more striking is the difference between the retirement nest eggs of the two families. Whereas the Spends will enter retirement with total accumulated saving of just over \$77 000, the Thrifts will have more than \$385 000—five times as much.

These dramatic differences depend in part on the assumption that the real rate of return is 8 per cent—lower than the actual return to mutual funds since 1980, but still a relatively high rate of return from a historical perspective. The Spend family in our example actually saves more than typical Australian households, many of which carry \$5000 or more in credit card debt at high rates of interest and have no significant saving at all. The point of the example, which remains valid under alternative assumptions about the real interest rate and saving rates, is that, because of the power of compound interest, a high rate of saving pays off handsomely in the long run.

- The **real interest rate** is the annual percentage increase in the purchasing power of a financial asset. When measured ex post, it is equal to the nominal, or market, interest rate minus the inflation rate.
- To obtain a given **real rate of return**, lenders must charge a high nominal interest rate when inflation is high and a low nominal interest rate when inflation is low.
- **Deflation**, a fall in the general level of prices, can lead to an increase in the real interest rate. This is because the nominal interest rate will not fall below zero.

### Consumer Price Index

$$\text{CPI} = \frac{\text{Cost of base-year consumption basket of goods and services in current year}}{\text{Cost of base-year consumption basket of goods and services in base year}}$$

e.g. family's income

TABLE 1.8 Comparing the real values of a family's income in 2010 and 2013

YEAR	NOMINAL FAMILY INCOME	CPI	REAL FAMILY INCOME = NOMINAL FAMILY INCOME/CPI
2010	\$40 000	1.00	\$40 000/1.00 = \$40 000
2013	\$44 000	1.25	\$44 000/1.25 = \$35 200

### Real Interest Rate

$$r = i - \pi$$

where  $r$  = the real interest rate

$i$  = the nominal, or market, interest rate

$\pi$  = the inflation rate

- In general, **saving** equals current income minus spending on current needs; the **saving rate** is the percentage of income that is saved.
- **Wealth, or net worth**, equals the market value of assets (real or financial items of value) minus liabilities (debts).
- **Saving is a flow**, being measured in dollars per unit of time; **wealth is a stock**, measured in dollars at a point in time. As the amount of water in a bathtub changes according to the rate at which water flows in, the stock of wealth increases at the saving rate. **Wealth also increases** if the value of existing assets rises (**capital gains**) and **decreases** if the value of existing assets falls (**capital losses**).
- Individuals and households **save** for a variety of reasons, including lifecycle objectives, such as saving for retirement or a new home; the **need to be prepared for an emergency** (**precautionary saving**); and the **desire to leave an inheritance** (**bequest saving**). The amount people save is also affected by the **real interest rate**, which is the 'reward' for saving. Evidence suggests that **higher real interest rates lead to modest increases in saving**. Saving can also be affected by **psychological factors**, such as the degree of self-control and the desire to consume at the level of one's neighbours (demonstration effects).
- The **saving of an entire country** is **national saving, S**. National saving is defined by  $S = Y - C - G$ , where  $Y$  represents total output or income,  $C$  equals consumption spending and  $G$  equals government purchases of goods and services.
- **National saving** can be broken up into **private saving**, or  $Y - T - C$ , and **public saving**, or  $T - G$ , where  $T$  stands for taxes paid to the government less transfer payments and interest paid by the government to the private sector. **Private saving** can be further broken down into **household saving** and **business saving**. In Australia, the **bulk of private saving** has often been done by businesses.
- **Public saving** is equivalent to the **government budget surplus**,  $T - G$ ; if the government runs a **budget deficit** then **public saving is negative**.

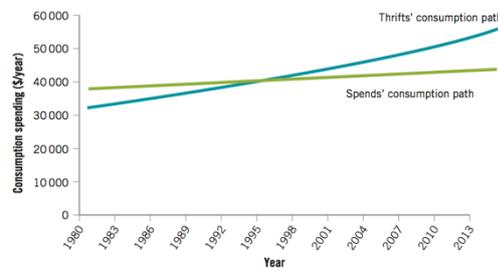


Figure 2.6 Consumption trajectories of the Thrifts and the Spends The figure shows consumption spending in each year by two families, the Thrifts and the Spends. Because the Thrifts save more than the Spends, their annual consumption spending rises relatively more quickly. By the time of retirement in the year 2015, the Thrifts are both consuming significantly more each year than the Spends, and also have a retirement nest egg that is five times larger.

### ex. Should Patrick Buy a Ride-On Lawn Mower?

#### SHOULD PATRICK BUY A RIDE-ON LAWN MOWER?

Patrick is thinking of going into the lawn care business. He can buy a \$4000 ride-on mower by taking out a loan at 6 per cent annual interest. With this mower and his own labour, Patrick can net \$6000 per summer, after the deduction of costs such as petrol and maintenance. Of the \$6000 net revenues, 20 per cent must be paid to the government in taxes. Assume that Patrick could earn \$4400 after taxes by working in an alternative job. Assume also that the lawn mower can always be resold for its original purchase price of \$4000. Should Patrick buy the lawn mower?

To decide whether to invest in the capital good (the lawn mower), Patrick should compare the financial benefits and costs. With the mower, he can earn revenue of \$6000, net of petrol and maintenance costs. However, 20 per cent of that, or \$1200, must be paid in taxes, leaving Patrick with \$4800. Patrick could earn \$4400 after taxes by working at an alternative job, so the financial benefit to Patrick of buying the mower is the difference between \$4800 and \$4400, or \$400; \$400 is the value of the marginal product of the lawn mower.

Since the mower does not lose value over time and since petrol and maintenance costs have already been deducted, the only remaining cost Patrick should take into account is the interest on the loan for the mower. Patrick must pay 6 per cent interest on \$4000, or \$240 per year. Since this financial cost is less than the financial benefit of \$400, the value of the mower's marginal product, Patrick should buy the mower.

Patrick's decision might change if the costs and benefits of his investment in the mower change, as Example 2.6 shows.

#### SHOULD PATRICK BUY A RIDE-ON LAWN MOWER?

With all other assumptions the same as in Example 2.5, decide whether Patrick should buy the mower:

- if the interest rate is 12 per cent rather than 6 per cent
- if the purchase price of the mower is \$7000 rather than \$4000
- if the tax rate on Patrick's net revenues is 25 per cent rather than 20 per cent
- if the mower is less efficient than Patrick originally thought so that his net revenues will be \$5500 rather than \$6000.

In each case, Patrick must compare the financial costs and benefits of buying the mower.

- If the interest rate is 12 per cent, then the interest cost will be 12 per cent of \$4000, or \$480, which exceeds the value of the mower's marginal product (\$400). Patrick should not buy the mower.
- If the cost of the mower is \$7000, then Patrick must borrow \$7000 instead of \$4000. At 6 per cent interest, his interest cost will be \$420—too high to justify the purchase, since the value of the mower's marginal product is \$400.
- If the tax rate on net revenues is 25 per cent, then Patrick must pay 25 per cent of his \$6000 net revenues, or \$1500, in taxes. After taxes, his revenues from mowing will be \$4500, which is only \$100 more than he could make working at an alternative job. Furthermore, the \$100 will not cover the \$240 in interest that Patrick would have to pay. So, again, Patrick should not buy the mower.
- If the mower is less efficient than originally expected, so that Patrick can earn net revenues of only \$5500, Patrick will be left with only \$4400 after taxes—the same amount he could earn by working at another job. So, in this case, the value of the mower's marginal product is zero. At any interest rate greater than zero, Patrick should not buy the mower.

### ex. Government Saving

#### GOVERNMENT SAVING

Following are data on the Australian Commonwealth government's revenues and expenditures for the financial year 2004/2005, in billions of dollars. Find (a) the government's budget surplus or deficit and (b) the contribution of the government to national saving.

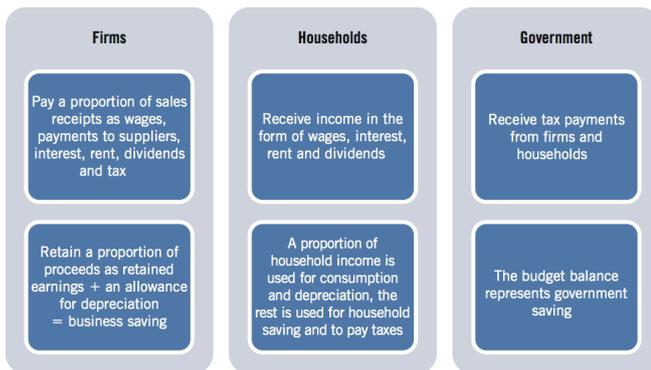
COMMONWEALTH GOVERNMENT	\$ BILLION
Receipts	206.6
Expenditures	195.7

Source: Compiled from Commonwealth Government Budget Papers, [www.budget.gov.au/2006-07/overview/html/overview\\_29.htm](http://www.budget.gov.au/2006-07/overview/html/overview_29.htm)

The federal government's receipts minus its expenditures were  $206.6 - 195.7 = 10.9$ , so the government ran a budget surplus of \$10.9 billion in 2004/2005. Thus, the contribution of the Commonwealth government to Australia's national saving in 2004/2005 was \$10.9 billion.

- **Investment** is the purchase or construction of new capital goods, including housing. Firms will invest in new capital goods if the benefits of doing so outweigh the costs. Two factors that determine the cost of investment are the price of new capital goods and the real interest rate. The higher the real interest rate, the more expensive it is to borrow, and the less likely firms are to invest. The benefit of investment is the value of the marginal product of new capital, which depends on factors such as the productivity of new capital goods, the taxes levied on the revenues they generate and the relative price of the firm's output.
- In the absence of international borrowing or lending, the supply of, and demand for, national saving must be equal. The supply of national saving depends on the saving decisions of households and businesses and the fiscal policies of the government (which determine public saving).
- The demand for saving is the amount business firms want to invest in new capital. The real interest rate, which is the 'price' of borrowed funds, changes to equate the supply of and demand for national saving. Factors that affect the supply of or demand for saving will change saving, investment and the equilibrium real interest rate. For example, an increase in the government budget deficit will reduce national saving and investment and raise the equilibrium real interest rate. The tendency of government budget deficits to reduce investment is called crowding out.

### Income and National Saving



Each of these three sectors in the economy receives an income flow each period. After meeting their current needs, what is left over from this income flow represents saving. The combined saving of the three sectors is national saving.

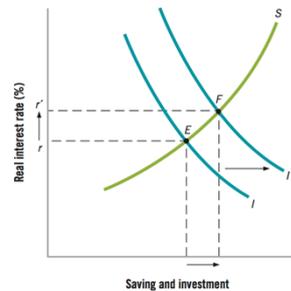
### ex. The Effects of New Technology

#### THE EFFECTS OF NEW TECHNOLOGY

Exciting new technologies have been introduced in recent years, ranging from the internet to new applications of genetics. A number of these technologies appear to have great commercial potential. How does the introduction of new technologies affect saving, investment and the real interest rate?

The introduction of any new technology with the potential for commercial application creates profit opportunities for those who can bring the fruits of the technology to the public. In economists' language, the technical breakthrough raises the marginal product of new capital. Figure 2.14 shows the effects of a technological increase in the marginal product of capital. At any given real interest rate, an increase in the marginal product of capital makes firms more eager to invest. Thus, the advent of the new technology causes the demand for saving to shift upward and to the right, from  $I$  to  $I'$ .

At the new equilibrium point  $F$ , investment and national saving are higher than before, as is the real interest rate, which rises from  $r$  to  $r'$ . The rise in the real interest rate reflects the increased demand for funds by investors as they race to apply the new technologies. Because of the incentive of higher real returns, saving increases as well.



### ex. Increase in Government Budget Deficit

#### AN INCREASE IN THE GOVERNMENT BUDGET DEFICIT

Suppose the government increases its spending without raising taxes, thereby increasing its budget deficit (or reducing its budget surplus). How will this decision affect national saving, investment and the real interest rate?

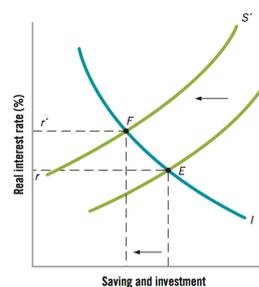
National saving includes both private saving (saving by households and businesses) and public saving, which is equivalent to the government budget surplus. An increase in the government budget deficit (or a decline in the surplus) reduces public saving. Assuming that private saving does not change, the reduction in public saving will reduce national saving as well.

Figure 2.15 shows the effect of the increased government budget deficit on the market for saving and investment. At any real interest rate, a larger deficit reduces national saving, causing the saving curve to shift to the left, from  $S$  to  $S'$ . At the new equilibrium point  $F$ , the real interest rate is higher at  $r'$ , and both national saving and investment are lower. In economic terms, the government has dipped further into the pool of private saving to borrow the funds to finance its budget deficit. The government's extra borrowing forces investors to compete for a smaller quantity of available saving, driving up the real interest rate. The higher real interest rate makes investment less attractive, assuring that investment will decrease along with national saving. The tendency of increased government deficits to reduce investment in new capital is called crowding out.

Reduced investment spending implies slower capital formation and thus lower economic growth. This adverse effect of budget deficits on economic growth, via crowding out, is probably the most important potential cost of deficits, and a major reason why economists advise governments to minimise their deficits wherever

possible. This is particularly the case when the economy is operating at close to maximum capacity, a time when competition between the private and government sectors for scarce resources could be fierce.

There is one other important caveat concerning crowding out. The analysis of Figure 2.13 assumes that borrowers of funds in the economy are restricted to those resources made available through national saving. In reality, the scope for borrowing today extends far beyond a nation's borders due to the increasing integration of the world's capital markets. It is now relatively easy to obtain financing from almost any country in the world that is willing to extend credit. This means that the degree of competition for resources between the government and private sectors that underlies the crowding out argument may not be as prevalent as suggested by the analysis of Figure 2.15. This implies that the link between a national government's budget position and the real interest rate may be less strong than that illustrated in Figure 2.15. We will return to this point in Chapter 15 when we consider international borrowing and lending in some detail.



**Figure 2.15** The effects of an increase in the government budget deficit on national saving and investment An increase in the government budget deficit reduces the supply of saving, raising the real interest rate and lowering investment. The tendency of increased government deficits to reduce investment in new capital is called crowding out.

Your Weighted Average is **82.500**. This was calculated on 01-May-2018. [?](#)

Year	Study Period	Subject	Short Title	Ver	Mark	Grade Code	Grade Description	Credit Points
2017				1	77	H2A	Second Class Hons A	12.500
2017	Semester 2	ECON10003	Introductory Macroeconomics	1	80	H1	First Class Honours	12.500
2017				1	75	H2A	Second Class Hons A	12.500
2017				1	91	H1	First Class Honours	12.500
2017				1	82	H1	First Class Honours	12.500
2017				1	80	H1	First Class Honours	12.500
2017				1	90	H1	First Class Honours	12.500
2017				1	85	H1	First Class Honours	12.500