UNISA ECS2602: MACROECONOMICS

Study Unit: 1,2

2016

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Recap?

- <u>Macroeconomics</u> **–** a branch of economics where we study the economy as a whole. In Greek "macro" means **large,** thus under this branch we study the behavior of society as whole not individuals. We look at global economic magnitudes like the total production of a country, total employment, the inflation rate etc.

- **Macroeconomic objectives**
- Economists usually distinguish five macroeconomic objectives which can be used to judge the performance of the economy.
  - *Economic growth*
  - *Full employment*
  - *Price stability*
  - *Balance of payments stability*
  - *Equal distribution of income*

BUSINESS CYCLE

- The business cycle is the pattern of upswing (expansion) and downswing (contraction) that can be discerned in economic activity over a number of years.
- From the figure below:, between AB is the period of upswing and BC is a period of downswing of the economy. The role of macroeconomic policies **(fiscal and monetary policies)** is to try reducing the distance between the cycle and the long-term trend, such that there is less fluctuation in the economy.
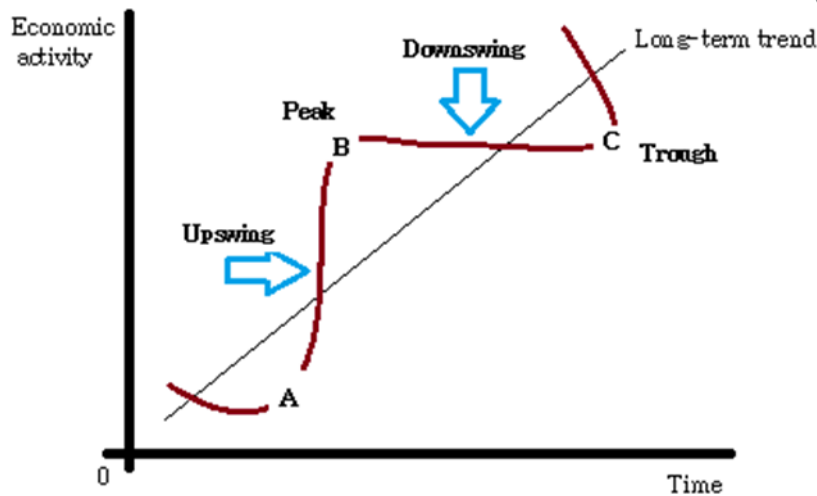
- However it is important to understand what causes the fluctuations of the business cycle. Several economists argued that:
  - Fluctuations in the growth of economic activity are temporary, thus could be associated with exogenous or factors outside the market system.
  - Others argue that business cycle is endogenous. As the economy grows, interest rates increase, imports increase, foreign exchange reserves fall and so on until the peak is reached.
  - Others argue that economic fluctuations are caused by various structural external or institutional changes.

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UNIT1: OVERVIEW OF SA ECONOMY

Economic growth - GDP

- When total production of goods and services in an economy increases.

- <u>Gross Domestic Product</u>: it is the total **value** of all **final** goods and services produced in South Africa during one year. Therefore, GDP is one of the most important measures of performance of the economy.

  - *The distinction between **final goods** and **intermediate goods (used as inputs)** is an important one. A tomato sold to a ketchup manufacturer would NOT be included in the GDP number, while a tomato sold in a store as produce would be included, as it represents the final use of that good. It is also worth noting that trade in illegal goods and services are also excluded from GDP figures.*

- **There are 3 methods of calculating GDP**
  - Production method (Value added)
  - Expenditure method (final goods and services)
  - The income method (income of the factors of production)

- **Production = Spending = Income**

Measuring Economic growth

1. **EXPENDITURE METHOD**

Total spending on goods and services can be broken down as follows: $Y = C + I + G + X$

- *Y = Gross Domestic Product*

- *C = Consumption:* spending by Households,

- *I = Investment:* sum of spending by firms on goods such as plant, equipment and inventories and spending by households on housing; fixed investment + inventory investment

- *G = Government Spending:* <u>Government Purchases</u> are the sum of the national government + Provincial + Local government purchases of goods and services.

- *X = Net Exports (exports LESS imports):*
  - Exports = goods and services produced in the SA and purchased by foreigners;
  - Imports = goods and services produced abroad and purchased by South Africans.
  - If X > 0 then trade surplus
  - If X < 0 then trade deficit

Measuring Economic growth

Relationship between Gross Domestic Expenditure and GDP

- GDE = C + I + G where as

- GDP = C + I + G + (Exports - Imports).

  - You may even say that **GDP = GDE + (Exports – Imports).**

- **GDE includes imports and excludes exports.**

- **GDP includes exports and excludes imports.**

  - Therefore the difference between GDE and GDP is the difference between exports and imports.

  - If GDP is > GDE it means that Exports > Imports during that period.

  - This means that the value of spending in the country was lower than the value of production.

Economic growth – GDP_

- **What then cause changes in GDP?**
  - changes in prices
  - changes in quantities of output produced
- **Real GDP vs Nominal GDP**
  - For a correct comparison of production across years we use a measure of output that corrects for inflation (Real GDP). Real GDP measures these values using the prices of a base year. Real value refers to the purchasing power required
  - Nominal GDP measures these values using current prices (synonymous with GDP). Nominal value is the face value.
- **Per-capita GDP**
  - This is a total GDP divided by the population size
  - Widely used as a measure of economic welfare (standard of living) of citizens.

Macroeconomic policies

- **Fiscal policy**
  - Instrument is the Budget: Tax and government expenditure

Expansionary fiscal policy	Contractionary
• Rising government expenditure • Reduction in tax rate(s) • Resulting in higher budget deficit • AD rises	• Rising tax rates • Reduction in government expenditure • Resulting in lower budget deficit or surplus • AD declines

- **Monetary policy**
  - Instrument is the Repo rate, and monetary aggregates

Expansionary Monetary policy	Contractionary
• Reduction in interest rates • Increase in money supply in the economy • AD rises	• Rising interest rates • Reducing money supply in the economy • AD declines

UNEMPLOYMENT

- The unemployment rate is thus a very important economic indicator. Most people understand what unemployment is but fail to define and measure it. Therefore, **unemployment rate is the number of unemployed persons expressed as a % of the total working force.**

- According to International Labour Organisation (ILO) the **unemployed** are those people within the economically active population who

    a) did not work during the 7 days prior to the interview

    b) want to work and are available to start work within a week of the interview

    c) have taken active steps to look for work or to start some form of self-employment in the four weeks prior to the interview

- In line with international standards, during 1998 Stats SA revised its definition of the **official unemployment rate** to that used by the (ILO).

- The **economically active population** consists of both those who are employed and those who are unemployed.

    - The **official/strict/narrow unemployment rate** is calculated as the % of the economically active population which is unemployed.

    - The **expanded/broad unemployment** rate does not require criterion (c) above to hold. Only criteria (a) and (b) must be met for a person to be classified as unemployed.
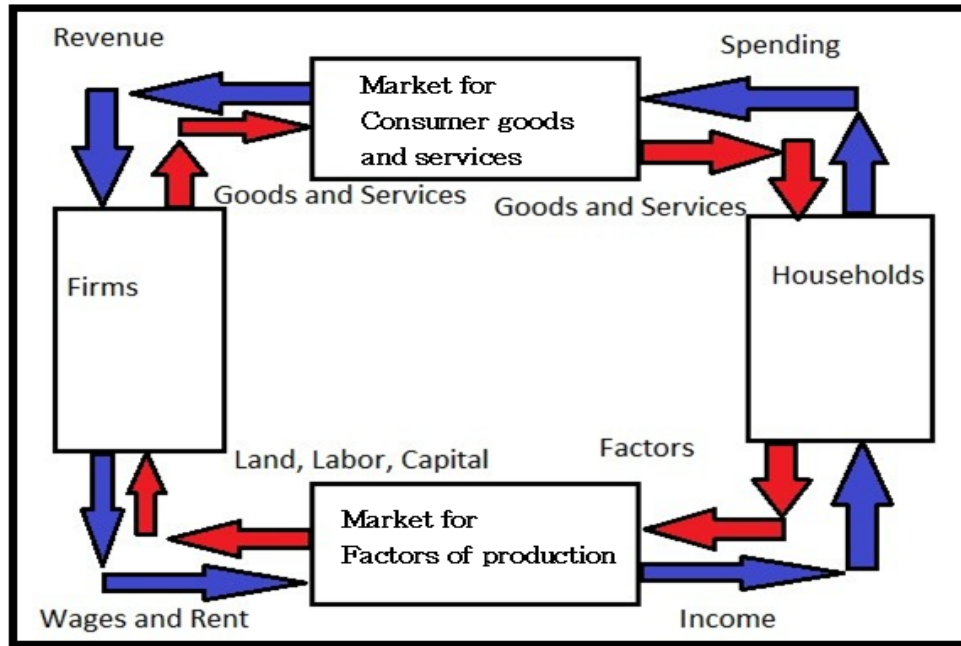
Different types of unemployment

Let's consider the following examples in order to understand the differences

1) Tom resigns from his job as a lecturer at UNISA to look for a better job. Until he finds a new job, Tom is **frictionally unemployed.**

2) Max works at the farm in Limpopo producing bananas during summer. For the rest of the year Max is **seasonally unemployed.**

3) Xolani works for ABSA as a cashier and during the 2008/9 global financial crisis ABSA retrenched its employees to cut costs. Xolana was also retrenched and expect to be hired when economic activity picks up. Therefore Xolani will be **cyclically unemployed.**

4) Vilakazi is an engineer at Implants mine in Marikana. If the ongoing strike results in a closure of the mine in Marika, she will become **structurally unemployed.**

ECS2602-UNIT 2:
THE GOODS MARKET

Lets Recap

Revenue
Spending
Market for
Consumer goods
and services
Goods and Services
Goods and Services
Firms
Households
Land, Labor, Capital
Factors
Market for
Factors of production
Wages and Rent
Income

Source http://www.macrobasics.com/chapters/chapter2/lesson21/

- In macroeconomics all these different markets for goods and services, which include both producers and consumers are aggregated to make up the "Goods market"
- A market where firms/ producers decide what and how to produce, and consumers decide what and how much to consume.

- This is also referred to as the "real sector of the economy" – because it is concerned with real things, such as the production and consumption of goods and services.

Lets Recap
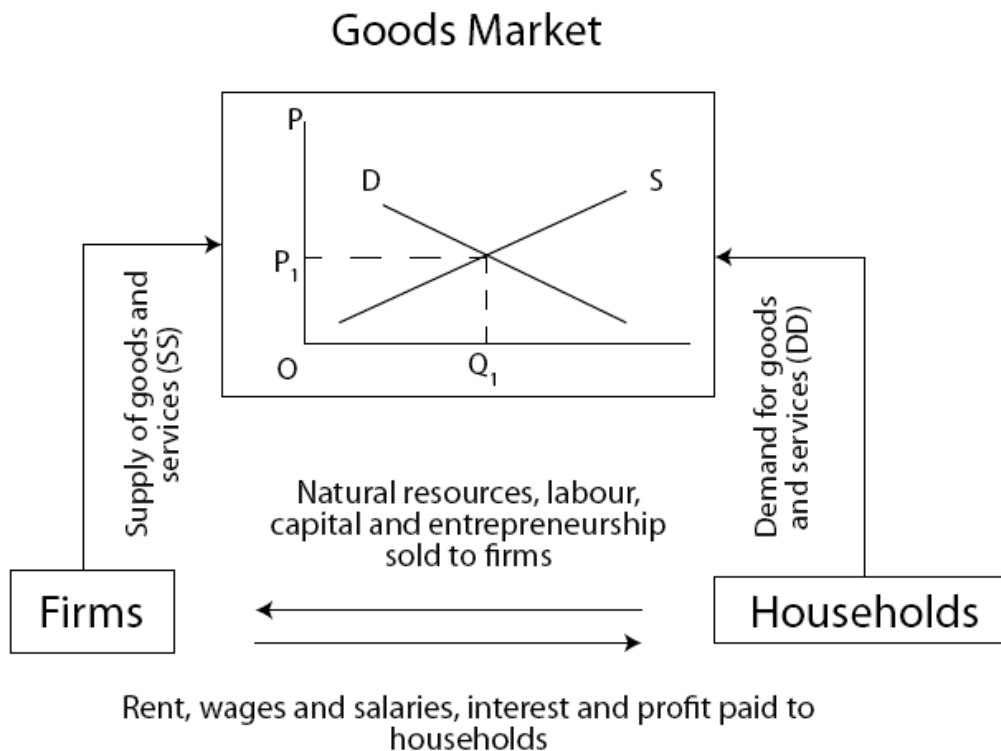
Goods Market

- Households sell their factors of production to firms.
- Firms use these factors to produce goods and services that are sold in the goods market to households who use their income to buy the goods and services.
- In the goods markets firms thus determine the supply (S), while households determine the demand (D).
- The interaction of supply and demand determines the price (P1) and quantity (Q1) of each good or service.

Composition of Gross Domestic Expenditure and GDP

C+I+G+(X-IM)	Billions of dollars	Percent of GDP
Personal consumption expenditures (C)	8745.7	70.0
Consumer durables	1026.5	8.2
Nondurable goods	2564.4	20.5
Services	5154.9	41.3
Gross private domestic investment (I)	2105.0	16.9
Business fixed investment	1329.8	10.6
Nonresidential structures	335.1	2.7
Equipment and software	994.7	8.0
Residential investment	756.3	6.1
Inventory investment	18.9	0.2
Government purchases of goods and services (G)	2362.9	18.9
Federal	877.7	7.0
National defense	587.1	4.7
Nondefense	290.6	2.3
State and local	1485.2	11.9
Net exports (NX)	−726.5	−5.8
Exports	1301.2	10.4
Imports	2027.7	16.2
Total (equals GDP) (Y)	12487.1	100.0

Note: Numbers may not add to totals shown owing to rounding.
Source: Bureau of Economic Analysis Web site, *www.bea.gov*, Table 1.1.5, May 31, 2006.

The Composition of GDP

Open Economy Z=C+I+G+X-IM	Closed Economy Z=C+I+G

1) **Final Consumption expenditure by households (C)** refers to the goods and services purchased by consumers.

2) **Government Spending (G)** refers to the purchases of goods and services by the government. It does not include **government transfers**, nor interest payments on the government debt.

3) **Investment or Gross Capital formation (I),** is the purchase of capital goods. It is the sum of **nonresidential investment** and **residential investment.**

4) *Exports (X)* are the purchases of SA goods and services by foreigners.

5) *Imports (IM)* are the purchases of foreign goods and services by consumers, business firms, and the SA government.

Net Exports (X – IM) is the difference between exports and imports, also called the **trade balance**.

The Model - Assumptions

Endogenous Variables

- Variables that depend on other variables within the model.

Exogenous Variables

- Variables that are not explain within the model

The Demand for Goods Identity

- The total demand for goods is written as:

$$Z \equiv C + I + G + X - IM$$

- Under the assumption that the economy is closed, $X = IM = 0$, then:

$$Z \equiv C + I + G$$

1. Consumption

$$C = c_0 + c_1 Y_D$$

- This is called the **consumption function.**
- It is a **behavioral function**, that is, it captures the behavior of households/ consumers.
- This function has two **parameters**:
  - c_1 – Marginal **propensity to consume**
  - c_0 - intercept of the consumption function – **(autonomous consumption)**

Disposable income, (Y_D) is given by Total Income less Taxes

$$Y_D \equiv Y - T$$

Thus, $c_1 Y_D$ is also known as **Induced consumption**

1. Consumption_

Consumption increases
with disposable income.

$$Y \uparrow \Rightarrow Y_D \uparrow \Rightarrow C \uparrow$$

$$Y_D \equiv Y - T$$

$$C = c_0 + c_1(Y - T)$$

- If Households income is R100m, and taxes are R20m, therefore disposable income is R80m

$$T \uparrow \Rightarrow Y_D \downarrow \Rightarrow C \downarrow$$

Consumption
function
$$C = c_0 + c_1 Y_D$$

Consumption, C

c_0

slope = c_1

Disposable Income, Y_D
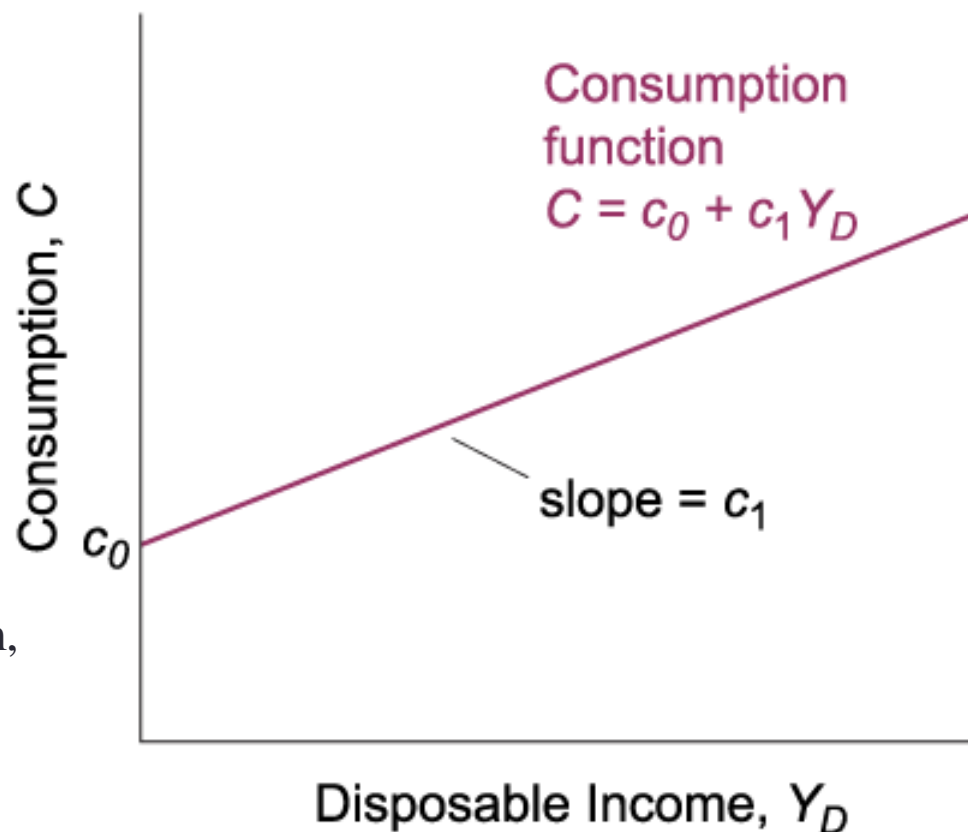
- Change in MPC changes the slope of the consumption curve.
- Change in autonomous consumption shifts the curve
- Change in disposable income causes a movement along the curve.

1. Consumption_

- Households also save part of their income
- Both consumption and savings are positively dependent on the level of output and income.
- The higher the level of output and income in the economy, the higher are consumption and savings too.
- **Savings function** can be given as:

$$S = -c_0 + (1 - c_1)Y_D$$

$(1 - c_1)$ Is the **Marginal propensity to save** (s)

There is a negative relationship between MPC (c) and MPS (s).
- The higher the MPC, the lower the MPS
- If households consume large portion of their income that means they save less.

2. Investment (I)

- **Real and Financial investment**
  - **Real investment** is spending on additions to the capital stock
    - E.g. Machinery, structures, inventories etc
    - Such investment is undertaken to generate profits in the future

  - **Financial investment** is investment in shares and other financial instruments.
    - When people put money on deposit with a bank or buy shares they are making a financial investment with the aim to get future returns.
    - This does not create production capacity
  - Therefore, when referring to investment we usually mean real investment.
    - Real investment creates production capacity
    - Creates demand for consumer goods and services

2. Investment (I)_

- Investment here is taken as given – an autonomous variable determined by exogenous factors such as:
    - Interest rates (-)
    - Expectations (+)
    - Business confidence (+)
    - Regulations (+)
- **Investment function** can be given as: $I = \bar{I}$

3. Government Spending (G)

- Government spending, *G*, together with taxes, *T*, describes ***fiscal policy***.
  - Thus, the main instrument of fiscal policy is the Budget.
  - The budget is essentially a reflection of political decisions about how much to spend, what to spend it on and how to finance the spending.
- Assume that *G* and *T* are also exogenous variables.
- Budget deficit exists when: **G > T**
- Budget surplus exists when: **G < T**

- **An expansionary fiscal policy:**
  - stimulates economic activity by increasing aggregate demand
  - How? Government spending increase and/or tax decreases
- **A contractionary fiscal policy:**
  - Used to cool down economic activity by reducing aggregate demand
  - How? Government spending reduced and/or taxes increases

4. The Determination of Equilibrium Output

Equilibrium condition in the goods market requires that
- production, Y, be equal to the demand for goods, Z:

$$Y = Z$$

Therefore:
$$Y = c_0 + c_1(Y - T) + \bar{I} + G$$

This can also be written as:
$$Y = c_0 + c_1 Y - c_1 T + \bar{I} + G$$

5. Using Algebra

$$Y = c_0 + c_1(Y - T) + \bar{I} + \overline{G}$$

- How many endogenous variables?
- How many equations?
- Can we solve this? (Solve for Y)

$$Y = c_0 + c_1 Y - c_1 T + \bar{I} + \overline{G}$$

$$Y - c_1 Y = c_0 - c_1 T + \bar{I} + \overline{G}$$

$$(1 - c_1)Y = c_0 + \bar{I} + \overline{G} - c_1 T$$

$$Y = \frac{1}{1 - c_1}[c_0 + \bar{I} + \overline{G} - c_1 T]$$

multiplier   **autonomous spending**

Thus, change in equilibrium level of output and income will be due to change in the multiplier (marginal propensity to consume), and the autonomous spending

6. Equilibrium in the Goods market: Using a Graph

$$Z = (c_0 + \bar{I} + \bar{G} - c_1 T) + c_1 Y$$

Equilibrium output is determined by the condition that production be equal to demand.

At point A
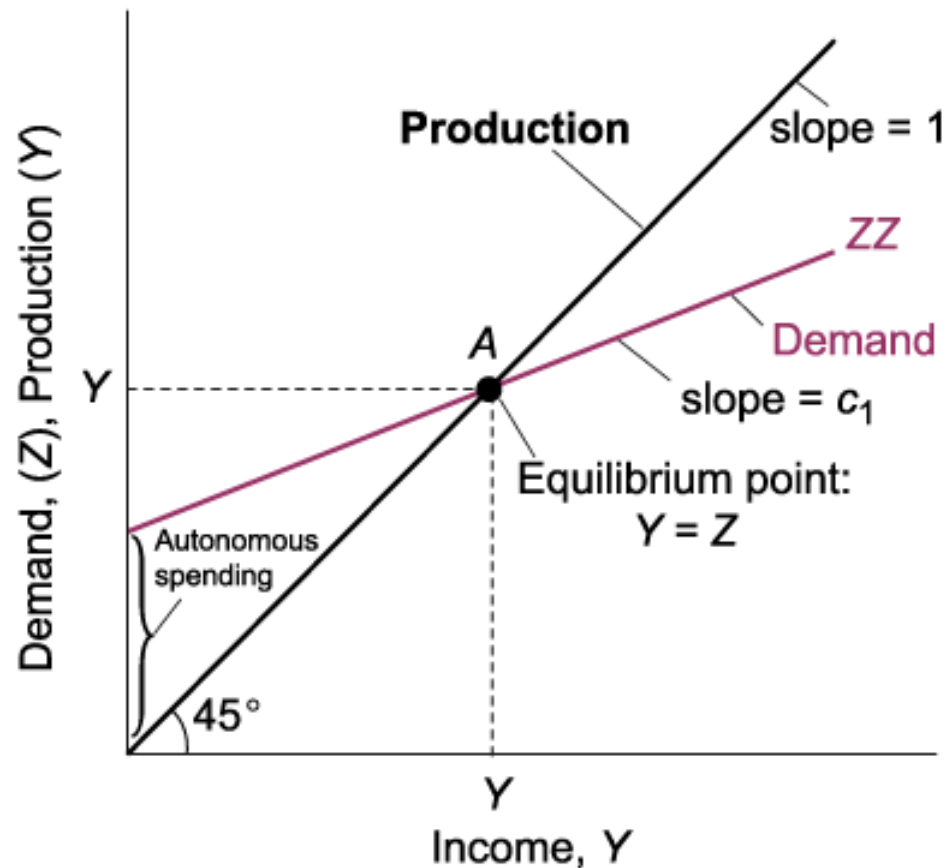
The Keynesian Multiplier

- An increase in demand leads to an increase in production and a corresponding increase in income.

-

- The end result is an increase in output that is larger than the initial shift in demand, by a factor equal to the multiplier.

7. Changes in Equilibrium level of Output and Income

7.1. The Effects of an Increase in Autonomous Spending c_0 on Output

An increase in autonomous spending (e.g. an increase G) has a more than one-for-one effect on equilibrium output.

But, How Long Does It Take for Output to Adjust?

The speed of adjustment depends on how and how often firms revise their production schedule.

Describing formally the adjustment of output over time is what economists call the **dynamics** of adjustment.
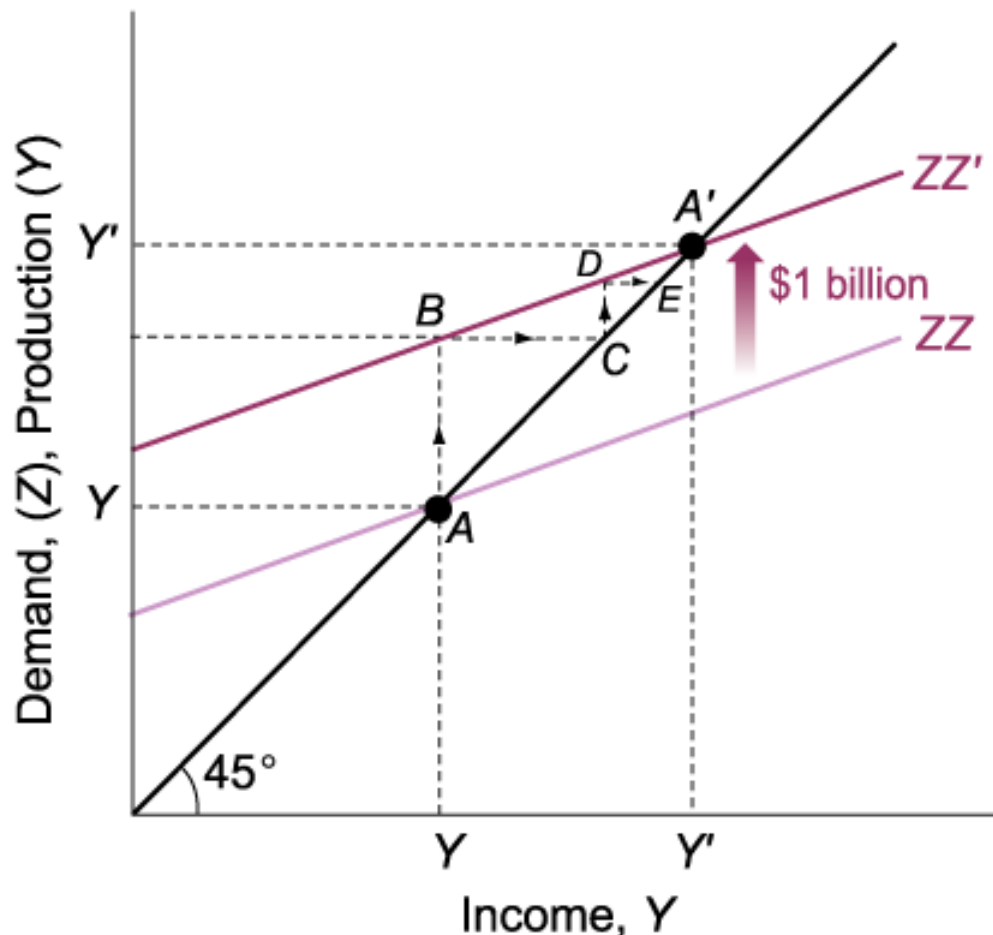
8. Fiscal Policy and Full employment

- Full employment can be described as a situation in which all resources (labour, capital, land and entrepreneurship) are used to produce goods and services.
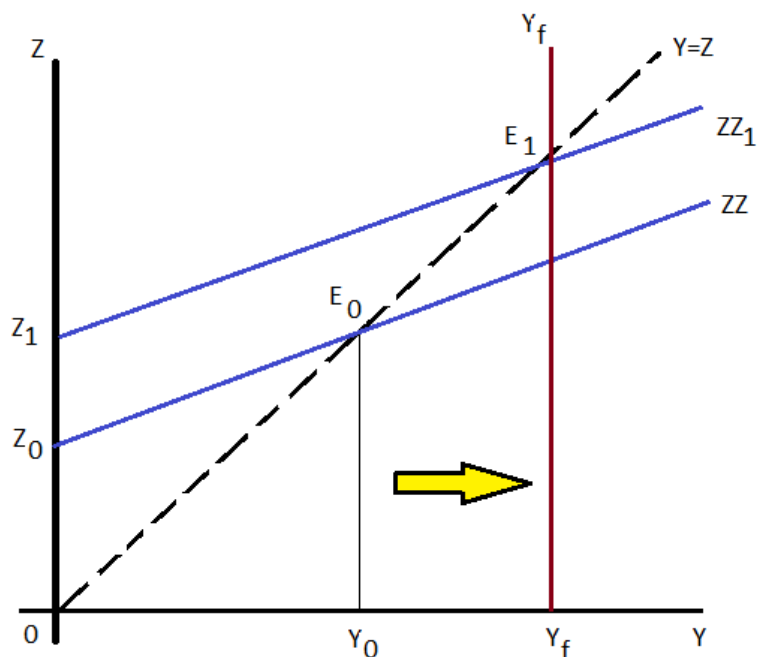
- Unemployment gap or output/ income gap is the distance between Y_0 and Y_f

- **Government spending effect:**
  - By how much should gov spending increase to reach full employment equilibrium level?
- **Tax effect**
  - Decrease in taxation, increases disposable income, causing rise in household consumption, aggregate demand increase closer to full employment level.

ECS2602
The Financial Market
UNIT+3

Tutorial 3

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2016

1

Learning Outcomes

- How interest rate is determined

- What causes change in interest rate

- Impact of monetary policy on interest rate

- Monetary policy in SA

What do we know?

1) Financial markets
2) Demand for money
3) Supply for money
4) Interest rate
5) Monetary policy
6) Liquidity trap

3

1. What is money, income and wealth?

- Money
  - is anything that is widely accepted in exchange for goods and services in ordinary commercial transactions. In other words, money is whatever you use to buy stuff.

- Income
  - is the total earned by an individual or household during a specific time period.
  - Economists call income a flow variable, which means it has time units attached.

- Wealth
  - The accumulation of past saving plus interest, dividends, and capital gains (or losses) is called wealth.
  - Thus, wealth is the net worth of a person, the total value of his assets minus his liabilities. Wealth is known as a stock,

- NB: *Having a huge income does not ensure a person to become wealthy.*

4

2. The Role of Money

- **Medium of Exchange**
  - A generally accepted means of payment.

- **Store of Value**
  - Transfer wealth or purchasing power through time.
  - Money must be able to be reliably saved, stored, and retrieved – and be predictably usable as a medium of exchange when it is retrieved.

- **Unit of Account**
  - A widely recognized measure of value.
  - If N goods, there are $N(N-1)/2$ prices. But, if one of those goods is the unit of account, need to know only $(N-1)$ prices.

3. Portfolio decisions

- A portfolio decision refers to the choice by a financial market participant as to how much of various assets to hold.

- There are different kinds of assets which financial wealth can be held
    - Money, Shares, bonds, real assets (house) forex etc

- Will assume that:
    - there are only 2 assets: Money and bonds
    - Financial assets on the bond market is only Treasury bills (TBs)
    - Thus a choice is either to keep money or bonds (TBs)

- Thus, equilibrium exists when market participants have made optimal decisions as to how much money and bonds to hold.

4. Demand for Money

- **Money demand** is the amount of assets that people are willing to hold as money (instead of illiquid assets).

    - What influences willingness to hold money?

- **Keynes's Liquidity Preference Theory :**

    - Transactions Motive
    - Precautionary Motive
    - Speculative Motive

Demand for Active balances
- Influenced by people's need to do transactions
- The more transactions the higher the demand for money
- Thus, demand for active balance depends on the level of output and income in the economy. Higher income and output level, the more transactions will be.

$$Y \uparrow \Rightarrow active-transactions \uparrow \Rightarrow M^d \uparrow$$

Demand for passive balances
- Also referred to as the speculative demand for money.
- Is related to the need to keep wealth in the form of money as the most liquid form
- Keeping TBs has the benefit of higher potential return but less liquid.
- The higher the return (interest rate) the higher the opportunity cost of holding other assets than money since keeping money earns not interest.

$$i \uparrow \Rightarrow passive-demand \downarrow \Rightarrow M^d \downarrow$$

4. Demand for Money_

What Influences Individual Demand for Money?

1. **Expected returns/interest rate** on money relative to the expected returns on other assets.

2. **Risk**: the risk of holding money principally comes from unexpected inflation, thereby unexpectedly reducing the purchasing power of money.
    - but many other assets have this risk too, so this risk is not very important in money demand

3. **Liquidity**: A need for greater liquidity occurs when either the price of transactions increases or the quantity of goods bought in transactions increases.

What Influences Aggregate Demand for Money?

1. **Interest rates**: money pays little or no interest, so the interest rate is the opportunity cost of holding money instead of other assets, like bonds, which have a higher expected return/interest rate.
    - A higher interest rate means a higher opportunity cost of holding money → lower money demand.

2. **Prices**: the prices of goods and services bought in transactions will influence the willingness to hold money to conduct those transactions.
    - A higher price level means a greater need for liquidity to buy the same amount of goods and services → higher money demand.

3. **Income**: greater income implies more goods and services can be bought, so that more money is needed to conduct transactions.
    - A higher real national income (GNP) means more goods and services are being produced and bought in transactions, increasing the need for liquidity → higher money demand

4. Demand for Money_

- **The amount of money demanded for transaction and speculative purposes depends: personal income and interest rate.**

  - Therefore, demand for money is a positive function of level of output and income but a negative function of interest rate. This can be represented as:
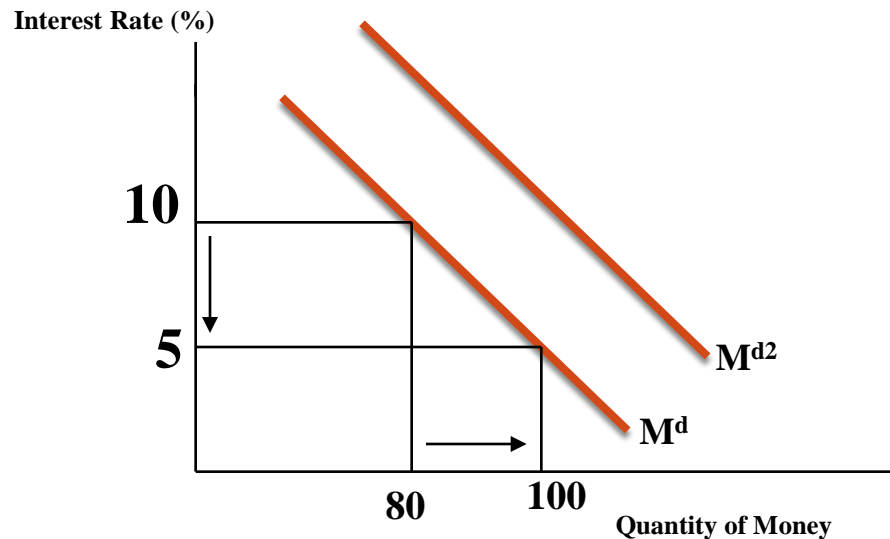
$$M^d = YL(i)$$

$$Y \uparrow \Rightarrow M^d \uparrow$$

$$i \uparrow \Rightarrow M^d \downarrow$$

5. The Money Supply

- Who controls the quantity of money that circulates in an economy, the **money supply**?

- Central bank controls the **nominal money supply**

  - In SA, the Reserve Bank is responsible

    - Directly regulates the amount of currency in circulation.

    - It indirectly controls the amount of checking deposits issued by private banks.

5. The Money Supply_

- Therefore, Money supply equation is exogenously determined – it is the Central bank that determines level of money supply

$$M^s = M$$
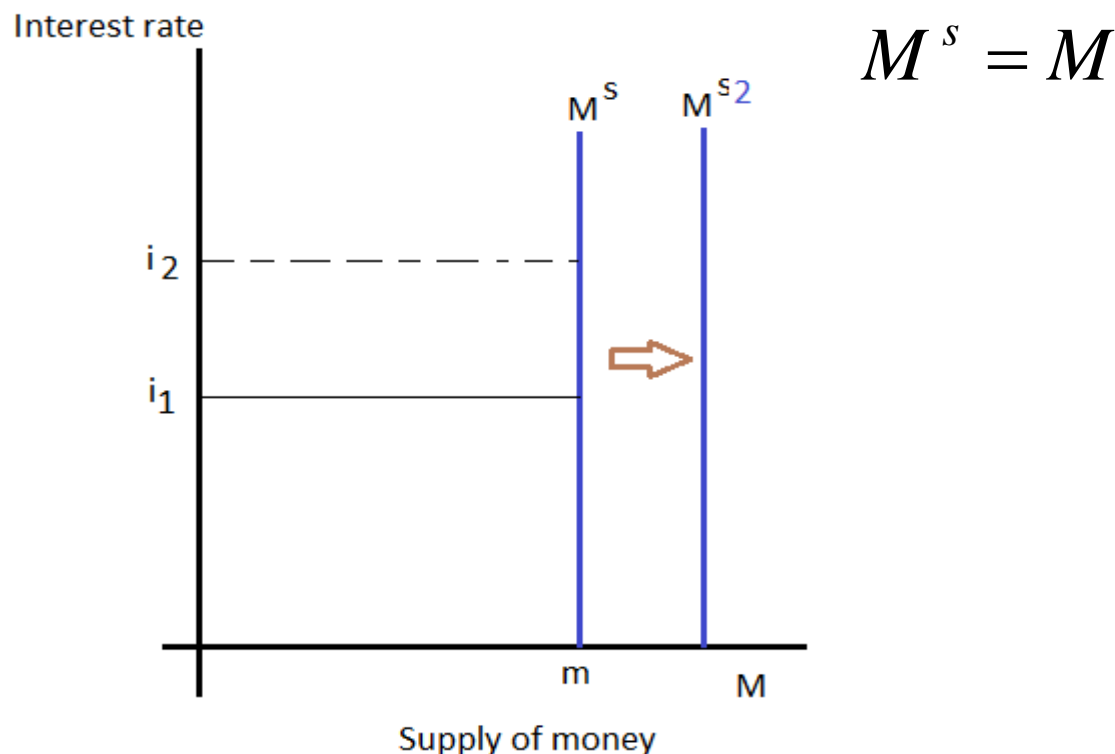
Real v/s Nominal Money supply and demand

- Given the average price level, the nominal money supply divided by the average price level (P) defines the real money supply.

  - The real money supply, Ms/P, is also exogenous.

$$\frac{M^S}{P} = M$$

- Real demand for money is also given as the nominal demand for money divided by the average price level (P)

$$\frac{M^D}{P} = YL(i)$$

  - Where, the remand for real money is positively related to real income, and interest rate (i).

6. Equilibrium in the Financial Market

Equilibrium interest rate

Figure 14-3

Determination of the Equilibrium Interest Rate

With P and Y given and a real money supply of M^s/P, money market equilibrium is at point 1. At this point aggregate real money demand and the real money supply are equal and the equilibrium interest rate is R^1.
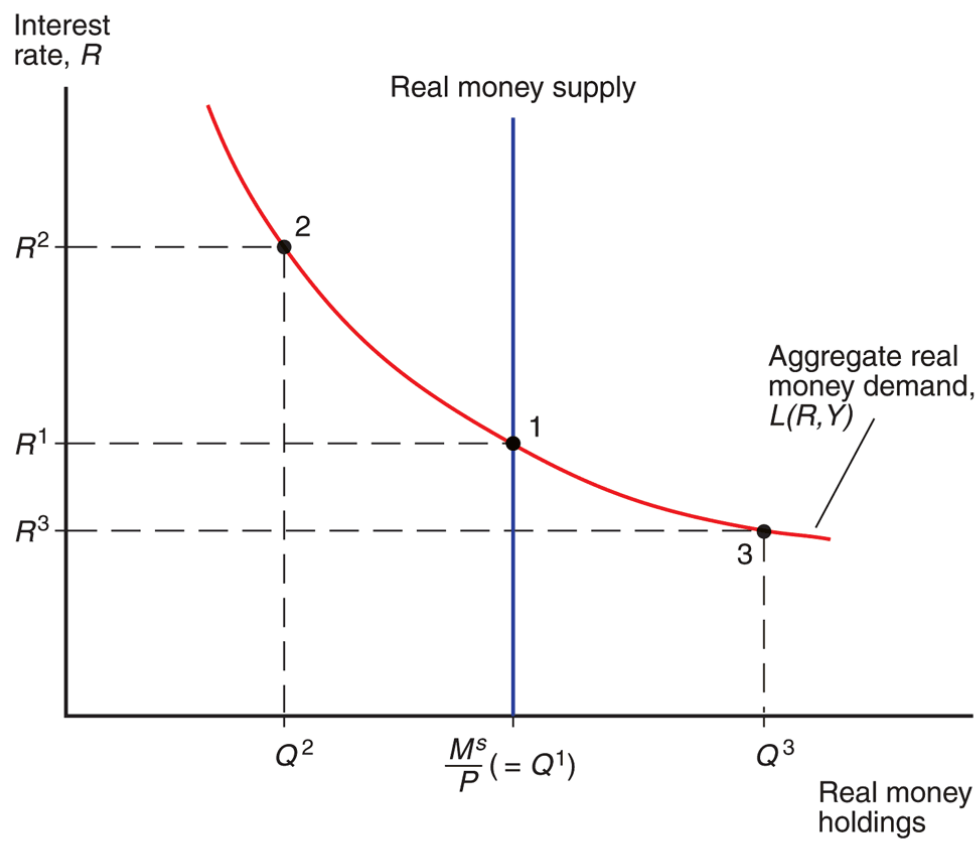
6. Equilibrium in the Money Market

Figure 14-5

Effect on the Interest Rate of a Rise in Real Income

Given the real money supply, $M^s/P (= Q^1)$, a rise in real income from Y^1 to Y^2 raises the interest rate from R^1 (point 1) to R^2 (point 2).

A higher level of income/output increases money demand (all other things constant,) as agents require more money for transaction and precaution purposes

An increase in national income increases equilibrium interest rates for a given price level.

14
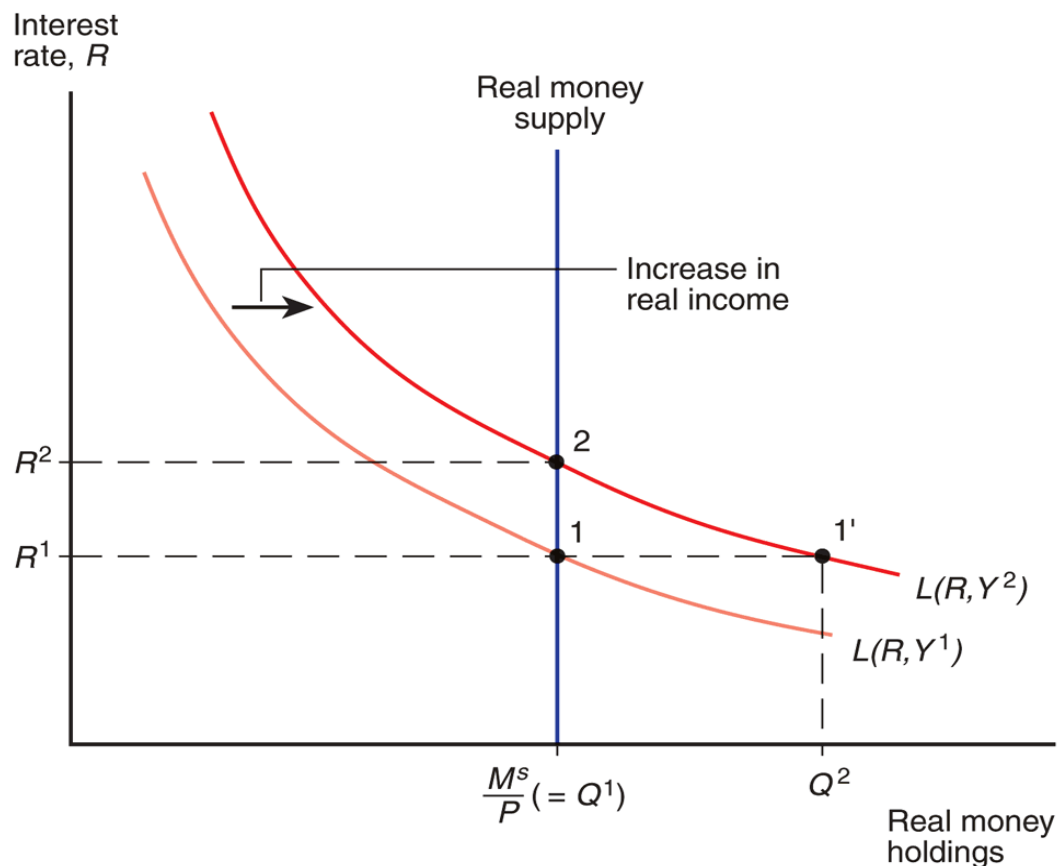
6. Equilibrium in the Financial Market_

Changes in the Money Supply

Figure 14-4

Effect of an Increase in the Money Supply on the Interest Rate

For a given price level, P, and real income level, Y, an increase in the money supply from M^1 to M^2 reduces the interest rate from R^1 (point 1) to R^2 (point 2).

An increase in the money supply lowers the interest rate for a given price level.

There is excess money supply, which agents will want to convert into asset holdings. This increases the price of bonds, and reduces the rate of interest. The opportunity cost of holding money falls, and money demand increases

A decrease in the money supply raises the interest rate for a given price level.
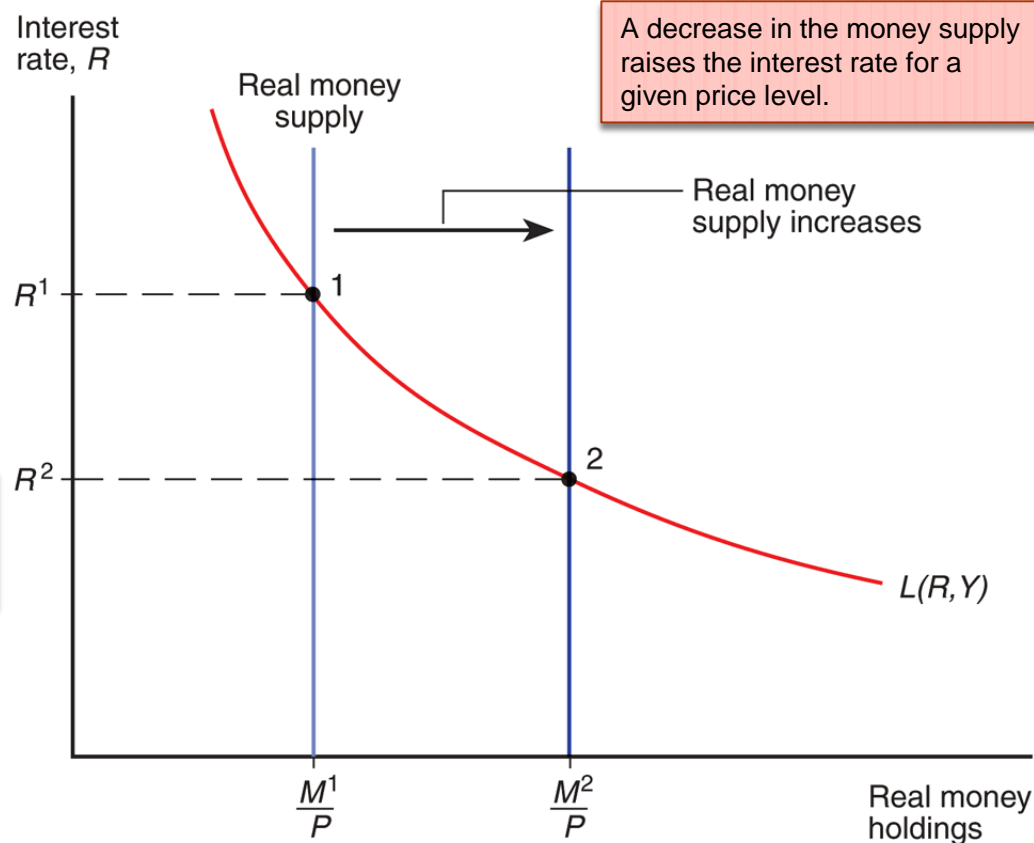
6. Monetary Policy Effect

$$M^s \uparrow : D_B \uparrow \Rightarrow P_B \uparrow \Rightarrow i \downarrow$$

Increase in Money supply,
- Central bank buys TB (bonds) on the open market
- The seller receives money
- <u>Money supply is increased </u>(rightward shift in the money supply curve)
- Since the CB offers to buy back TB at the higher rate, Demand for TB increases
- Price for TB increases
- The interest therefore, decreases

$$M^s \downarrow : S_B \uparrow \Rightarrow P_B \downarrow \Rightarrow i \uparrow$$

Decrease in Money supply,
- Central bank sells TB (bonds) on the open market
- The buyers pay the CB money
- <u>Money supply is decreased </u>(leftward shift in the Money supply curve)
- Since the CB offers to buy back TB at the higher rate, Demand for TB increases
- Price for TB increases
- The interest therefore, increases

6. Liquidity Trap

i

$$\frac{M^s}{P}$$
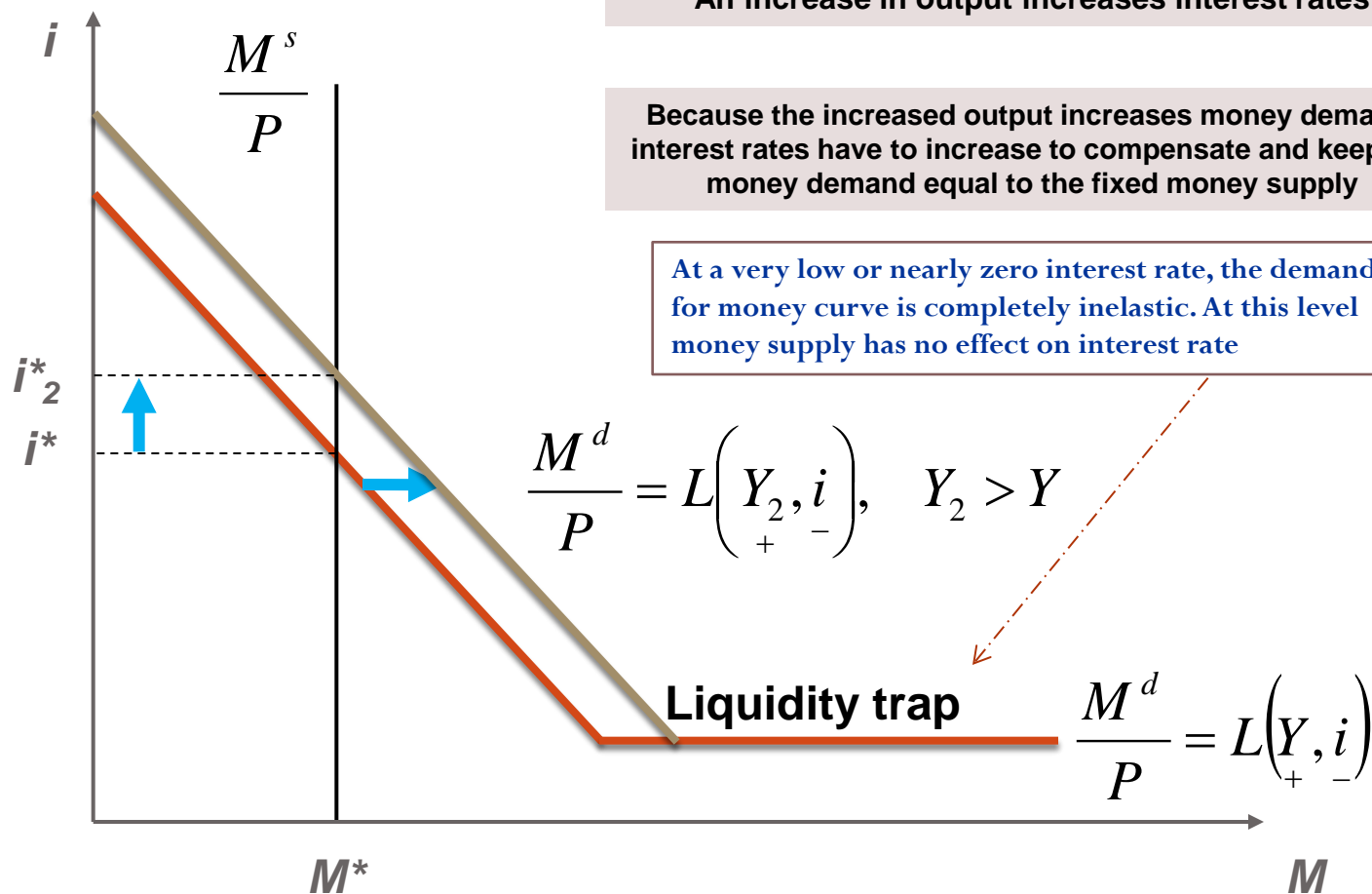
An increase in output increases interest rates

Because the increased output increases money demand, interest rates have to increase to compensate and keep the money demand equal to the fixed money supply

At a very low or nearly zero interest rate, the demand for money curve is completely inelastic. At this level money supply has no effect on interest rate

i^*_2

i^*

$$\frac{M^d}{P} = L\left(\underset{+}{Y_2}, \underset{-}{i}\right), \quad Y_2 > Y$$

Liquidity trap

$$\frac{M^d}{P} = L\left(\underset{+}{Y}, \underset{-}{i}\right)$$

M^*

M

ECS2602
The IS-LM Model in a Closed Economy
UNIT+4

Tutorial 4

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2016

1

IS-LM Model

Investment **S**aving – **L**iquidity Preference **M**oney Supply (IS-LM) Model

- A macroeconomic tool that basically demonstrates the relationship between *interest rates and real output* in the goods/output market and money market.
- The intersection of the IS and LM curves is the "*General Equilibrium*" where there is simultaneous equilibrium in both markets.

- ## The IS Curve

  - The IS curve tells you all combinations of Y and r that equilibrate the output market, given that firms are willing to supply any amount that's demanded.

- ## The LM Curve

  - The LM curve tells you all combinations of Y and r that equilibrate the money market, given the economy's nominal money supply M and price level P.

IS-LM Model

Main Assumptions in a Closed economy

1) **Consumption**

   - Consumption (C) is defined as C = C(Y-T) where T corresponds to government taxes.

2) **Investment**

   - Investment (I) is not constant (no longer exogenous), and we see that it depends mainly on two factors:

     - Level of output (+) and

     - Interest rate (-)

   $$I = I(Y, i)$$

   Increase in level of output increases investment;
   Increase in level of interest rate decreases investment

   - Thus, since Investment is regarded as positive function of output and income. Thus change in income will affect both consumption and Investment.

1. IS Curve: The Investment = Savings curve

- **The Market for goods and services.**

- Inflation and inflationary expectations are assumed to be stable.

  - *An assumption that in a short-run the general price level is fixed.*

- The IS curve derives a relationship between interest rates and income in the short run.

$$Y = C\,(Y\text{-}\,T) + I\,(Y,\,i) + G$$

- An increasing interest rate will cause a reduction in production through its effect on investment. $\uparrow i \Rightarrow \downarrow I \Rightarrow Y \downarrow$

  - Therefore, the IS curve shows a negative relationship between r and Y.

  - An increase in the interest rate reduces investment by making it more expensive for firms to borrow money to make investment purchases and also by increasing the opportunity cost for those who plan to finance investment projects using their own funds.

1. IS Curve: The Investment = Savings curve

An Equilibrium in the goods market implies that

- An increase in the interest rate leads to a decrease in output.

$$\uparrow i \Rightarrow \downarrow I \Rightarrow Y \downarrow$$

- The *IS* curve is downward sloping.

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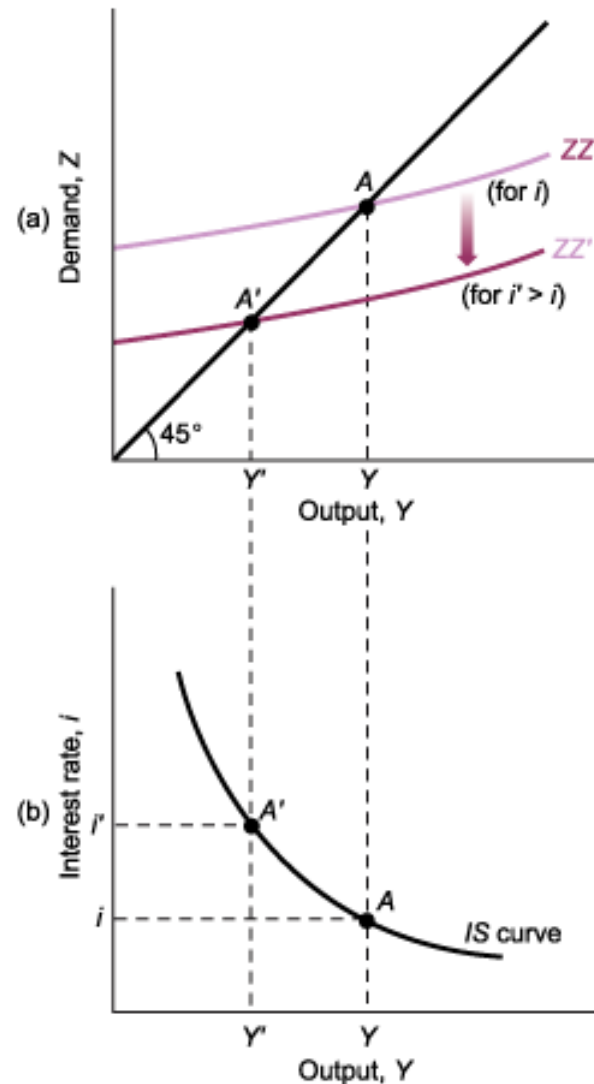
1. IS Curve: The Investment = Savings curve

Shifts of the IS Curve

Change in interest rate will cause a movement along the IS curve.

Assume a Change in T or G

- An increase in taxes shifts the *IS* curve to the left.

$$\uparrow T \Rightarrow \downarrow Y_D \Rightarrow \downarrow C \Rightarrow \downarrow Y$$

Therefore, change in
- Consumption (consumer confidence)
- Investment (investor confidence)
- Government spending or Taxes

Will cause the IS curve to shift

Interest, *i*

i

IS (for taxes *T*)

IS' (for *T' > T*)

Y'   Y

Output, Y
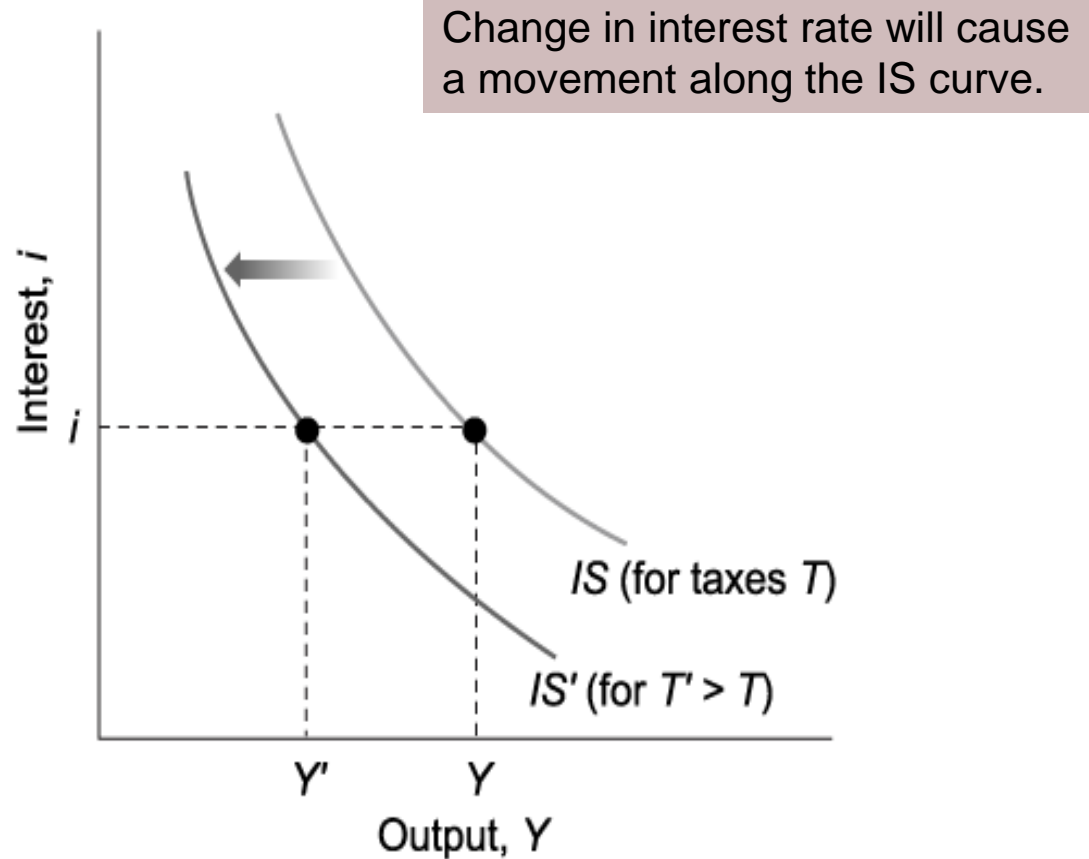
2. LM Curve: Liquidity Preference = Money Demand curve

- **The LM curve represents money market equilibrium.**
  - Describes the behavior of the money market, which determines interest rates in the economy.
  - The LM curve consists of the combinations of income and interest rates that clear the market for money balances (i.e. equate money demand and money supply).
  - In equilibrium, the real money supply is equal to the real money demand, which depends on real income, (Y), and the interest rate (r).
    - The interest rate is determined by the equality of the supply of and the demand for money.
- The curve is given by

$$\frac{M}{P} = L(Y, i)$$

  - LM Curve captures the effect of income/output (Y) on nominal interest rate (i), for given values of M (nominal money supply) and
  - P (in short run price is assumed to be fixed).

2. LM Curve: Liquidity Preference = Money Demand curve

The interest rate is determined by the equality of the supply of and the demand for money.

Effects of an Increase in Income on the Interest Rate

Assume an increase in income

- At a given interest rate, this will increase demand for money.

- Given the money supply, this leads to an increase in the equilibrium interest rate.

$$\uparrow Y \Rightarrow \uparrow M^d$$

8
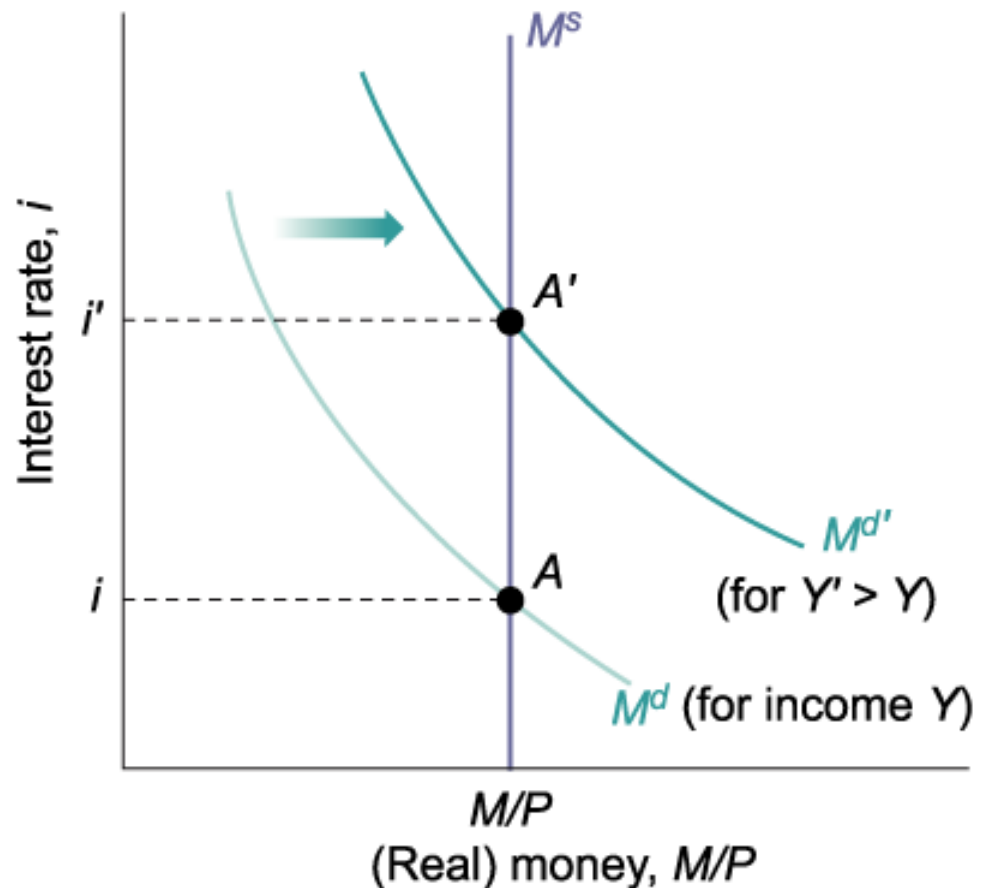
2. LM Curve: Liquidity Preference = Money Demand curve

The Derivation of the LM Curve

Equilibrium in financial markets implies that

- An increase in income leads to an increase in the interest rate (due to increase in M^d)
- Therefore, the *LM* curve is upward-sloping.
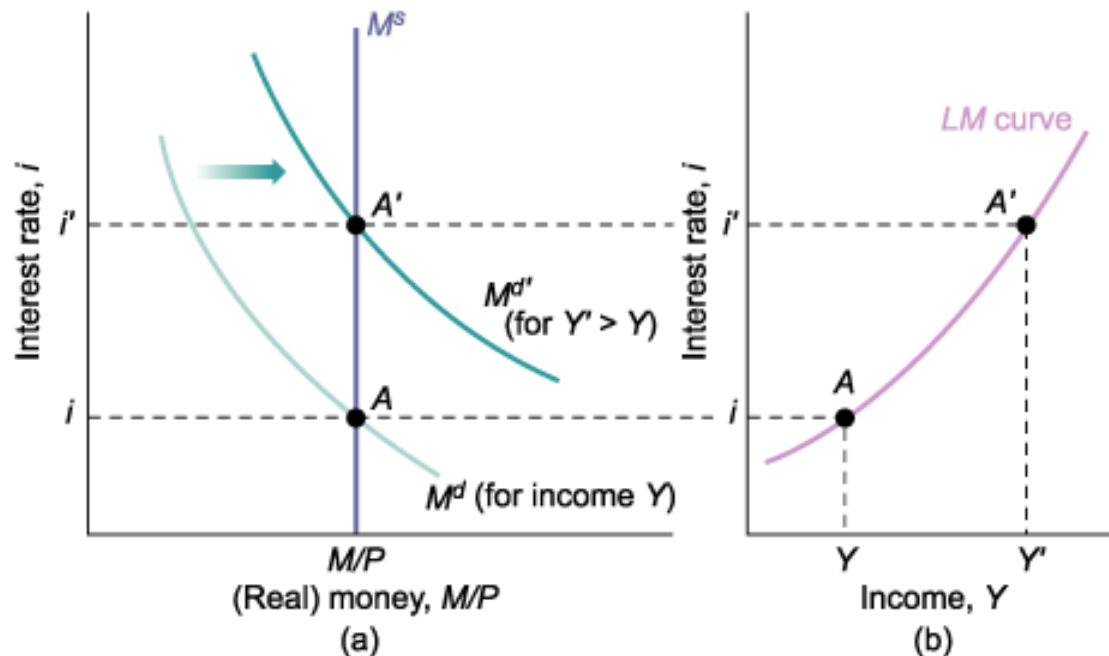
2. LM Curve: Liquidity Preference = Money Demand curve

Movement along the LM curve

- Changes in money demand due to changes in income (Y) or by changes in interest rate (i) are reflected as movements along the LM curve.

  - When income decreases, money demand falls and as a result interest rates must decrease to restore money market equilibrium.

  - When income increases, money demand rises and as a result interest rates must increase to restore money market equilibrium.

Shift of the LM curve

- An increase in the supply of money by the CB will result in an excess supply of money.

  - This will cause the LM curve to shift outwards in order to restore equilibrium.

- An increase in the price level will raise money demand and result in an excess demand for money.

  - This will cause the LM curve to shift inwards to restore equilibrium

2. LM Curve: Liquidity Preference = Money Demand curve

An increase in money supply leads the *LM* curve to shift down.
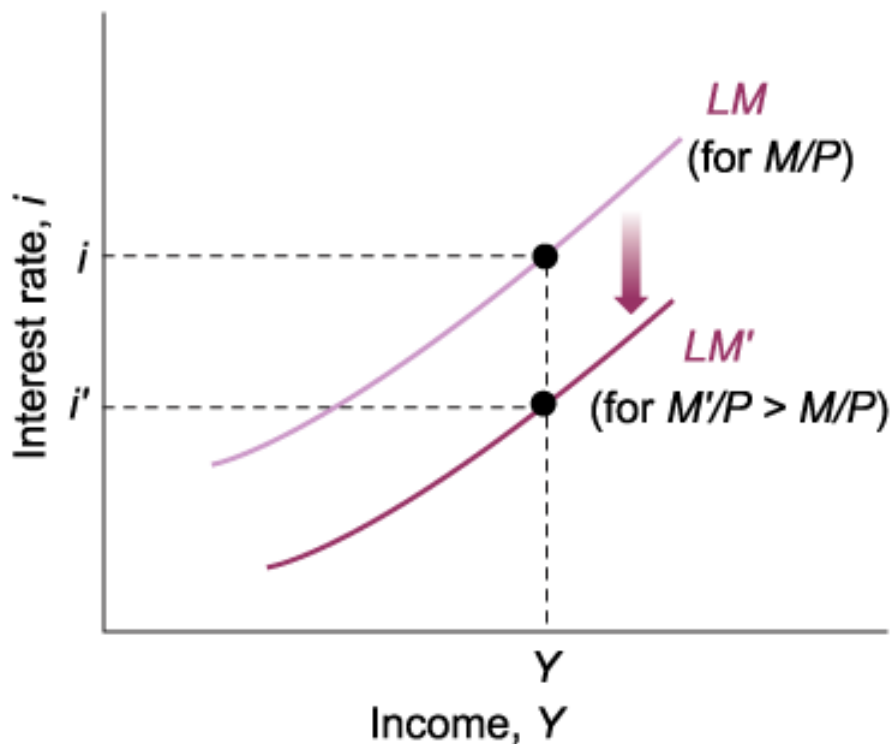
3. THE IS-LM MODEL

The IS-LM Model

- Equilibrium in the goods market implies that an increase in the interest rate leads to a decrease in output.

- Equilibrium in financial markets implies that an increase in output leads to an increase in the interest rate.

- When the *IS* curve intersects the *LM* curve, both goods and financial markets are in equilibrium.
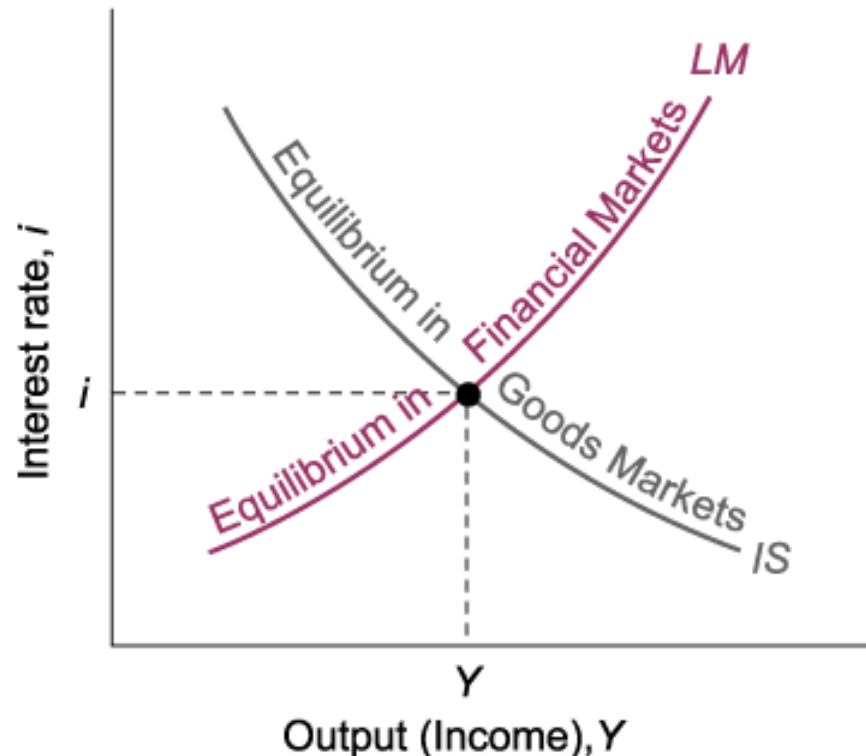
3.1 Fiscal Policy Effect and the Interest Rate

- *Fiscal contraction*, or *fiscal consolidation*, refers to fiscal policy that reduces the budget deficit.

- An increase in the deficit is called a *fiscal expansion*.

- Taxes affect the *IS* curve, not the *LM* curve.

The Effects of an Increase in Taxes

- An increase in taxes shifts the *IS* curve to the left, and

- leads to a decrease in the equilibrium level of output and the equilibrium interest rate.
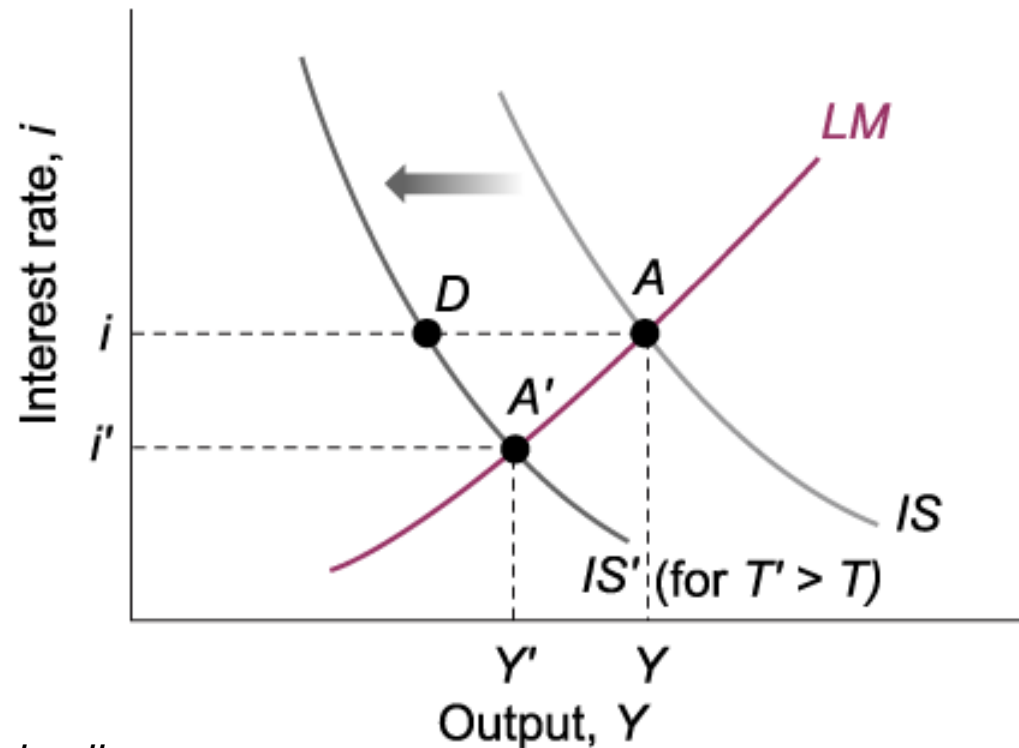
Fiscal Policy
- *Expansionary fiscal policy*
  - shifts the IS curve to the right
- *Contractionary fiscal policy*
  - shifts the IS curve to the left

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3.2. Monetary Policy Effect and the Interest Rate

- *Monetary contraction*, or *monetary tightening,* refers to a decrease in the money supply.

- An increase in the money supply is called *monetary expansion*.

- Monetary policy does not affect the *IS* curve, only the *LM* curve. For example, an increase in the money supply shifts the *LM* curve down.

The Effects of a Monetary Expansion

Monetary expansion leads to higher output and a lower interest rate.
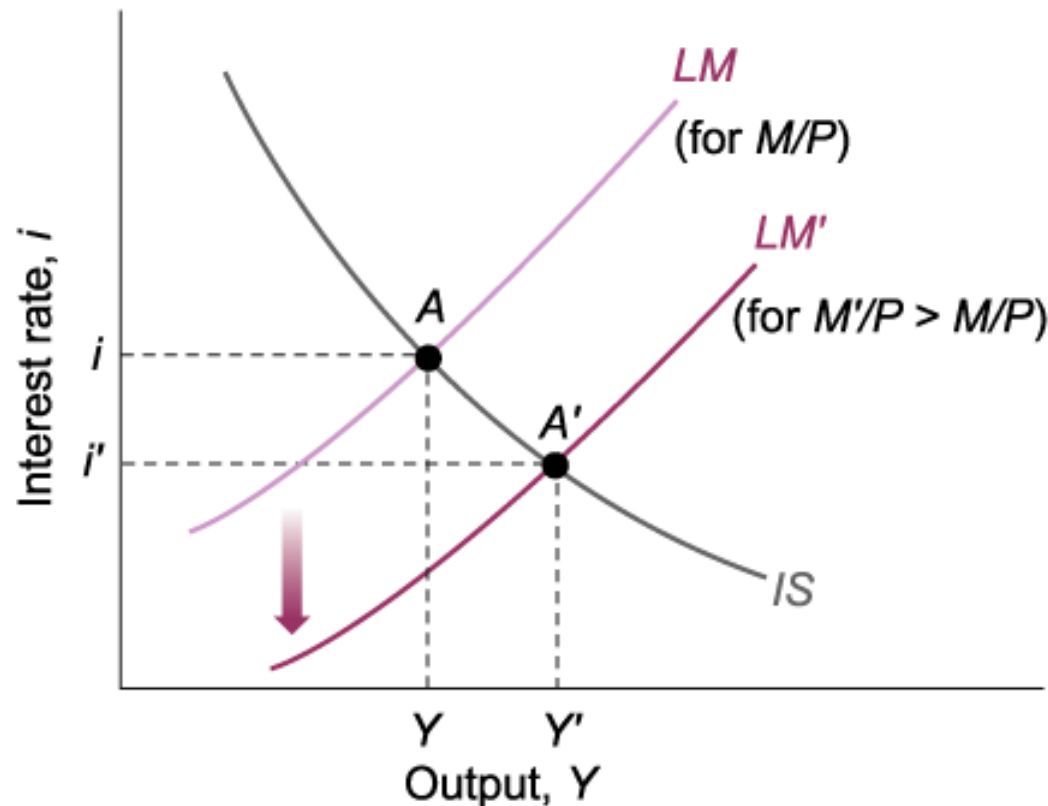
Monetary Policy
- Expansionary monetary policy
  - shifts the LM curve to the right
- Contractionary monetary policy
  - shifts the LM curve to the left

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4. Using a Policy Mix

- The combination of monetary and fiscal polices is known as the *monetary-fiscal policy mix,* or simply, the *policy mix.*

The Effects of Fiscal and Monetary Policy.

	Shift of IS	Shift of LM	Movement of Output	Movement in Interest Rate
Increase in taxes	left	none	down	down
Decrease in taxes	right	none	up	up
Increase in spending	right	none	up	up
Decrease in spending	left	none	down	down
Increase in money	none	down	up	down
Decrease in money	none	up	down	up

4. Using a Policy Mix

The Clinton-Greenspan Policy Mix

Deficit Reduction and Monetary Expansion

The appropriate combination of deficit reduction and monetary expansion can achieve a reduction in the deficit without adverse effects on output.
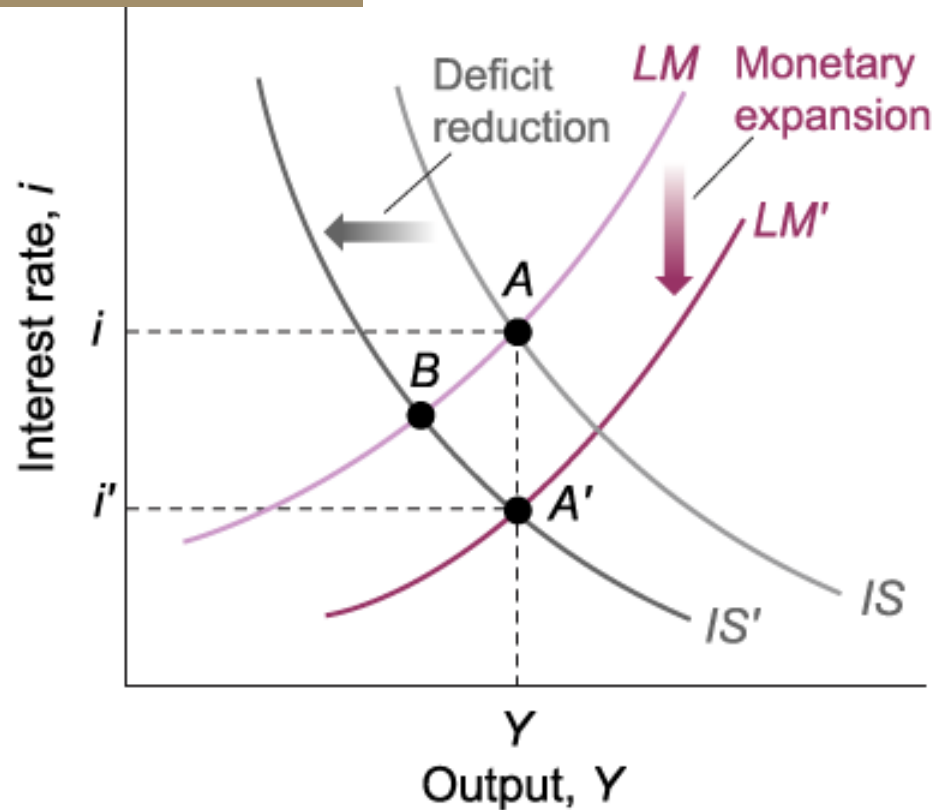
Fiscal Policy and Crowding Out

- When government expenditures increase, output and income begin to increase.

- The increase in income increases the demand for money.

- The increase in money demand increases the interest rate.

- Higher interest rates cause a decrease in investment, offsetting some of the expansionary effect of the increase in government spending.

Partial Crowding Out

1. Let's assume if government spending increases by R500, IS increases by R1000.

2. The increase in income increases money demand which increases interest rates from 4% to 5%.

3. The increase in the interest rate causes a decrease in investment so that the increase in income is only R600, less that the full multiplier effect.

LM

R1000

Real Interest Rate (%)

5%

4%

IS_1

IS_0

R6000   R6600   R7000

Aggregate Output

20
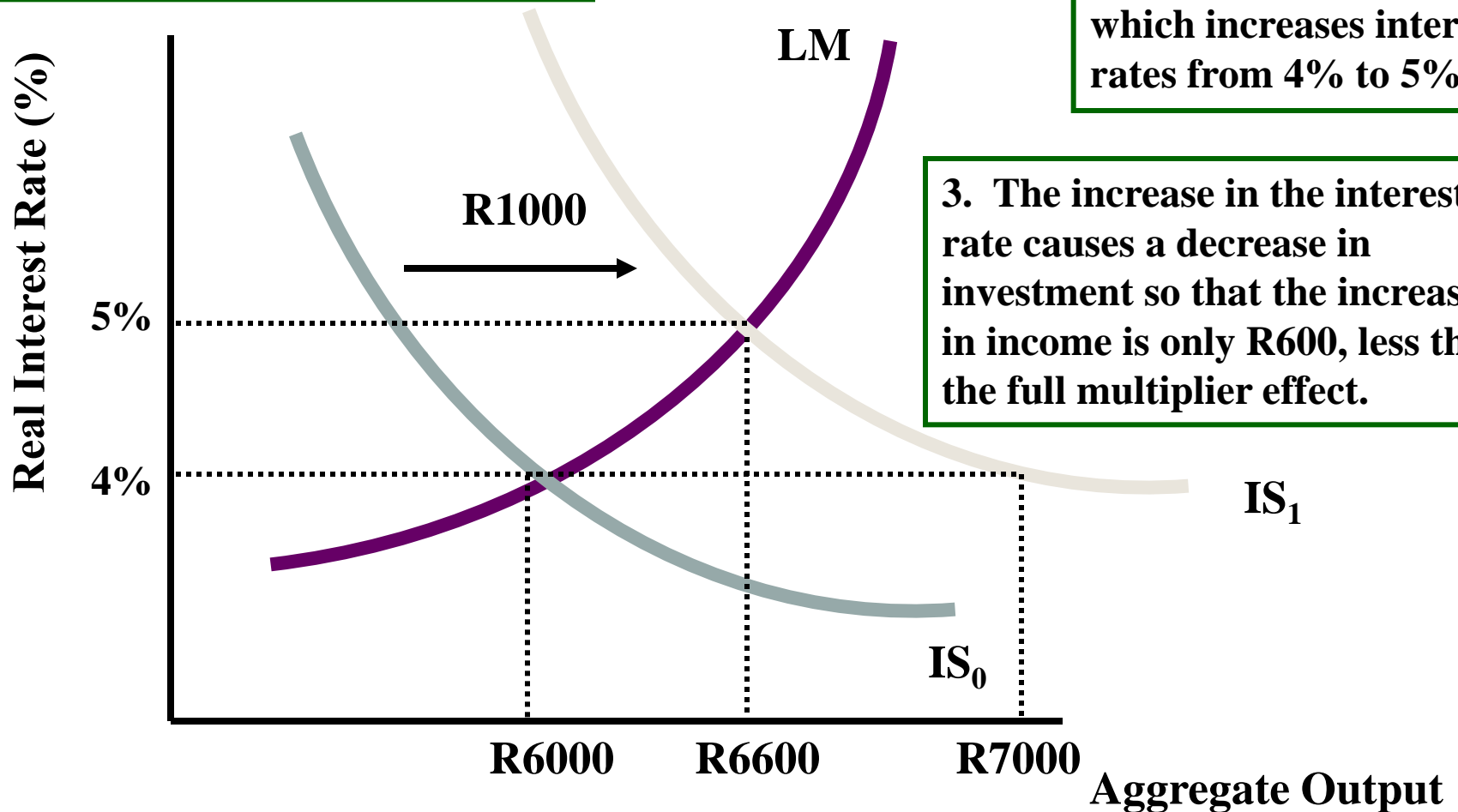
Full Crowding Out

1. **Again government spending increases by R500, and the IS increases by R1000.**

2. **If the demand for money is totally insensitive to the interest rate, the interest rate increases from 4% to 9%.**

3. **The increase in the interest rate causes a decrease in investment that completely offsets the increase in government spending.**

Real Interest Rate (%)

LM

9%

4%

R1000

IS_1

IS_0

R6000

R7000

Aggregate Output

21
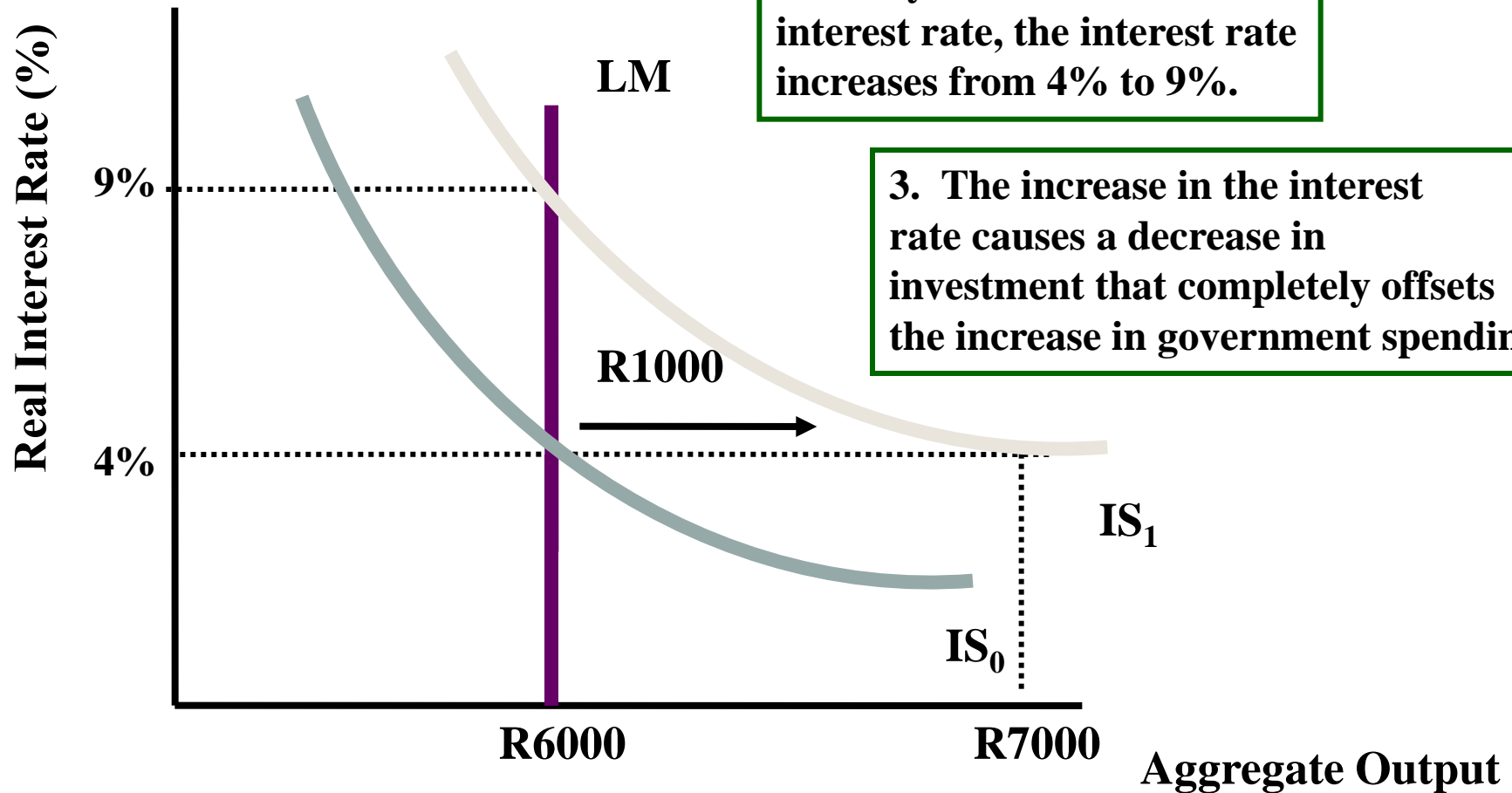
Ineffective Fiscal Policy

- **When complete crowding out occurs, fiscal policy is ineffective, changing only interest rates, not output.**

- **Crowding out is greater if:**
  - **Money demand is very sensitive to income changes**
  - **Money demand is not very sensitive to interest rate changes**

Monetary Policy in the IS/LM Model

The CB increases the money supply which decreases interest rates and increases investment and output.
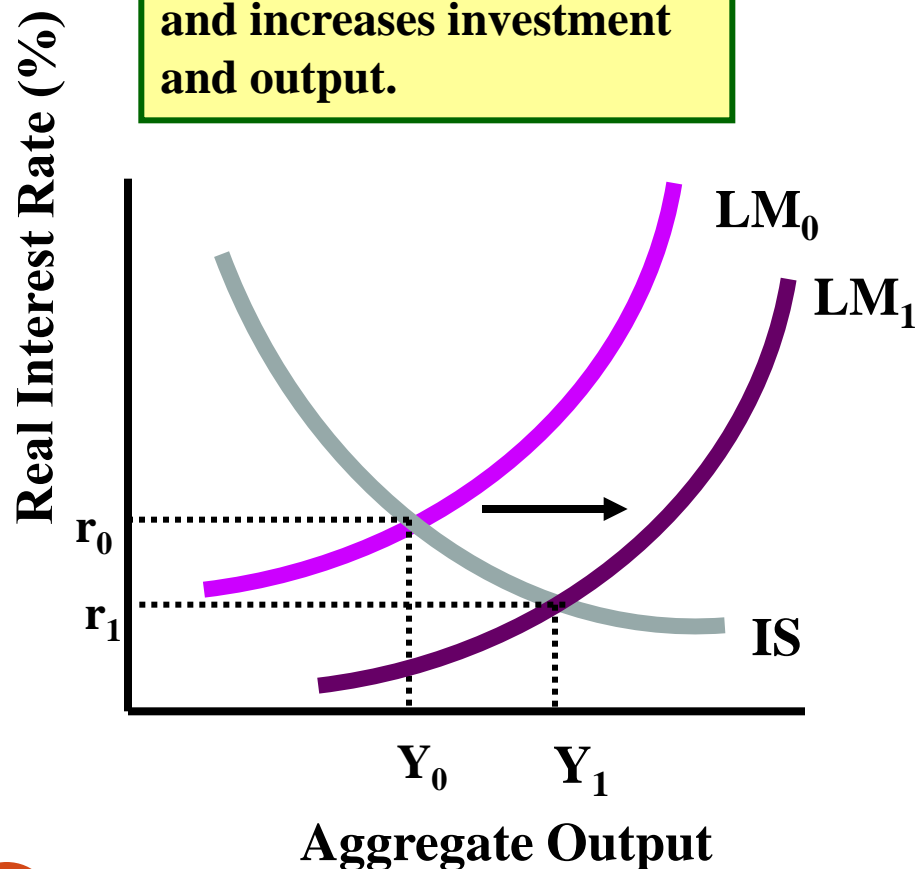
In a liquidity trap, increases in the money supply do not decrease interest rates, so investment and output do not increase.
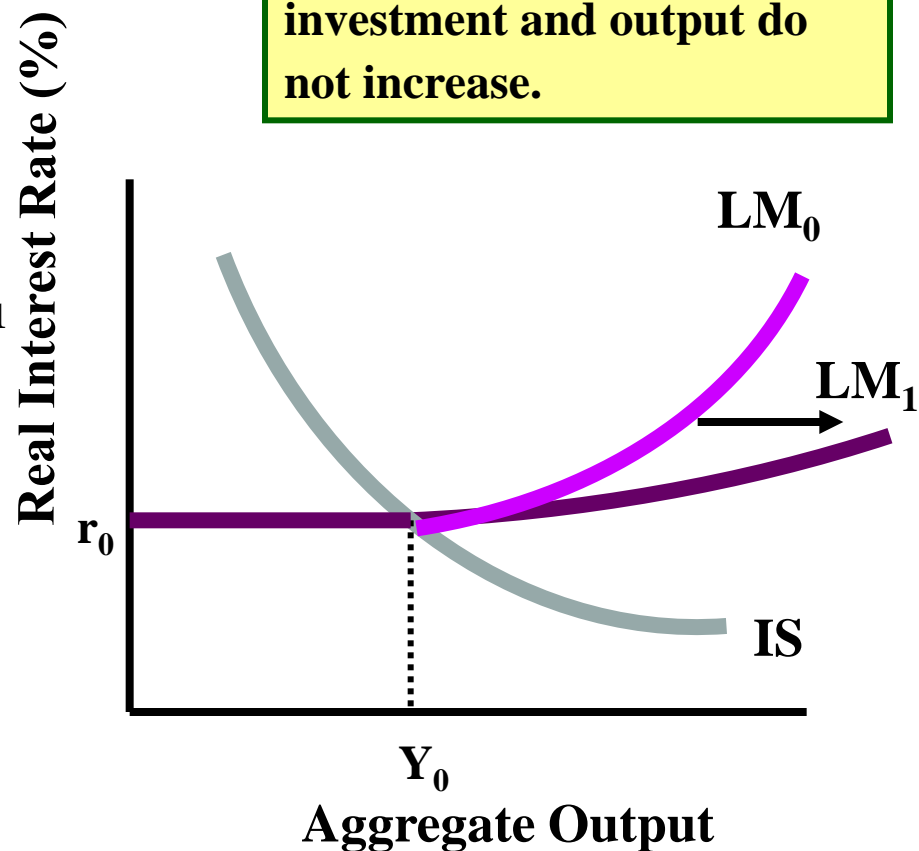
ECS2602: UNIT5 Openness in Goods and Financial Markets

E. Ramathuba
2016

What do we know

❖ Open v/s closed economy

❖ Nominal and real exchange rate

❖ Appreciation and depreciation

❖ Factors influencing Real Exchange Rate

❖ Balance of Payments (BOP)

❖ Interest parity condition

AN OPEN ECONOMY
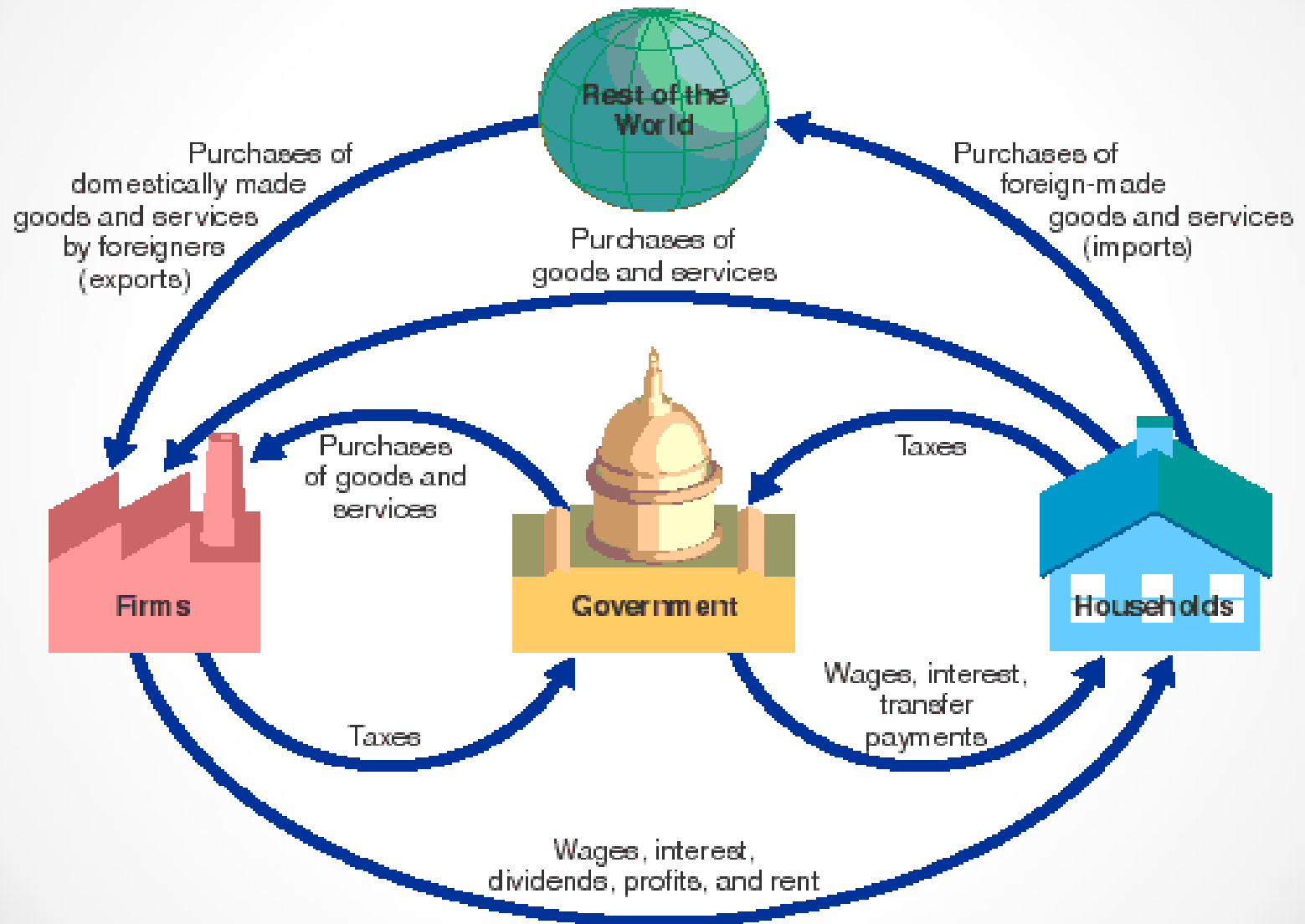
Openness in Goods and Financial Markets

❖ Three dimensions:

1. **Openness in Goods markets**. Free trade restrictions include **tariffs** and **quotas**.

2. **Openness in Financial markets**. **Capital controls** place restrictions on the ownership of foreign assets.

3. **Openness in Factor markets**. The ability of firms to choose where to locate production, and workers to choose where to work. The **North American Free Trade Agreement (NAFTA)** is an example of this.

We Wont focus on this for now

5.1. Openness in the Goods Markets

Openness in the goods market
- Refers to the ability of consumers and firms including government to choose between domestic and foreign goods.
    - Free trade restrictions include tariffs and quotas.

- *How openness can be measured?*
    - Imports and exports as percentage of GDP

- **When the economy is open**
    - Economic agents have the choice to buy domestic or foreign goods. Buying from domestic or foreign market.
    - Such decision will be informed by the **relative price** of domestic goods to that of foreign goods.
    - Thus, the **exchange rate** plays important role is such decision.

5.1. Openness in the Goods Markets_

Exchange Rates

- **Nominal exchange rates** between two currencies can be quoted in one of two ways:

  a) As the price of the domestic currency in terms of the foreign currency.

  R1 = $0.05
  - This means that the price of the rand in term of dollar. With R1 South Africans can buy so much of the dollars.
  - This is the international (widely used) convention of defining the nominal exchange rate.

  b) As the price of the foreign currency in terms of the domestic currency.

  $1 = R15.00
  - This is commonly used in SA – i.e. on TV news etc

5.1. Openness in the Goods Markets_

Nominal Exchange Rates

The nominal exchange rate **(E)** is the price of the domestic currency in terms of the foreign currency. **R1 = $**

Given a flexible or Floating exchange rate regime:

o **An appreciation** of the domestic currency is an increase in the price of the domestic currency in terms of the foreign currency, which corresponds to a increase in the exchange rate. $E \uparrow$

o **A depreciation** of the domestic currency is a decrease in the price of the domestic currency in terms of the foreign currency, or a decrease in the exchange rate. $E \downarrow$

When countries operate **under fixed exchange rates**, that is, maintain a constant exchange rate between them, two other terms used are:

o **Revaluations**, rather than appreciations, which are decreases in the exchange rate, and

o **Devaluations**, rather than depreciations, which are increases in the exchange rate.

5.1. Openness in the Goods Markets_

From Nominal to Real Exchange Rates

Price of SA goods, in Rands (P)

→

Price of SA goods, in Dollars: EP

Price of US goods, in Dollars (P*)

Price of SA goods, in terms of US goods: ε=EP/P*

Relative price of domestic goods

$$\varepsilon = \frac{EP}{P^*}$$
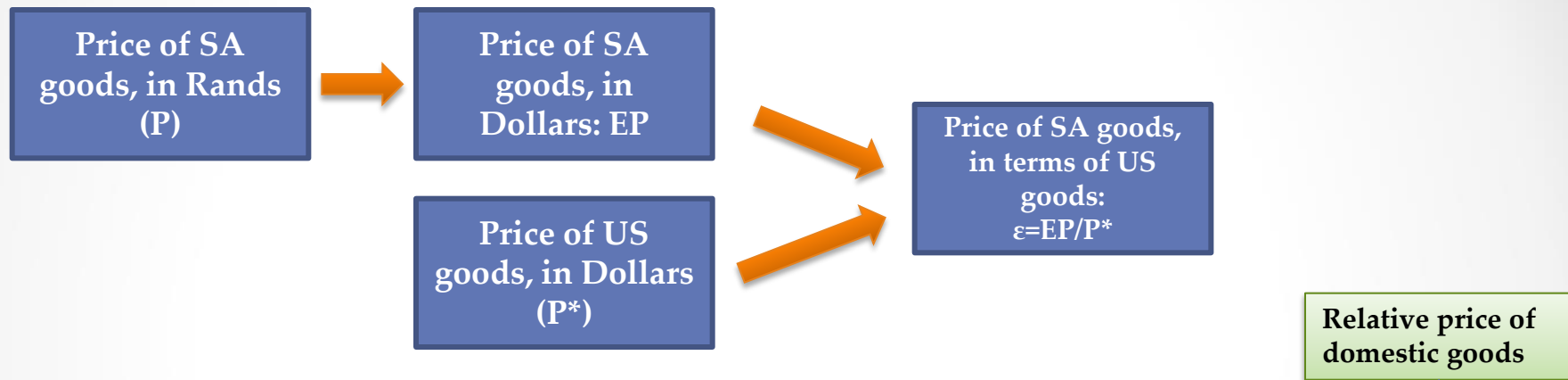
There are 3 factors impacting the Real exchange rate:
  a) Nominal exchange rate (E)
  b) Domestic price level (P)
  c) Foreign price level (P*)

Therefore,

$\uparrow EP > P^* \Rightarrow \varepsilon \uparrow \Rightarrow$ real appreciation

$\downarrow EP < P^* \Rightarrow \varepsilon \downarrow \Rightarrow$ real depreciation

5.1. Openness in the Goods Markets_

From Bilateral to Multilateral Exchange Rates

- Bilateral exchange rates are exchange rates **between two countries.**

- Multilateral exchange rates are exchange rates **between several countries.**

- For example, to measure the average price of SA goods relative to the average price of goods of its trading partners,
  - ❑ we use the SA share of import and export trade with each country as the weight for that country, or the multilateral real SA exchange rate.

5.2. Openness in Financial Markets

Openness in Financial markets refers to the ability of financial investors not only to choose between money and domestic financial markets, but also to trade (purchase and sell) foreign financial assets in their portfolio.

- The purchase and sale of foreign assets implies buying or selling foreign currency – also called foreign exchange.

- **Openness in financial markets allows:**
  o Financial investors to diversify their portfolios – holding both domestic and foreign assets and speculate on foreign interest rate movements.

  o Countries to run trade surpluses and deficits. A country that buys more than it sells must pay for the difference by borrowing from the rest of the world.

5.2. Openness in Financial Markets_

The Balance of Payments (BOP)

❑ The balance of payments account summarizes a country's transactions with the rest of the world.

❑ Transactions
- Above the line are current account transactions.
- Below the line are capital account transactions.

❑ The Current Account balance and the Capital account balance should be equal.
- But because of data gathering errors they don't.
- For this reason, the account shows a statistical discrepancy.

5.2. Openness in Financial Markets_

The Balance of Payments

Example: The U.S. Balance of Payments, 2006 (in billions of U.S. dollars)			
Current Account			
Exports	1,436		
Imports	(2,200)		
Trade balance (deficit = −) (1)		-763	
Investment income received	620		
Investment income paid	(629)		
Net investment income (2)		-9	
Net transfers received (3)		-84	
Current account balance (deficit = -) (1) + (2) + (3)		-856	
Capital Account			
Increase in foreign holdings of U.S. assets (4)	1,764		
Increase in U.S. holdings of foreign assets (5)	(1,049)		
Capital account balance (deficit = -) (4) − (5)		715	
Statistical discrepancy		141	

5.2. Openness in Financial Markets_

The Balance of Payments

The Current Account	**The Capital Account**

❑ Current account – records the transactions above the line – which is payments to and from the rest of the world:
   ▪ Records the exports and imports of goods and services.
   ▪ SA residents receive investment income on their holdings of foreign assets and vice versa.
   ▪ Countries give and receive foreign aid; the net value is recorded as net transfers received.
❑ The Total Net payments in the CA balance can be positive (or negative), in which case the country has a current account surplus (or deficit).
	❑ Transactions below the line.
	
	❑ The capital account balance, also known as net capital flows can be positive or (negative).
	   ▪ If foreign holdings of SA assets are greater (less) than SA holdings of foreign assets, in which case there is a capital account surplus (deficit).
	   ▪ Negative net capital flows are called a capital account deficit.

5.2. Openness in Financial Markets_

The Choice between Domestic and Foreign Assets

❑ The decision whether to invest abroad or at home depends not only on **interest rate differences**, but also on your <u>expectation</u> of what will happen to the **nominal exchange rate**.

Illustration:

Assume you have R100 000 available to invest. Given that:
- Current SA interest rate is = 4% on 1 year TB
- US interest rate is = 3.8% on 1 year TB
- Future exchange rate is R1=$0.11

Decision to invest in SA or US will depend on interest rate differential and expected exchange rate.
- Return on SA bond = R100 000 x (1+0.04) = R104 000
- Return on US bond R100 000 x 0.11=R10 000 x(1+0.038)=R10 380
- Therefore, SA has higher returns

The Choice between Domestic and Foreign Assets

❑ If both US bonds and SA bonds are to be held, they must have the same expected rate of return, so that the following arbitrage relation must hold:

$$(1 + i_t) = (E_t)(1 + i_t^*)\left(\frac{1}{E_{t+1}^e}\right)$$

Rearranging the equation, we obtain the uncovered interest parity relation, or interest parity condition:

$$(1 + i_t) = (1 + i_t^*)\left(\frac{E_t}{E_{t+1}^e}\right)$$

The **Interest Parity Condition** implies that, the domestic interest rate (i) will be equal to the foreign interest rate (i*) minus the expected appreciation of the domestic currency (E^e) only through the arbitrage process.

$$i_t \approx i_t^* - \frac{E_{t+1}^e - E_t}{E_t}$$

> Expected appreciation of the domestic currency

5.2. Openness in Financial Markets_

The Choice between Domestic and Foreign Assets

❑ The assumption that financial investors will hold only the bonds with the highest expected rate of return is obviously too strong, for two reasons:

- It ignores transaction costs.

- It ignores risk.

5.2. Openness in Financial Markets_

Interest Rates and Exchange Rates

❑ The relation between the domestic nominal interest rate, the foreign nominal interest rate, and the expected rate of depreciation of the domestic currency is stated as:

$$i_t \approx i_t^* - \frac{E_{t+1}^e - E_t}{E_t}$$

❑ Arbitrage implies that the domestic interest rate must be (approximately) equal to the foreign interest rate less (plus) the expected appreciation (depreciation) rate of the domestic currency.

$$\text{If} \quad E_{t+1}^e = E_t \quad \text{then} \quad i_t = i_t^*$$

5.2. Openness in Financial Markets_

Interest Rates and Exchange Rates

Suppose SA nominal interest is 5%, and in U.S. is 2%

Should you hold SA bonds or U.S. bonds?

❑ It depends whether you expect the rand to depreciate vis-á-vis the dollar over the coming year.

▪ If you expect the rand to depreciate by more then 3.0%, then investing in SA bonds is less attractive than investing in U.S. bonds.

▪ If you expect the rand to depreciate by less than 3.0% or even to appreciate, then the reverse holds, and SA bonds are more attractive than U.S. bonds.

Summary

❑ The choice between domestic goods and foreign goods depends primarily on the *real exchange rate.*

❑ The choice between domestic assets and foreign assets depends primarily on
  ❑ their **relative rates of return**, which depend on
    ▪ **domestic interest rates and**
    ▪ **foreign interest rates**, and
    ▪ on **the expected depreciation of the domestic currency.**

ECS2602: UNIT6 Goods Market in an open economy

E. Ramathuba

2016

Expected outcome

a) Impact of a **change in domestic demand** on the level of Output, Income and Trade balance.

b) The impact of **change in foreign demand** on the level of Output, Income and Trade balance.

c) The **impact of depreciation** on the level of Output, Income and Trade balance

6.1. The Demand for Domestic Goods

Open economy, the **demand for domestic goods** is given by:

$$Z \equiv C + I + G - IM/\varepsilon + X$$

Whereby

- $C = C(Y - T)$
- $I = f(Y, i)$
- G is regarded as exogenous
- IM depends on domestic level of output (Y) and which is the real exchange rate and not nominal exchange rate (E).
- X is exports which depends on the level of income of country's trading partners (Y*). This imply that the level of domestic output does not affect exports. Thus $X = \bar{X}$

6.1. The Demand for Domestic Goods_

The Determinants of Imports

A higher real exchange rate leads to higher imports, thus:

$$IM = IM(Y, \varepsilon)$$
$$(+, +)$$

- An increase in domestic income, Y, leads to an increase in imports.
- An increase in the real exchange rate, ε, leads to an increase in imports, IM.

The Determinants of Exports

Let Y^* denote foreign income, thus for exports we write:

$$X = X(Y^*, \varepsilon)$$
$$(+, -)$$

- An increase in foreign income, Y^*, leads to an increase in exports.
- An increase in the real exchange rate, ε, leads to a decrease in exports.

6.1. The Demand for Domestic Goods_

- The domestic demand for goods is an increasing function of income (output). (Figure a)

- The demand for domestic goods is obtained by subtracting the value of imports from domestic demand, and then adding exports. (Figure b)
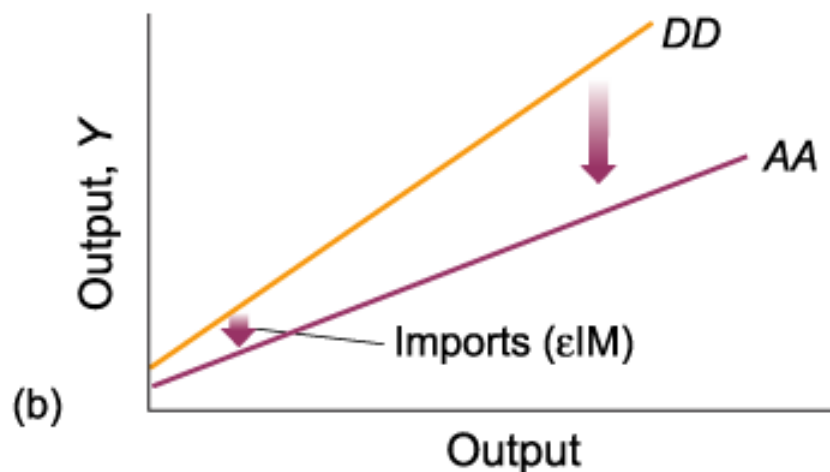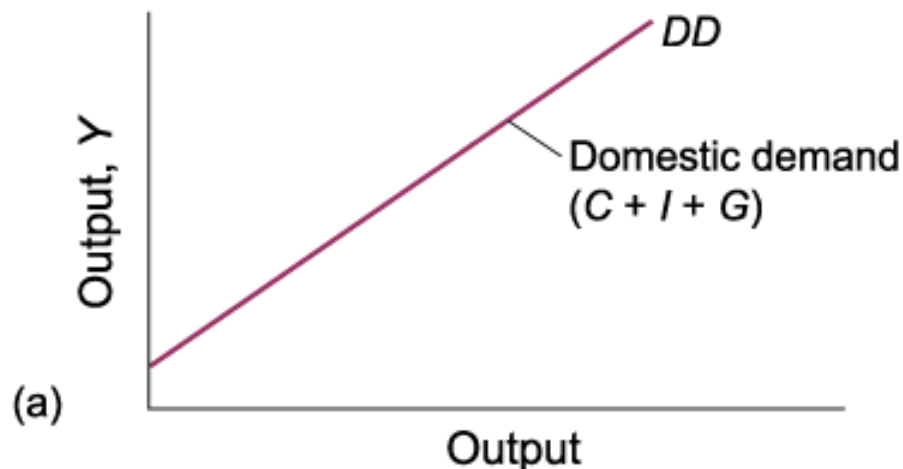
6.1. The Demand for Domestic Goods_

- The demand for domestic goods is obtained by subtracting the value of imports from domestic demand, and then adding exports. (Figure c)

- The trade balance is a decreasing function of output. (Figure d)

Facts:
- AA is flatter than DD. As income increases, the domestic demand for domestic goods increases less than total domestic demand.
- As long as some of the additional demand falls on domestic goods, AA has a positive slope.
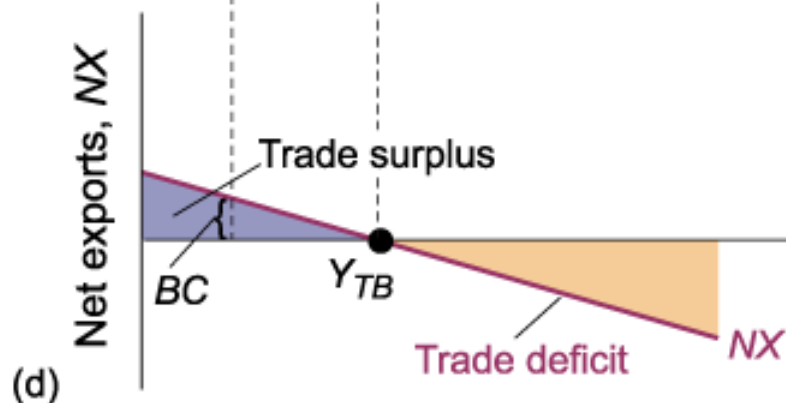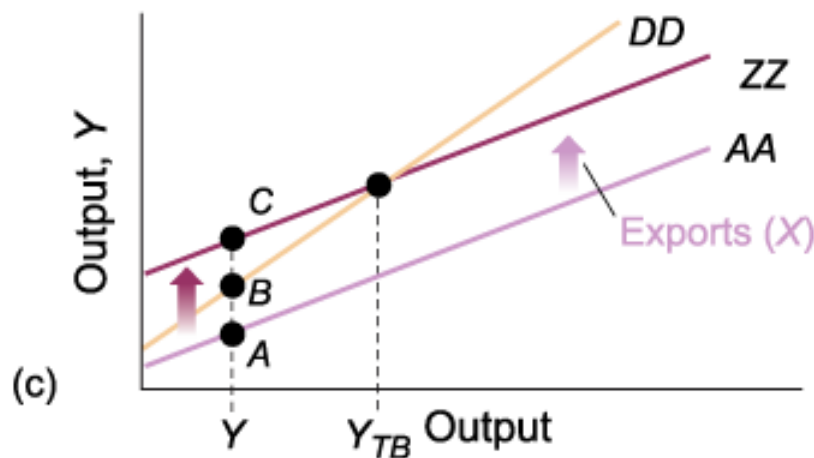
6.2. Equilibrium Output and the Trade Balance

The goods market is in equilibrium when domestic output equals the demand – both domestic and foreign – for domestic goods:

$$Y = Z$$

Therefore;

$$Y = C(Y - T) + I(Y,r) + G - \varepsilon M(Y,\varepsilon) + X(Y^*,\varepsilon)$$

- The goods market is in equilibrium when domestic output is equal to the demand for domestic goods.

- At the equilibrium level of output, the trade balance may show a deficit or a surplus.
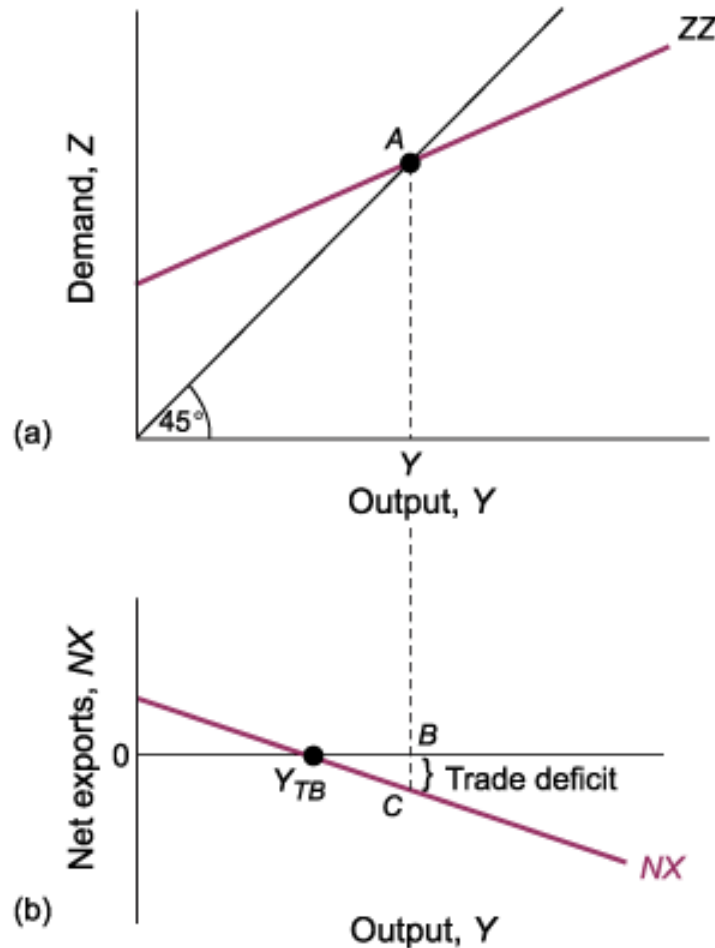
6.2. Equilibrium Output and the Trade Balance_

An increase in government spending leads to an increase in output and result to a trade deficit (a deterioration of the trade balance)

$$\uparrow G \Rightarrow \uparrow Z \Rightarrow Y \uparrow \Rightarrow IM \uparrow \Rightarrow NX \downarrow$$

Facts:

between open and closed economies:

- There is now an effect on the trade balance. The increase in output from Y to Y′ leads to a trade deficit equal to BC. Imports go up, and exports do not change.
- Government spending on output is smaller than it would be in a closed economy. **This means the multiplier is smaller in the open economy**
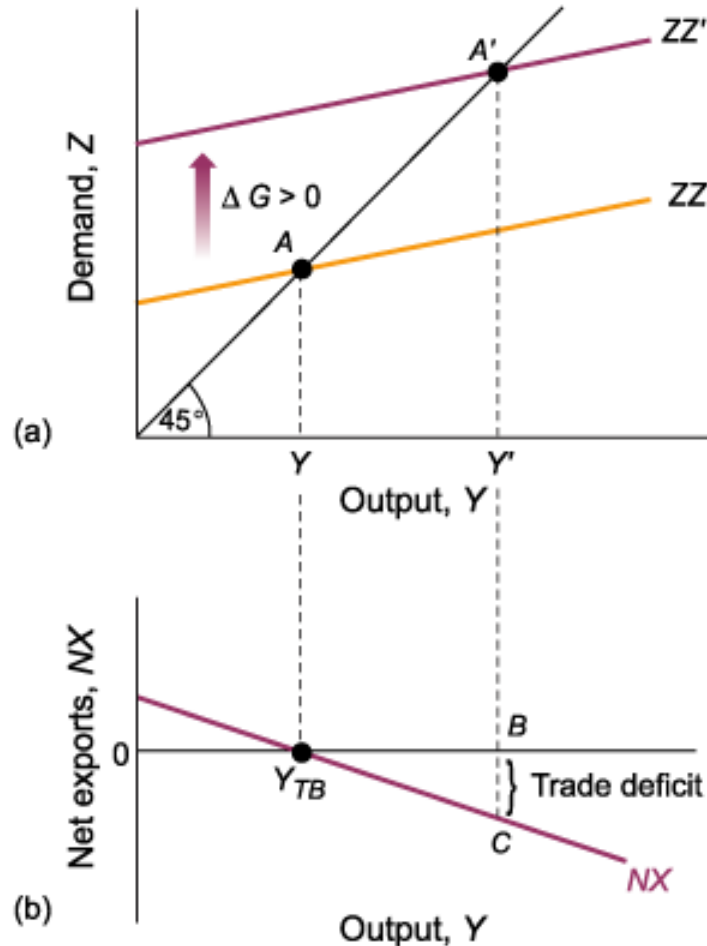
6.2. Equilibrium Output and the Trade Balance_

An increase in foreign demand leads to an increase in output and to a trade surplus (an improvement in the trade balance)

$$X \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \Rightarrow IM \uparrow$$

Note:

- The increase in Exports > increase in Imports, therefore the trade balance Improves.

$$NX \uparrow$$
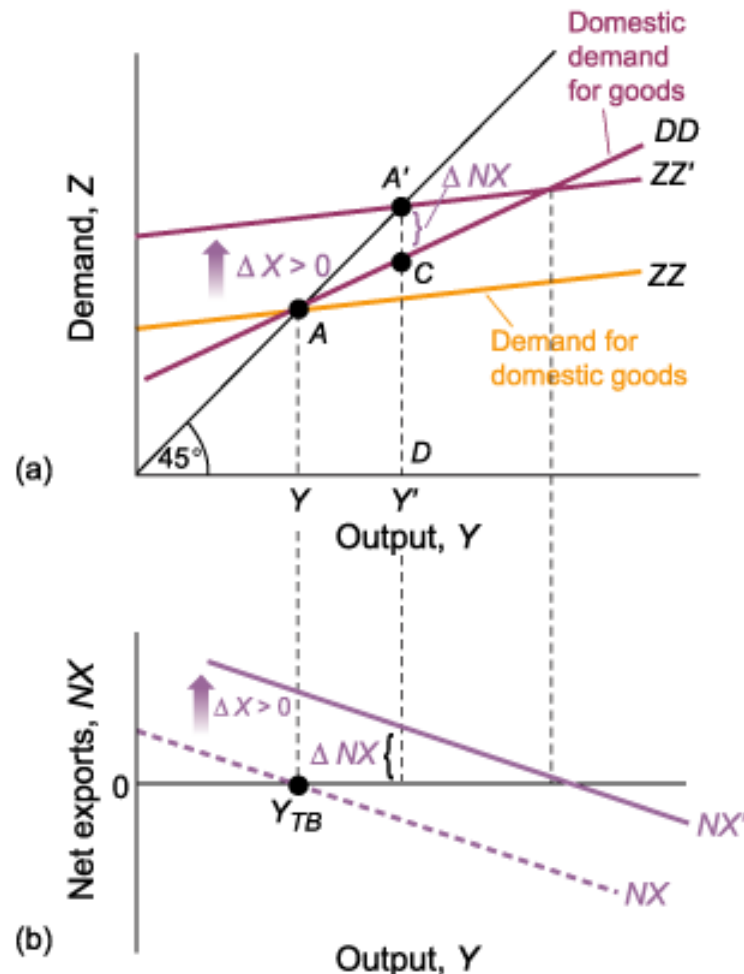
A real exchange rate is given by :

$$\varepsilon \equiv \frac{EP}{P^*}$$

This imply that the real exchange rate, ε , is equal to
- the nominal exchange rate, E, times
- the domestic price level, P,
- divided by the foreign price level, P^*.

The Marshall-Lerner Condition

Is the condition under which a real depreciation (an increase in ε) leads to an increase in net exports.

$$NX = X(Y^*, \varepsilon) - IM(Y, \varepsilon)/\varepsilon$$

As the real exchange rate $\mathcal{E}$ enters the right side of the equation in three places, this makes it clear that the real depreciation affects the trade balance through three separate channels:

- Exports, X, increase.

- Imports, IM, decrease

- The relative price of foreign goods in terms of domestic goods, $1/\mathcal{E}$, increases.

The Effects of a Depreciation

Positive effect

- A depreciation reduces the price of exports, and
- Increases the price of imports.
- Exports increases and imports decreases and
- Trade balance improves

Negative effect

- A rise in the price of imports increases the import bill,
- Which impacts negatively on the trade balance

The Effects of a Depreciation

- The depreciation leads to a shift in demand, both foreign and domestic, toward domestic goods.

- This shift in demand leads, in turn, to both an increase in domestic output and an improvement in the trade balance.

$$P_{exp} \downarrow \Rightarrow X \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$$

$$P_{imp} \uparrow \Rightarrow IM \downarrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$$

$$X \uparrow and\,.IM \downarrow \Rightarrow NX\,.improves$$
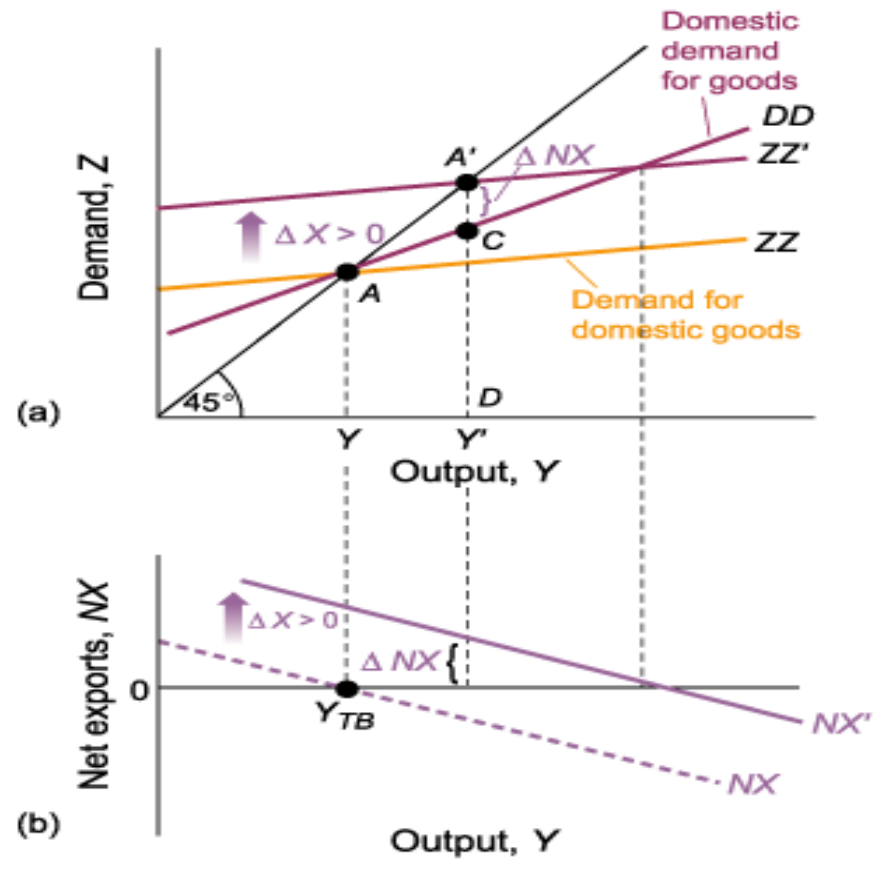
"We learn more by looking for the answer to a question and not finding it than we do from learning the answer itself."

Lloyd Alexander

ECS2602: UNIT7 Output, Interest rate, Exchange rate in IS-LM model – Open Economy

E. Ramathuba
2016

1

Outline

- Revisit the IS-LM Model equilibrium
  - o Goods market: IS curve
  - o Financial market: LM curve
- Introduce an open economy for an IS-LM model
  - o **Mundell-Fleming model:** also known as the **IS-LM-BoP model**.
    - It is An extension of the open economy IS-LM model,
    - It's a combination of the goods market
    - The domestic financial market.
    - And the foreign exchange market.
- Main questions we need to solve are:
  - a) What determines the exchange rate?
  - b) How can policy makers affect exchange rates?
    - Impact/effect of macroeconomic policies in an open economy
      - o Impact on the goods market
      - o Impact on the financial market
      - o Impact on the exchange rate and trade balance

3
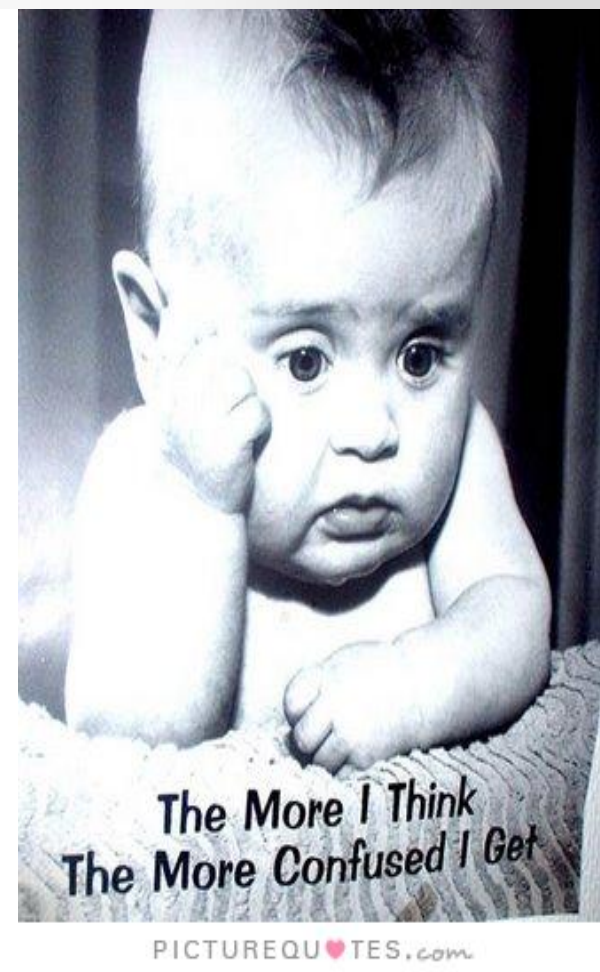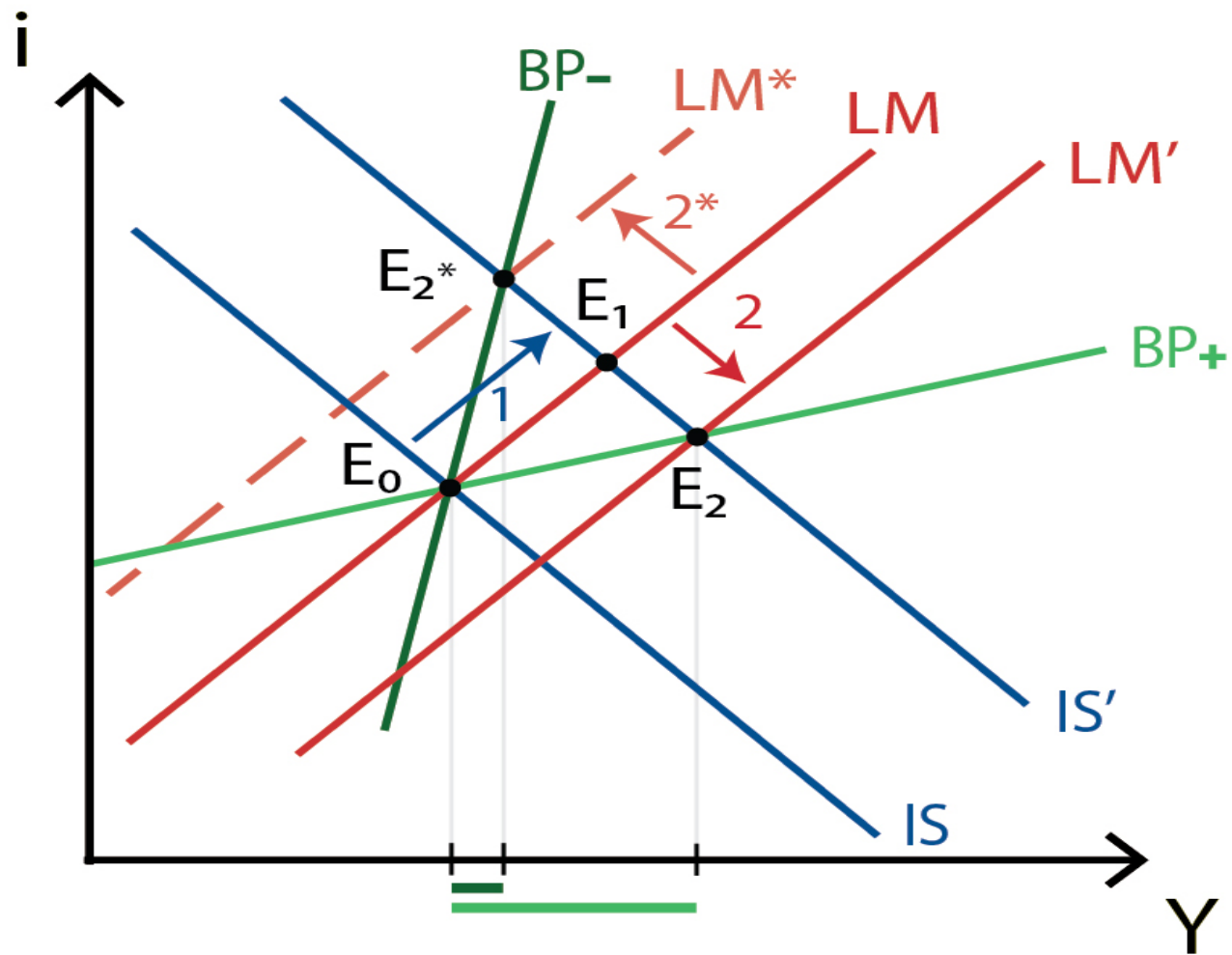
7.1 Equilibrium in the Goods market

- Price is assumed to be constant
  - Thus for an open economy both domestic price level (P) and foreign price (P*) level do not change.
  - Therefore, analysis can be based on nominal variables such as
    - nominal interest rate (i) and
    - nominal exchange rate (E).
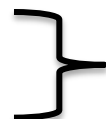
Variables of interest

- At Equilibrium

Net Export = Exports - Imports

Marshall Lerner Condition

$$Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, E)$$

$$(+, -) \qquad\qquad (+, +, -)$$

$$NX = X(Y^*, \varepsilon) - IM(Y, \varepsilon)/\varepsilon$$

Effects of nominal interest rate and nominal exchange rate

Decrease in Interest rate (i),	Decrease in Nominal exchange rate (E),
• Increases Investment, • Which increases demand for goods, • Thus level of Output and Income increases (depending on the multiplier effect)	• Depreciation of exchange rate • Increase in Exports, and Trade balance improves, • Increase in exports increases demand for goods, • Thus, level of Output and Income increases (depending on the multiplier effect)
$$i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$$	$$E \downarrow \Rightarrow X \uparrow \Rightarrow NX \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$$

7.2 Equilibrium in Financial markets

- The relationship between *domestic interest rate* and *exchange rate* is based on **Interest parity condition**

The **Interest Parity Condition** implies that, the domestic interest rate (i) will be equal to the foreign interest rate (i*) minus the expected appreciation of the domestic currency (E^e) only through the arbitrage process.

$$i_t \approx i_t^* - \frac{E_{t+1}^e - E_t}{E_t}$$

Expected appreciation of the domestic currency

+ relationship

- Assume that:
  - Interest in the rest of the world is fixed
  - Expected exchange rate is fixed
  - Therefore, nominal exchange rate can be given as $E = \dfrac{1+i}{1+i^*} E^e$

7.2 Equilibrium in Financial markets

Under the Interest Parity Condition (given i*, and E^e
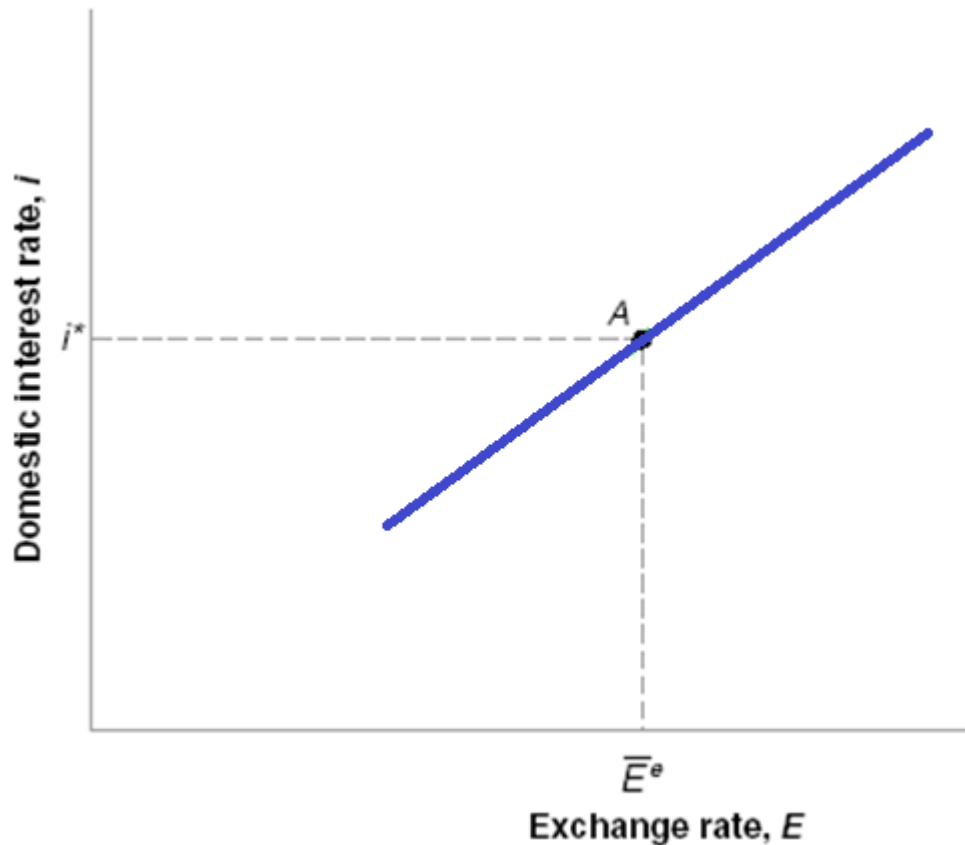
Domestic interest rate and the exchange rate

- A higher domestic interest rate leads to a higher exchange rate – **an appreciation**.

$$i \uparrow \Rightarrow \uparrow E$$

- A lower domestic interest rate leads to a lower exchange rate – **a depreciation**.

$$i \downarrow \Rightarrow \downarrow E$$

7.3 Goods and Financial Markets in Equilibrium

IS-LM Model: Equilibrium in the open economy

$$IS: \quad Y = C(Y-T) + I(Y,i) + G + NX\left(Y, Y^*, \frac{1+i}{1+i^*}\overline{E}^e\right) \qquad E = \frac{1+i}{1+i^*}\overline{E}^e$$

$$LM: \quad \frac{M}{P} = YL(i)$$

The Effect of interest rate changes on the economy:

   ❑ directly through investment,

   ❑ indirectly through the exchange rate.

7.3 Goods and Financial Markets in Equilibrium
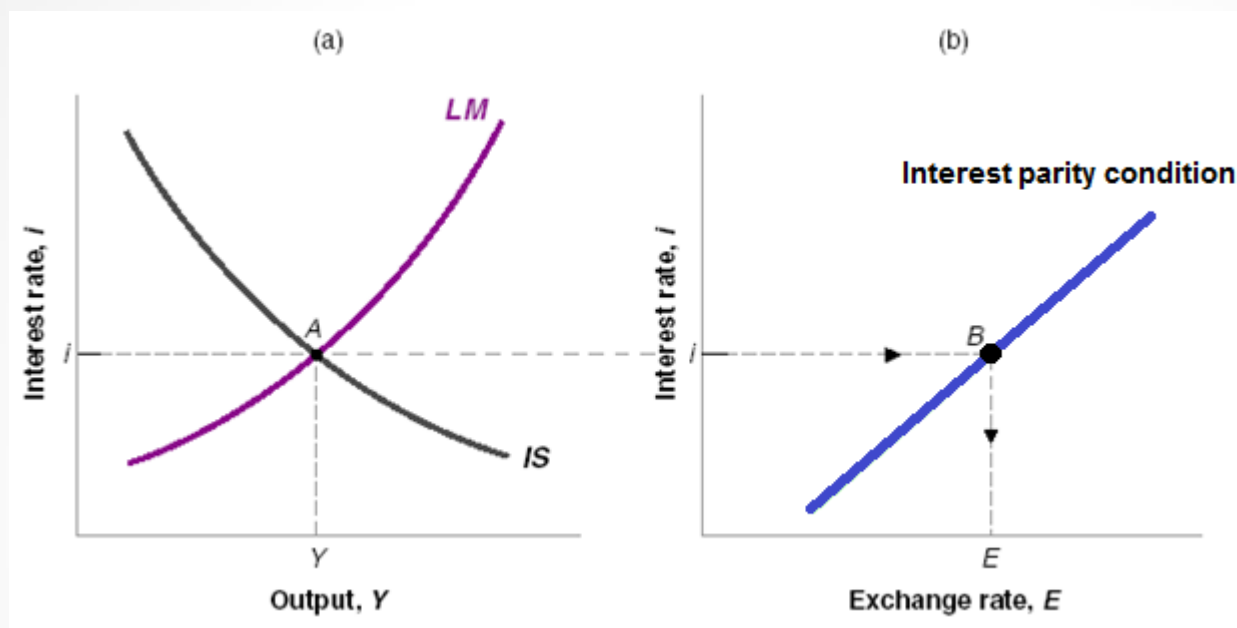
- An increase in the interest rate reduces output both directly and indirectly (through the exchange rate).
- The IS curve is downward sloping.
- Given the real money stock, an increase in output increases the interest rate: The LM curve is upward sloping.

7.4 Policy Effects in Open economy

1. Expansionary Fiscal policy - an Increase in Government Spending

An increase in government spending leads to

- an increase in output, an increase in the interest rate, and an appreciation.
- increase in government spending shifts the IS curve to the right. It shifts neither the LM curve nor the interest-parity curve.

Effect through demand for money

- Consumption and government spending both go up.

- The effect of government spending on investment was ambiguous in the closed economy, it remains ambiguous in the open economy.

- Both the increase in output and the appreciation combine to decrease net exports.
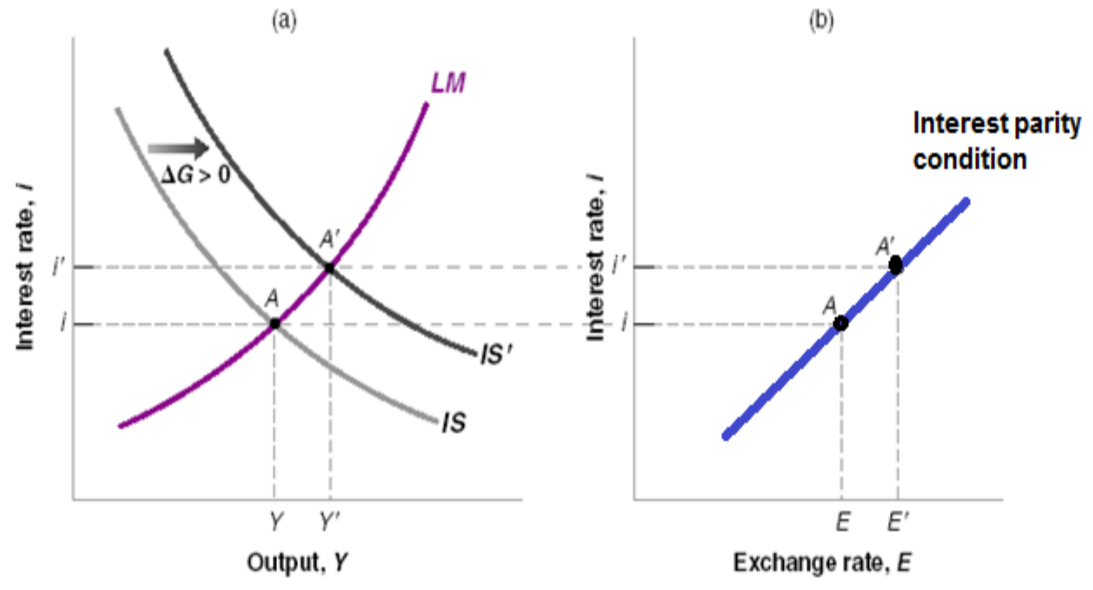
7.4 Policy Effects in Open economy

2. The Effects of a Monetary Contraction

A monetary contraction leads

- to a decrease in output, an increase in the interest rate, and an appreciation.
- A monetary contraction shifts the LM curve up. It shifts neither the IS curve nor the interest-parity curve.
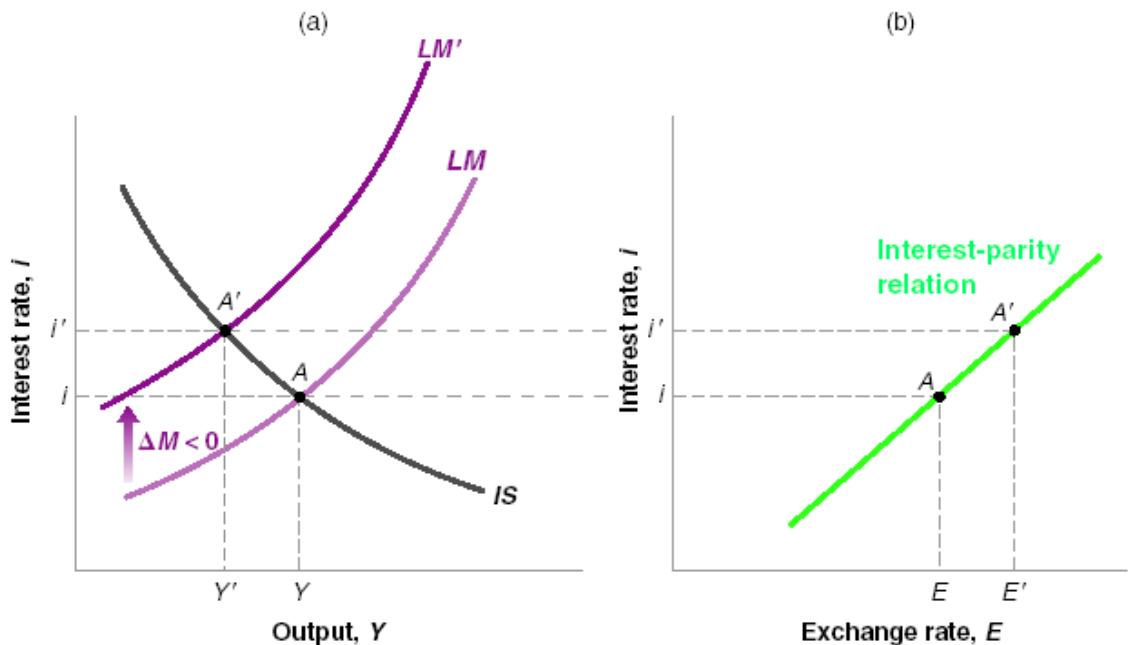
7.4 Policy Effects in Open economy

Comparison between Monetary and Fiscal policy effects on economic variables

Variables	Expansionary fiscal policy	Expansionary Monetary policy
Demand for goods	Higher	Higher
Level o Output and Income	Higher	Higher
Government spending/ taxes	G – Higher; Taxes – Lower	None
Money supply	None	Higher
Interest rate	Higher	Lower
Investment	Indeterminate	Higher
Consumption	Higher	Higher
Capital flows	Inflow	Outflow
Exchange rate	Appreciate	Depreciate
Exports	Lower	Higher
Imports	Higher	Lower
Trade balance	Worsens	Improves

ECS2602: UNIT8
The Labour Market

E. Ramathuba
2016

What we need to know

❖ Natural rate of unemployment

❖ Labour behaviour and wage setting

❖ Firms behaviour and price setting
  ❖ Higher wages increase production costs and therefore prices

❖ How the equilibrium unemployment rate is determined
  ❖ Higher employment reduces unemployment
  ❖ Lower unemployment puts pressure on wages

❖ Determination of natural level of output

1. Wage determination

How Wages are determined?

o Wages are determined through a **collective bargaining process** (negotiations between employer and employees/ union), which depends on:

1) The nature of the job
2) Labour market conditions such as
   a) Unemployment rate
   b) Expected prices (inflation)
   c) Demand for labour
   d) Supply of labour
   e) Labour laws and regulations

- Thus, nominal wage will be given by:

$$W = P^e f(u, z)$$

$$(+ \qquad - \quad +)$$

P^e	•	Is the expected/ future Price level (inflation).
u	•	Unemployment rate
z	•	Institutional factors (such as labour laws and regulations, minimum wages and employment benefits, etc

-

1. Wage determination

Based on nominal wage setting relation:

$$W = P^e f(u, z)$$

- If $P^e = P$ and is given/ known: this implies that the expected/ future price is the same as the actual price level

- Therefore, the nominal wage will now be

$$W = Pf(u, z)$$

This can be converted into **Real wage setting**:

$$W/P = f(u, z)$$

$$(-\quad +)$$

This implies that:
- Targeted real wage (W/P) depends on unemployment and institutional factors.

$$\uparrow u \Rightarrow \downarrow W/P$$

The higher the unemployment rate the weaker the bargaining power, thus the lower the nominal wage they can bargain for and given the price level the real wage will be lower.

1. Wage determination

- Based on the real wage setting relation $\dfrac{W}{P} = f(u, z)$
  $(-\quad +)$

- We can therefore conclude that there is a negative relationship between the unemployment and there level of real wages.

Real Wage, W/P

Wage-setting relation (W/P varies inversely with u)

WS

Unemployment Rate, u
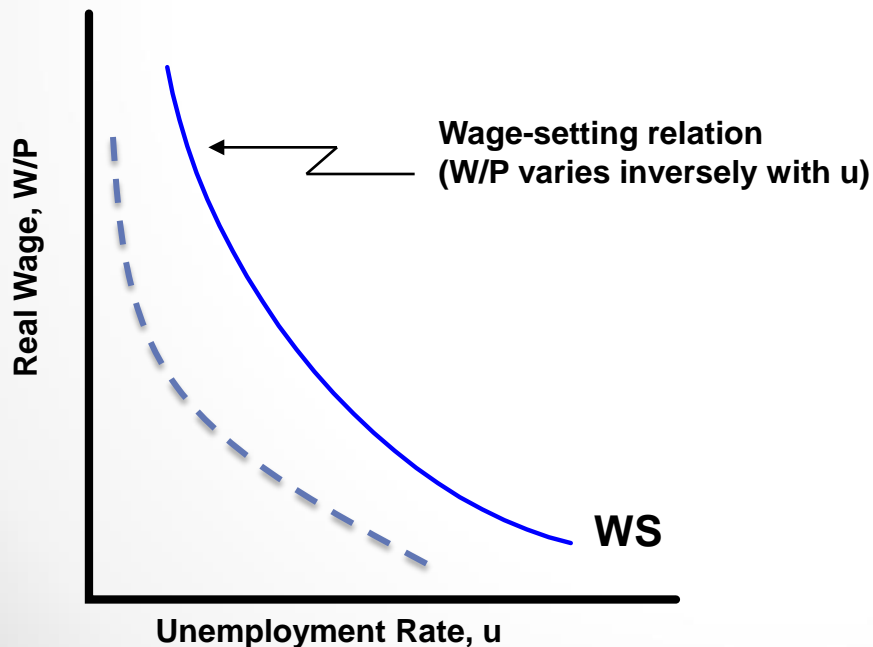
Changes in the Wage setting curve

- Is due to any factors other than unemployment rate that will increase the bargaining power of workers. Such as *change in legislation favouring workers – protection against lay-offs, minimum wage etc.*

- *That will cause a shift in the WS curve*

2. Price determination

How Prices are determined in an imperfectly competitive market?

- Price is set by firms depending on the **mark-up on cost** and **total costs of production**.
    1) Mark-up
    2) Total cost also depends on nature of production function
        - Relationship between
            - inputs,
            - quantity of output and
            - the price of inputs (**including the nominal wage for labour)**

- Thus, increase in nominal wage will increase price per unit
    o This implies a **positive relationship between nominal wage and price per unit.**

2. Price determination

Assume that:

a) Labour is the only factor of production used to produce output

$$Y = A.N$$

Y= Output
A=labour productivity (output per worker)
N=Employment

b) A is constant and equal to 1.

$$A = 1$$

This implies a constant returns to scale (CRS)
- If number of workers increases by 50, Output will increase by 50
- Marginal product of labour = 1. An additional unit produced by hiring one extra worker is = 1
- Marginal cost of producing an extra unit of output = wage paid for the additional employee.

Therefore:

$$Y = N$$

The price equation will be given by:

$$P = (1 + m)W$$

$$(+ \quad +)$$

This implies that what ever the level of nominal wages, the price level will always be higher than the wages paid to workers due of the **mark-up element**.

•

2. Price determination

- Recall that: $P = (1 + m)W$

- In real terms this can also be written as;

$$\frac{W}{P} = \frac{1}{1 + m}$$

This implies that :
- The real wage implied depends on the price setting
- Therefore, unemployment has no effect on the price setting. **Only the mark-up drives the level of implied real wages**.

$$\uparrow m \Rightarrow \downarrow W/P$$

2. Price determination

Real Wage, W/P

**Price-setting relation
(W/P is independent of u)**

$$\frac{1}{1+m}$$

PS

PS1

Unemployment Rate, u

Change in the Price setting curve

- Change in the mark-up will result to a shift in the PS curve

- The higher the mark-up (m) the lower the implied real wage (W/P)

$$m \uparrow \Rightarrow {W}\!\!\diagup\!\!{P} \downarrow$$

3. Equilibrium and the Natural rate of Unemployment

Wage-setting, F(u, Z) = Price-setting, $\frac{1}{1+\mu}$

A

E

$\frac{1}{1+m}$

PS

B

WS

u_n – The *natural rate* of unemployment

Unemployment Rate, u

Real Wage, W/P

- At point E, the targeted real wage implied by wage setting = the real wage implied by price setting.

- The **Equilibrium natural rate of unemployment** is achieved when wage implied by wage setting = real wage implied by price setting.

- This equilibrium does not mean labour demand = labour supply

- The Equilibrium will change due to:
    a) Change in mark-up
    b) Change in bargaining power of workers due o factors other than unemployment

- At point A, the unemployment rate is lower than its natural rate, thus targeted wage is higher than the feasible real wage.

- At point B, unemployment rate is higher than its natural rate, thus targeted wage < feasible real wage

4. Natural rate of Unemployment and Output

- Since we know the natural rate of unemployment we can derive the **natural level of Employment** and the **natural level of Output** (through the production function).

Assuming the Production Function: ⟶

$$Y = N$$
$$Y_n = N_n = L(1-u_n)$$

$$N_n = L(1 - u_n)$$

$N_n =$ Natural level of Employment

$L =$ Labour force

$u_n =$ Natural rate of unemployment

- Therefore:

$$Y_n = \text{number of workers employed X output per worker}$$

This implies that
- As the natural unemployment rate changes the natural level of employment and natural level of output will also change

Summary

- Assumption that the expected price = actual price level

- Wage setting implies the real wage is inversely related to unemployment

- The price setting real wage is constant

- Labour market equilibrium occurs when W/P wage setting = W/P price setting

- Labour market equilibrium determines the unemployment rate – the natural rate of unemployment:
  - it the level of unemployment that results when the rate of unemployment is normal, considering both frictional and structural factors.
  - Also called the NAIRU (Nonaccelerating Inflation Rate of Unemployment)

ECS2602: UNIT9 AS-AD MODEL
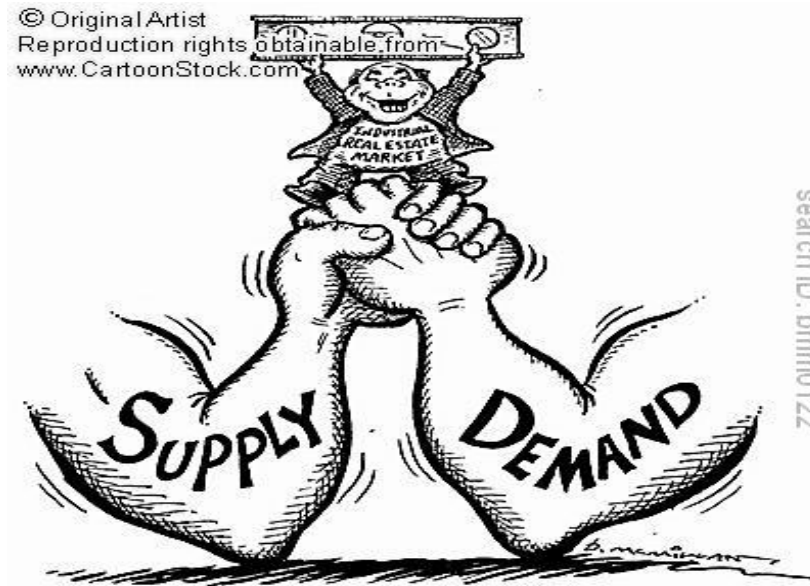
Presented by E. Ramathuba

2016

EXPECTED OUTCOME

You should be able to explain, illustrate chain of events, or using diagrams:

1. The aggregate supply relationship
2. Derivation of the AS curve and AD curve
3. Equilibrium in the short-run
4. From short-run to long-run
5. Impact of macroeconomic policies
6. Neutrality of money
7. Impact of oil price (supply side shock)

The AS-AD model
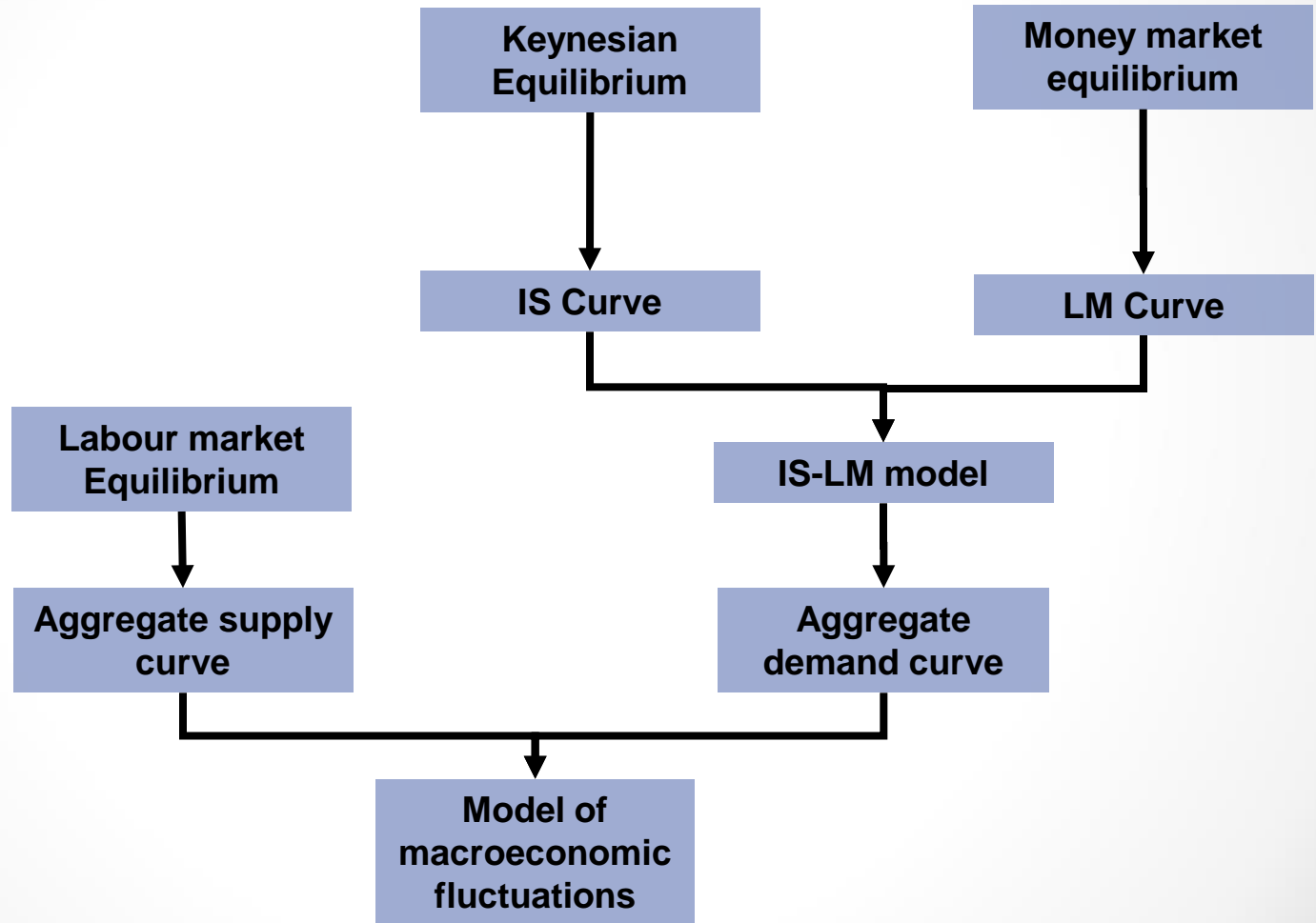
1. Aggregate Supply

- The *aggregate supply relation* captures the effects of output on the price level. It is derived from the behavior of wages and prices.

- Recall the equations for wage and price determination

$$W = P^e F(u, z)$$ **Wage setting**

$$P = (1 + m)W$$ **Price setting**

1.1. Deriving the Aggregate Supply Relation

Step 1: Eliminate the nominal wage from:

$$W = P^e F(u, z) \text{ and } P = (1+m)W \text{ , then:}$$

$$P = P^e (1+m) F(u, z)$$

This implies that the price level depends on the expected price level and the unemployment rate. Given that μ and z are constant.

Step 2: Express the unemployment rate in terms of output:

$$u = \frac{U}{L} = \frac{L - N}{L} = 1 - \frac{N}{L} = 1 - \frac{Y}{L}$$

Therefore, for a given labor force, the higher the output, the lower is the unemployment rate.

1.1. Deriving the Aggregate Supply Relation

Step 3: Replace the unemployment rate in the equation obtained in step 1

$$P = P^e \left(1+m\right) F\left(1 - \frac{Y}{L}, z\right)$$

This implies that the price level depends on the expected price level, P^e, and the level of output, Y (and also μ, z, and L, but we take those as constant here).

1.2. Properties of the AS relation

$$P = P^e (1+m) F\left(1 - \frac{Y}{L}, z\right)$$

The *AS* relation has two important properties:

1. An increase in output leads to an increase in the price level.

$$Y \uparrow \Rightarrow N \uparrow \Rightarrow u \downarrow \Rightarrow W \uparrow \Rightarrow P \uparrow$$

2. An increase in the expected price level leads, one for one, to an increase in the actual price level. This effect works through wages:

$$P^e \uparrow \Rightarrow W \uparrow \Rightarrow P \uparrow$$

1.3. The Aggregate Supply (AS) curve

- Given the expected price level (P^e), an increase in output (Y) leads to an increase in the price level (P).

- If output is equal to the natural level of output ($Y = Y_n$), the price level is equal to the expected price level ($P = P^e$).
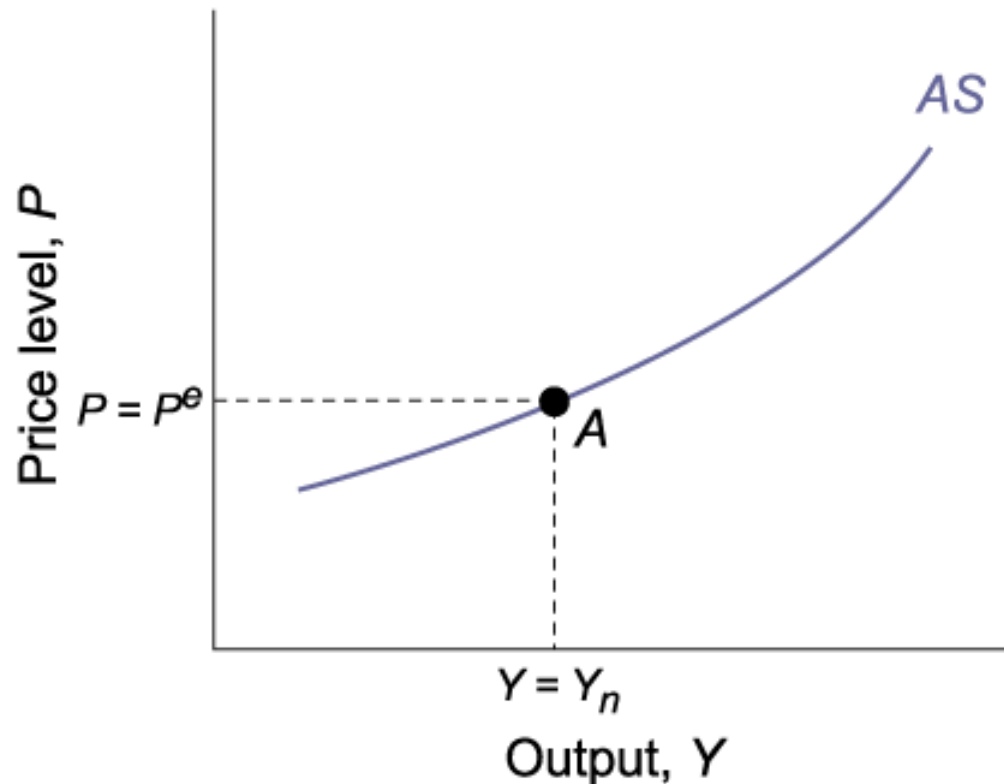
1.3. The Aggregate Supply (AS) curve

1.3.1 Properties of the *AS* curve
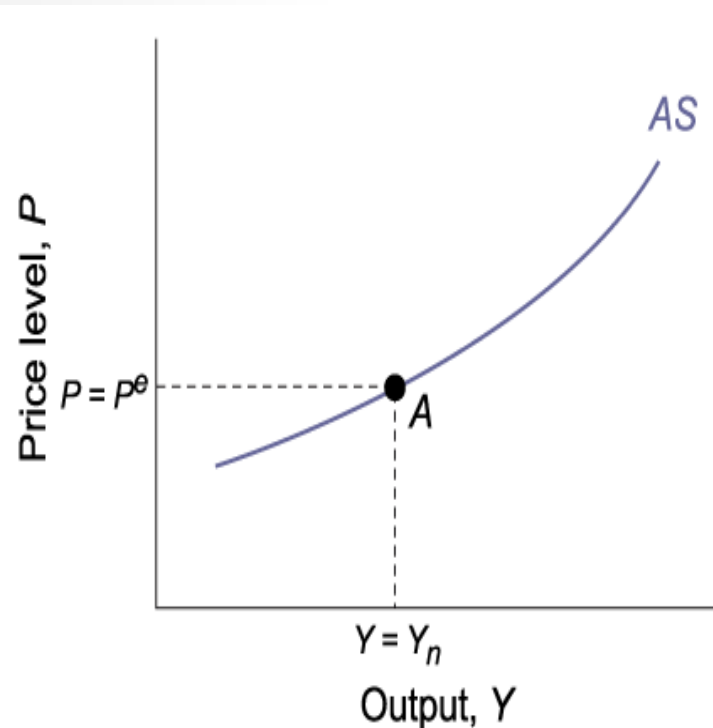
1. The *AS* curve is **upward sloping.** As explained earlier, an increase in output leads to an increase in the price level.

2. The *AS* curve **goes through point *A*, where $Y = Y_n$ and $P = P^e$.** This property has two implications:
   1. When $Y > Y_n$, $P > P^e$.
   2. When $Y < Y_n$, $P < P^e$.

3. **An increase in P^e shifts the *AS* curve up, and a decrease in P^e shifts the AS curve down.**

1.3. The Aggregate Supply (AS) curve

1.3.2 Shift of the AS curve

- An increase in the expected price level shifts the aggregate supply curve up.

Increase in P^e shift AS curve upwards

Decrease in P^e shifts SA curve downwards

AS'

(for $P^{e'} > P^e$)

AS

$P = P^{e'}$ — A'

(for expected price level P^e)

$P = P^e$ — A

Y_n

Output, Y
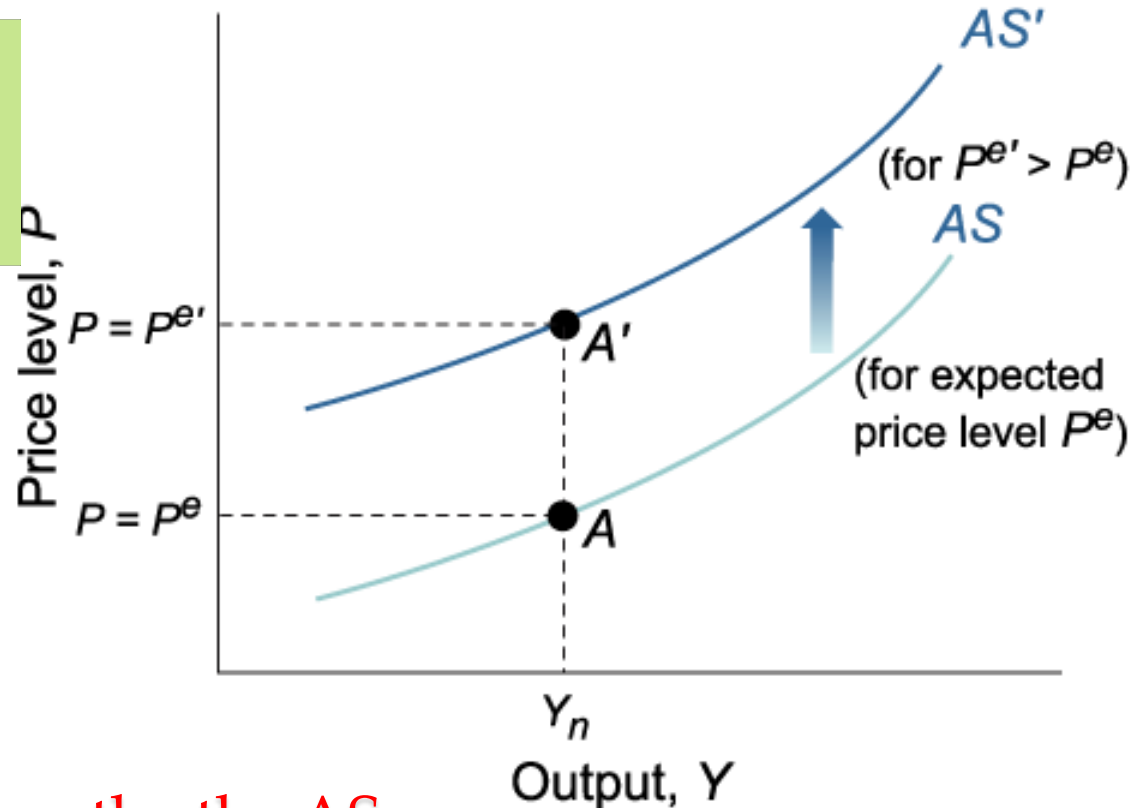
Price level, P

1.3.3 Movement along the the AS curve

Is due to change in level of output, employment/ unemployment, nominal wages and the price level.

$$Y \uparrow \Rightarrow N \uparrow \Rightarrow u \downarrow \Rightarrow W \uparrow \Rightarrow P \uparrow$$

2. Aggregate Demand

- The *aggregate demand relation* captures the effect of the price level on output.

- It is derived from the equilibrium conditions in the **goods and financial markets.**

- Recall the equilibrium conditions for the goods and financial markets

$$IS \text{ relation: } Y = C(Y - T) + I(Y, i) + G$$

$$LM \text{ relation: } \frac{M}{P} = YL(i)$$

2.1 Derivation of Aggregate Demand Curve

- An increase in the price level leads to a decrease in output.

$$P \uparrow \Rightarrow M/P \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow$$

Demand

- Increase in price implies that real money supply declines.
- Lower money supply shifts LM curve upwards as real money supply decreases
- Thus, interest rates rises.
- As a result the Investment spending and demand for goods decreases
- Level of output and income declines until a new equilibrium is reached at point A'
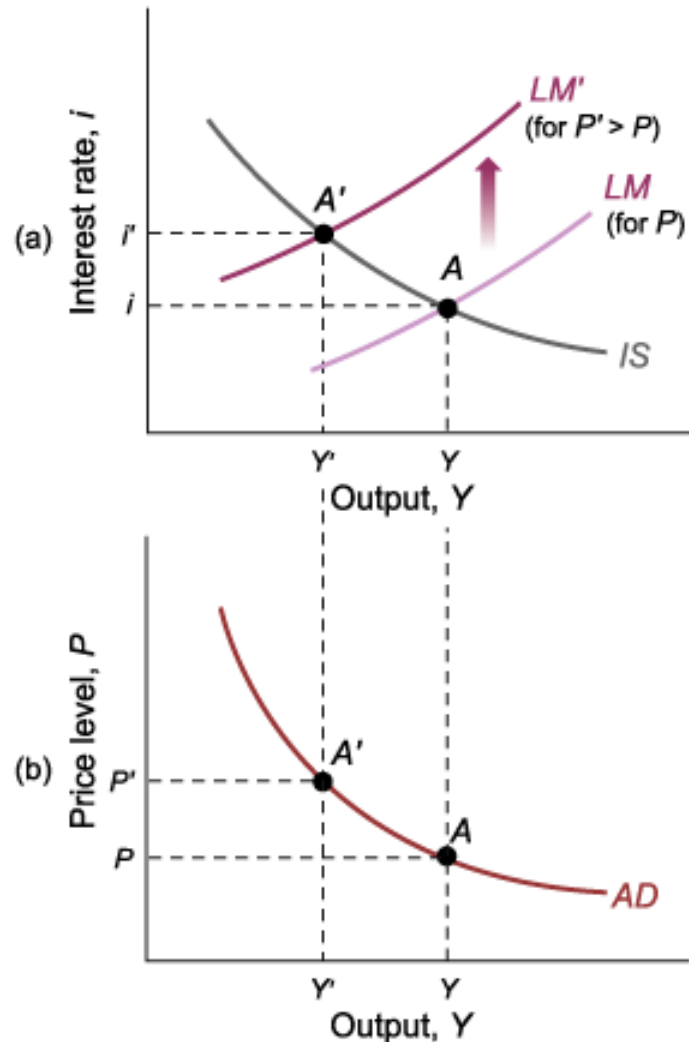
2.1 Shift in Aggregate Demand Curve

Changes in monetary or fiscal policy—or more generally in any variable, other than the price level, that shift the *IS* or the *LM* curves—shift the aggregate demand curve.

Assume increase in government spending

$$Y = Y\left(\frac{M}{P}, G, T\right)$$
$$(+, +, -)$$

Increase in government spending

Decrease in nominal money

AD''   AD   AD'

Price level, *P*

P

Y
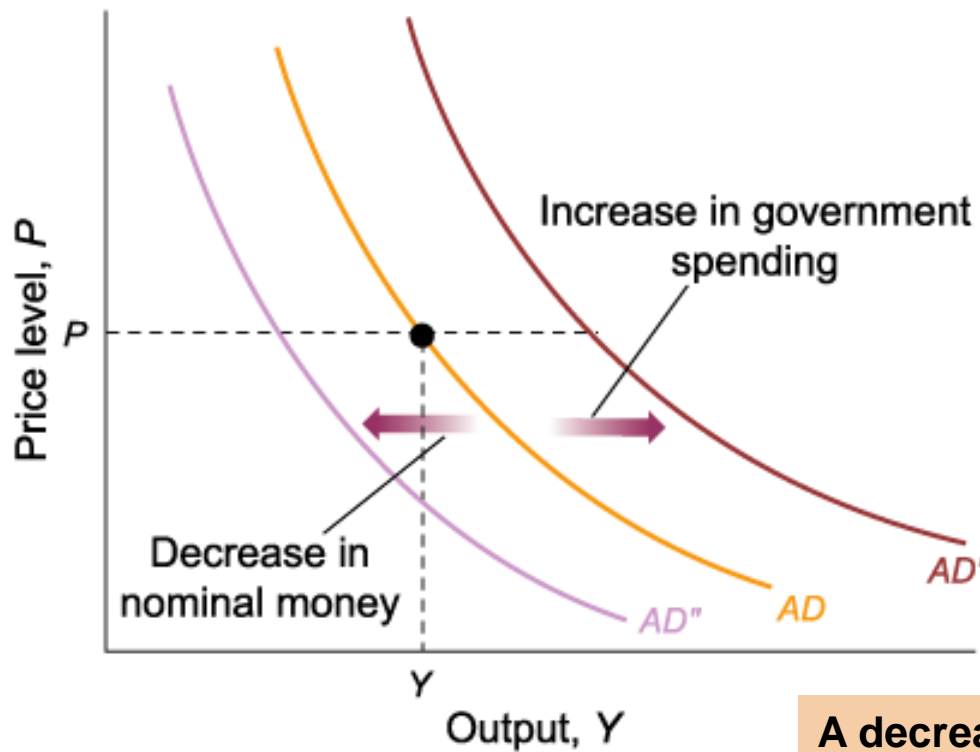
Output, *Y*

A decrease in nominal money decreases output at a given price level, shifting the AD curve to the left

3. Equilibrium in the Short-Run & in the Medium-Run

$$AS\ Relation\ \ P = P^e(1+m)F\left(1 - \frac{Y}{L}, z\right)$$

$$AD\ Relation\ \ Y = Y\left(\frac{M}{P}, G, T\right)$$

❖ Equilibrium depends on the value of P^e.

❖ The value of P^e determines the position of the AS curve, and the position of the *AS* curve affects the equilibrium.

3.1. Equilibrium in the Short-Run

The equilibrium is given by the intersection of the AS curve and the AD curve.

At point _A_, the labor market, the goods market, and financial markets are all in equilibrium.
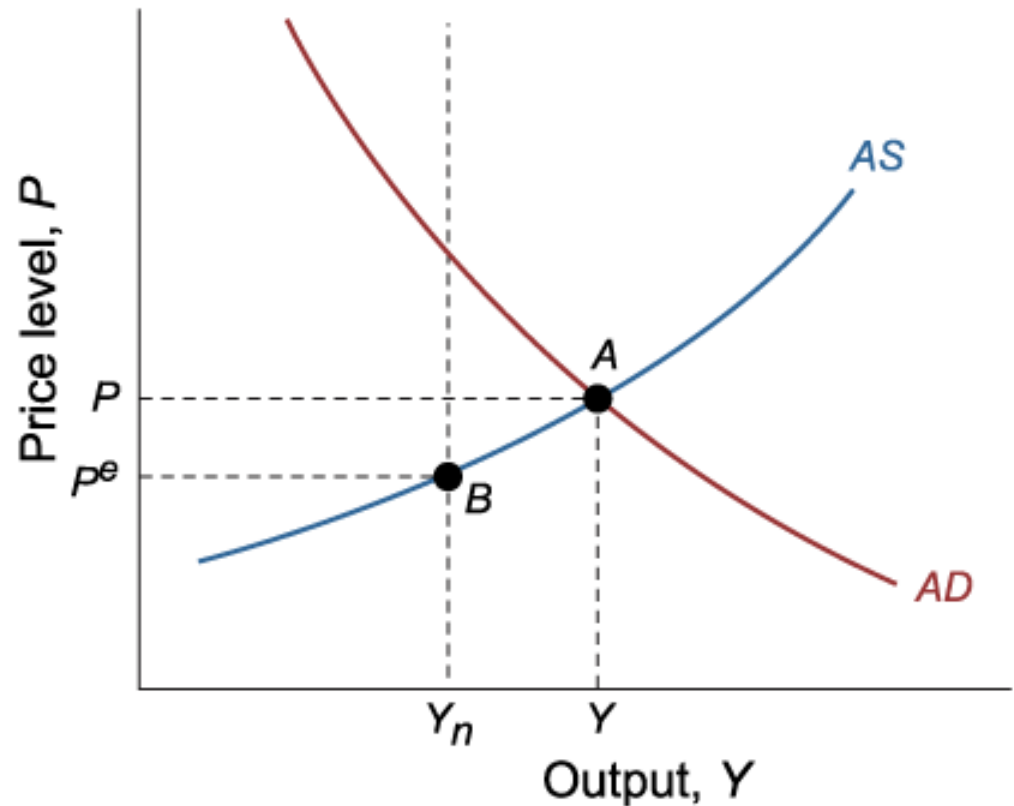
3.2. From the Short-Run to the Medium-Run

- At point A, $\ Y > Y_n \Rightarrow P > P^e$

- Wage setters will revise upward their expectations of the future price level (P^e). This will cause the AS curve to shift upward.

- Expectation of a higher price level also leads to a higher nominal wage, which in turn leads to a higher price level.

$$P^e \uparrow \Rightarrow W \uparrow \Rightarrow P \uparrow \Rightarrow M\!\big/\!_P \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow$$

- The adjustment will continue until
  $$Y = Y_n \ and \ P = P^e$$

Wage setters no longer have a reason to change their expectations.

- **Thus, In the medium run, output returns to the natural level of output.**
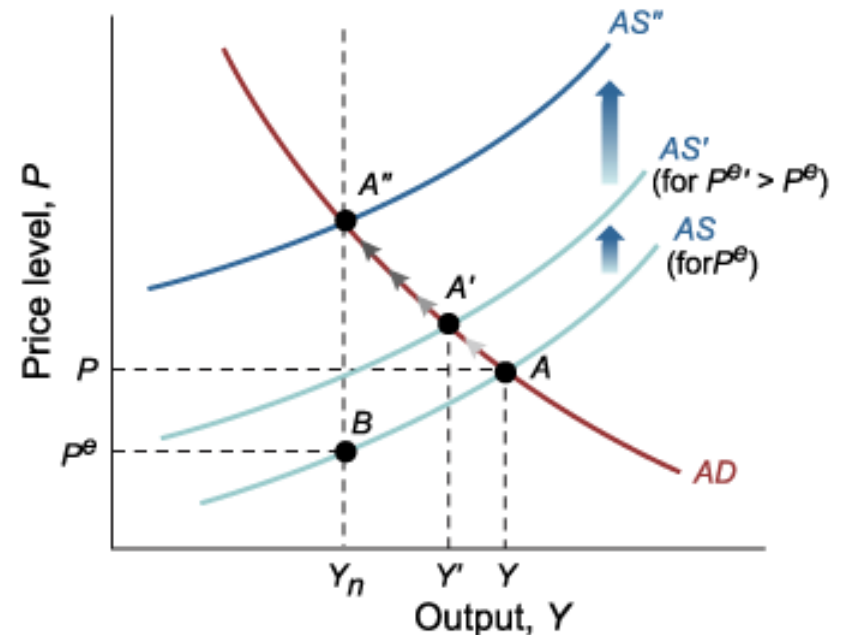
This is called the *Adjustment of Output over Time*

4. The Effects of a Monetary Expansion

$$Y = Y\left(\frac{M}{P}, G, T\right)$$
$$(+, +, -)$$

- In the **AD equation**, we can see that an increase in nominal money, *M*, leads to an increase in the real money stock, *M/P*, leading to an increase in output.

- The aggregate demand curve shifts to the right.

4. The Effects of a Monetary Expansion

- The increase in the nominal money stock causes the aggregate demand curve to shift to the right.

- **In the short run, output and the price level increase.**

- The difference between Y and Y_n sets in motion the adjustment of price expectations.
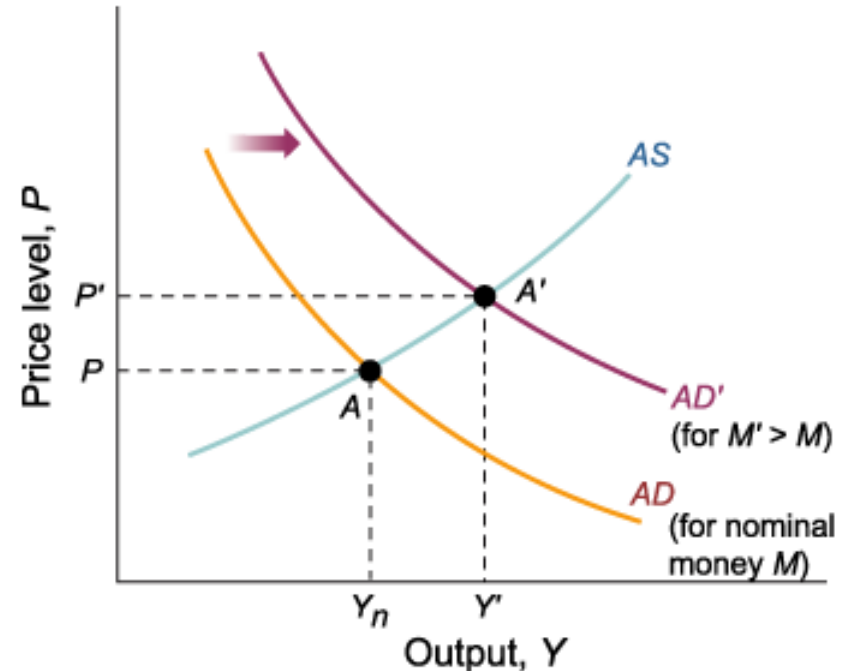
4. The Effects of a Monetary Expansion

- **In the medium run,** the *AS* curve shifts to *AS''* and the economy returns to equilibrium at Y_n.

- The increase in prices is proportional to the increase in the nominal money stock.
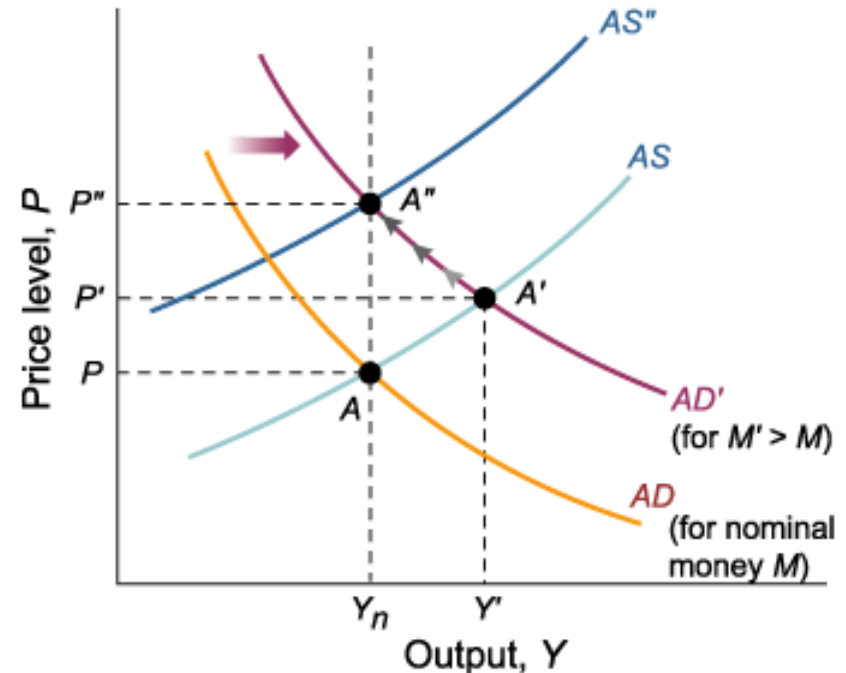
Therefore, a monetary expansion leads to an increase in output in the short run, but has no effect on output in the medium run.

4. The Effects of a Monetary Expansion

4.2. The impact through IS-LM model

- The short-run effect of the monetary expansion is to **shift the *LM* curve down.**
- The interest rate is lower, output is higher.

$$M^s \uparrow \Rightarrow M\!\!\big/\!_P \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$$

4. The Effects of a Monetary Expansion

- **If the price level is fixed** (do not increase), the shift in the *LM* curve would be larger – to the *LM′′*.

4.2. The impact through IS-LM model

- Over time, the price level increases, the real money stock decreases and the *LM* curve returns to where it was before the increase in nominal money.

- **In the medium run, the real money stock and the interest rate remain unchanged.**
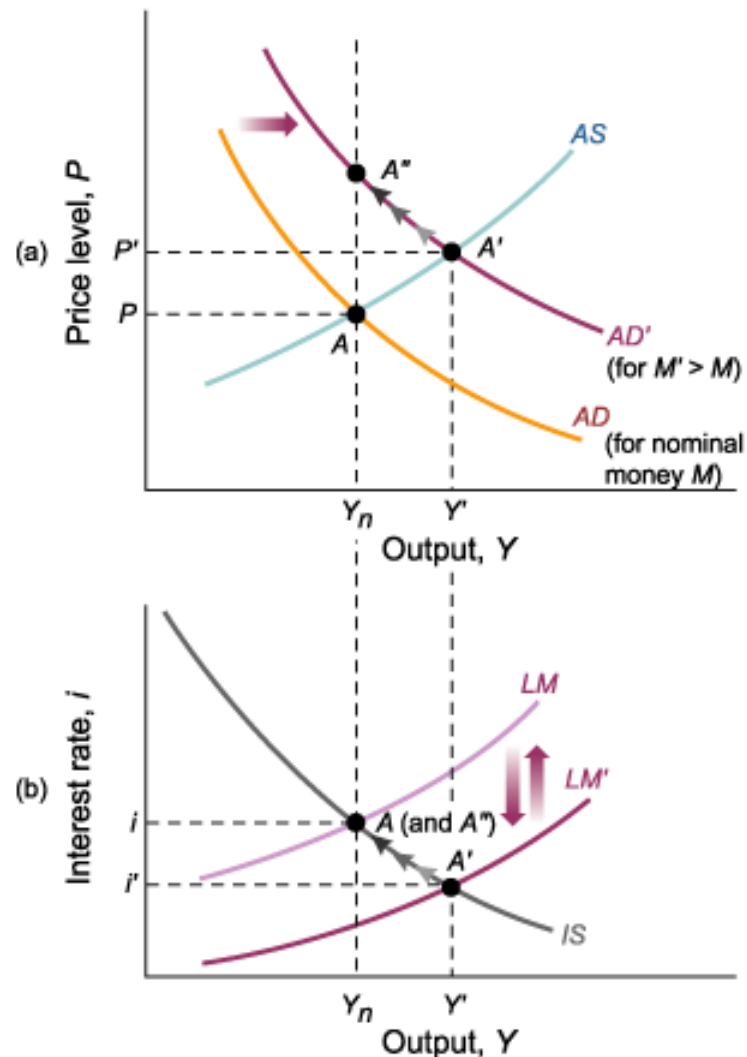
4. The Effects of a Monetary Expansion

4.3. Dynamic effects on Output and the interest rate

- The increase in nominal money initially shifts the LM curve down, decreasing the interest rate and increasing output.

$$M^s \uparrow \Rightarrow M\!\big/\!P \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$$

- **Over time (in the medium-run),** the price level increases, shifting the LM curve back up until output is back at the natural level of output.

$$Y \uparrow \Rightarrow N \uparrow \Rightarrow u \downarrow \Rightarrow W \uparrow \Rightarrow P \uparrow$$

$$P \uparrow \Rightarrow M\!\big/\!P \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow$$
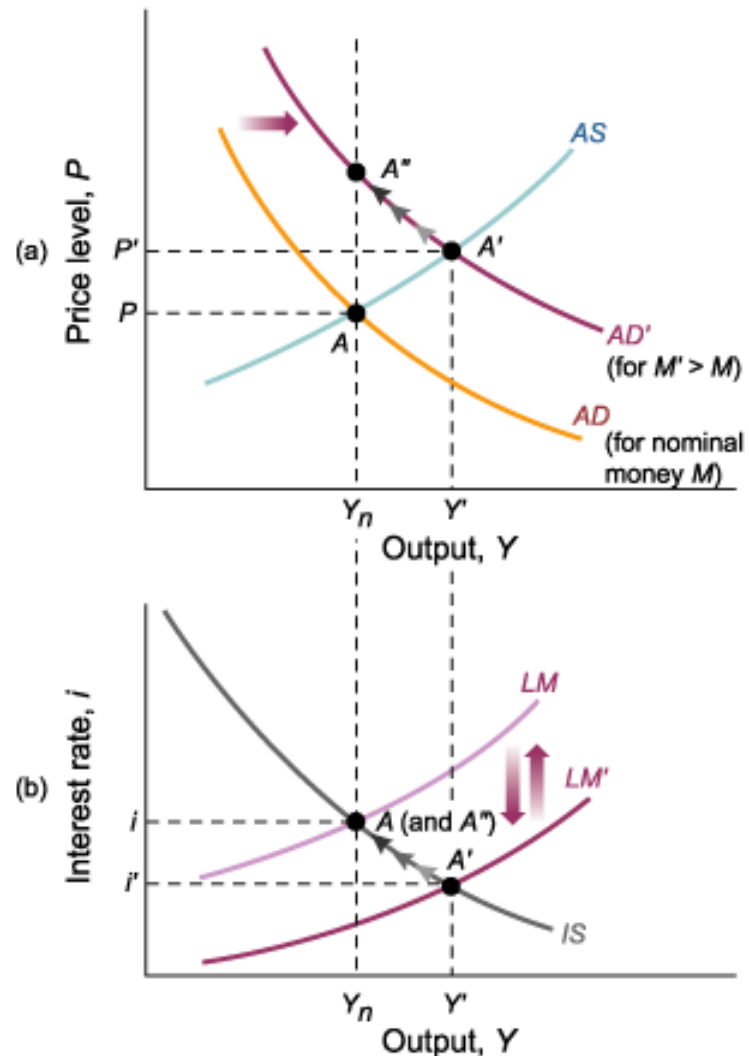
4. The Effects of a Monetary Expansion

4.4. The Neutrality of Money

- **Over time, the price level increases, and the effects of a monetary expansion on output and on the interest rate disappear.**

- **The *neutrality of money* refers to the fact that an increase in the nominal money stock has no effect on output or the interest rate in the medium run.**

- **The increase in the nominal money stock is completely absorbed by an increase in the price level, thus the real variables ($M/P, i, I, Z, Y, W/P$) all remain unchanged. Only the nominal variables ($M^s, W, and\ P$) increase in the medium term.**

5. A Decrease in the Budget Deficit

5.1. The Dynamic Effects of a Decrease in the Budget Deficit

A decrease in the budget deficit leads initially to a decrease in output.

$$G \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow$$

Over time, output returns to the natural level of output.

5. A Decrease in the Budget Deficit

- Since the price level declines in response to the decrease in output, the real money stock increases. This causes a shift of the *LM* curve to *LM'*.

$$G \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow \Rightarrow M^d \downarrow \Rightarrow i \downarrow$$

- **Both output and the interest rate are lower than before the fiscal contraction.**

5. A Decrease in the Budget Deficit

- The *LM* curve continues to shift down until output is back to the natural level of output.

- The interest rate is lower than it was before deficit reduction.

Therefore, a Deficit reduction leads to

- a decrease in output and the interest rate in the short-run

In the medium run, output returns to its natural level, while the interest rate declines further.
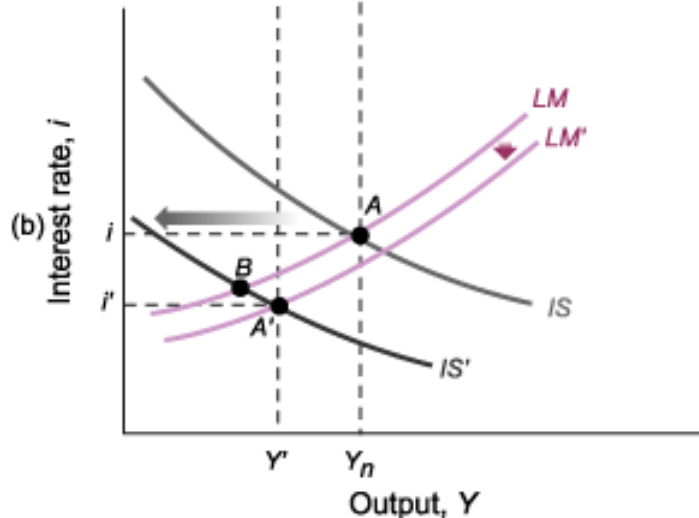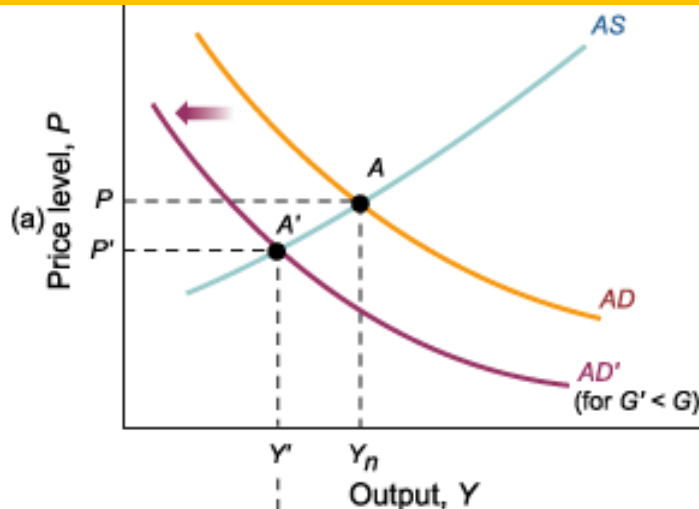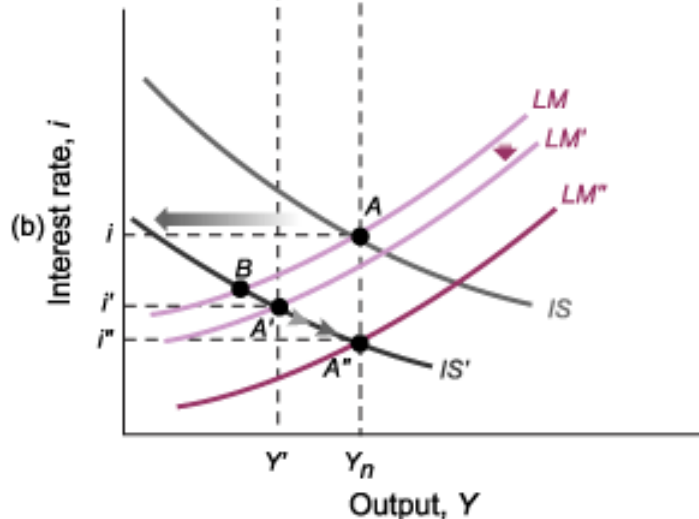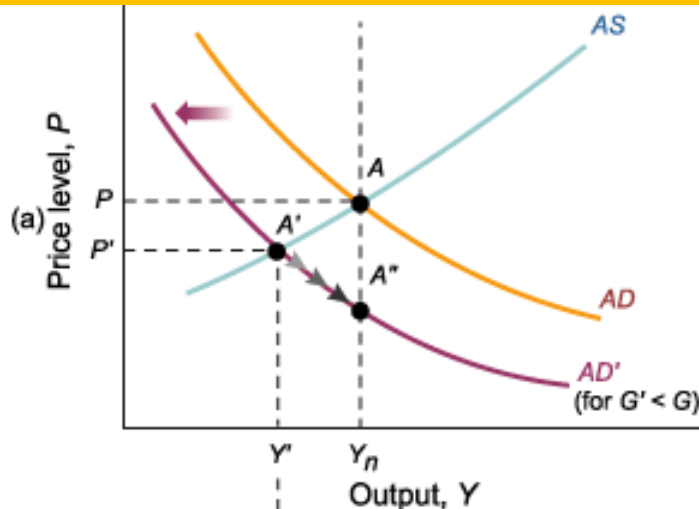
5. A Decrease in the Budget Deficit

5.1. Effect on Output, and the interest rate

The composition of output is different than it was before deficit reduction.

$$IS\ relation:\ Y_n = C(Y_n - T) + I(Y_n, i) + G$$

- **Income and taxes remain unchanged, thus, consumption is the same as before.**
- **Government spending is lower than before; therefore, investment must be higher than before deficit reduction—higher by an amount exactly equal to the decrease in *G*.**

In the medium run, budget deficit reduction leads to a decrease in the interest rate and an increase in investment.

6. Changes in the Price of Oil
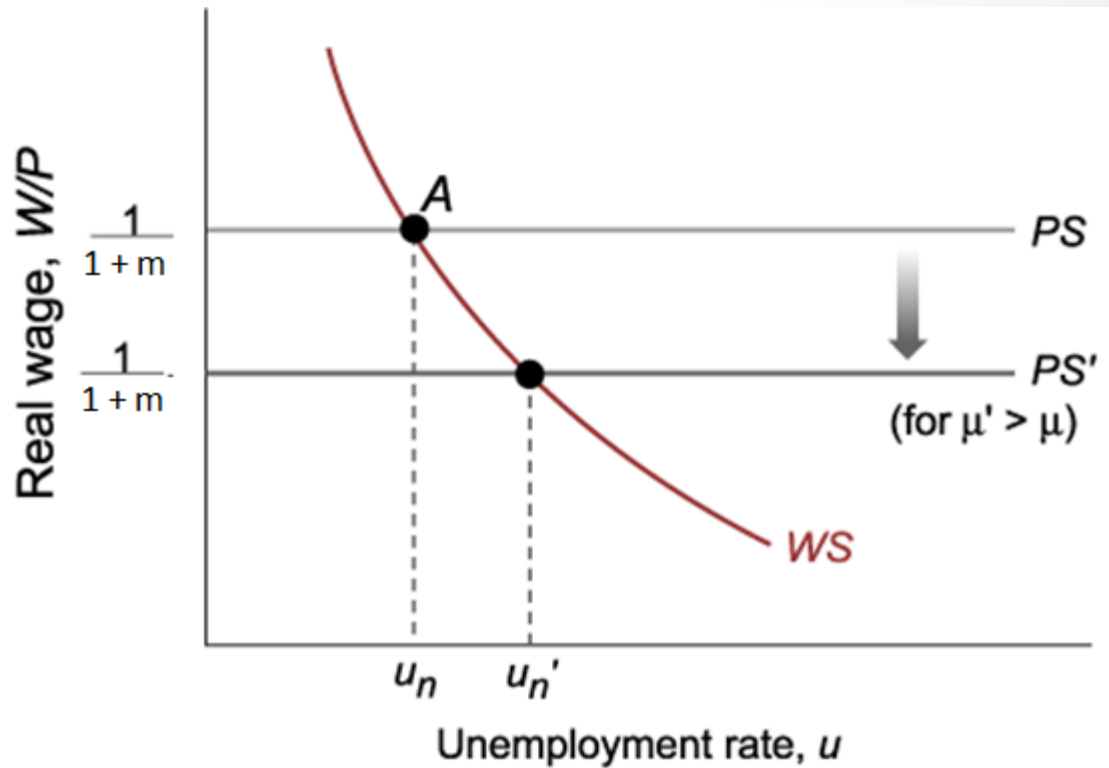
The Price of Crude Petroleum, 1960-2001

There was two sharp increases in the relative price of oil in the 1970s, followed by a decrease in the 1980s and the 1990s.
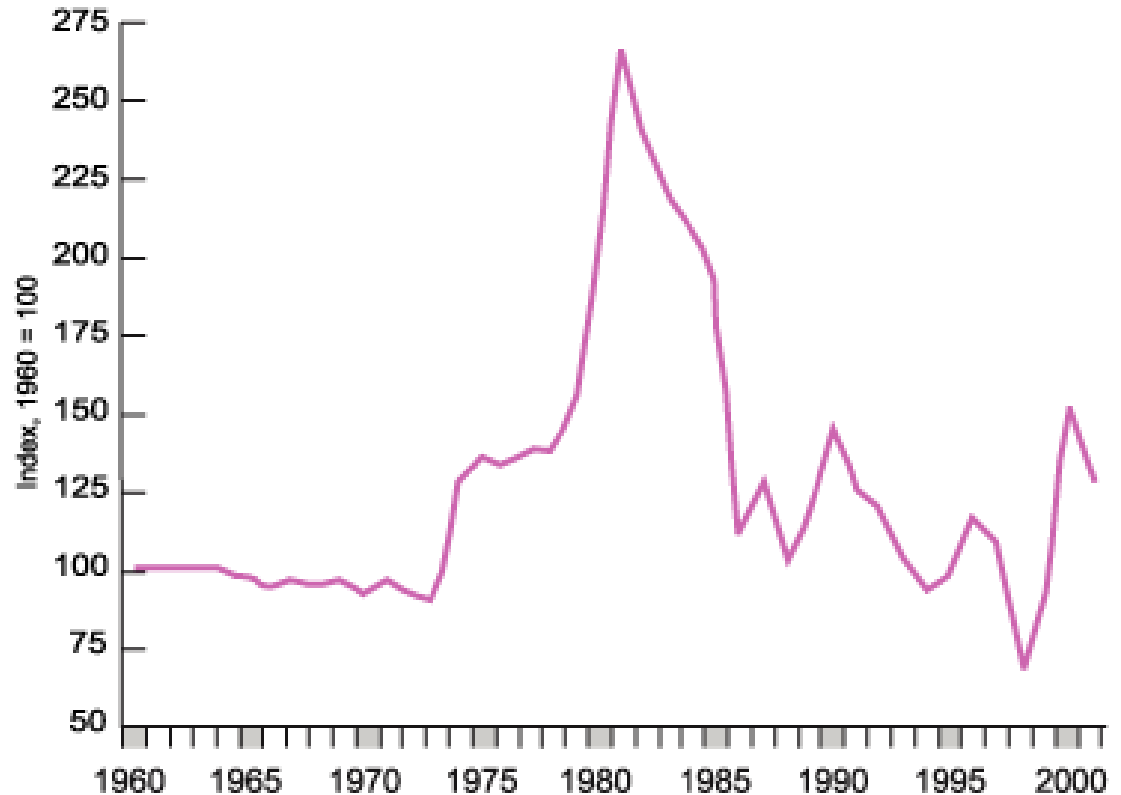
6. Changes in the Price of Oil

6.1. The Effects of an Increase in the Price of Oil on the Natural Rate of Unemployment

The higher price of oil causes an increase in the mark-up and a downward shift of the price-setting line.
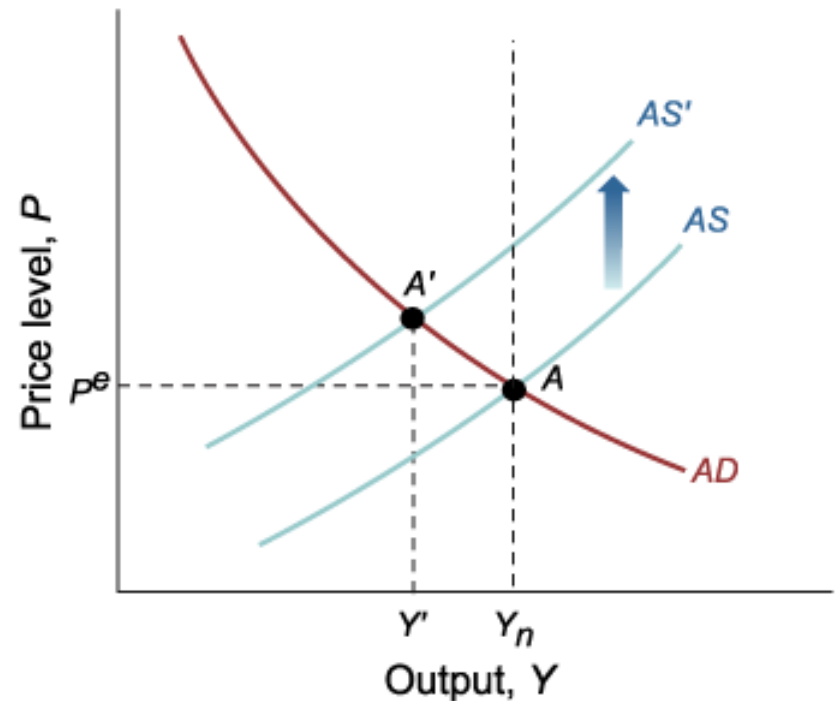
6. Changes in the Price of Oil

$$P = P^e(1+m)F\left(1-\frac{Y}{L}, z\right)$$

- An increase in the markup, μ, caused by an increase in the price of oil, results in an increase in the price level, at any level of output, Y.

- The aggregate supply curve shifts up.

6. Changes in the Price of Oil

- After the increase in the price of oil, the new *AS* curve goes through point *B*, where output equals the new lower natural level of output, Y'_n, and the price level equals P^e.

- The economy moves along the *AD* curve, from *A* to *A'*. Output decreases from Y_n to Y'.

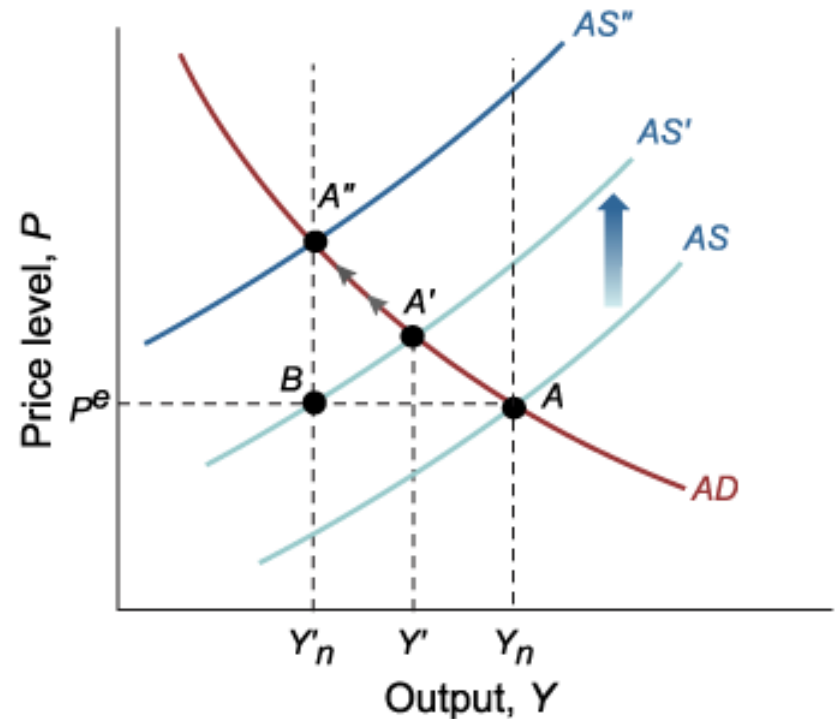# 6. Changes in the Price of Oil

- Over time, the economy moves along the *AD* curve, from *A′* to *A″*.

- At point *A″*, the economy has reached the new lower natural level of output, $Y'_{n'}$ and the price level is higher than before the oil shock.
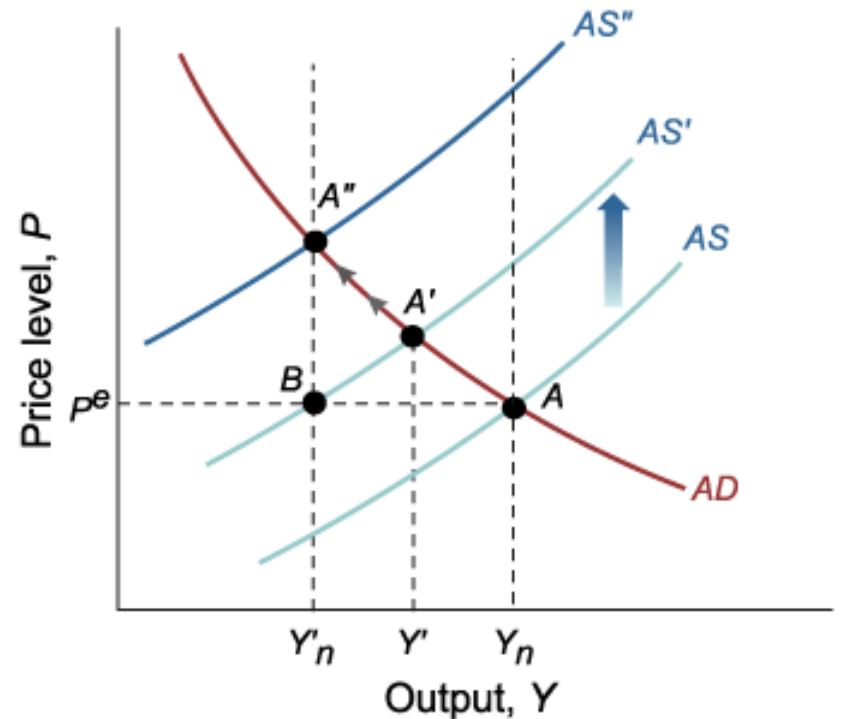
6. Changes in the Price of Oil

6.2. The Dynamics of Adjustment: Effects of an Increase in the Price of Oil

- An increase in the price of oil leads, in the short run, to a decrease in output and an increase in the price level.

- Over time, output decreases further and the price level increases further.

SUMMARY

The Short Run Versus the Medium Run

Short-Run Effects and Medium-Run Effects of a Monetary Expansion, a Budget Deficit Reduction, and an Increase in the Price of Oil on Output, the Interest Rate, and the Price Level

	Short Run			Medium Run		
	Output Level	Interest Rate	Price Level	Output Level	Interest Rate	Price Level
Monetary expansion	increase	decrease	increase (small)	no change	no change	increase
Deficit reduction	decrease	decrease	decrease (small)	no change	decrease	decrease
Increase in oil price	decrease	increase	increase	decrease	increase	increase