Introductory Macroeconomics

Section 1: Measuring the Macroeconomy

1.1 Basic Concepts

What is Macroeconomics?

- Study of the national and international aggregate economy
- Analyse the performance of the economy
- Study of the government's role in managing the economy

Standards of Economic Performance

- Rising living standards in the long run
- A reasonably smooth business cycle, in particular with downturns or recessions as mild as possible
- Maintaining a stable real value of the national currency; neither excessive inflation nor deflation
- Ensuring sustainable levels of both public (government) and national debt
- Ensure an adequate but not excessive rate of savings, or provision for the future
- Provide employment for all those who seek work

1.2 Gross Domestic Product

Defining GDP

- GDP – the market value of all the final goods and services produced in a country during a given period (excludes goods not traded in markets like domestic home care, and intermediate goods)
- This is calculated using the 'value added' method, in which the cost of the inputs needed to supply that good or service is subtracted from the market value of that product or service, thus producing the total 'net gain' of that stage of production
- GDP can be calculated by three methods: production, income and expenditure

Calculating GDP

- The Production method adds up the value added at each stage of production for all goods produced in the country during the year
- The Income method adds up the pre-tax incomes of labour (salaries and wages) and capital (interest, profits, rent, royalties)
- The Expenditure method calculates the total amount of money spent on final domestically-produced goods and services by the four major sectors (C, I, G and NX)
- These three measures will (aside from statistical discrepancies) be identical, as all income received must be spent by someone else as expenditure (thus income = expenditure)
- Also, all expenditure that is counted in GDP must be upon final goods and services, while (if we assume firms buy their own inventories) all goods that are produced must be sold (exp=production)

GDP is Value-Added

- Because what we care about is those items that are of direct economic value, only final goods and services are included in GDP
- Intermediate goods and services are valuable only to the extent that they contribute to the production of final goods and services, and so are not counted separately

- Suppose wheat is grown in 2006 but is not used to make flour until 2007. What year should the value of the flour be allocated to?
- The answer is that we take the value added at each stage of production, and add that on the the GDP of the year in which that stage of production occurred
- The value added, in turn, is the market value of a product or service minus the cost of the inputs needed to supply that good or service

Problems with GDP

- One problem with this method is that it ignores production that occurs outside of markets
- Over the past 40 years, the proportion of women in the paid workforce has risen from 33% to 55%
- As more childcare and homemaking is done by paid workers rather than unpaid housewives, real GDP over this time will have increased more than actual economic wellbeing
- Another problem is that government services that are not sold in a market, like education and defence, are added to GDP according to how much they cost to provide, not according to their actual value
- Non-market economic activities, including volunteer work, unpaid housekeeping services, subsistence agriculture, barter, and underground economic activity like cleaners, tradesmen and babysitters paid in cash, as well as drugs and other illegal activities, are not included in GDP
- Environmental degradation is not measured in GDP, notably air and water quality
- Other intangibles like traffic congestion, leisure time, public safety, civic organisations and open space are not only not traded in markets but are also unmeasurable, and hence excluded from GDP

1.3 Inflation

Measuring Inflation

- Nominal GDP is measured at the prices of the current year; real GDP is current production measured in the prices of some base year
- $\mathrm{Y} = \mathrm{P} \times y$, where P is the price level relative to some base period, where P = 1
- Thus before the base period, P < 1, and afterwards, P > 1 (assuming constant inflation)
- CPI measures the average level of prices in the economy; more specifically, it is the cost of buying a given 'basket' of goods in one year divided by the cost of buying the same basket of goods in a predetermined 'base year'
- $CPI = \frac{cost\ of\ basket\ g\ and\ s\ in\ current\ year}{cost\ of\ same\ basket\ of\ g\ and\ s\ in\ base\ year}$
- The rate of inflation is the percentage change in the CPI over the specified time period (usually one year): $\pi = \frac{CPI_2 - CPI_1}{CPI_1} \times 100$, it is the rate at which the average level of prices is changing
- CPI is a weighted average of goods, so the most important goods get the highest weight
- These weights are only adjusted every five years, and hence in the interim, substitution away from expensive commodities tends to mean that the CPI overstates inflation
- The CPI also tends to overestimate inflation because of quality adjustment bias

The Costs of Inflation

- Additional time and resources that most be devoted to compensating for the higher cost of holding rapidly depreciating money; e.g. more regular trips to the bank, and hence an increase in the resourcing of bank branches
- Inflation also adds noise to the price system, which makes it difficult for businesses to determine whether an increase in demand for their products is real or merely the result of inflation

- The additional time and effort required to find out more about inflation and expected future changes in inflation will tend to make businesses more hesitant about responding to changing market conditions, hence making price more sticky and the economy less flexible
- Increased levels of taxation owing to 'bracket creep' and taxation of inflation-produced profits
- If the rate of inflation is higher than expected, borrowers gain at the expense of creditors, and employers gain at the expense of workers (particularly if wage rates are set by union agreements)
- If it is lower than expected, then the reverse occurs: thus inflation redistributes wealth in unexpected and unpredictable ways, hence discouraging investment and extra work
- Inflation encourages people to focus more energy on either trying to anticipate and hence profit from inflation, or by trying to insulate themselves from it, rather than productive investment
- Highly variable makes it very difficult to plan for the future – for example, it is likely that one will save either too much or too little for one's retirement, if the inflation rate is unpredictable
- 'Menu costs', or the costs of physically changing prices
- Deflation can be harmful if it becomes too large, as unlike under inflation the rate of interest cannot adjust to compensate for rate of change in the value of the currency
- Nominal interest rates can never fall below zero, and so if deflation becomes significant, real interest rates will be high

1.4 Saving and Investment

Saving Terminology

- The saving of a household, business, nation, etc, is its income minus its spending on current needs
- Rate of saving is the level of saving divided by income
- Assets are anything of value that an economic unit owns, be it financial (stocks, bonds, money) or real (consumer durables, house, valuables)
- A stock is a measure that is defined at a point in time; wealth is a stock
- A flow is a measure that is defined per unit of time; saving is a flow
- A flow is often the rate of change of a stock; for example, saving is an important component in the rate of change in wealth
- Capital gains are increases in the market value of one's assets, caused by occurrences like a rise in house prices or a rise in the value of shares
- National saving is equal to total private saving (household saving plus business saving), plus government saving: $S_{TOT} = S_{gov} + S_{Priv} = (T - G) + (Y - T - C)$
- Government saving occurs when the government collects more in taxes than its spends – in other words when it runs a budget surplus

Reasons for Saving

- Total change in one's wealth is equal to net saving plus net capital gains
- People save to meet long-term financial objectives like buying a house, providing for retirement, paying for their children's education
- Precautionary saving is saving for protection against unexpected setbacks, like a medical emergency or the loss of a job
- Bequest saving is saving for the purpose of leaving an inheritance, either to charity or one's children. This is mainly done by wealthy people
- A higher real interest rate increases the future purchasing power that one will gain by saving, without changing the amount of current consumption that one must forgo in order to do so
- Thus higher interest rates encourage people to save more

- On the other hand, higher interest rates reduce the amount that people must save in order to reach any given targeted level of wealth (e.g. to buy a new car), and hence can reduce saving
- Overall the data indicates that higher interest rates have a slightly positive effect on rates of saving

Why do Australians Save so Little?

- Household saving in Australia had always been low by world standards, and in recent decades it has declined further
- Two reasons include the rapid increases in share prices and house prices in the 1990s and 2000s, which has led many to see their wealth increasing, and hence reducing the perceived need to save
- In Japan and other countries, one must save a substantial portion of the purchase price of a house before buying it; in Australia often 5-10% is enough, thus reducing the need to save for this purpose
- Another factor may be that Australia's extensive social security system makes people feel insulated from unexpected problems, and hence reduces the desire to undertake precautionary saving
- Finally, the recent rise in income inequalities may have prompted some people to increase their relative level of consumption at the expense of their savings so as to maintain their level relative to their peers to which they were accustomed, even though their peers may now be earning more money than them

Investment and Capital Formation

- When deciding whether to invest, firms will weigh up the marginal cost and the marginal benefit
- The marginal cost of investing will be related to the price of the asset to be purchased, and the real rate of interest
- The real interest rate represents either the literal cost of borrowing the funds needed for investment, or the opportunity cost of the interest that the firm could have earned on the money that it uses to fund the investment
- The marginal benefit of investing is related to the marginal product of the investment, which is affected by the level of taxation of profits, technological advances which may allow more output to be produced from a given input, and the price of the goods being produced by the investment
- The marginal product of capital is equal to the product price multiplied by the extra output produced: $VMP_K = P \times MP_K$ (note that $MP_K \downarrow as\ I \uparrow$)
- The benefit from I = extra revenue from selling the output produced from the extra capital

The Interest Rate

- The real interest rate and level of saving and investment (which without overseas borrowing or lending must always be equal) can be modelled using supply and demand diagrams
- An economy can invest only those resources which its savers make available
- Anything which increases the level of saving causes the saving (supply) curve to shift to the right; anything which reduces saving causes it to shift to the left
- Anything which increases the demand for investment (for example higher marginal productivity) will shift the investment curve to the right (increase demand), and visa-versa
- Note that shifts in the savings curve are the result of both government and private saving decisions
- Real interest rate – percentage change in real purchasing power of asset
- Nominal interest rate – percentage change in dollar value of financial asset

1.5 Wages and Employment

Wage Determination

- The marginal product of labour is the increase in output with the hiring of one additional worker: $\frac{dq}{dL}$
- Value of the marginal product $= \bar{p} \times \frac{dq}{dL} =$ extra revenue firm gets from one extra worker
- Diminishing marginal product of labour means that $\frac{dq}{dL} \downarrow as\ L \uparrow$ - in other words the benefit to the firm of hiring an additional worker declines as the size of its existing labour force increases
- A profit maximising firm will always hire more workers until $VMP_L < W$, and will always be willing to pay a wage up to the value of VMP_L
- Because of diminishing marginal product, the demand curve for labour will slope down
- $\text{Real wage} = \frac{\text{nominal wage}}{\text{CPI}}$
- Nominal wage firm decision: hire additional worker if $VMP_L > P_L$
- Real wage firm decision: hire additional worker if $\frac{VMP_L}{CPI} > \frac{P_L}{CPI}$
- Because dividing two numbers by a constant does not affect the size of the inequality, we can think about firm hiring decisions in terms of real or nominal wage – it does not matter
- As the wage income is the primary benefit of working, a higher wage tends to increase the supply of labour – thus it is assumed that the supply curve for labour is upward sloping
- The wage rate will be the price of labour such that the quantity demanded is equal to the quantity supplied

Trends in Wages and Employment

- $\text{Real unit labour costs} = \frac{\text{Average labour cost}}{\text{Average labour productivity}}$, where labour costs include wages, payroll taxes and employment subsidies, so that they represent the total cost of hiring labour in real terms, 143
- If the labour cost rises faster than the average labour productivity, then employers will be likely to want to hire fewer workers; on the other hand if labour productivity rises faster than wages, then firms will tend to expand their demand for labour, 143-144
- During the 1970s, real wages rose by far more than productivity, owing to the pro-worker policies of Gough Whitlam – the result was rising unemployment, 144
- The average rate of unemployment in Australia was around 2% prior to the mid-1970s, while since then it has been about 7%. This indicates a significant increase in the natural rate of unemployment, 176
- One explanation for this is that the ratio of average unemployment benefits to average wages rose rapidly in the mid 1970s from about 15% to nearly 30%, where it has remained ever since, 176-177
- During the 1980s, real wages stayed basically flat, but real unit labour costs fell dramatically, enabling a great increase in employment, 144
- Part of the explanation for this is that Bob Hawke made agreements with unions, promising political influence, tax concessions and welfare benefits in exchange for wage restraint, so as to enable unemployment to fall, 145
- On the other hand, labour productivity did not rise greatly during the 1980s, which was seen to be symptomatic of heavy labour market regulations, 145
- During the 1990s, neither real labour costs nor employment changed very much – most of the increase in productivity went to higher real wages, 145
- During the early 2000s, real labour costs have been falling, thus enabling substantial rise in employment, while still allowing real earnings to rise somewhat, 145

Explaining Growing Inequality

- Globalisation is one of the major causes of growing income inequality in Australia over the past few decades, 145
- This occurs because opening up to foreign trade will lead to an expansion in industries where your country possesses a comparative advantage, and a reduction in those industries where it has a comparative disadvantage, 146-147
- This tends to mean that the demand for workers in these disadvantaged industries declines, hence lowering both employment and the wages of those industries, 146
- In contrast, those industries that expand increases her demand for labour, thus raising wages and employment, 147
- The end result is that some wages rise while others fall, and hence overall inequality increases
- This is exacerbated by the fact that most industries that contract due to globalisation are those which predominantly employ low-skilled workers, while the expanding industries employ higher-skilled workers
- Although market forces would tend to direct workers in the contracting industries to re-employment in the expanding industries, lack of skills and adjustment costs may prevent this in the short run, 147
- In recent years, technological growth has benefitted skilled workers far more than unskilled workers by increasing the demand for skilled workers while reducing the demand for unskilled workers, resulting in greater wage inequality, 148-149
- This had occurred because the nature of technological change is different to earlier decades. Early in the 20th century, technological progress saw the introduction of large factories which provided high-paying jobs for even very low skilled workers, 148
- More recently, however, these simplistic jobs are increasingly taken over by machines and computers, which require highly trained workers to operate and maintain, 149

1.6 Unemployment

Measuring Unemployment

- The ABS conducts monthly surveys of 30,000 Australian households, and classifies all persons over the age of 15 as either employed, unemployed or out of the labour force
- The labour force comprises all those people who are employed, plus all those people who are not employed but are looking for work. The participation rate measures the size of the workforce relative to the size of the over-15 population: it is currently about 65%
- Full-time students, unpaid homemakers, retirees and the disabled are all out of the labour force
- A person is deemed to be employed if they undertook at least one hour of paid work during the week prior to the survey, or are on sick leave or vacation from a regular job
- A person is classified as unemployed if they did not participate in paid work, but actively sought work within the previous week by going to a job interview, registering with Centrelink, etc

Types of Unemployment

- Economists classify unemployment into three different types. The first two, frictional and structural, are independent of the business cycle, and hence are referred to as the 'natural rate of unemployment'
- The third type, cyclical unemployment, is caused by contractions of the business cycle
- Many economists believe that changes to the structure of Australia's economy have dramatically increased the natural rate of unemployment since the 1970s

- These include increased welfare benefits for the short-term unemployed, and a decline in the manufacturing sector

Frictional and Structural Unemployment

- Frictional unemployment is short-term unemployment caused by workers moving between jobs, looking for their first job or looking for a better job, 153-154
- Frictional unemployment is unavoidable in a dynamic economy where technology and changing demand constantly require some industries to contract and others to expand, hence requiring workers to move around between jobs, 153-154
- Structural unemployment is long-term unemployment which occurs because the skills and aspirations of workers do not match the jobs available in the economy, 154
- Discrimination or language barriers could prevent some workers from finding jobs, while other lack the skills now in demand – for example unemployed steel-workers may have neither the ability nor the desire to find jobs in the expanding IT industry, 154
- Unemployment caused by unions and minimum wages artificially raising the price of labour and hence reducing the demand for it is also classified as structural unemployment, 154

Costs of Unemployment

- Because it typically does not last long, frictional unemployment poses very small psychological and economic costs – in fact when we factor in the increased productivity and (presumably) happiness of workers who find a better job, frictional unemployment is probably beneficial, 153-154
- Because it is long-term and less voluntary than frictional, structural unemployment causes much greater economic and psychological costs, 154
- Unemployment imposes economic costs on society as a whole, which is now deprived of the output of unemployed workers whilst still having to support them via welfare benefits
- The unemployed workers and their families are also likely to suffer financial hardship, and possibly a deterioration of skills through lack of use
- The psychological costs of prolonged unemployment are also significant, as workers loss self-esteem, feel they have lost control over their life, become stressed, depressed

Section 2: Short-Run Keynesian Model

2.1 Basic Concepts

Recession Terminology

- Big question: why does the economy sometimes outperform its long term growth rate, while other times it does not much worse? Why isn't economic growth smooth?
- Economic fluctuations are often called the business cycle, but this is a misleading name because the length, timing and severity of expansions and contractions are highly variable and unpredictable
- Peak – high point of economic activity prior to downturn
- Contraction – period of economic slowdown following a peak
- Trough – end point of the contraction and low point of economic activity prior to expansion
- Expansion – period of economic growth and movement from trough to peak
- Fortunately, expansions are longer than contractions; the economy is usually in expansion
- Growth style – recession occurs when rate of GDP growth is significantly below historical average
- Classical style – recession occurs when GDP has actually contracted

Facts about Recessions

- Recessions are generally defined to occur when there is a significant, noticeable decline in the rate of economic growth
- Unemployment generally lags behind whatever factor causes the recession, owing to the reluctance of firms to fire their trained and experienced workers, who will be costly to replace
- Producers of durable goods tend to be much more heavily affected by contractions than do providers of non-durable goods and services
- Inflation tends to rise before recessions and fall during or after them
- During recessions unemployment rises very rapidly, whereas during expansions it falls only slowly

Output Gaps

- Potential output (y^*): the output of the economy (real GDP) when it is utilising its capital and labour resources at normal rates; level of GDP consistent with economy's long-run growth rate
- Output gap ($y - y^*$): the percentage difference between potential output and actual output
- Expansion: $y > y^*$
- Contraction: $y < y^*$
- A positive output gap is called an expansionary gap, and represents an above-normal utilisation of resources. It is generally considered to be a problem as it is often the forerunner of inflation
- A contractionary gap occurs when the output gap is negative, and is a problem because it represents underutilisation of resources and unemployment

Unemployment

- Frictional unemployment: unemployment as a result of people looking for new or their first job
- Structural unemployment: unemployment caused by a mismatch in worker skills or ambitions and job requirements
- Cyclical unemployment ($u - u^*$): the extra unemployment caused by economic contractions
- Natural rate of unemployment (u^*): the sum of frictional and structural unemployment; rate of unemployment when output gap is zero
- Okun's law: $100 \times \frac{y-y^*}{y^*} = -\beta(u - u^*)$, where β is the factor of correlation equal to 1.6 in Australia
- This means that a one percentage point increase in cyclical unemployment leads to a 1.6 percentage point increase in the output gap (or equivalently a 1.6 percentage point decline in actual GDP), 177-178
- Okun's law allows us to make predictions about how unemployment will change with a given output gap

2.2 The Keynesian Model

Core Keynesian Insight

- The key assumption of the Keynesian model is that prices do not change, as over the short run, firms set one price for a good and then meet the demand at that price
- Firms will only vary the price if the benefit gained from changing the price exceeds the menu costs of making the change
- Short run – the period of time in which changes in demand lead to changes in quantity, but not changes in price
- The fact that prices do not change in the Keynesian model means that there is no distinction between nominal and real GDP, interest rates, etc, 190

Aggregate Expenditure

- Planned Aggregate Expenditure – the total planned expenditure on final goods and services
- $PAE = C^P + I^P + G^P + NX^P$
- It is assumed that $C^P = C,\ G^P = G,\ NX^P = NX$, as households, government and foreigners have complete control over their spending, and so their spending plans are always realised
- However, firms that are meeting demand at their set price do not have control over the quantity they sell, and hence (because unsold inventories are counted as investment) they do not have direct control over how much they invest
- Thus if sales are less than expected, inventories grow more than expected, and $I > I^P$
- If firms sell more than expected, and hence have lower inventory investment than expected, $I < I^P$
- Equilibrium occurs when $Y = PAE \rightarrow I = I^P$; i.e., there is no unexpected change in inventories
- The 45-degree line marks out this range of possible equilibriums

Consumption

- Consumption – spending by households on final goods and services
- Consumption function: $C = \bar{C} + c(Y - T)$
- Exogenous consumption ($\bar{C}$) – the part of consumption expenditure independent of income
- Induced consumption ($c(Y - T)$) – the part of consumption which is 'induced' by income levels
- Disposable income ($Y - T$) – is GDP minus taxes, representing the level of income that households consider when making spending decisions
- Marginal propensity to consume (c): the proportion of an additional dollar of income that will be spent on consumption

Injections

- Injections ($J^P = I^P + G + X$): the component of PAE that does not come from household consumption, including exports, government spending and planned investment
- Planned investment (I^P); planned spending by firms on new capital goods, including equipment, factories, residential housing and inventories
- Planned investment – assumed to be exogenous (not dependent upon GDP), as the real interest rate and 'entrepreneurs expectations' about the future profitability of investment proposals, are much more important determinants of planned investment than GDP
- Government expenditure – spending by government on goods and services, excluding interest repayments and transfer payments; assumed to be exogenous

Withdrawals

- Withdrawals ($W = S + T + M$): the part of household income not spent on goods and services produced domestically, including expenditure on imports, taxes and savings
- Exports – purchases of domestically produced goods by foreigners, assumed to be exogenous
- Taxes ($T = \bar{T} + tY$): consist of an exogenous component that does not vary with income ($\bar{T}$), and an endogenous component which does vary with income tY; t = rate of taxation
- Savings ($S = Y - C - T$): household disposable income minus spending on consumption
- Imports are proportional to income, so $M = m(1 - t)Y$, where m is the marginal propensity to import, represented as a percentage of after-tax income spent on imports

Equilibrium

- Sun-run equilibrium output – the level of output when PAE = Y

- Short-run equilibrium occurs when $J^P = W$, as otherwise PAE would either be increasing or decreasing, and hence output would be changing
- In equilibrium, $S = I^P$, while out of equilibrium, $S \neq I^P$
- I^P is exogenous, therefore S must change to get back to equilibrium; for S to adjust, Y must adjust

The Multiplier

- Income-expenditure multiplier – the effect of a one-unit increase in exogenous expenditure on short-run equilibrium output
- For example, a multiplier of 5 means that a 10 unit increase in expenditure raises equilibrium output by 50 units
- This greater-than-proportional increase arises because a 10 unit increase in spending directly increases PAE by 10 units, but also raises income by 10 units, which in turn raises expenditure by $10k$, which in turn raises incomes by 10k, which then raises expenditure by $10k^2$, etc, etc
- Note that the multiplier exists because the consumption curve slopes upwards – in other words the level of consumption is dependent upon GDP
- If consumption were entirely exogenous, the multiplier would equal one. Similarly, the lower the marginal propensity to consume, the less consumption depends upon income, and hence the shallow is the slope of the consumption curve, and hence the lower is the multiplier
- $\text{Multiplier} = \frac{1}{1-k}$
- Marginal propensity of expenditure ($k = (c - m)(1 - t)$): the proportion of an additional dollar of income that is spent on domestically produced consumer goods
- Lower taxes, fewer imports, and more consumption spending (lower savings) all mean a higher k, and hence a higher multiplier

Reaching Equilibrium

- If PAE > Y, then firms are not producing enough to meet the demand. In the very short run they will have to run down their inventories, but in the slightly longer run they will have to step up production (and hence raise GDP, or Y) to meet the demand at existing prices
- Similarly, if PAE < Y, firms will find themselves with excess output that they cannot sell. Though they may stock up their inventories for a time, eventually they will find the costs of holing the extra merchandise to be too high, and so they will cut back on production.
- In the process of cutting back production, firms also reduce household incomes, hence further lowering PAE. This continues until PAE = Y, and withdrawals equal planned injections.
- At short-run equilibrium, the level of planned expenditure is just sufficient to buy up all the output that firms are producing, and hence there is no incentive for firms either to raise or lower output
- Similarly, firm's investment in inventories will be exactly as planned; no more or less
- Unintended inventory changes act as a signal for firms to change production

2.3 Fiscal Policy

Theory Behind Fiscal Policy

- Government expenditure is an important component of PAE, and hence by varying its expenditure the government can directly eliminate output gaps
- Thus, if a 10 unit decline in expenditure has caused a 50 unit decline in equilibrium GDP (owing to the multiplier of 5), then the government can increase its expenditure by 10 units, and the output gap will be abolished

- As induced consumption expenditure equals $(c - m)(1 - t)Y$, a reduction in the tax rate will increase consumption expenditure by the fact of higher after-tax incomes
- Effectively, tax cuts increase the slope of the consumption curve, thus yielding more spending for every given level of income, and hence eliminating an output gap
- Note that this only works if the tax cuts are not equalled by an equivalent reduction in government expenditure: if this occurs short-run equilibrium GDP actually falls, as part of the tax cut is saved
- In other words, PAE falls by the full value of the reduced government expenditure, but only rises by this value times the marginal propensity to consume (which owing to saving will be less than one)

Problems with Fiscal Policy

- One problem with fiscal policy is that it is slow to change and hence difficult to adjust to changing macroeconomic conditions
- Government spending can create large government deficits, which must be financed through national saving; this could soak up funds that would be used for investment in new capital goods, hence harming long-term growth
- Finally, wasteful government expenditure may raise aggregate spending, but also lower the potential output of the economy
- It has been hypothesised that large-scale spending on public works project by the Japanese government in the 1990s failed to pull Japan out of recession for two reasons
- Firstly, the expenditures were not large enough relative to the economy
- Secondly, impact they did have was largely cancelled by the decline in consumer confidence (and hence spending) caused by the realisation of consumers that they would one day have to pay for the wasteful spending

Section 3: Monetary Policy and AD/AS

3.1 Money and Banking

Money and its Uses

- Money is used a medium of exchange, so that trade can occur without a double coincidence of wants between parties (i.e. each has something the other wants), 246
- As this is very difficult to achieve, money greater expands the potential for trade and hence specialisation by permitting trade when only a single coincidence of wants exists, 246
- Money also functions as a unit of account, allowing complex economic calculations to be made weighing up the relative costs and benefit of using different resources that would otherwise by incomparable (i.e. trucks and apples), 246
- Finally, money also acts as a store of value, 246
- Currency is all notes and coins in circulation outside of banks, while M1 includes currency plus deposits in banks, 247
- M3 includes M1 plus all the bank deposits of the private non-banking sector, while broad money includes M3 plus a few other financial assets which can be used as money, 247

The Demand and Supply of Money

- Money is a type (or actually a variety of types) of financial asset that can be used to make purchases and store wealth, 266
- Anyone who holds wealth must make a portfolio allocation decision, or a choice about the forms in which they will hold this wealth, 266

- The aggregate demand for money is that total amount of money that all businesses and individuals in an economy choose to hold as part of their wealth
- The desire to hold money will increase when the benefits of holding money increase.
- As the major benefit of holding money is its usefulness in transactions, the demand for money increases when either prices or real GDP rise, as both necessitate an increase in expenditure and hence the need for more money, 269-270
- Conversely, the cost or 'price' of holding money is the opportunity cost of the interest that could have been earned on the money if it was invested
- Thus, higher interest rates increase the cost of holding money, and hence reduce the quantity of money demanded for holding, 269-271
- Because it is mostly affected by the actions of the Central Bank, the supply of money is not systematically effected by the nominal interest rate, and hence is represented by a straight vertical line on the supple-demand graph for money, 272
- Thus, both the nominal interest rate and the quantity of money supplied are determined by the point at which the supply and demand curves intersect, 272-273

The Quantity Theory

- M = money supply
- V = velocity of circulation (rate at which a given amount of money circulates around the economy)

$$M \times V = Y$$
$$M \times V = P \times y$$
$$MV = Py$$
$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta y$$
$$\text{assume y and V change slowly}$$
$$\therefore \%\Delta V \cong 0$$
$$\%\Delta y \cong 0$$
$$\therefore \%\Delta M = \%\Delta P$$

- Thus, by controlling the money supply we can control inflation
- However, the reserve bank no longer directly targets the rate of money, as there has been an explosion of financial assets in the economy, and there are thousands of alternatives which are used as close substitutes for money
- In other words, in a deregulated financial system, it is hard to target the money supply
- Instead, the reserve bank targets the interest rate

Banks and the Creation of Money

- Currency held in banks is called bank reserves. Banks use their reserves to meet demand for payments by customers who have deposited money with them, 248-249
- However, most of the time most people do not withdraw their money but simply leave it in the bank. Hence banks do not need to keep reserves equal to 100% of their deposits, 249
- Instead, they find it far more profitable to lend the reserves out and earn interest on them, 249
- Because most people like to keep their money in a bank, however, the lent out reserves will ultimately be deposited back in the banks again, 249
- The supply of currency that can be moved around is fixed, and so the bank's reserves (assuming the money it lends out is re-deposited in banks) will always be equal to the same amount, 249
- However, each round of lending will increase the bank's deposits by the value of the lent out money. Thus, if a bank lends out 90% of its reserves each time, its deposits will be equal to $100 + 90 + 81 + 72 + 63 \ldots = 1000$, 249-250

- The process of lending out and re-depositing will only end when the fixed value of reserves equals 10% of the bank deposits. At this point, the bank will not consider it wise to lend out any more of its reserves, as it needs them all to service its customers and their deposits, 250
- $\text{Bank deposits} = \frac{\text{bank reserves}}{\text{desired reserve to deposit ratio}}$, 251
- Thus, the total money supply of an economy = Currency held by public + $\frac{\text{bank reserves}}{\text{desired reserve/deposit ratio}}$

3.2 The Overnight Cash Market

The Reserve Bank of Australia

- The Reserve Bank was established by an Act of Parliament in 1959, 255
- Its threefold purpose is the maintain the stability of Australia's currency, to maintain full employment, and to promote the prosperity of the Australian people, 255
- The decisions of the Reserve Bank are made by its board, which consist of nine members appointed by the Treasurer, and meets eleven times per year to decide its policies, 255-256
- In the 1960s and 1970s, the bank mostly focused on controlling the supply of money, but since financial deregulation in the 1980s, it has become much more difficult to accurately measure the supply of money, and hence the reserve now targets interest rates, 256

Exchange Settlement Accounts

- Exchange settlement accounts are special accounts held by commercial banks with the reserve bank, for the purpose of paying checks and making other payments between banks – it is a requirement of law for each bank to have one such account
- This is used, for instance, if customer A with an account at bank A writes a cheque to customer B with an account at Bank B; Bank A must have some way of transferring money to Bank B, and this is what the exchange settlement accounts are for
- Specifically, the amount is credited to the ESA of one bank and debited to the account of the other bank
- The reserve bank requires each bank to have enough money in their ESA to pay for such transactions, but of course, banks do not know how much such business they will need to conduct on any given day, as it depends upon the transactions of their customers
- However, exchange settlement accounts do not pay much interest, and hence it is in the interest of banks to keep as little money in them as possible
- To help them manage their exchange accounts, banks have a specialised market mechanism known as the overnight cash market, which is a segment of the financial market which allows banks to borrow or lend money for periods of 24 hours or less

The Overnight Cash Rate

- Some banks need to borrow to top up their ESA; other banks have too much money in their ESA, and hence want to lend it out
- The overnight cash rate is the interest rate paid on funds in the ESA
- The RBA sets a 'target cash rate', and then agrees to always lend however much money for ESA accounts is demanded at 0.25% above this rate, and always borrow as much as is supplied at 0.25% below this rate
- Thus, in order to change the OCR, the RBA need only make an announcement – only if demand changes and the OCR is slightly off target (within the $\pm$0.25% band) will the RBA need to use open market operations to correct this

- For example, if the OCR is a bit higher than the target, the RBA can buy assets from the banks, depositing the money in their ESA. This increases ESA reserves that banks will be willing to lend, hence lowering the overnight cash rate

Bond Prices and Interest Rates

- A bond is a financial asset representing the promise to repay a certain sum of money on a certain specified date, plus periodic (often annual) payments of interest calculated as a proportion of the final repayment value of the bond
- Suppose we have a two year bond with a principal of $1000 and a coupon rate of 5%
    - At the end of year 1, the lender receives $50
    - At the end of year 2, the lender receives $50 plus the original $1000
- The maximum price that the owner of the bond will be able to sell the bond at the beginning of year 2 is $1000, as only a price of $1000 allows an end payment of $1050 to earn a 5% (competitive) rate of interest
- Thus we see that bond prices rise as interest rates fall, and vice-versa

Cash Rate Spillover Effects

- If the cash rate falls, some people who previously lent in the overnight cash market (this is mostly banks, but anybody can) will be motivated to search for higher returns in other markets
- This will be reflected in an increase in the demand for bonds of longer durations
- Similarly, the lower overnight interest rate will attract some borrowers to the overnight market in search of the now lower interest rate
- This will be reflected by a reduction in the supply of longer bond durations
- The end result is that the price of longer durations bonds rises, thus lowering interest rates
- Thus we see that changes in the cash rate flow throughout the entire economy

3.3 Monetary Policy

Managing Interest Rates

- The connection between the cash rate and other interest rates allows the reserve bank to use open market operations to affect the cash rate, and hence other interest rates too, 256-258
- For example, if the reserve bank wants to raise interest rates, they can sell government bonds to private banks
- By taking the money they receive in exchange out of circulation, the reserve bank reduces the reserves of commercial banks, hence reducing the supply of money, and hence the supply of credit, and hence raising interest rates
- If the reserve wants to lower the interest rate, they can buy government bonds, paying for them with newly-printed money which thus increases the reserves of commercial banks
- This increases the supply of money, and hence increasing the supply of credit, thus lowering interest rates

Interest Rates and Expenditure

- Higher real interest rates increase the reward to saving, and thereby increase household savings while reducing household consumption
- Households also become less willing to borrow for consumption spending when interest rates are high, thus further reducing consumption spending
- The result is that a higher real interest rate reduced exogenous consumption, shifting the PAE curve downwards

- Higher real interest rates also make some low-return investments unprofitable, thus reducing planned investment for each level of GDP
- Thus, the reserve bank can eliminate an output gap by finding the level of the output gap, dividing it by the multiplier, and changing the interest rate such that exogenous expenditure increases by this amount, thus increasing PAE enough to eliminate the gap

Interest Rates and Inflation

- In fact what the RBA affects is the nominal interest rate, rather than the real interest rate
- This is a problem, because it is $r = R - \pi$ rather than i than effects PAE
- However, because π generally changes slowly, any change in R will also cause a change in r
- In theory a fall in r will increase exogenous consumption, hence shifting the consumption function upwards
- In practise the interest rate does not have much effect on the consumption function, and most of the increase in PAE comes from increases in I^P when r falls
- Because the reserve bank can control the nominal interest rate through the cash rate, and because inflation tends to change slowly over time, the reserve bank can, over the short run at least, control with the real interest rate
- Over the long run, as inflation and prices adjust, the real interest rate will be determined by the balance of savings and investment

Target Interest or Money Supply?

- The reserve bank can target either the interest rate or money supply, but not both simultaneously
- Suppose, for instance, that the bank set the money supply at a fixed amount. In this case, any shift in the demand for money would result in a change in the interest rate, which the bank could only offset by changing the money supply
- Similarly, if the reserve bank sets the interest rate, they must agree to offset any changes in the demand to hold money by buying or selling the correct number of bonds, such that the interest rate always remains stable. It is not possible to do this without varying the money supply

Taylor Rule and Policy Function

- The reserve bank's policy reaction function shows the relationship between the rate of inflation, and the real interest rate set by the RBA
- The steeper the function, the more aggressively the RBA responds to high inflation by raising interest rates
- The Taylor rule expresses the interest rate set by the reserve bank as a function beginning with some constant, and then adding or subtracting components according to what is happening to the output gap and what is happening to inflation
- Taylor Rule: $r = 0.01 - 0.5\left(\frac{y^* - y}{y^*}\right) + 0.5\pi$
- The Taylor rule does not work precisely in nations which have an inflation target, like Australia
- The RBA's policy reaction function would like more like $r = \alpha_0 + \alpha_1(\pi - \pi^T)$, where π^T is the target level of inflation and $\alpha_0 = r^*$ – note that output is not a consideration
- Thus, at high levels of inflation, we would expect to also see the RBA setting high real interest rates, and visa-versa
- New definition of monetary policy: a movement along a policy reaction function in response to a change in π
- A change in monetary policy (perhaps because a new reserve bank governor is appointed) is represented by a shift in the policy reaction function: that is a change in r without any change in π

3.4 Aggregate Demand/Aggregate Supply Model

Aggregate Demand

- The Aggregate Demand curve shows the relationship between inflation and equilibrium output
- The major reason for the downward slope of the AD curve is because a higher rate of inflation induces the reserve bank to raise the real interest rate (movement along the PRF), which in turn lowers expenditure and hence lowers equilibrium GDP
- Another possible reason for the downward slope of the AD curve is because poorer people tend to be more hurt by inflation than wealthier people, as they are often on fixed or semi-fixed incomes, and cannot easily purchase assets to protect against inflation
- Thus inflation tends to redistribute wealth from the poor (who spend relatively more of their wealth) to the rich (who save relativity more), hence reducing overall spending
- Higher rates of inflation produce greater uncertainty of future economic conditions and prices, hence encouraging households and businesses to be more cautious and save more
- Any changes in expenditure produced by factors other than movement along the RBA's PRF are known as exogenous changes in consumption, and are depicted by shifts in the AD curve

Other Aspects of the Model

- The LRAS is a vertical line drawn at the level of the economy's potential GDP
- The SRAS is drawn as a horizontal line at the prevailing rate of inflation, which represents the assumption that in the short run, firms will supply whatever output is demanded at the prevailing level of inflation
- This current rate of inflation is determined by past expectations of inflation and past pricing decisions
- The short-run equilibrium is a situation in which inflation is stable and consistent with past expectations, and where output equals the level of equilibrium output that is consistent with that rate of inflation – this occurs at the intersection of the AD and SRAS curves
- Long-run equilibrium occurs when actual output is equal to potential output, and inflation is stable, which occurs at the intersection of the SRAS, LRAS and AD curves

Deviations from Equilibrium

- Whenever the short-run equilibrium level of output is different to potential GDP, firms will eventually respond by changing their prices, hence changing inflation
- For example, if short-run equilibrium output is lower than potential output, firms will lower their prices, and hence the rate of inflation will fall, causing a downward shift in the SRAS curve
- At this power level of inflation, the reserve bank will set a lower real interest rate, and hence spending and output will rise
- This will continue until the SRAS, LRAS and AD curves all interest at a single point, which is the long-run equilibrium
- Any deviation away from y* is for a short time only. In the long-run, the economy returns to y*
- This indicates that vigorous fiscal or monetary policies should only be used in the event of large deviations from potential output, which may take long enough to self-correct such that intervention is justified

Inflation Expectations

- Inflation is slow to change (inflation inertia), in large part due to inflation expectations, meaning that the level of inflation that people expect to in the future will be built into price and wage contracts that they arrange today

- Thus, if workers and businesses think inflation will be 5% next year, workers will push for wage increases of 5%, employers will be willing to grant increases of 5%, sellers will raise prices by 5%, and be willing to pay 5% higher costs
- Hence, inflation perceptions are often self-fulfilling, and hence actual inflation often tends to be very close to expected inflation
- Inflation expectations, in turn, are determined largely by people's recent experience of current rates of inflation. Hence inflation tends to change slowly over time
- Long-term wage and price contracts also serve to 'build in' wage and price increases that depend upon current inflation expectations

Relationship of Inflation and Recessions

- When an economy is at full employment (i.e. no output gap), firms have no incentive to change their prices by more or less than the general rate of inflation, and inflation stays constant
- In an expansionary output gap, firms find the demand for their products exceeding their ability to supply, and hence they will tend to raise prices by more than the rate of inflation: inflation rises
- In a recessionary output gap, firms find that the demand for their products is less than their ability to supply, and hence they tend to raise their prices by less than the rate of inflation: inflation falls
- Keynesian assumption: In the short run, firms supply whatever is demanded at that rate of inflation
- AD-AS assumption: Potential GDP is unaffected by inflation; it is determined by long-run supply factors which do not change over the short-run time frame being examined at the moment

Causes of Inflation: Rise in AD

- A rise in aggregate expenditure caused perhaps by increased consumer spending or a rapid rise in military expenditure, will shift the AD curve to the right, thus creating an expansionary gap
- In the short run, firms will respond to the higher spending by raising their output, but in the longer-run, they will begin to raise their prices, thus shifting upward the SRAS curve and hence gradually eliminating the output gap, 315
- Thus process continues until output is restored to its potential level, and the economy has returned to LR equilibrium
- Note that because of the higher level of spending, equilibrium will occur at a higher inflation
- The great inflation in Australia in the 1970s was set off by a combination of dramatically higher government spending under the Whitlam government, government-sponsored wage increases that outstripped productivity gains and hence lowered output, and a rise in the global price of oil which reduced potential output, and hence acted to raise prices

Causes of Inflation: Shocks

- An inflation shock is a sudden change in the rate of inflation that is unrelated to an economy's output gap – in the past they have been caused by rapid changes in the oil price
- Potential output shocks reduce the potential GDP of the economy, and hence shift the LRAS curve to the left. The result is both a lower level of output and higher level of inflation
- Inflation shocks and potential output shocks are collectively referred to as aggregate supply shocks, as they both increase inflation and unemployment at the same time
- Such shocks often rapidly raise the rate of inflation by directly shifting upwards the SRAS curve. Because firms do not immediately adjust their prices, this shift will create a recessionary output gap
- Over time, firms will lower their prices and both the higher inflation and the output gap will subside. However, in the meantime the economy would face a significant recession, 318-319

- Reserve banks in many nations have tried to avoid the short-term costs of keeping inflation low by aggressively raising interest rates at the first sign of an expansionary gap, in the hope that they can keep inflation from getting to the level such that a recession is needed to overcome it

Section 4: Long-Run Economic Growth

4.1 Basic Concepts

Defining Growth

- Economic growth is the analysis of the shift in LRAS over extended periods of time
- Aggregate demand and business cycles merely cause actual output to fluctuate around potential output, but do not explain long-term rise in that level of potential output
- Although the differences in income in countries across the world are vast, we actually need only explain relatively small differences in annual growth rates, which compounded over time produce massive differences in wealth

Labour Force Participation

- Real GDP per capita can be expressed as the output per employed worker times the proportion of the population that is employed
- $\frac{y}{P} = \frac{y}{N} \times \frac{N}{P}$, where N = labour force, P = population
- Thus, both output per worker and the portion of the population that is working determine the rate of economic growth
- In Australia over the past 40 years, both average output per worker and the proportion of people working have increases (the latter from 66% in 1965 to 74% in 2006)
- However, it is primarily differences in output per worker that explain the differences in worldwide standards of living, as labour force participation cannot increase forever

Factors Affecting Growth

- Factors that improve labour productivity include human capital, physical capital, technology, land and other resources, entrepreneurship, and the legal and political environment
- Capital goods are long-lasting goods used to make other goods; capital goods experience diminishing returns, which means that if other inputs are held constant, adding more and more capital will gradually produce less and less additional output, 355-356
- Resources are not so important, as nations can attain all they lack through trade, as have Japan and Switzerland
- Technology is the single most important cause of increased productivity, as it allows existing labour and capital to be used more efficiently
- Entrepreneurs play a key role in economic growth, as they are the ones who use new technologies to create new products technological processes and more efficient methods of production
- Managers are also important, as they determine the efficiency with which existing technologies and workers are used – better ways of organising them can raise productivity
- Governments can attempt to promote economic growth by providing free education, subsidising research, providing public infrastructure, increasing savings through tax revenues, and providing an efficient legal system

Recent Productivity Slowdown

- Rates of productivity growth have slowed substantially in western countries since 1973: one theory is that economic growth is coming in ways harder to measure, like increased quality of goods and service industries
- Another theory is that the Depression and WWII had prevented many important technological advancements of the 1930s and 1940s from being applied to civilian use immediately, and instead this occurred during the 1950s and 1960s, thus producing unusually rapid growth

Limits to Growth?

- The limits to growth thesis ignores the fact that economic growth seldom takes the form of just more and more of what we have at the moment, but always involves newer, better and different types of goods and services, which may use less resources and be cleaner than earlier goods, 367
- Another factor is that as nations become richer, they have more resources to spare to combat environmental damage, and clean up their environment, as they no longer have to worry so much about the necessities, 367
- Pollution seems to be U-shaped, with the peak occurring at a level of GDP per capita roughly equal to that of Mexico today, 367-368
- The final problem is that the 'limits to growth' hypothesis ignores the ability of the market (and also society via the political process) to adapt to changing circumstances, and find new resources to replace scarce ones, 367
- Thus, fears about oil depletion in the 1970s turned out to be totally baseless, as higher prices led to more conservation and higher supply, 367

4.2 The Cobb-Douglas Production Function

Production Function

- Labour and capital are the primary factors of production, with secondary factors such as technology, political stability, managerial expertise, worker skills, and so on, contributing to the efficiency with which these primary factors are converted to output
- The result of bringing the primary and secondary factors together is output
- The production function is a representation of the relationship between primary and secondary factors of production
- A production table is a way of displaying the firm's production function, showing the output that will be produced at each combination of labour and capital
- The mathematical representation of the production function is: $Y_t = A_t \times f(K_t L_t)$, which means that output produced in time interval t is a function of the capital and labour supplied during that period, times the index of secondary factors of production

Marginal Products of L and K

- The Marginal Product of capital MP_K is the additional increment to output generated by a one-unit increase in the capital stock, holding all other factors constant: the production function exhibits diminishing marginal product of capital ($K \uparrow, MP_K \downarrow$)
- Diminishing marginal product is the result of the low-hanging fruit principle: each additional unit of capital or labour will always be assigned to the task that will produce the largest addition to output
- Thus as the number of units of capital to labour increase, the additions to output decrease
- The marginal revenue product of capital (MRP_K) is equal to the marginal product of capital multiplied by the price of the additional output ($MRP_K = \bar{P} \times MP_K$)

The Cobb-Douglas Function

- The Cobb-Douglas function is a specific type of production function built upon historical data
- It is widely used because it displays a number of properties consistent with real-world data, including declining marginal product and constant returns to scale (if we double inputs (L and K), we double output)
- Function is modelled by: $Y = AK^{\alpha}L^{1-\alpha}$
  - $A =$ total factor productivity, or secondary factors of production
  - $(0 < \alpha < 1) =$ share of Y paid to capital
  - $(\alpha) =$ share of Y paid to labour

Properties of the Function

- The two-dimensional version of the production function holds everything constant but capital
- It has a logarithmic shape because of diminishing marginal returns to capital – diminishing gradient
- This helps to explain why Germany could grow to rapidly after WWII – it started off with low capital stocks, so a small addition to K increase GDP by a large amount
- An increase in total factor productivity increases output for all levels of K (shifts function up), so naturally the effect of this will be larger with larger values of K
- Thus rich countries achieve most of their growth through higher TFP rather than capital accumulation

Growth Accounting

- Growth accounting is a method of dividing up an economy's economic growth between growth in primary and growth in secondary factors of production
- The rate of growth of GDP is dependent upon the rate of growth of K and the rate of growth of L, with the relative importance determined by α
- Thus, a one percent increase in the capital stock will increase output by one percentage point multiplied by the importance of capital in the economy
- Thus, if we know α, and the percentage changes in K, L and A, we can calculate the rate of economic growth and the relative contribution of the different factors to this growth
- Although the number of hours worked is fairly easy to find in ABS statistics, K is much more difficult, owing to the need to factor in capital depreciation
- Using such data, we find that since the 1960s, TFP has constantly been the most important contributor to Australian economic growth
- Capital accumulation is more important for growth in poorer countries, while as countries become richer diminishing marginal returns means that capital growth will not produce the same GDP growth as before, and hence TFP become more important

4.3 The Solow-Swan Model

Basics of the Model

- Under the Solow-Swan model, the rate of growth in GDP per capita is solely dependent upon total factor productivity (assumed to be constant) and the capital-labour ratio
- Savings provide the resources needed for investment; we assume savings are a function of income
- Thus, $s = \theta y$, where θ is a number between 1 and 0
- Replacement investment (i_r): investment which takes place either to provide replacements for worn out capital, or to provide capital to new workers – this does not raise the capital-labour ratio
- In other words, $k = K/L$, and K tends to fall over time (owing to depreciation), while L tends to rise (owing to population growth)

- The amount of investment needed to exactly offset these tendencies is replacement investment
- Net investment ($i_n = \Delta k$): any investment above replacement investment

The Steady State

- A steady state economy is one in which the capital-labour ratio is constant, and hence economic growth has come to a halt: no change in k means no change in y
- If $d =$ depreciation rate and $n =$ pop growth rate, $i_r = (d + n)k$
- Thus: $i = i_r + i_n = (d + n)k + \Delta k$
- If we assume that investment is equal to savings, and that savings per capita are always the same definite proportion of national income represented by θ, then $i = \theta y$
- Therefore we can determine that $\theta y = (d + n)k + \Delta k, \therefore \Delta k = \theta y - (d + n)k$
- This importantly tells us that the economy will achieve steady state when replacement investment is equal to total savings, and hence net investment is zero

A Diagrammatic Approach

- The national production function can be drawn on a set of axes comparing national output/income per capita (i.e. y), to the capital-labour ratio (k), 408
- Because of diminishing marginal utility, this line will be logarithmic in shape, with diminishing gradient, 408
- The national savings per capita can be represented by a line directly below the production function; as savings are merely a set proportion of income, it will have the same shape, but be lower, 408
- The level of replacement investment for any given level of income, however, will be linearly related to the capital-labour ratio, 408
- As such, the savings curve and replacement investment curve will inevitably intersect at some point. This point represents the steady state of the economy, where growth stops, 408-409
- When the capital stock of an economy is below the steady state level, the economy will always tend to grow, as savings will exceed replacement investment, 409
- Conversely, an economy with a capital stock larger than its steady state level will not save enough to provide the full replacement ratio, and hence will experience economic retraction, 409
- In the end, diminishing marginal product means that eventually additional investment of capital produces enough output such that the savings increment of this output is just sufficient to compensate for its own depreciation, 410

Second Implication: Stagnation

- The first implication of the Solow model is that economic growth stops in the long run, when a nation reaches its steady state
- This prediction, however, simply does not agree with real world data
- Growth accounting data also indicates that TFP, not capital, is the most important driver of growth in wealthy nations
- The Solow model takes TFP as totally exogenous, and says nothing about it; endogenous growth models incorporate human capital and technological change into the Solow model
- Under the Solow model, SR growth consists of moving toward the steady state: LR growth consists of the steady state slowly moving to the right as a result of higher savings or TFP increases

Second Implication: Convergence

- The second major implication of the Solow model is that countries with lower capital stocks will grow faster than countries with higher capital stocks, so long as they have the same steady state (i.e. TFP, population growth, depreciation, and savings propensity are the same)

- This is essentially the consequence of diminishing marginal utility of capital – countries that have a high k will not grow as much with an additional increment of k than low k countries will
- If we look at real world data, we find that convergence has occurred within groups of fairly similar countries, for example the rich OECD, and countries open to international trade
- For the world as a whole, however, there is no evidence of overall convergence
- This is unsurprising, as already noted, convergence only works if countries have similar steady states, and hence have similar economic and social conditions

Problems with the Solow Model

- One major problem with the Solow model is that its prediction of an eventual end to economic growth does not tally with the experience of many western countries over the past few hundred years, 416
- The other major difficulty with it is that its focus on capital accumulation as the source of growth is at odds with empirical analysis showing TFP to be far more important, 416
- Nevertheless, economists still consider the Solow model to be a useful starting point, upon which other models can build, 416
- New growth theories frequently focus on factors such as education and technology, and how they interact with each other to produce growth, 416-418

Section 5: The Open Economy

5.1 International Trade

Trends in Global Trade

- World trade has grown far more rapidly than world GDP since the end of WWII (something like 2-3 times as rapidly), 429
- This is in part due to lower transport costs, and in part due to the work of GATT and WTO, 429
- About 80% of world trade is in merchandise (mostly manufactured goods), and about 80% of trade is conducted by the EU, USA and Asia, 429
- Since the 1930s, average world tariffs have fallen to about 20% of their prior levels, 430
- Regional trade agreements are a newer phenomenon, and have increased drastically in number since the singing of NAFTA in 1993, 431

Free Trade and Inequality

- Some anti-globalisation protestors argue that free trade hurts the poor and increases world inequality both within and between nations, 440
- The argument is that free trade forces workers in developing countries into low skilled and hence low paid jobs, thus stunting their growth potential, while at the same time reducing the wages of unskilled workers in the developed world, 440
- In actuality, the factor price equalisation theorem tells us that we should expect inequality between nations to decline with free trade, 440-441
- This is because inequality is a function of the relative earnings of the owners of capital to the earnings of labour, which in turn is highly dependent upon their marginal rates of return, 440
- Free trade enables all investors and capitalists to seek the highest available return and lowest possible costs of production; hence nations with relatively high returns for capital will tend to receive more capital investment (thus lowering the rate of return), while countries with abundant

labour forces, and hence low returns to labour, will become the site of labour intensive production, thus increasing the returns to labour, 440-441

- The end result is that the ratio of capital returns to labour returns will become equalized across nations, hence equalising rates of inequality across nations as well, even though some nations may have an overall higher standard of living, 440-441
- Free trade also promotes economic growth by permitting specialisation and comparative advantage to work, creating jobs, and dispersing technologies through increased investment
- Also important is the empirical fact that open economies tend to converge with wealthy nation's levels of income, 441
- Thus, although some workers and producers may be hurt, on balance there is no evidence that trade liberalisation increases inequality or poverty, 441-442

Quotas and Tariffs

- A tariff places a tax on imported goods which raises their price above the world price, usually as high as the domestic price, 435-437
- As a result, domestic producers are able to charge higher prices, and become relatively more competitive with foreign producers, and hence they are able to increase their output, 435-436
- The result of this is that domestic producers gain, and the proportion of the good sourced domestically rises, 435-437
- At the same time, consumers lose because they must pay the higher price, and as a result they also cut back on consumption of the good and source more of their purchases domestically, thus reducing imports, 435-437
- Though the government collects some tariff revenues, the reduction in imports by consumers and their partial replacement by less-efficiently produced domestic goods results in an overall loss on surplus, 435-437
- An import quota is a legal restriction on the number of items that can be imported, 437
- Import quotas have exactly the same effects as equivalent tariffs, except that instead of generating revenue for the government, they generate rents for those who hold import licences, who are able to buy at the low world price and sell at the higher domestic price, 438

Comparative Advantage

- A person has a comparative advantage relative to person B in producing a good or service when their opportunity cost of producing it is lower than that of person B
- An absolute advantage occurs when one individual or country is more efficient at producing all goods and services than another country/individual
- When everyone specialises in producing the goods and services in which they have a comparative advantage (the lowest opportunity cost), there will be a much larger total of goods and services available for everyone
- The production possibilities frontier is a graph which relates the amount of a chosen good that can be produced by an economy (y axis) against some other good or group of goods (x axis)
- The gradient at any point on the graph represents the opportunity cost of producing more of the x-axis good: thus if over a certain interval 20 cars must be given up to produce 100 extra TVs, we say the opportunity cost $= m = \frac{rise}{run} = \frac{-20\ cars}{100\ TVs} = -\frac{1}{5} car/TV$
- Because workers with a comparative advantage in producing cars will be the last to move to other industries, the slope of this line will gradually increase as we move to the right, representing the increasing opportunity cost of producing more of 'other goods'

- When a country opens up to international trade, the world price of the two goods relative to one another is drawn in as a straight line (representing the constant price relationship) intersecting the production possibilities frontier at the point where this world price equals the domestic price
- This point represents the point of production efficiency, at which the country should always produce if it is open to international trade
- Under autarky, the nation must always consume exactly what it produces, and hence this might not represent the optimal allocation of resources
- Under international trade, however, it trade resources to consumer differently to production, and hence it should always produce at this point of production efficiency, as this will always maximise consumption
- Welfare is maximised by producing here, as the opportunity cost of producing more of either good is equal to that of buying it from the world market
- Producing more of either good would thus entail a larger opportunity cost than buying the same item on the international market, and hence would represent a waste of resources

5.2 Free Exchange Rates

Real and Nominal Rates

- Nominal exchange rate (e): units of foreign currency per units of domestic currency
- A rise in e is called appreciation of the currency, and a fall in e is called depreciation
- $P = domestic\ price\ level$, $P^f = foreign\ price\ level$
- Real exchange rate $= eP/P^f$: in other words the domestic price is converted into the foreign currency at the nominal exchange rate, than divided by the actual price of the foreign good
- A high real exchange rate means that domestic goods are on average more expensive that foreign goods, and hence exports will be uncompetitive while imports will increase
- There is no particular correlation between a strong economy and a strong currency

Purchasing Power Parity Theory

- The purchasing power parity theory is based upon the law of one price, which states that if transportation costs are small relative to the price of the item, then the price of an internationally traded commodity must be the same in all locations
- Purchasing power parity theory thus holds that the nominal exchange rate of any two currencies should adjust such that the real exchange rate is 1:1; or in other words so that prices in both countries (expressed in the same currency) are the same
- A further implication of PPP theory is that countries which experience high inflation should also experience a rapid depreciation of their currency, and vice-versa
- While PPP is effective at explaining long-run trends in exchange rates, it is not so useful in analysing short-run fluctuations
- This limited applicability is the result of transport costs preventing all goods from being traded internationally, and also the fact that not all goods are of uniform type and quality across nations

Supply-Demand Analysis

- The quantity of dollars supplied in the foreign exchange market is what is relevant for the following analysis, and not the total supply of Australian dollars circulating in the Australian economy
- Australians supply Australian dollars on the foreign exchange market when they want to obtain foreign currency to purchase foreign goods or assets

- A high exchange rate makes foreign goods cheaper, thus increasing the demand for foreign currencies, and hence increasing the quantity of dollars supplied
- The demand for Australian dollars will similarly originate from the desire of foreigners to purchase Australian goods or assets
- A higher exchange rate means that Australian goods are relatively more expensive to foreigners, and hence the demand for Australian dollars declines with a higher exchange rate
- The equilibrium exchange rate will be that which equalises the quantity of dollars demanded and the quantity of dollars supplied on the foreign exchange market
- If $r^A > r^{US}$ and no change in the exchange rates is expected, there will be an increase in the demand for Australian interest bearing assets
- The result will be a rightward shift of the demand curve for Australian dollars, and hence a stronger Australian currency

Monetary Policy and Exchange Rates

- It is argued that flexible exchange rates tend to reinforce policy actions of the reserve bank
- For example, a rise in interest rates in response to inflationary fears will tend to increase the demand for Australian dollars to buy Australian assets, while reducing the supply of Australian dollars to buy overseas assets
- This reduction in supply and increase in demand will raise the exchange rate, hence discouraging exports and encouraging imports
- This decline in net exports will lead to an equivalent decline in aggregate demand, thus reducing the pressure of inflation
- In actual fact this will not happen, as (holding money supply and velocity constant), the aggregate demand in Australia is unaffected by relative changes n imports, exports or investment
- If exports decline, while foreign investment and imports both increase, it just means that foreigners and Australians are both spending less money on Australian goods
- To the exact same extent as this decline in expenditure, foreigners are spending more on Australian assets, with some of the funds coming from those previously used to pay for Australian exports, and the remainder coming from the additional funds may available by the increase in imports by Australian consumers
- Thus, unless there is large-scale hoarding of Australian currency by foreigners, all money spent on imports will come back and be spent in Australia: thus net exports must always be zero, and international trade cannot have any direct impact on AD

5.3 Fixed Exchange Rates

Methods of Fixing Exchange Rates

- A Currency crisis is a sudden unprecedented fall in a country's exchange rate
- Typically, a fixed exchange rate involves the central bank setting an official exchange rate above the fundamental exchange rate – this will produce an excess supply of domestic currency
- One justification for fixing an exchange rate is to create certainty about the exchange rate over the long-term, thus making it easier to plan and invest in the long term (particularly for foreigners)
- One method is to use the government's foreign exchange reserves to buy up the excess supply of domestic currency: the big problem with this is that the reserves will always be finite
- Another way is to restrict imports and purchases of foreign assets, thus reducing the supply of domestic currency to correspond with the diminished demand for domestic currency at the higher rate – the problem with this is that the country will lose some of the gains from trade

- Another method is to keep a high interest rate through a tight monetary policy, thus increasing the demand for domestic assets, and hence also domestic currency – the downside of this is that monetary policy cannot be used to regulate the economy

Currency Crises

- A speculative attack is a massive selling off of assets denominated in the domestic currency, and simultaneous attempt to convert the domestic currency so raised into foreign currency
- These often occur when international investors notice a nation's foreign currency reserves are running low, and hence it will be unable to maintain its overvalued exchange rate for much longer
- The expectation of a future lower exchange rate creates an incentive to sell the currency while the exchange rate is still high
- This in turn increases the supply of the currency, this increasing the distance between demand and supply curves, and hence requiring the reserve bank to increase its purchase of currency
- Ironically, by making it much more difficult for the government to maintain the existing overvalued exchange rate, speculative attacks often give rise to the very devaluation that was feared

The European Monetary System

- The EMS involved a fixing of each nation's exchange rate to the DM, thus forcing them to adopt the same restrictive monetary policies of the German Central Bank
- After the reunification of Germany in 1990, however, the West German government initiated a significant program of fiscal expansion to rebuild the East, to which the German central bank responded by raising interest rates and hence eliminating the expansionary gap
- In order to stay in the EMS, however, the UK would have had to have also raised interest rates, and hence producing a contractionary gap and a recession
- Speculators expected the UK to pull out of the EMS, and hence the pound to depreciate; thus the demand for the pound fell, and hence the UK was forced to pull out of the EMS as predicted, and its exchange rate fell even more than it otherwise would have

The East Asian Crisis

- The Asian Financial Crisis began when foreign investors became less confident about East Asian investments, thus reducing the demand and increasing the supply of their overvalued currencies
- This reduced government foreign currency reserves, thus creating an expectation of devaluation, and hence leading to the inevitable abandonment of the fixed rate
- Some nations tried to maintain their fixed rates by raising interest rates, but this only led to recession and growing unemployment
- The plummeting price of assets also undermined confidence in domestic banking systems

The International Monetary Fund

- The original purpose of the IMF was to support the Breton Woods system by lending foreign exchange to countries running low on reserves, 476
- Since this system was abandoned by the western world, the IMF has lent to developing countries like Mexico, Russia and Brazil to help them maintain their currencies, 476
- Although some argue that fixed exchange rates reduce uncertainty in international transactions and hence promote trade, this is not really true, as devaluations and speculative attacks can cause rapid devaluations just as if the exchange rate was freely floating, 477-478

Monetary Policy and Fixed Rates

- The problem of depletion of foreign reserves can be rectified by instead using monetary policy to manipulate the demand and supply of one's domestic currency so that the fundamental value is brought into line with the fixed rate, 474-475
- For example, if the currency is overvalued, the domestic interest rate could be increased, thus increasing the demand for demand for domestic currency from foreign investors, and hence raising the fundamental value to the official rate, 474
- The problem with this is that using monetary policy to maintain a fixed exchange rate means that it is no longer available to stabilize the domestic economy; indeed, the two goals may conflict with one another (if for example the economy is in recession with an overvalued currency), 475

5.4 Balance of Payments

The Current Account

- The balance of payments is a series of financial accounts which records all economic transactions between citizens of one country and the rest of the world
- Credits on the balance of payments are those transactions which bring in currency; debits are those transactions which diminish (cost) currency
- The current account is that part of the balance of payments which relates to the transfer of goods, services and direct income payments
- Transactions which create demand for Australian dollars are recorded as a credits (exports)
- They include income from exports of goods and sale of services, money earned by Australian citizens from overseas royalties, rent, interest and profits, and money brought into the country by immigrants and remittances, etc
- Transactions which create supply of Australian dollars are recorded as a debits (imports)
- They include payments for imports of goods and services, money paid by Australian citizens to overseas as royalties, rent, interest and profits, and money taken out of the country by immigrants and remittances, etc

The Capital Account

- The capital account records all the transactions that involve the transfer of assets or liabilities
- Transactions which acquire a liability are counted as credits, including sale of Australian assets and foreign investment into Australia
- Transactions which result in the acquisition of an asset are counted as debits, including the purchase of foreign assets, and Australian investment overseas
- The current account balance and capital account balance over any given period must always sum to zero, as money spent on buying foreign imports or assets must always at some point be used to purchase Australian assets, goods or services

International Capital Flows

- Capital flows allow domestic investment to differ from domestic saving, and also permit countries to run trade imbalances
- High domestic interest rates and low levels of risk tend to increase the level net capital inflows into a country, while low interest rates and /or high levels of risk will lead to capital outflows, 494-495
- This process tends to balance itself, however, as a high interest rate country will experience capital inflows, hence bidding up the price of its domestic assets, which we know corresponds to a decline in interest rates, 494-495

- Simultaneously, the capital outflow from the investing country will reduce the demand for domestic assets, thus raising the real interest rate there, 494-495
- In an open economy, funds can be lent overseas to invest there, or borrowed from overseas to invest domestically, thus the following equation holds: NS + KI = I, 496
- Capital flows and savings can be modelled using a supply-demand diagram in exactly the same way as international trade: domestic investment as represented as demand, national savings as supply, the real international interest rate as the price, and the difference between NS and I at this price will be either capital inflows or capital outflows, 496-497
- Thus, foreign capital inflows can be important in funding domestic investment, and hence in promoting economic growth, 497

Argentinean Credit Default

- The Argentinean economic collapse and default of 2001-2002 can be explained by the fact that Argentina borrowed heavily from foreigners when economic growth was strong and hence domestic returns to investment good in the 1990s, 498
- When the economy slowed down after 1998, however, not only did repayment of loans become more difficult, but tax revenues fell, increasing government deficits, and hence requiring even more foreign loans, 498
- Foreign investors became increasingly pessimistic, and unwilling to lend to Argentina except at very high rates, which eventually Argentina became unable to pay, and hence was forced to default, 498

Twin Deficits Hypothesis

- The hypothesis is that countries with large budget deficits will also have current account deficits
- Countries with low or negative public savings will tend to have low national savings, and hence high national spending, and hence high imports

$$\begin{aligned} Y &= C + I + G + NX \\ Y - C - G - I &= NX \\ NS - I &= NX \end{aligned}$$

- Similarly, low savings countries will tend to have national savings lower than investment, and hence will have to borrow from other countries, thus generating a capital account surplus, which is the same thing as a current account deficit
- The mechanism for this is that lower levels of saving will produce higher domestic interest rates, which (assuming no unusual risk) will lead to capital inflows, thus bidding up domestic asset prices and hence lowering the domestic interest rate to the world level
- A country that acquires foreign investment/capital inflows in this manner must have a capital account surplus, and hence a current account deficit to balance it