Student's Handbook Guide to ECON 282 Intermediate Macroeconomic Theory I

A student's guide to the complex nature of our economy at an intermediate level, part 1

Learn about models of price, interest rate, output, and employment determination. How fiscal, and monetary policies as well as supply shocks affect the country's economy. In the end we will learn about the open economy model with fixed and flexible exchange rates, and prices as well as international capital mobility.

Disclaimer: The following information does not contain any knowledge on how a Red Dragon grows and maintain its horde. One can consider their tactics of slavery, tyrannical governance, elimination of rivals, terrorism, or anything a dick would do to be a valid guess. However, in order to avoid being roasted by Bahamut this information will not be discussed any further.

Contents

Chapter 1: Science of Macroeconomics

What is Macroeconomics?

The study of the economy as a whole, addresses many topical issues like

- What causes recessions? What is "government stimulus" and why might it help?
- How can problems in the housing market spread to the rest of the economy?
- What is the government budget deficit? How does it affect workers, consumers, businesses, and the taxpayers?
- Why does the cost of living keep rising?
- Why are so many countries poor?/ What policies might help them grow out of poverty?
- What is the trade deficit?

Economic Models

Are simplified versions of a more complex reality. They remove irrelevant details to make it easier to understand. Moreover, they are used to show relationships between variables, explain the economy's behavior, and devise policies to improve economic performance.

Elements of Performance of an Economic Model

1. Measurement
2. Policy
3. Model

Elements of an Economic Model

1. Objective
2. Assumption
3. Solution

An example of a model

Here is an example of a model for the supply and demand for new cars. Assume the market is competitive: each buyer and seller is too small to affect the market price

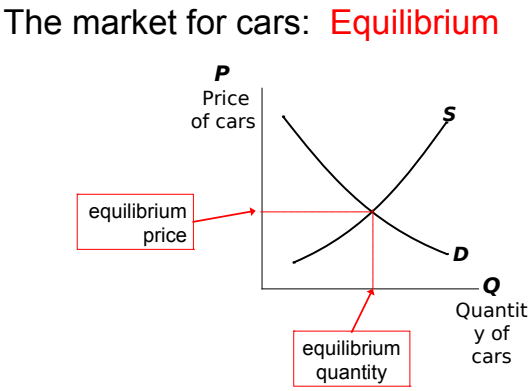
Q^d	quantity of cars that buyers demand
Q^s	quantity that producers supply
P	price of new car
Y	aggregate income
P_s	price of steel (an input)

Let the demand equation be $Q^d = D(P, Y)$.
This shows that the quantity of cars consumers demand is related to the price of cars and aggregate income.
Let the supply equation be $Q^s = S(P, P_s)$.
This shows that the quantity of cars supplied from manufactures is related to the price of cars and the cost of steel one of its inputs.

Note about the equation

These equations are **General functional notation**, they show variables that are related. **Specific Functional form** shows the precise quantitative relationship of the function.

The curves

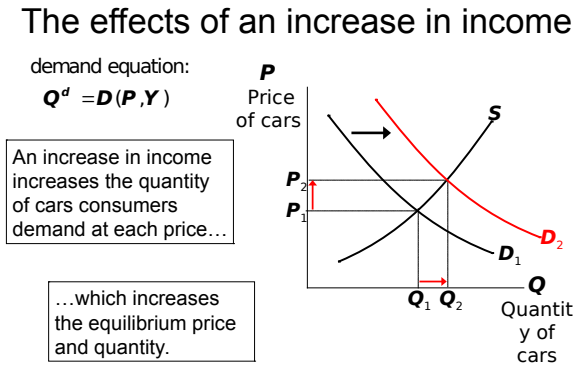


The demand curve. Shows the relationship between quantity demanded and price, other things being equal.

The supply curve. Shows the relationship between quantity supplied and price, other things being equal.

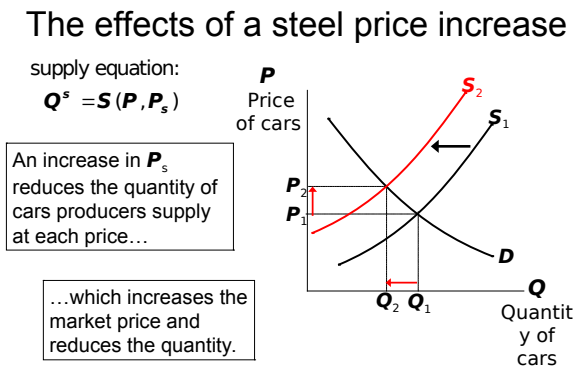
The intersection. of the demand and supply curve is the equilibrium point where the market will sell new cars at that equilibrium price and equilibrium quantity.

The effects of an increase in income



If we increase the aggregate income of consumers it will shift the demand curve to the right as consumers have more money to spend on cars. Note: We are only changing one variable at a time, everything else is constant. This will increase the quantity demanded for cars at P_1. However, car manufactures will not produce cars at that price point causing a shortage that raise prices, reducing the quantity demanded until it reaches a new equilibrium.

The effects of a steel price increase



The increase in P_s causes a leftward shift in the supply curve. Because this is a competitive market neither the producer nor the consumer have control over price. Therefore, the producer needs to reduce its output in order to cover the increase overhead in material cost as they cannot pass the increased cost to the consumer. This leads to a shortage of new cars at P_1 causing an increase in price and decrease in the quantity of cars sold.

Definition

endogenous variable: are determined in the model.
exogenous variable: are determined outside the model: the model takes their values and behavior as given.

In this case P, Q^d, Q^s are endogenous. Y, P_s are exogenous

Multitude of Models

No one model can address all the issues we care about. Models are only designed in such a way that it can only answers thing it was designed for and nothing else.

For each new model you should keep track of

- its assumptions
- Which variables are endogenous/exogenous
- the questions it can help us understand, and those it cannot

Our assumptions so far

Definition on our Assumptions

Market clearing: An assumption that prices are flexible, adjust to equate supply and demand. This is the assumption we will keep until chapter 3. Happens a lot in the long run **Sticky Prices**: are prices that are resistant to change, due to contract, etc. Used a lot in many short-run models.

Later on we will remove assumptions that will more closely related to reality.

Chapter 2: The Data of Macroeconomics

Three metrics to measure economic performance

- Gross Domestic Product
- Consumer Price Index
- Unemployment rate

Note

This does not encompass everything regarding the economy just the big stuff. There is also a time lag associated with these measurements.

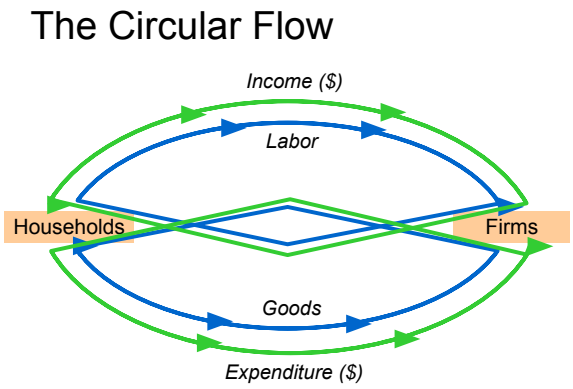
GDP: Gross Domestic Product

Definitions

There are two definitions regarding GDP.

Total expenditure: on domestically-produced final goods and services.
Total income: earned by domestically-located factors of production.

Expenditure equals income because every dollar spent by a buyer becomes income to the seller.



Note

Note: This does not include the government, investments, and the rest of the world. These will be added later.

Value Added

Defintion: Value Added

Value added is the value of its output minus the value of the intermediate goods the firm used to produce that output. This is used to prevent double counting of intermediate products and final products.

Example

The farmer added 1 dollar of value to the final product. As $VA = \$1 - \$0 = \$1$
The miller added 2 dollars of value to the final product. As $VA = \$3 - \$1 = \$2$.
The baker adds 3 dollars to the final product. As $VA = \$6 - \$3 = \$3$
$\Sigma VA = \$6$
In the end GDP which equals to the value of the final goods produced is equal to the sum of value added at all stages of production.

Expenditure components of GDP

GDP Expenditure Equation

This is the formula used to calculate GDP using the expenditure approach.

$$Y = C + I + G + NX \tag{2.1}$$

Where:

Y: is the value of total output
C: Consumption
I: Investments
G: Government
NX: Net export = EX - IM.
Everything on the right is aggregated expenditure, while Y is the value of total output.

Consumption (C)

The value of all goods and services bought by households. There are different components that make up consumption.

Factors that makes up Consumptions

Durable goods: Last a long time like cars.
Non-durable goods: last a short amount of time, like consumables.
Services: work done for consumers like air travel, dry cleaning, etc.

Also 80 percent of all GDP comes from consumption and investments.

Investment (I)

Factors that makes up Investments

Spending on **goods** bought for future use (i.e., capital goods)

Business Fixed Investment: Spending on new plant and new equipment.
Residential Fixed Investment: Spending by consumers and landlords on new housing units.
Inventory Investment: The change in the value of all firms' inventories.

Government Spending (G)

Includes all government spending on goods and services but excludes transfer payments (e.g. unemployment insurance payments), because they do not represent spending on goods and services.
Due to our fiscal setup in Canada, transfer payment from the Government of Canada is transferred to the individual provinces which is part of good and services.

Note on expenditures

Note: How we spend more on services compared to goods.

This is because services are produced in countries where they are consumed. Unlike goods where they can be produced anywhere.

Net Export (NX)

NX

Net export denoted as NX is equal to EX - IM where EX is Export and IM is Import.

A question for you:

Suppose a firm

- produces $10 million worth of final goods
- but only sells $9 million worth.

Does this violate the expenditure = output identity?

Why output = expenditure

Even though production and consumption does not equal, the difference is made up by the company buying their own products and putting them into inventory. This difference make the identity true.

Stock and Flow

Definition of Stock and Flow

Stock is a quantity measured at a point in time. This is the "absolute" total.
Flow is a quantity measured per unit of time. This is the "difference" of the stock.

stock	flow
a person's wealth	a person's annual savings
# of people with college degrees	# of new college graduates this year
the govt debt	the govt budget deficit
Balance on your credit card statement	Inflation Rate

GNP vs GDP

GDP vs GNP

Gross National Product (GNP):Total income earned by the nation's factors of production, regardless of where its located.
Gross Domestic Product (GDP):Total income earned by domestically-located factors of production, regardless of nationality.

$$GNP = GDP \quad (2.2)$$
$$+\text{Y earned by Canadians abroad}$$
$$-\text{Y earned by Foreigners in Canada}$$

In Canada, foreigners put more money into the Canadian economy than Canadians earning money elsewhere.

Real GDP vs Nominal GDP

Real vs Nominal GDP

GDP is the value of all final goods and services provided.

Nominal GDP measures these values using current prices.
Real GDP measure these values using the prices of a base year. It controls for inflation. However, this assumption works if inflation is positive.

Changes in Nominal GDP can be due to changes in prices, or changes in the quantities of output produced.

Changes in Real GDP can **only** be due to changes in quantities as the prices are fixed to a constant base-year.

GDP Deflator

Inflation and GDP Deflator

Inflation rate is the percentage increase in the overall level of prices. One measure of the price level is the **GDP deflator**. These products are aggregated so not everything is affected by the GDP deflator, its the average.

$$\text{GDP Deflator} = \frac{\text{Nominbal GDP}}{\text{Real GDP}} \times 100 \qquad (2.3)$$

Chain-Weighted Real GDP

Update the base year every year, so it is more accurate than a constant-price GDP. This is because relative prices change, so the base year should be updated periodically. Constant-price GDP is easier to compute and for the most part its close enough.

Consumer Price Index (CPI)

What is CPI?

A measure of the overall level of prices. The results are published by Stats Canada.

Deals with the value of things consumers want, unlike GDP, CPI includes imports and only counts household goods.

COLA: Cost of living adjustment

There are currently 600 different items in the basket used to calculate the CPI.

How to construct the CPI

1. Survey consumers to determine composition of the typical consumer's "basket" of goods.
2. Every month, collect data on prices of all items in the basket; compute the cost of the basket.
3. $$\frac{\text{cost of basket in that month}}{\text{cost of basket in base period}} \times 100$$

Understanding the CPI

Example with 3 goods

For good i = 1, 2, 3

C_i = the amount of good i in the CPI's basket

P_{it} = the price of good i in month t

E_t = the cost of the CPI basket in month t

E_b = the cost of the basket in the base period

Understanding the CPI

$$\text{CPI in month } t = \frac{E_t}{E_b} = \frac{P_{1t}C_1 + P_{2t}C_2 + P_{3t}C_3}{E_b}$$

$$= \left(\frac{C_1}{E_b}\right) P_{1t} + \left(\frac{C_2}{E_b}\right) P_{2t} + \left(\frac{C_3}{E_b}\right) P_{3t}$$

The CPI is a weighted average of prices.

The weight on each price reflects that good's relative importance in the CPI's basket.

Note that the weights remain fixed over time.

Note on the composition of the basket

Even though the composition of the basket is updated from time to time, it may not accurately reflect the purchases of the average consumer. Moreover, it may overestimate the rate of inflation.

Reasons why the CPI may overstate inflation

Substitution bias: The CPI uses fixed weight so it cannot reflect consumers' ability to substitute towards goods whose relative prices have fallen.

Introduction of new goods: The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But it does not reduce the CPI, because the CPI uses fixed weights.

Unmeasured changes in quality: Quality improvements increase the value of the dollar, but are often not fully measured.

The CPI is also called the Laspeyres Price Index. In general calculations of price that involves a fixed basket will overstate the price change.

CPI vs. GDP Deflator

prices of capital goods
- included in GDP deflator (if produced domestically)
- excluded from CPI

prices of imported consumer goods
- included in CPI
- excluded from GDP deflator

the basket of goods
- CPI: fixed
- GDP deflator: changes every year

Labour and Employment

Defintion on Labour and Employment

Employed: Working at a paid job

Unemployed: Not employed but looking for a job

Labour Force: The amount of labour available for producing goods and services; all employed plus unemployed persons

Not in the labour force: Not employed and not looking for work.

Unemployment rate: Percentage of the labour force that is unemployed. $UE = \frac{U}{U+E} \times 100$

Labour Force Participation rate: The fraction of the adult population that "participates" in the labour force. $LFP_{rate} = \frac{E+U}{Pop} \times 100$

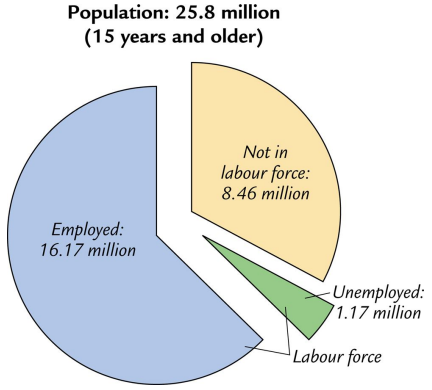


Figure 2.4 The Three Groups of the Population
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

Okun's Law

Okun's Law Equation

The negative relationship between cyclical unemployment and GDP.

$$\Delta\text{Unemployment Rate} = -0.5(\%\Delta\text{real GDP} - 4) \quad (2.4)$$

Chapter 3: National Income: Where it comes from and where it goes

Outline of the Model

The Classical Model

A close economy, market-clearing model. This is the classical model of macroeconomics.

We assume that there is no import or export and that supply equal demand at all times, meaning that the prices are flexible.

Supply Side:
- Factor markets (supply, demand, price)
- determination of output/income

Demand Side:
- Determinants of C, I, and G
  - Meaning the the output = spending and savings = investment. **Equilibrium**:
- goods market
- loanable funds market

The figure below shows the circular flow of money in this model.

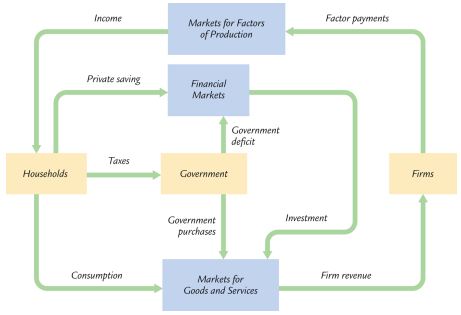


Figure 3.1 The Circular Flow of Dollars Through the Economy
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

Our Assumptions for our model

1. Technology is fixed
2. The economy's supplies of capital and labour are fixed at $K = \hat{K}$ and $L = \hat{L}$

The output is determined by the fixed factor supplies and the fixed state of technology: $\hat{Y} = F(\hat{K}, \hat{L})$

Factor of Production

Factors of Production

K = Capital: tools, machines, and structures used in production.

L = Labour: the physical and mental efforts of the worker

Production Function

Denoted Y = F(K,L) shows how much output Y the economy can produce from K units of capital and L units of labour. It reflects the economy's level of technology and exhibits constant returns to scale.

Returns to scale: A review

Initially $Y_1 = F(K_1, L_1)$

Scale all inputs by the same factor z:

$K_2 = zK_1$ and $L_2 = zL_1$

(*e.g.*, if $z = 1.25$, then all inputs are increased by 25%)

What happens to output, $Y_2 = F(K_2, L_2)$?

- If **constant returns to scale**, $Y_2 = zY_1$
- If **increasing returns to scale**, $Y_2 > zY_1$
- If **decreasing returns to scale**, $Y_2 < zY_1$

The distribution of national income (Supply side)

Definition for supply side

Determined by **Factor prices**, the prices per unit that firms pay for the factors of production.

Wage = Price of L

Rental rate = Price of K.

Note: The rental rate is the cost to use the capital per unit of time.

W	Nominal wage
R	Nominal rental rate
P	Price of output
W/P	real wage (measured in units of output)
R/P	real rental rage

How factor prices are determined

Factor prices are determined by supply and demand in factor markets. Recall that the supply of each factor is fixed. Demand however, follows a standard demand curve.

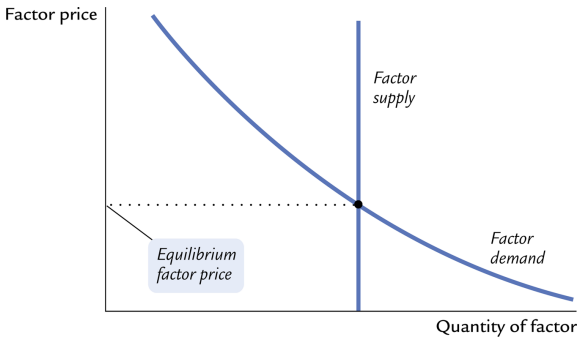


Figure 3.2 How a Factor of Production Is Compensated
Mankiw and Scarth: Macroeconomics, Canadian Third Edition
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The demand for labour. Assume markets are competitive: each firm takes W, R, and P as given. The basic idea is that firm hires each unit of labour if the cost does not exceed the benefit. That being the cost being the real wage, and the benefit being the marginal product of labour.

Marginal Product of Labor (MPL)

The extra output the firm can produce using an additional unit of labor.

You will only hire workers if and only if the additional cost of labour does not exceed the benefit of marginal product of labour.

$\frac{dY}{dL}$

Exercise: *Compute & graph MPL*

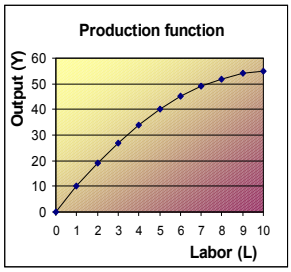
a. Determine ***MPL*** at each value of ***L.***

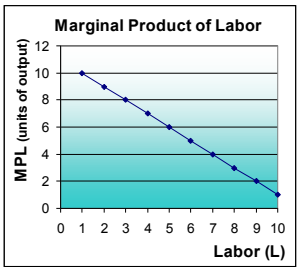
b. Graph the production function.

c. Graph the ***MPL*** curve with ***MPL*** on the vertical axis and ***L*** on the horizontal axis.

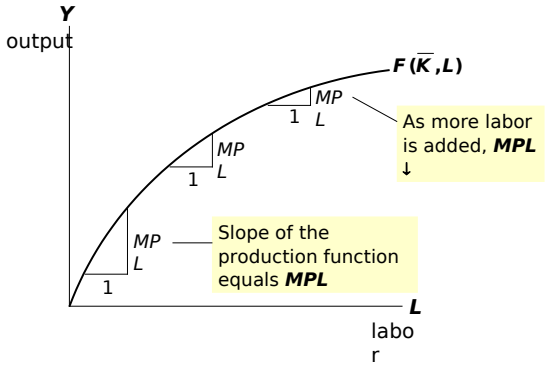
L	***Y***	***MPL***
0	0	n.a.
1	10	?
2	19	?
3	27	8
4	34	?
5	40	?
6	45	?
7	49	?
8	52	?
9	54	?
10	55	?

Answers:





MPL and the production function



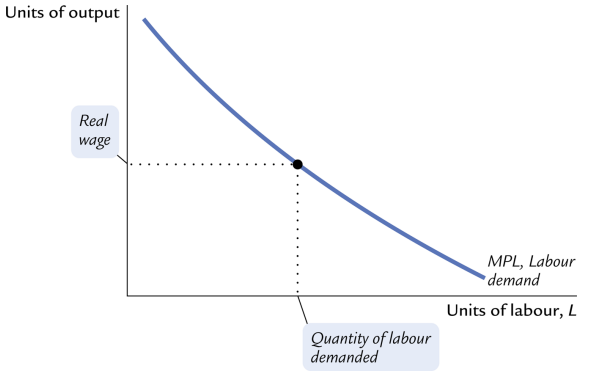


Figure 3.4 The Marginal Product of Labour Schedule
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As a factor input is increased, its marginal product falls (other things equal).
For example if you hired more workers and kept the capital the same then there will be more workers per machines which will decrease your overall productivity.

Exercise *(part 2)*

Suppose ***W/P*** = 6.

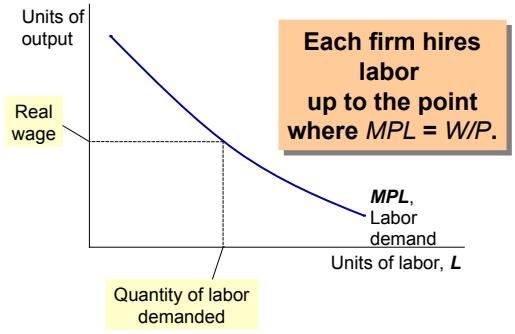
d. If ***L*** = 3, should firm hire more or less labor? Why?

e. If ***L*** = 7, should firm hire more or less labor? Why?

L	***Y***	***MPL***
0	0	n.a.
1	10	10
2	19	9
3	27	8
4	34	7
5	40	6
6	45	5
7	49	4
8	52	3
9	54	2
10	55	1

The maximum number of workers the firm should hire is 5 as the MPL is equal to W/P of 6.

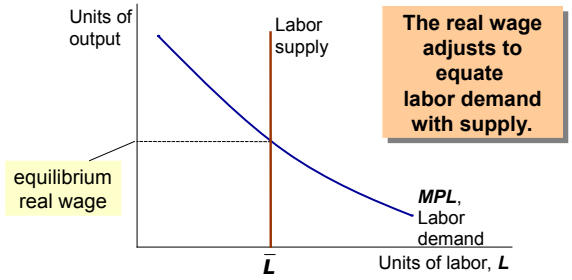
MPL and the demand for labor



The MPL is now the demand curve for labour for businesses.

The equilibrium real wage

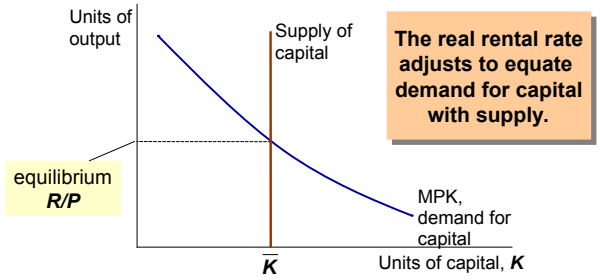
The equilibrium real wage



The rental rate

So we know that MPL = W/P. The same logic can be applied to MPK = R/P as we increase capital there will be less workers per machines that can operate them therefore decreasing the overall productivity. For MPK it's the same concept with MPL but with capital $\frac{dY}{dK}$.

The equilibrium real rental rate



Neoclassical Theory of Distribution

States that each factor input is paid its marginal product.

How income is distributed

Total labor income = $MPL \times \bar{L}$
Total capital income = $MPK \times \bar{K}$
If production function has constant returns to scale, then

$$\bar{Y} = MPL \times \bar{L} + MPK \times \bar{K}$$

Cobb-Douglas Production Function

Cobb-Douglas Production function

The Cobb-Douglas production function has constant factor shares:

α is the capital share of total income

$$Y = AK^{\alpha}L^{1-\alpha}$$

A represents the level of technology

Note on the Cobb-Douglas Production Function

This is a continuous function that also can show the curvature based on the function second order derivatives. It also shows constant factor shares. Shows diminishing MR and also shows return to scale well.

Each factor's marginal product is proportional to its average product:

$$MPK = \alpha AK^{\alpha-1}L^{1-\alpha} = \frac{\alpha Y}{K}$$

$$MPL = (1-\alpha)AK^{\alpha}L^{-\alpha} = \frac{(1-\alpha)Y}{L}$$

The marginal product of labour is proportional to the average produce. Same with marginal capital of labour.

Demand side of the model

Consumption (C)

Consumption Function

Disposable income is the total income minus total taxes: $Y - T$

Marginal Propensity to Consume (MPC) is the delta change of C of one unit increase in disposable income.

$$C = C_0 + C(Y - T) \tag{3.1}$$

Were:

C_0 is the autonomous consumption. Consumption that is independent from income. C is the marginal propensity to consume or the slope of the consumption function.

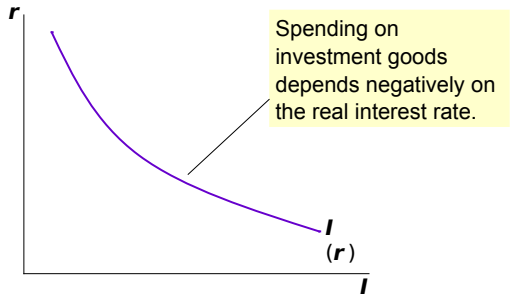
Investment (I)

Investment Function

$I = I(r)$ where r denotes the **real interest rate**, the nominal interest rate corrected for inflation.

The real interest rate is the cost of borrowing and the opportunity cost of using one's own funds to finance investment spending.

The investment function



The Investment "Market" or loanable funds market

Investment in this model is a simple supply-demand model, where:

- Demand for funds are called investments
- Supply for funds are called savings
- "Price" of funds is the real interest rate

Demand for Investment

The demand for loanable funds comes from investments and depends negatively on r (the interest/cost).

Supply for Investment

The supply of loanable funds comes from savings:

- Households use their savings to make bank deposits, purchase bonds and other assets. These funds become available to firms to borrow to finance investment spending
- The government may also contribute to saving if it does not spend all the tax revenue it receives.

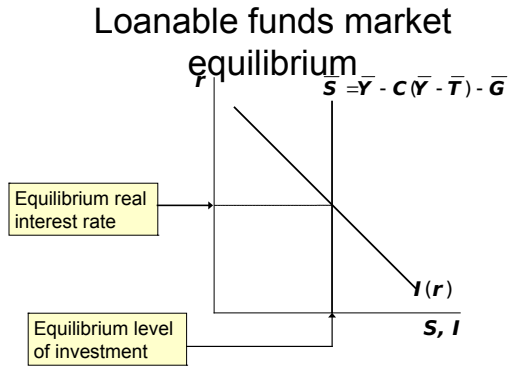
Types of savings

Private Saving = $(Y - T) - C$

Public Saving = $T - G$

National Saving = $S = (Y - T) - C + T - G$

National saving does not depend on r, so the supply curve is vertical.



Special role of r

r adjusts to equilibrium the goods market and the loanable funds market simultaneously: If the L.F. market in equilibrium, then $Y - C - G = I$ add $C + G$ to both sides to get $Y = C + I + G$ The goods market equilibrium. Thus the equilibrium in the loanable funds market must equal the equilibrium in the goods market.

Government (G)

Government Spending

denoted as G = govt spending on goods and services
G excludes transfer payments (e.g., social security benefits, unemployment insurance benefits).
We assume that government spending and total taxes are exogenous. So $G = \bar{G}$ and $t = \bar{T}$.

Budget surpluses and deficits

If $T > G$, budget surplus = $T - G$ = Public Saving
If $T < G$, budget deficit = $G - T$ = Public Savings is negative
If $T = G$, the budget is balanced, public savings is zero.
The Canadian government finances its deficit by issuing Treasury bonds - i.e., borrowing.

Summary of the demand

The market for goods and services.

aggregate demand	$C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$
Aggregate supply	$\bar{Y} = F(\bar{K}, \bar{L})$
Equilibrium	$\bar{Y} = C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$

The real interest rate adjusts to equate demand with supply.

Mastering the loanable funds model. Things that shift the saving curve:

- **Public Savings** which is affected by fiscal policy
- **Private Savings** which is affected by preferences and tax laws that affects savings

The savings is dependent on the interest rate as a higher interest rate means a higher rate of return from savings.

Some technological innovations will shift the investment curve, as to take advantage of the innovation firms must buy new investment goods. Also tax laws that affect investments will also shift the investment curve.

Case Study

CASE STUDY: The Reagan deficits

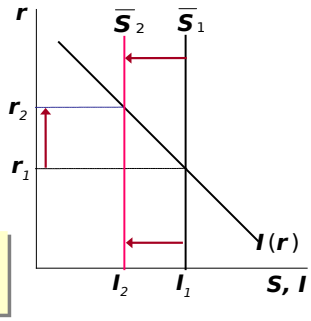
- Reagan policies during early 1980s:
  - increases in defense spending: $\Delta G > 0$
  - big tax cuts: $\Delta T < 0$
- Both policies reduce national saving:

$$\bar{S} = \bar{Y} - C(\bar{Y} - \bar{T}) - \bar{G}$$

$\uparrow \bar{G} \Rightarrow \downarrow \bar{S}$ $\downarrow \bar{T} \Rightarrow \uparrow C \Rightarrow \downarrow \bar{S}$

CASE STUDY: The Reagan deficits

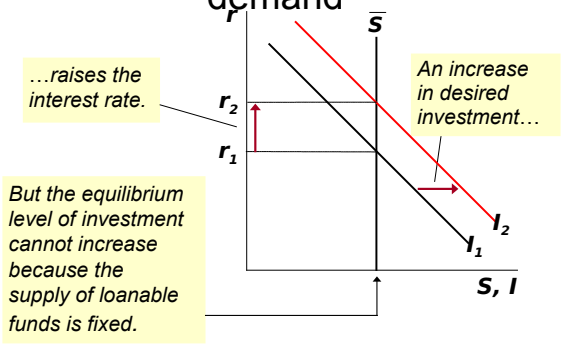
1. The increase in the deficit reduces saving…
2. …which causes the real interest rate to rise…
3. …which reduces the level of investment.



Now you try…

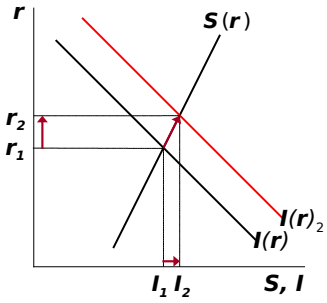
- Draw the diagram for the loanable funds model.
- Suppose the tax laws are altered to provide more incentives for private saving. (Assume that total tax revenue T does not change)
- What happens to the interest rate and investment?

An increase in investment demand



An increase in investment demand when saving depends on *r*

An increase in investment demand raises r, which induces an increase in the quantity of saving, which allows I to increase.



Chapter 4: Money and Inflation

Definitions

Money: is the stock of assets that can be readily used to make transactions.

Medium of exchange: we use it to buy stuff as a universal form of currency. This solves the problem with bartering as bartering leads to the problem of indivisibility and the double incidence of need. Both parties need to agree on the exchange.

Store of value: transfers purchasing power from the present to the future.

Unit of account: the common unit by which everyone measures prices and values. Solves the quality differences between bartered goods.

Money Supply: is the quantity of money available in the economy.

Monetary policy: is the control over the money supply. This is done by the country's **Central Bank** in this case the Bank of Canada.

Liquidity How easy can you use the asset to buy goods and services. Here's a small list from most to least liquid.

Cash, chequing account, stock and bonds, cars, houses, etc.

Money: Types

1. fiat money
   - has no intrinsic value
   - example: the paper currency we use
2. commodity money
   - has intrinsic value
   - examples:
     gold coins,
     cigarettes in P.O.W. camps

Fiat money is money because the government say so. Because fiat money does not have any intrinsic value, monetary policy is used to control inflation.

Measurement of Money

B = Currency + chartered bank deposits at the BOC.

M1 = Sum of Currency circulation + demand deposits + other chequing accounts at chartered banks.

M2 = M1 + personal savings deposits + non-personal notice deposits at the chartered banks.

M2+ = M2 + all deposits + shares + mortgages loan companies + credit unions + Caisses Populaires.

M3 = M2 + fixed-term deposits of firms at the chartered banks.

Note

We use M2 the most as that is the most common, **Money Supply** in our use case is currency + deposit.

Velocity

Definition of Velocity

Velocity is the rate at which money circulates. The formal definition is the number of times the average dollar bill changes hands in a given time period.

$$V = \frac{T}{M} \tag{4.1}$$

Where:
V = Velocity
T = Value of all transactions
M = Money Supply

Example

$500 billion in transactions in 2007
$100 billion in money supply in 2007
The average dollar used is five transactions in 2007 so the velocity is 5.

Because transactions are difficult to calculate we use Nominal GDP. So the actual equation is.

$$V = \frac{PY}{M} \tag{4.2}$$

Where:
P = Price of output
Y = Quantity of output (real GDP)
Therefore, PY = Value of output.

Quantity Theory of Money

Quantity Equation and Real Money Balance

$$MV = PY \tag{4.3}$$

$$\frac{M}{P} = \frac{Y}{V} \tag{4.4}$$

$$\left(\frac{M}{P}\right)^d = kY \tag{4.5}$$

Based from the preceding definition of velocity.

M/P is the **Real Money Balance**, it represent the purchasing power of the money supply.

$(\frac{M}{P})^d$ is the simple demand for money.

We replace 1/V with k which is the inverse of the velocity.

k is how much money people wish to hold for each dollar of income (k is exogenous)

Identity

Note this is an identity, where the nominal output from the economy has to equal to the product of the money supply and its velocity.

In this model lets have V be a constant and is exogenous.

How the price level is determined. With V constant, the money supply determines the nominal GDP (P x Y). Real GDP is determined by the economy's supplies of K and L and the production function. The price level is P = nominal GDP/Real GDP.

Inflation rate

$$\pi = \frac{\Delta M}{M} - \frac{\Delta Y}{Y} \qquad (4.6)$$

Normal economic growth requires a certain amount of money supply growth to facilitate the growth in transactions. Money growth in excess of this amount leads to inflation.
$\Delta Y/Y$ depends on growth in the factors of production and on technological progress (all of which we take as given, for now). Hence, the Quantity Theory predicts a one-for-one relation between changes in the money growth rate and changes in the inflation rate.

The quantity theory of money implies.

1. countries with higher money growth rates should have higher inflation rates
2. the long-run trend behavior of a country's inflation should be similar to the long-run trend in the country's money growth rate

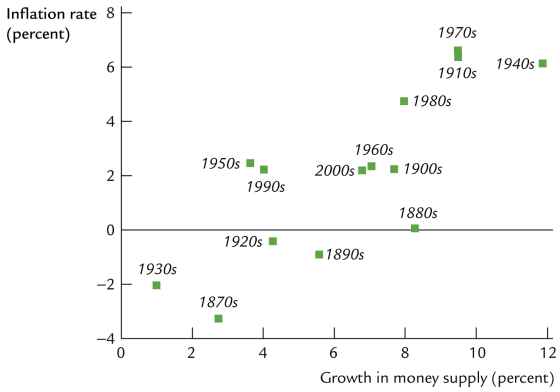


Figure 4.1 Historical Data on U.S. Inflation and Money Growth
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

As you can see there is a positive correlation between the growth in money supply and the rate of inflation.

Fisher Effect

Fisher Effect

Is the one-to-one positive relationship between inflation rate and the nominal interest rate. An increase in inflation will cause an increase in nominal interest rate.

$$i = r + \pi \qquad (4.7)$$

Where:
i is the nominal interest rate
r is the real interest rate

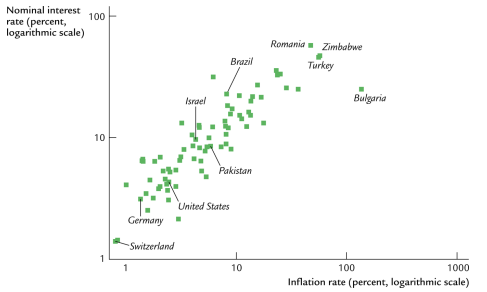


Figure 4.4 Inflation and Nominal Interest Rates Across Countries
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

Exercise

Exercise:

Suppose ***V*** is constant, ***M*** is growing 5% per year,
Y is growing 2% per year, and ***r*** = 4.

a. Solve for ***i***.

b. If the Fed increases the money growth rate by 2 percentage points per year, find Δi.

c. Suppose the growth rate of ***Y*** falls to 1% per year.
- What will happen to π?
- What must the Fed do if it wishes to keep π constant?

Answers:

V is constant, ***M*** grows 5% per year,
Y grows 2% per year, ***r*** = 4.

a. First, find $\pi = 5 - 2 = 3$.
Then, find $i = r + \pi = 4 + 3 = 7$.

b. $\Delta i = 2$, same as the increase in the money growth rate.

c. If the BOC does nothing, $\Delta\pi = 1$.
To prevent inflation from rising,
BOC must reduce the money growth rate by 1 percentage point per year.

Different Real Interest Rates

There are two different real interest rates.

ex ante vs ex post

π = actual inflation rate (not known until after it has occurred)

π^e = expected inflation rate

$i - \pi^e$ = **ex ante** is the real interest rate that people expect at the time they buy a bond or take out a loan.

$i - \pi$ = **ex post** is the real interest rate that is actually realized.

Money Demand Function

Money Demand Function

$$(M/P)^d = L(i, Y) \qquad (4.8)$$

Where i is the interest rate and Y is the expenditure.

i is negatively correlated to Money demand. While Y is positively correlated to money demand.

L is used for the money demand function because money is the most liquid asset.

The money demand function

$$(M/P)^d = L(i, Y)$$
$$= L(r + \pi^e, Y)$$

When people are deciding whether to hold money or bonds, they don't know what inflation will turn out to be.

Hence, the nominal interest rate relevant for money demand is $r + \pi^e$.

Equilibrium.

$$\frac{M}{P} = L(r + \pi^e, Y$$

The left side is the supply of real money balances, the right side is the real money demand.

What determines what

$$\frac{M}{P} = L(r + \pi^e, Y)$$

variable	how determined *(in the long run)*
M	exogenous (the Fed)
r	adjusts to make $S = I$
Y	$\bar{Y} = F(\bar{K}, \bar{L})$ $\quad \frac{M}{P} = L(i, Y)$
P	adjusts to make

How P responds to ΔM

$$\frac{M}{P} = L(r + \pi^e, Y)$$

- For given values of r, Y, and π^e, a change in M causes P to change by the same percentage – just like in the quantity theory of money.

What about expected inflation?

- Over the long run, people don't consistently over- or under-forecast inflation, so $\pi^e = \pi$ on average.
- In the short run, π^e may change when people get new information.
- EX: Fed announces it will increase M next year. People will expect next year's P to be higher, so π^e rises.
- This affects P now, even though M hasn't changed yet….

In the long run the expected inflation rate generally equals the actual inflation rate later on. However, in the short-run it may be different.

How P responds to $\Delta\pi^e$

$$\frac{M}{P} = L(r + \pi^e, Y)$$

- For given values of r, Y, and M,
  $\uparrow \pi^e \Rightarrow \uparrow i$ (the Fisher effect)
  $\Rightarrow \downarrow (M/P)^d$
  $\Rightarrow \uparrow P$ to make (M/P) fall to re-establish eq'm

An increase in expected interest rate will leads to a self-fulling prophecy of higher prices.

Chapter 5: The Open Economy

Canada is heavily dependent on trade.

Unlike a closed economy where spending equals output and investments equal saving. An open economy allows spending to not equal output and savings not equal investments.

Preliminaries

$C = C^d + C^f$

$I = I^d + I^f$

$G = G^d + G^f$

d = Spending on domestic goods

f = Spending on foreign goods

EX = Foreign spending on domestic goods

$IM = C^f + I^f + G^f$ Spending on foreign goods

$NX = EX - IM$ Trade Balance

This is the new equation for the open economy.

$$Y = C + I + G + NX \tag{5.1}$$

$$NX = Y - (G + I + G) \tag{5.2}$$

Trade Surplus and Deficit

We have a **trade surplus** if output > spending and export > import. The size of the trade surplus is equal to NX.

We have a **trade deficit** if output < spending and export < import. The size of the trade deficit is equal to -NX.

Capital flow

Net capital outflow

Is the net outflow of "loanable funds", or the net purchases of foreign assets. The country's purchases of foreign assets minus foreign purchases of domestic assets.

$$S = I + NCO \text{ (Net capital outflow)} \tag{5.3}$$

Net outflow is the movement of asset.
Net export is the movement of goods.

When S > I then the country is a net lender. If S < I then the country is a net borrower.

Link between Capital flow and NX

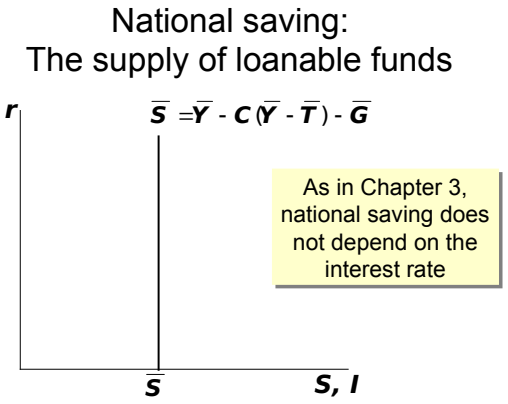
We know that the NX equation to be
$NX = Y - (C + I + G)$
Using algebra we can manipulate this such that
$NX = (Y - (C + G)) - I = S - I$.

Whatever consumers or the government don't spend goes to savings. That's why $Y - (C + G) = S$.
Therefore trade balance = net capital outflow.
Thus, a country with a trade deficit (NX < 0) is a net borrower (S < I).

Savings and investment in a small open economy

This is an open-economy version of the loanable funds model from Chapter 3. They includes many of the same elements.

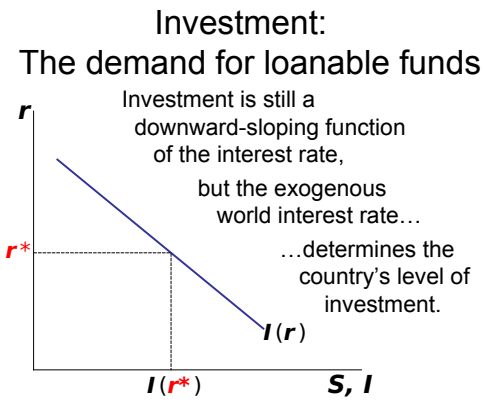
production function	$Y = \bar{Y} = F(\bar{K}, \bar{L})$
consumption function	$C = C(Y - T)$
investment function	$I = I(r)$
exogenous policy variables	$G = \bar{G},\ T = \bar{T}$

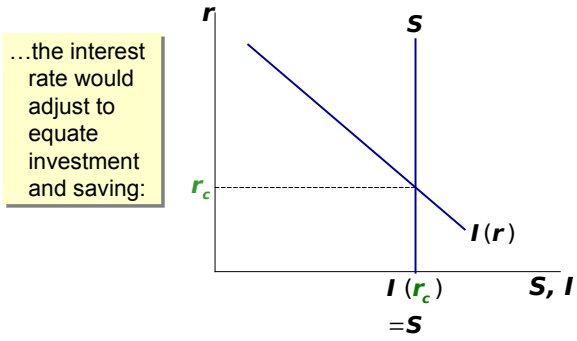


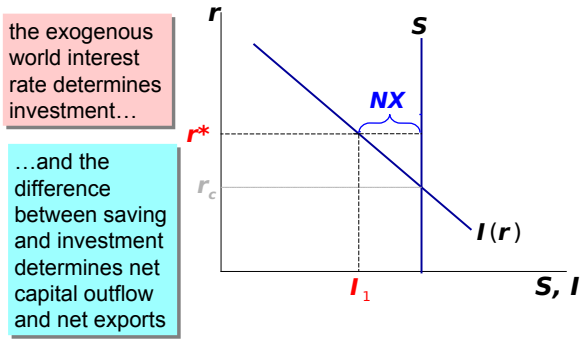
Assumption

- Domestic and foreign bonds are perfect substitute
- perfect capital mobility, no restriction on international trade in asset
- economy is small, cannot affect the world interest rate denote r^*, the country is the price taker.

The first two points imply that $r = r^*$, the last point implies r^* is exogenous.



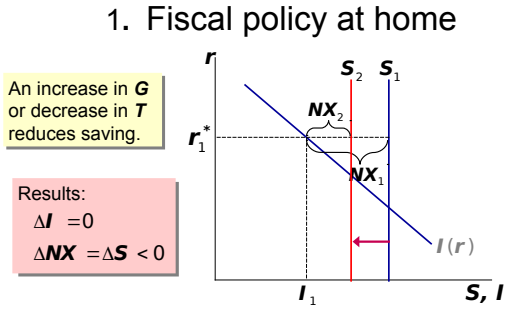




Experiments

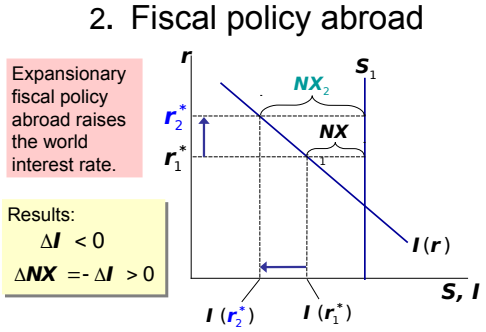
1. Fiscal policy at home (increase in G)
2. Fiscal policy abroad (increase in r^*)
3. An increase in investment demand

Fiscal policy at home



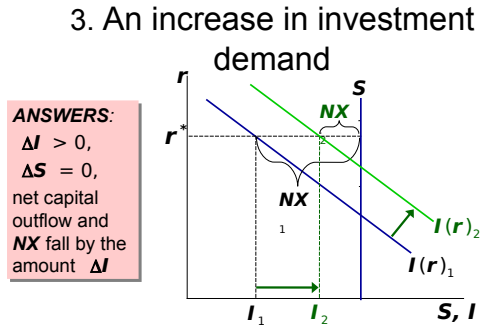
An expansionary policy like increasing government spending or reducing taxes will create a trade deficit. As you require more money to fund these actions.

Fiscal policy abroad



An expansionary fiscal policy abroad raises the world interest rate. The savings in the country has to fall in order to fund these actions. Therefore, the global interest rate raises.

An increase in investment demand



Will reduce NX as the increased demand for investment increases the inflow of foreign investment

Exchange rate

Exchange rate

e is the nominal exchange rate, its always in the context of foreign currency to a single unit of our domestic currency. It shows the relative price of domestic currency in terms of foreign currency.

ε is the real exchange rate. It shows the relative price of domestic goods in terms of foreign goods. (The price of a big mac in Canada vs the price of a big mac in Japan).

$$\varepsilon = \frac{eP}{P^*} \tag{5.4}$$

Where P^* is the price of the foreign good, and P is the price of a domestic good. The numerator shows the price of a domestic good in foreign currency.

~ McZample ~

- one good: Big Mac
- price in Japan: P^* = 200 Yen
- price in Canada: P = $2.50
- nominal exchange rate e = 120 Yen/$

$$\varepsilon = \frac{e \times P}{P^*} = \frac{120 \times \$2.50}{200 \text{ Yen}} = 1.5$$

To buy a Canadian Big Mac, someone from Japan would have to pay an amount that could buy 1.5 Japanese Big Macs.

slide 28

In the real world we can think ε as the relative price of a basket of domestic goods in terms of a basket of foreign goods.

In our macro model there's just one good, "output" so ε is the relative price of one country's output in terms of the other country's output.

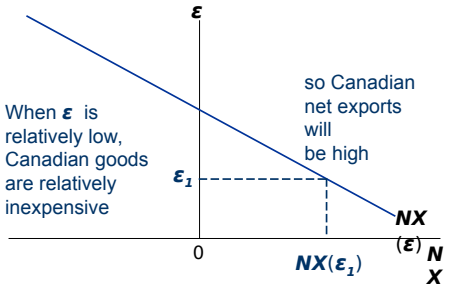
If ε increases then Canadian goods become more expensive relative to foreign foods therefore export goes down and import goes up which decreases net export.

net export function

reflects this inverse relationship between NX and ε.

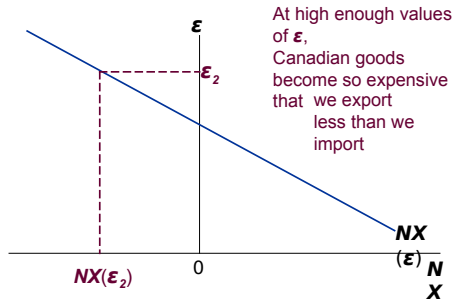
$$NX = NX(\varepsilon) \tag{5.5}$$

The *NX* curve for Canada



A good example is Wood, and to a lesser extent regional jet aircraft.

The *NX* curve for Canada



A good example is toys

How ε is determined

The accounting identity says $NX = S - I$.
We saw earlier how $S - I$ is determined:

- S depends on domestic factors (output, fiscal policy variables, etc)
- I is determined by the world interest rate r^*.

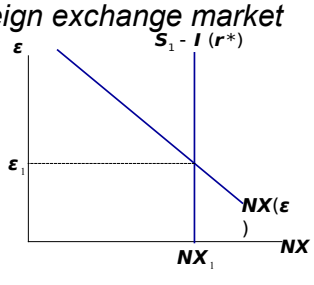
So, ε must ensure

$$NX(\varepsilon) = \bar{S} - I(r^*)$$

Interpretation: Supply and demand in the foreign exchange market

demand: Foreigners need dollars to buy U.S. net exports.

supply: Net capital outflow (***S - I***) is the supply of dollars to be invested abroad.



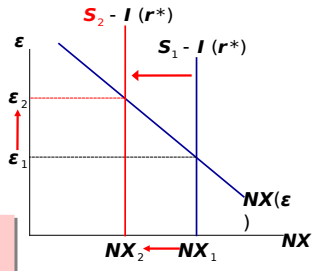
Neither S nor I depends on ε, so the net capital outflow NX_1 is vertical. ε adjusts to equate NX with net capital outflow, $S - I$.

Demand is from foreigners needing to buy our currency to buy our exports.
Supply is the net capital outflow of our currency invested abroad.

Fiscal policy at home

1. Fiscal policy at home

A fiscal expansion reduces national saving, net capital outflow, and the supply of dollars in the foreign exchange market…

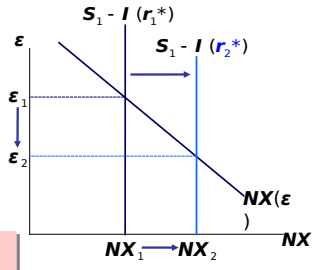


…causing the real exchange rate to rise and ***NX*** to fall.

Fiscal policy abroad

2. Fiscal policy abroad

An increase in ***r**** reduces investment, increasing net capital outflow and the supply of dollars in the foreign exchange market…

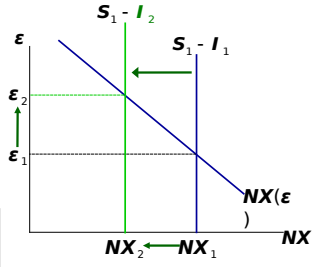


…causing the real exchange rate to fall and ***NX*** to rise.

Increase in investment demand

3. Increase in investment demand

An increase in investment reduces net capital outflow and the supply of dollars in the foreign exchange market…

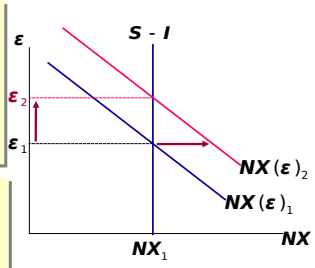


…causing the real exchange rate to rise and ***NX*** to fall.

Trade policy to restrict imports

4. Trade policy to restrict imports

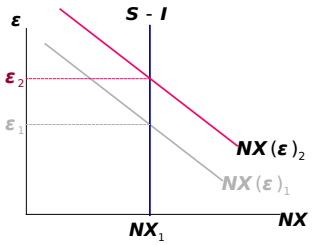
At any given value of ***ε***, an import quota
⇒ ↓***IM*** ⇒ ↑***NX***
⇒ demand for dollars shifts right



Trade policy doesn't affect ***S*** or ***I*** , so capital flows and the supply of dollars remain fixed.

4. Trade policy to restrict imports

Results:
Δε > 0 (demand increase)
ΔNX = 0 (supply fixed)
ΔIM < 0 (policy)
ΔEX < 0 (rise in ***ε***)



Determinants of the nominal exchange rate

Nominal exchange rate

This is the equation for the nominal exchange rate.

$$e = \varepsilon \times \frac{P^*}{P} \tag{5.6}$$

So e depends on the real exchange rate and the price levels at home and abroad.

Var	Determinants
ε	$\bar{H} - I(r^*)$
P^*	$L^*(r^* + \pi^*, Y^*)$
P	$L(r^* + \pi, Y)$

The growth rate of e equals the difference between foreign and domestic inflation rates.

$$\frac{\Delta e}{e} = \frac{\Delta \varepsilon}{\varepsilon} + \pi^* - \pi \tag{5.7}$$

Purchasing Power Parity

Purchasing Power Parity (PPP)

There are two definitions of PPP:

- A doctrine that states that goods must sell at the same (currency-adjusted) price in all countries.
- The nominal exchange rate adjusts to equalize the cost of a basket of goods across countries.

This because of arbitrage, the law of one price.

$$P^* = e \times P \tag{5.8}$$

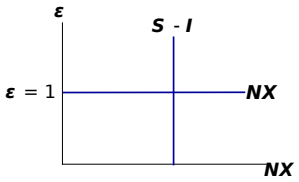
$$e = \frac{P^*}{P} \tag{5.9}$$

PPP implies that the nominal exchange rate between two counties equals the ratio of the countries' price level.

Purchasing Power Parity (PPP)

- If $e = P^*/P$, then $\varepsilon = e \times \frac{P}{P^*} = \frac{P^*}{P} \times \frac{P}{P^*} = 1$

and the *NX* curve is horizontal:



Under PPP, changes in $(S - I)$ have no impact on ε or e.

Does PPP hold in the real world?

No, for two reasons:

1. International arbitrage is not possible
   - non-traded goods
   - transportation costs
2. Different countries' goods are not perfect substitutes.

Nonetheless, PPP is a useful theory. It's simple and intuitive and in the real world, nominal exchange rates tend towards their PPP values over the long run.
The U.S. as a large open economy. So far we've learned the long-run models for two extreme cases: The closed economy and the small open economy. The US is an example of a large open economy, and it falls in between these two extremes. A fiscal expansion causes national savings to fall. The effect of this depends on openness and size.

	Close economy	Large open economy	small open economy
r	rises	rises, but not as much as in closed economy	no change
I	falls	falls but not as much as in closed economy	no change
NX	no change	falls, but not as much as in small open economy	falls

Chapter 6: Introduction to Economic Fluctuations

Facts about the business cycle.

- GDP growth averages 3–3.5 percent per year over the long run with large fluctuations in the short run
- Consumption and investment fluctuate with GDP, but consumption tends to be less volatile and investment more volatile than GDP.
- Unemployment rises during recessions and falls during expansions.

Index of Leading Economic Indicators.

- Published monthly by the Conference Board
- Aims to forecast changes in economic activity 6-9 months into the future
- Used in planning by businesses and govt, despite not being a perfect predictor.

Due to the unpredictability of the business cycle they only look at 6 to 9 months into the future.

Components of the LEI index.

- New orders for consumer goods and materials
- New orders, non-defense capital goods
- New building permits issued
- Index of stock prices
- Money supply data
- Yield spread (10-year minus 3-month) on Treasuries
- Index of consumer expectations

Time horizon in macroeconomics.

Long run	Prices are flexible, respond to changes in supply or demand
Short run	Many prices are "sticky" at some predetermined level

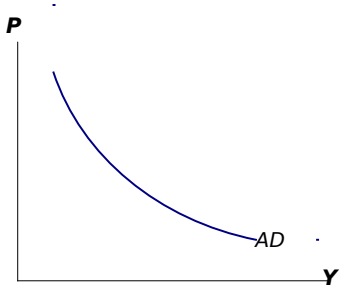
Now fiscal and monetary policy as well as other factors like exogenous changes in C or I will now affect output when prices are sticky

Aggregate demand

- The aggregate demand curve shows the relationship between the price level and the quantity of output demanded.
- For this chapter's intro to the *AD/AS* model, we use a simple theory of aggregate demand based on the quantity theory of money.
- Chapters 10-12 develop the theory of aggregate demand in more detail.

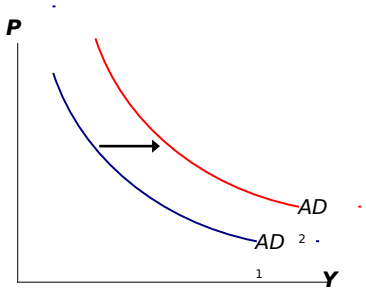
The downward-sloping *AD* curve

An increase in the price level causes a fall in real money balances (***M/P***), causing a decrease in the demand for goods & services.



Shifting the *AD* curve

An increase in the money supply shifts the *AD* curve to the right.



Aggregate supply in the long run

- Recall from Chapter 3:
  In the long run, output is determined by factor supplies and technology
  $\bar{Y} = F(\bar{K}, \bar{L})$

$\bar{Y}$ is the **full-employment** or **natural** level of output, the level of output at which the economy's resources are fully employed.

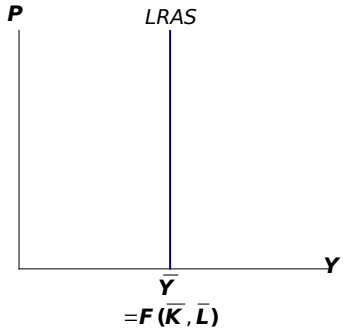
"Full employment" means that unemployment equals its natural rate (not zero).

Aggregate supply in the short run

- Many prices are sticky in the short run.
- For now (and through Chap. 12), we assume
  - all prices are stuck at a predetermined level in the short run.
  - firms are willing to sell as much at that price level as their customers are willing to buy.
- Therefore, the short-run aggregate supply (*SRAS*) curve is horizontal:

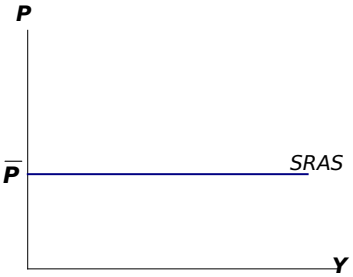
The long-run aggregate supply curve

$\bar{Y}$ does not depend on P, so *LRAS* is vertical.

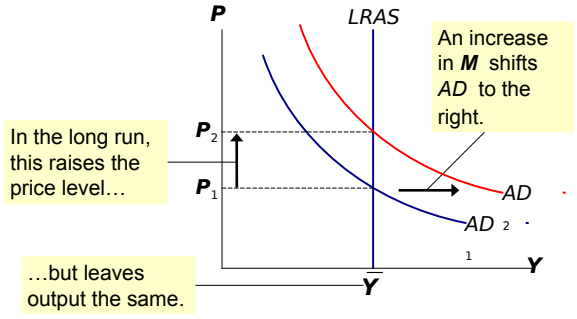


The short-run aggregate supply curve

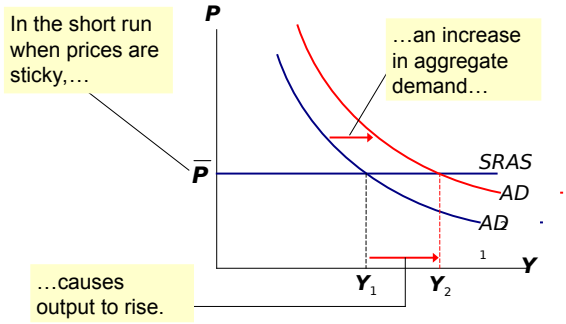
The *SRAS* curve is horizontal:
The price level is fixed at a predetermined level, and firms sell as much as buyers demand.



Long-run effects of an increase in *M*



Short-run effects of an increase in *M*



In the short run the price is fixed and the only thing that will change is the level of output.

From short run to long run

Over time, prices gradually become "unstuck". When they do, this will happen.

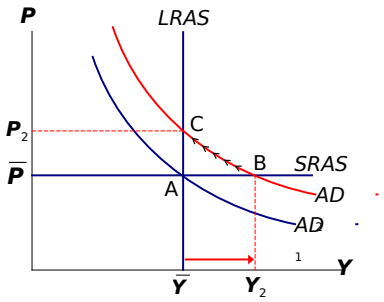
$$Y > \bar{Y} \text{ then } P \uparrow$$
$$Y < \bar{Y} \text{ then } P \downarrow$$
$$Y = \bar{Y} \text{ then } P \text{ Remains constant}$$

The SR & LR effects of $\Delta M > 0$

A = initial equilibrium

B = new short-run eq'm after BOC increases ***M***

C = long-run equilibrium



Supply shocks

- A **supply shock** alters production costs, affects the prices that firms charge. (also called **price shocks**)
- Examples of *adverse* supply shocks:
  - Bad weather reduces crop yields, pushing up food prices.
  - Workers unionize, negotiate wage increases.
  - New environmental regulations require firms to reduce emissions. Firms charge higher prices to help cover the costs of compliance.
- *Favorable* supply shocks lower costs and prices.

How shocking!!!

- **shocks**: exogenous changes in agg. supply or demand
- Shocks temporarily push the economy away from full employment.
- Example: exogenous decrease in velocity

  If the money supply is held constant, a decrease in ***V*** means people will be using their money in fewer transactions, causing a decrease in demand for goods and services.

Supply shock is often called price shocks as the rapid change in the cost of production often affect supply.

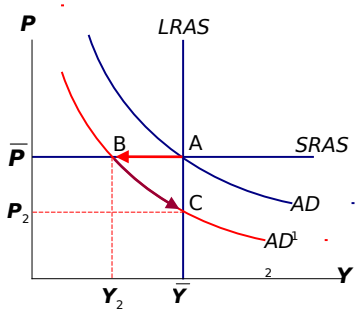
CASE STUDY: The 1970s oil shocks

- Early 1970s: OPEC coordinates a reduction in the supply of oil.
- Oil prices rose
  11% in 1973
  68% in 1974
  16% in 1975
- Such sharp oil price increases are supply shocks because they significantly impact production costs and prices.

The effects of a negative demand shock

AD shifts left, depressing output and employment in the short run.

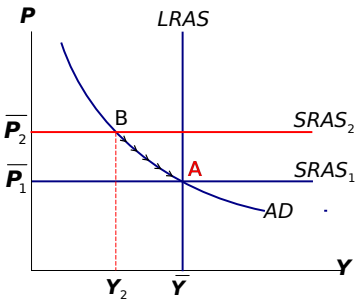
Over time, prices fall and the economy moves down its demand curve toward full-employment.



CASE STUDY: The 1970s oil shocks

The oil price shock shifts *SRAS* up, causing output and employment to fall.

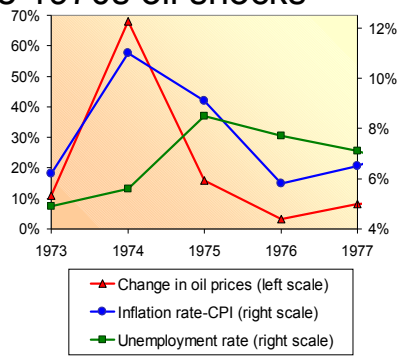
In absence of further price shocks, prices will fall over time and economy moves back toward full employment.



CASE STUDY: The 1970s oil shocks

Predicted effects of the oil shock:
- inflation ↑
- output ↓
- unemployment ↑

…and then a gradual recovery.

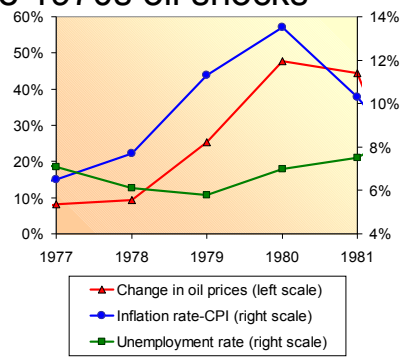


Stabilization policy

- def: policy actions aimed at reducing the severity of short-run economic fluctuations.
- Example: Using monetary policy to combat the effects of adverse supply shocks:

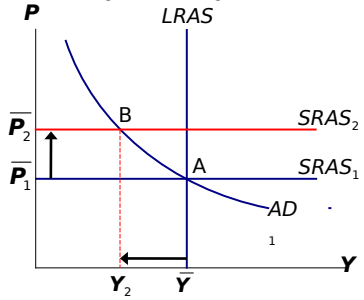
CASE STUDY: The 1970s oil shocks

Late 1970s:
As economy was recovering, oil prices shot up again, causing another huge supply shock!!!



Stabilizing output with monetary policy

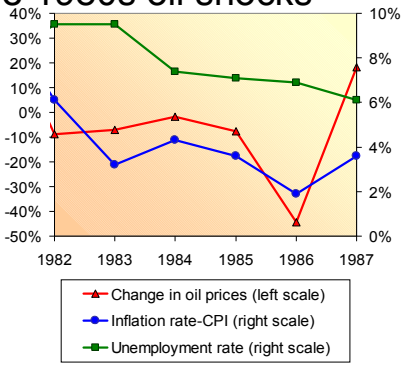
The adverse supply shock moves the economy to point B.



CASE STUDY: The 1980s oil shocks

1980s:
A favorable supply shock--a significant fall in oil prices.

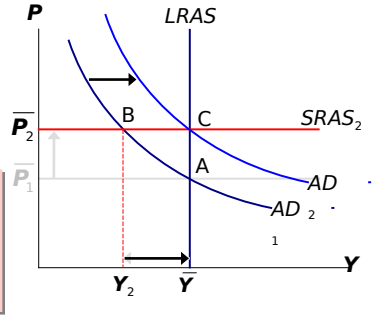
As the model predicts, inflation and unemployment fell:



Stabilizing output with monetary policy

But the BOC accommodates the shock by raising agg. demand.

results:
P is permanently higher, but ***Y*** remains at its full-employment level.



Chapter 7: Aggregate Demand I: Building the IS-LM Model

The IS-LM model is the leading interpretation of Keynes's General Theory of Employment, Interest, and Money. It is the classical theory of explaining economics for our country.

The IS stands for investment and savings while LM stands for liquidity and money. These factors are used in our assumption where they are fixed.

Keynesian Cross

Keynesian Cross

A simple closed economy model in which income id determined by expenditure.

$E = C + I + G$ = Planned expenditure
I = Planned investment
Y = Real GDP = actual expenditure
$E - Y$ = Unplanned inventory investments
$C = C(Y - T)$

Assumption

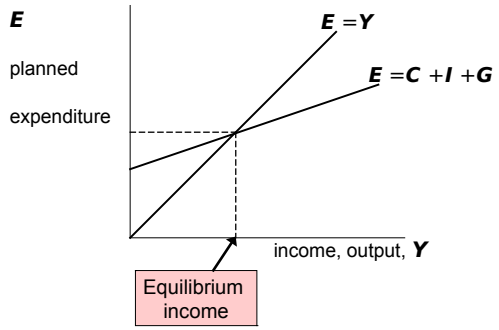
We assume that $G = \bar{G}$, $T = \bar{T}$, and $I = \bar{I}$.

Therefore our planned expenditure function is:

$$E = C(Y - \bar{T}) + \bar{I} + \bar{G} \tag{7.1}$$

The equilibrium condition is that the actual expenditure equals planned expenditure.

The equilibrium value of income



Unplanned inventory investments

If the PE < Y then unplanned inventory will rise as people are buying less than companies anticipated which will lead them to decrease production and cause income to fall.
If the PE > Y then unplanned inventory will fall as people are buying more than companies anticipated which will lead them to increase production and cause income to rise.

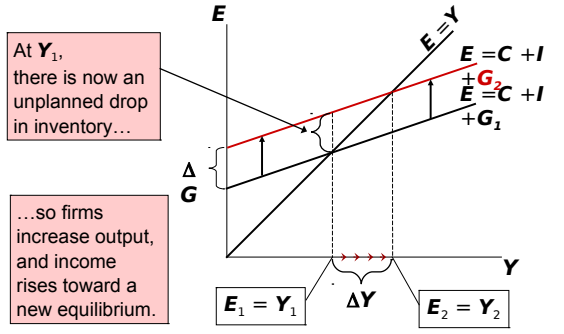
Government Spending

Government Purchases Multiplier

If the government increase their purchases by 1$ then it will increase the PE by the multiplier. Same effect applies to a decrease in purchases.

$$\frac{\Delta Y}{\Delta G} = \frac{1}{1 - MPC} \tag{7.2}$$

An increase in government purchases



The reason why the multiplier is greater than 1 is because an increase in government spending causes a feedback loop of increasing Y which increases C which increases Y and so forth. So the final impact on income is much bigger than the initial increase of G.

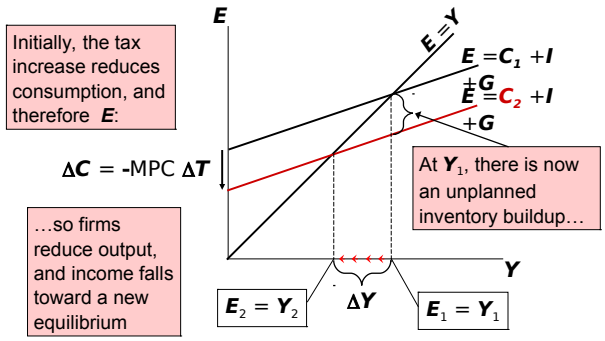
Taxes

Tax Multiplier

If the government raise taxes by 1$ then it will decrease the the PE by the multiplier. Same effect applies to a decrease in taxes.

$$\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - MPC} \tag{7.3}$$

An increase in taxes



The reason why the tax multiplier is negative is because a decrease in taxes will lead to an increase in disposable income. It's also greater than 1 as previously mention before but will be smaller than the government spending multiplier.

IS Curve

Definition

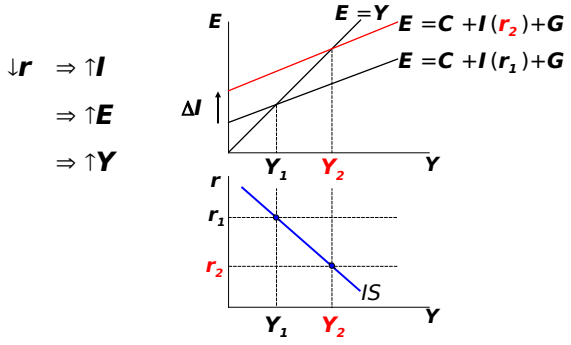
A graph of all combinations of r and Y that result in goods market equilibrium.

i.e. actual expenditure(output) = planned expenditure

The equation of the IS curve is:

$$Y = C(Y - \bar{T}) + I(r) + \bar{G} \tag{7.4}$$

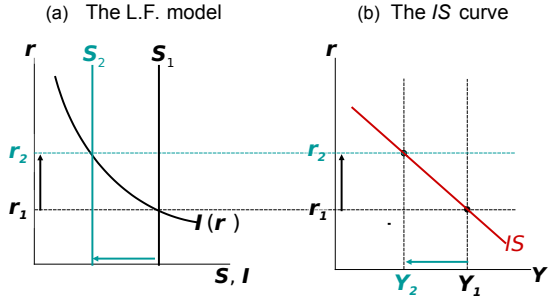
Deriving the *IS* curve



The IS curve is **not** a demand curve. It is an equilibrium curve where I = S for all values of r.

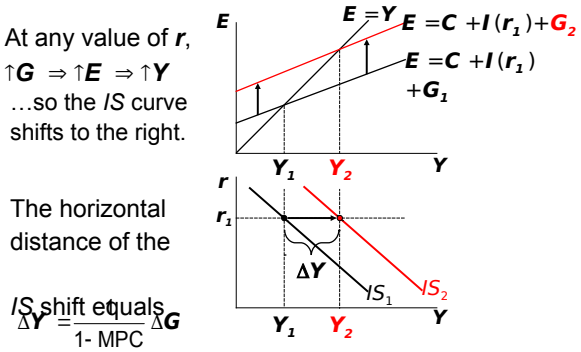
A fall in interest rate motivates firms to increase investment spending which drives up total planned spending. To restore equilibrium in the goods market, output must increase.

The *IS* curve and the loanable funds model



We can use the IS-LM model to see how fiscal policy (G and T) affects aggregate demand and output.

Shifting the *IS* curve: ΔG



IM Curve

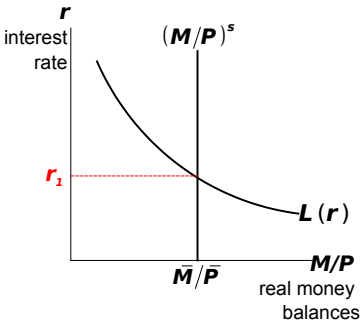
A simple theory in which the interest rate is determined by money supply and money demand.

The supply of real money is balances is fixed. While the demand for real money balances is a function of the interest rate.

Equilibrium

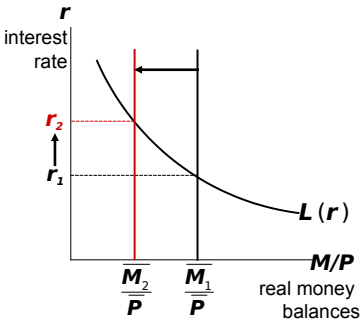
The interest rate adjusts to equate the supply and demand for money:

$\bar{M}/\bar{P} = L(r)$



How the BOC raises the interest rate

To increase *r*, BOC reduces *M*



CASE STUDY:
Monetary Tightening & Interest Rates

- Late 1970s: π > 10%
- Oct 1979: Fed Chairman Paul Volcker announces that monetary policy would aim to reduce inflation
- Aug 1979-April 1980: Fed reduces *M/P* 8.0%
- Jan 1983: π = 3.7%

How do you think this policy change would affect nominal interest rates?

Monetary Tightening & Rates, *cont.*

The effects of a monetary tightening on nominal interest rates		
	short run	long run
model	Liquidity preference *(Keynesian)*	Quantity theory, Fisher effect *(Classical)*
prices	sticky	flexible
prediction	$\Delta i > 0$	$\Delta i < 0$
actual outcome	8/1979: i = 10.4% 4/1980: i = 15.8%	8/1979: i = 10.4% 1/1983: i = 8.2%

LM Curve

Now let's put Y back into the money demand function:

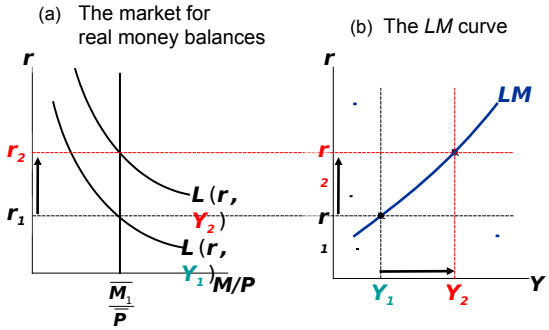
$$(M/P)^d = L(r, Y)$$

LM Curve

The LM curve is a graph of all combinations of r and Y that equate the supply and demand for real money balances. The equation for the LM curve is:

$$\frac{\bar{M}}{\bar{P}} = L(r, Y) \qquad (7.5)$$

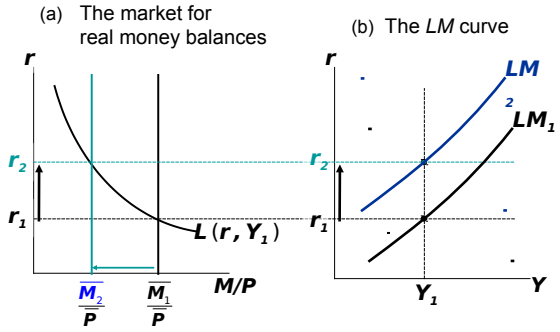
Deriving the *LM* curve



Why the LM curve is upward sloping

An increase in income raises money demand. Since the supply of real balances is fixed, there is now excess demand in the money market at the initial interest rate. In order to restore equilibrium in the money market the interest rate must rise.

How ΔM shifts the *LM* curve



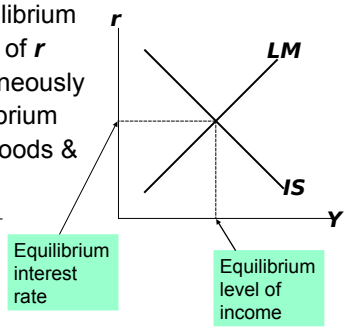
IS-LM equilibrium

The short-run equilibrium

The short-run equilibrium is the combination of r and Y that simultaneously satisfies the equilibrium conditions in the goods & money markets:

$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

$$\bar{M}/\bar{P} = L(r, Y)$$



Any points on the LM graph is market clearing in the money market.

Any points on the IS graph is market clearing in the goods market.

Three Models of Aggregate Supply

Three models of aggregate supply

1. The sticky-wage model
2. The sticky-price model
3. The imperfect-information model

Sticky-wage Model

The sticky-wage model tries to explain why the aggregate supply graph is positively sloped. Keynes thought that employment contracts was the answer to this behavior. Where employers couldn't change wages as they were bounded by a contract.

Assume that firms and workers negotiate contracts and fix the nominal wage before they know what the price level will turn out to be.
The nominal wage they set is the product of a target real wage and the expected price level.

Sticky-wage equation

$$\frac{W}{P} = \omega \times \frac{PE}{P} \qquad (7.6)$$

ω = target real wage

Stick Wage Model Equation:

$$Y = \bar{Y} = \alpha(P - PE) \qquad (7.7)$$

- Y = Aggregated output
- $\bar{Y}$ = Natural rate of output
- α = a positive parameter
- P = The actual price level
- PE = Expected Price level

The sticky-wage model

$$\frac{W}{P} = \omega \times \frac{P^e}{P}$$

If it turns out that	then
$P = P^e$	Unemployment and output are at their natural rates.
$P > P^e$	Real wage is less than its target, so firms hire more workers and output rises above its natural rate.
$P < P^e$	Real wage exceeds its target, so firms hire fewer workers and output falls below its natural rate.

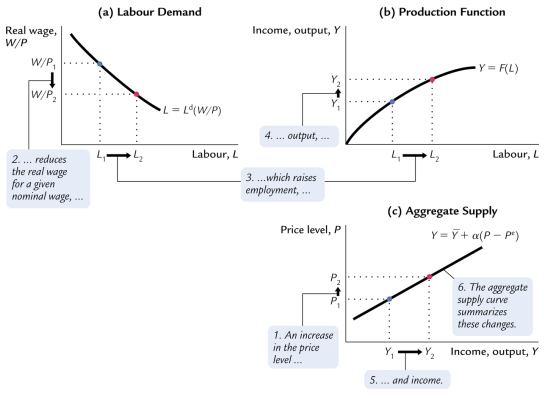


Figure 13.1 The Sticky-Wage Model
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

Counter-Cyclical

Implies that the real wage should move in the opposite direction as output during business cycles:

In booms, when P typically rises, real wage should fall.

In recessions, when P typically falls, real wage should rise.

This prediction however does not come true in the real world.

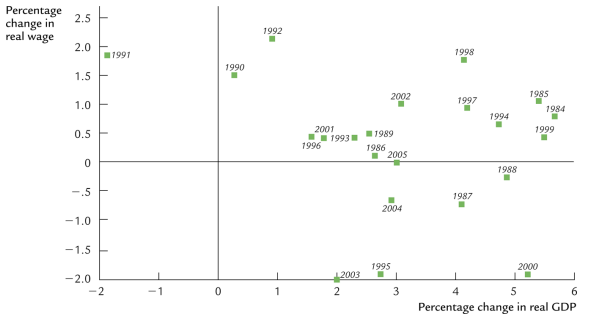


Figure 13.2 The Cyclical Behavior of the Real Wage
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

The problem with this model is that it assume that workers are on contracts but most of them are not. Unionized labour has been falling yet this pattern still holds.

Stick-Price Model

Reasons for sticky prices: Long-term contracts between firms and customers, cost to change menus, firms not wishing to annoy customers with frequent price changes, etc.

Lets assume that firms can set their own prices (as in a monopolistic competition).

Stick-Price Model

An individual firm's desire price is:

$$p = PE + a(Y - \bar{Y}) \tag{7.8}$$

Where:

$(Y - \bar{Y})$ = output gap
$a > 0$
PE = Expected price level
p = Actual sticky price

Assume sticky price firms expect that output will equal its natural rate. Then, $p = PE$.

Let s be the fraction of firms with sticky prices. Then,

$$P = sPE + (1 - s)[P + a(Y - \bar{Y})]$$

Where sPE is the price set by stick price firms, and $P + a(Y - \bar{Y})$ are price set by flexible firms.

Rearranging the parameters will lead to this equation.

$$P = PE + \frac{(1 - s)a}{s}(Y - \bar{Y})$$

Therefore, if PE is high then P will be high as firms expect higher prices. Therefore, firms that has the ability to set prices will set them higher. Other firms respond by setting higher prices.

Moreover, if Y is high then P will be high as a higher income will lead to an increase demand for goods. Firms with flexible prices will set their prices higher. The weight of the change in price is proportional to s. So a large s will lead to a greater change in P.

$$P = P^e + \left[\frac{(1 - s)\alpha}{s}(Y - \bar{Y})\right]$$

$$Y = \bar{Y} + \alpha(P - P^e)$$

$$\alpha = \frac{s}{(1 - s)\alpha}$$

In contrast to the sticky-wage model, the sticky-price model implies a pro-cyclical real wage: Suppose aggregate output/income fall. Then, firms see a fall in demand for their products. Firms with sticky prices reduce production, and hence reduce their demand for labour. The leftward shift in labor demand causes the real wage to fall.

This model is better than the sticky-wage model as it better explain the relationship between price and output. You can consider this to be an evolutionary improvement over the sticky-wage model.

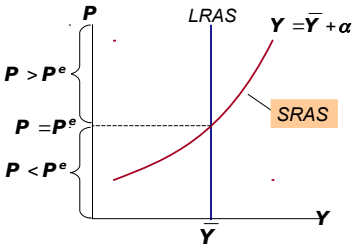
Imperfect-Information Model

Assume that all wages and prices are perfectly flexible, and that all markets are clear. We also assume that each supplier produce one good, and consume many goods. Each supplier knows the nominal price of the good they produce, but does not know the overall price level.

Supply of each good depends on its relative price: the nominal price of the good divided by the overall price level. The supplier does not know the price level at the time they make their decision, so they use the expected price level PE.

Suppose P rises but PE does not. The supplier think that their relative price has risen so they produce more. When the rest of the producers think this way then Y will rise whenever P rises above PE and vice versa.

Summary & implications



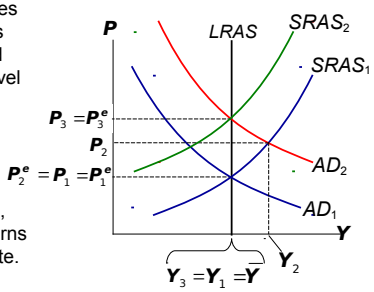
Each of the three models of agg. supply imply the relationship summarized by the *SRAS* curve & equation.

Summary & implications

Suppose a positive *AD* shock moves output above its natural rate and ***P*** above the level people had expected.

Over time, P^e rises, *SRAS* shifts up, and output returns to its natural rate.

SRAS equation: $Y = \bar{Y} + \alpha(P - P^e)$



Because there was a positive change from P1 to P2 people will think that inflation will continue to climb. Thus will decrease the SRAS to a new equilibrium.

Keynesian Economist think that P2 is a new equilibrium point.

Chapter 8: Aggregated Demand 2: Applying the IS-LM Model

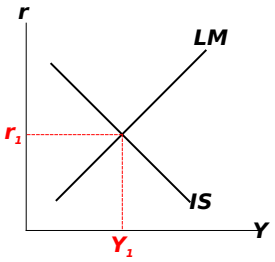
Equilibrium in the *IS-LM* model

The *IS* curve represents equilibrium in the goods market.

$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

The *LM* curve represents money market equilibrium.

$$\bar{M}/\bar{P} = L(r, Y)$$



The intersection determines the unique combination of Y and r that satisfies equilibrium in both markets.

How policy affects IS-LM

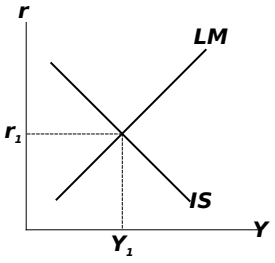
Policy analysis with the *IS-LM* model

$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

$$\bar{M}/\bar{P} = L(r, Y)$$

We can use the *IS-LM* model to analyze the effects of

- fiscal policy: G and/or T
- monetary policy: M

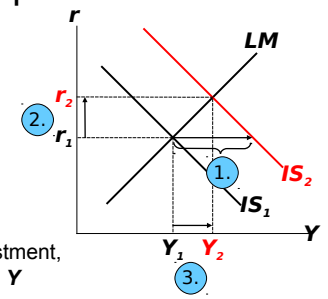


When Government buys stuff

An increase in government purchases

1. *IS* curve shifts right by $\frac{1}{1 - MPC} \Delta G$ causing output & income to rise.
2. This raises money demand, causing the interest rate to rise…
3. …which reduces investment, so the final increase in Y

is smaller than $\frac{1}{1 - MPC} \Delta G$



There is a feedback loop when the government increase spending as an increase in Y increases the Y used in the LM function which is fixed, so in order to compensate for the increase r increases which will feedback into the IS model.

When Government cut taxes

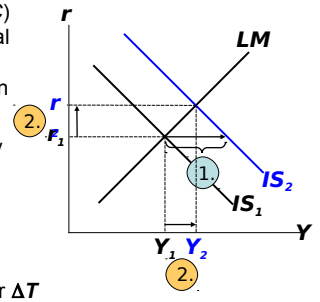
A tax cut

Consumers save (1-*MPC*) of the tax cut, so the initial boost in spending is smaller for ΔT than for an equal ΔG…

and the *IS* curve shifts by

1. $\frac{-MPC}{1 - MPC} \Delta T$

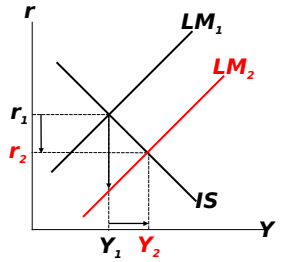
2. …so the effects on r and Y are smaller for ΔT than for an equal ΔG.



An increase in Money Supply

Monetary policy: An increase in *M*

1. $\Delta M > 0$ shifts the *LM* curve down (or to the right)
2. …causing the interest rate to fall
3. …which increases investment, causing output & income to rise.



In general
an increase in G or a decrease in T will shift the IS to the right
a decrease in G or a increase in T will shift the IS to the left
an increase in M will shift the LM to the right
a decrease in M will shift the LM to the left

Interaction between monetary and fiscal policy

Interaction between monetary & fiscal policy

- Model:
  Monetary & fiscal policy variables (***M***, ***G,*** and ***T***) are exogenous.
- Real world:
  Monetary policymakers may adjust ***M*** in response to changes in fiscal policy, or vice versa.
- Such interaction may alter the impact of the original policy change.

The BOC's response to $\Delta G > 0$

- Suppose government increases ***G***.
- Possible BOC responses:
  1. hold ***M*** constant
  2. hold ***r*** constant
  3. hold ***Y*** constant
- In each case, the effects of the ΔG are different:

Response 1: Hold *M* constant

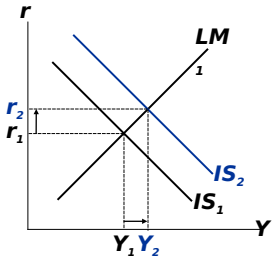
If government raises ***G***, the *IS* curve shifts right.

If BOC holds ***M*** constant, then *LM* curve doesn't shift.

Results:

$$\Delta Y = Y_2 - Y_1$$

$$\Delta r = r_2 - r_1$$



You get crowding out

Response 2: Hold *r* constant

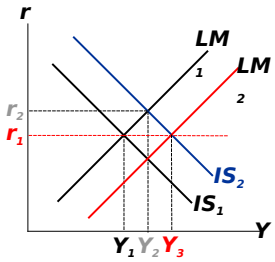
If government raises ***G***, the *IS* curve shifts right.

To keep ***r*** constant, BOC increases ***M*** to shift *LM* curve right.

Results:

$$\Delta Y = Y_3 - Y_1$$

$$\Delta r = 0$$



$$\frac{1}{1-MPC} = \Delta Y$$

You also get no crowding out

Response 3: Hold *Y* constant

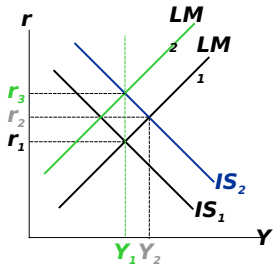
If government raises ***G***, the *IS* curve shifts right.

To keep ***Y*** constant, BOC reduces ***M*** to shift *LM* curve left.

Results:

$\Delta Y = 0$

$\Delta r = r_3 - r_1$



You get complete crowding out. Worst than response 1 as r is higher.

Estimates of fiscal policy multipliers

from the DRI macroeconometric model

Assumption about monetary policy	Estimated value of $\Delta Y / \Delta G$	Estimated value of $\Delta Y / \Delta T$
Fed holds money supply constant	0.60	-0.26
Fed holds nominal interest rate constant	1.93	-1.19

Shocks in the IS-LM model

IS shocks. exogenous changes in the demand for goods and services.

In the 80s the performance of the stock market didn't affect consumer purchases of goods.
In the late 90s the performance of the financial market have a clear impact on current or goods spending.
This is because technology and the internet made it easier to buy and sell shares.
Moreover, people are getting older and are withdrawing from their retirement account which are part of investment. These are changes in businesses or consumer confidence or expectation.

LM shocks. exogenous changes in the demand for money

Example:

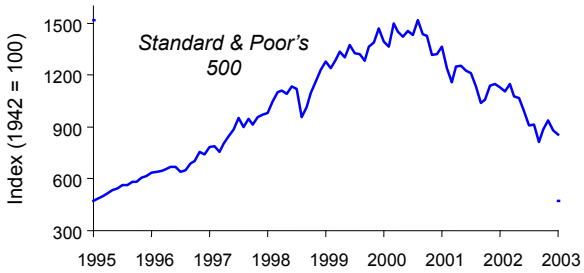
- a wave of credit card fraud increases demand for money
- more ATMs or the Internet reduce money demand

CASE STUDY: The U.S. recession of 2001

- During 2001,
  - 2.1 million people lost their jobs, as unemployment rose from 3.9% to 5.8%.
  - GDP growth slowed to 0.8% (compared to 3.9% average annual growth during 1994-2000).

CASE STUDY: The U.S. recession of 2001

- Causes: 1) Stock market decline ⇒ ↓***C***



CASE STUDY: The U.S. recession of 2001

- Causes: 2) 9/11
  - increased uncertainty
  - fall in consumer & business confidence
  - result: lower spending, *IS* curve shifted left
- Causes: 3) Corporate accounting scandals
  - Enron, WorldCom, *etc.*
  - reduced stock prices, discouraged investment

CASE STUDY: The U.S. recession of 2001

- Fiscal policy response: shifted *IS* curve right
  - tax cuts in 2001 and 2003
  - spending increases
    - airline industry bailout
    - NYC reconstruction
    - Afghanistan war

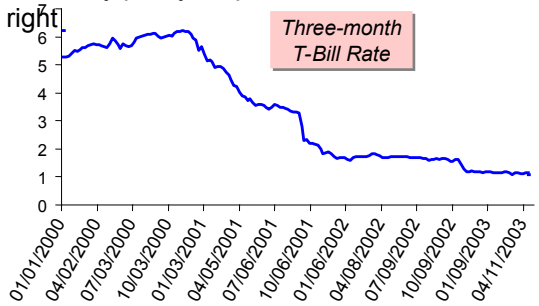
What is the Fed's policy instrument?

Why does the Fed target interest rates instead of the money supply?

1) They are easier to measure than the money supply.
2) The Fed might believe that *LM* shocks are more prevalent than *IS* shocks. If so, then targeting the interest rate stabilizes income better than targeting the money supply.

CASE STUDY: The U.S. recession of 2001

- Monetary policy response: shifted *LM* curve right



What is the Fed's policy instrument?

- The news media commonly report the Fed's policy changes as interest rate changes, as if the Fed has direct control over market interest rates.
- In fact, the Fed **targets** the *federal funds rate* – the interest rate banks charge one another on overnight loans.
- The Fed changes the money supply and shifts the *LM* curve to achieve its target.
- Other short-term rates typically move with the federal funds rate.

IS-LM and aggregate demand

- So far, we've been using the *IS-LM* model to analyze the short run, when the price level is assumed fixed.
- However, a change in ***P*** would shift *LM* and therefore affect ***Y.***
- The **aggregate demand curve** (*introduced in Chap. 9*) captures this relationship between ***P*** and ***Y.***

We can derive the AD curve from the IS-LM model

Summary

increase money → AD shifts to the right

decrease money →AD shifts to the left

increase government spending or decrease taxes → AD shift to the right

decrease government spending or increase taxes → AD shift to the left

Deriving the *AD* curve

Intuition for slope of *AD* curve:

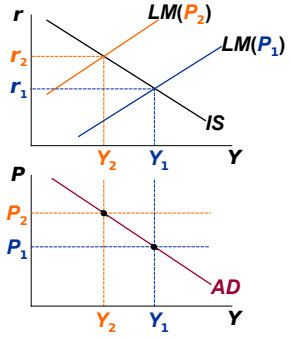
↑***P*** ⇒ ↓(***M/P***)

⇒ *LM* shifts left

⇒ ↑***r***

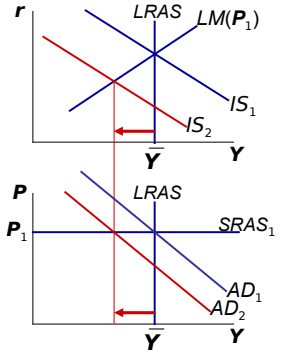
⇒ ↓***I***

⇒ ↓***Y***



The SR and LR effects of an *IS* shock

A negative *IS* shock shifts *IS* and *AD* left, causing ***Y*** to fall.



Monetary policy and the *AD* curve

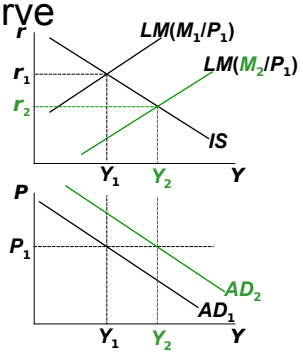
The BOC can increase aggregate demand:

↑***M*** ⇒ *LM* shifts right

⇒ ↓***r***

⇒ ↑***I***

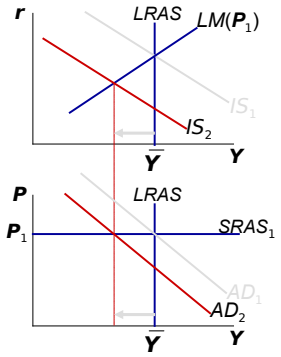
⇒ ↑***Y*** at each value of ***P***



We have a recessionary gap in this case

The SR and LR effects of an *IS* shock

In the new short-run equilibrium, $Y < \bar{Y}$



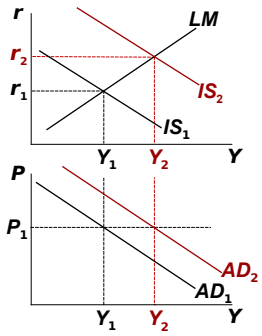
Fiscal policy and the *AD* curve

Expansionary fiscal policy (↑***G*** and/or ↓***T***) increases agg. demand:

↓***T*** ⇒ ↑***C***

⇒ *IS* shifts right

⇒ ↑***Y*** at each value of ***P***

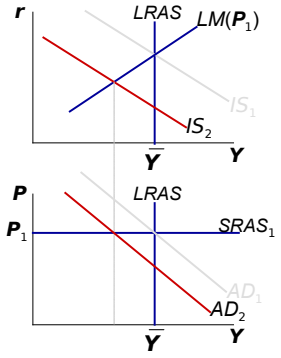


The SR and LR effects of an *IS* shock

In the new short-run equilibrium, $Y < \bar{Y}$

Over time, ***P*** gradually falls, which causes

- *SRAS* to move down.
- ***M/P*** to increase, which causes *LM* to move down.



The SR and LR effects of an *IS* shock

Over time, ***P*** gradually falls, which causes

- *SRAS* to move down.
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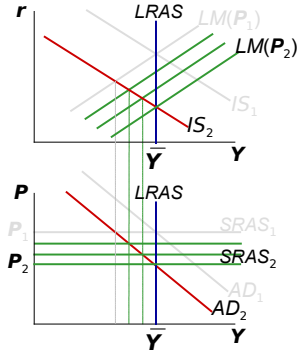
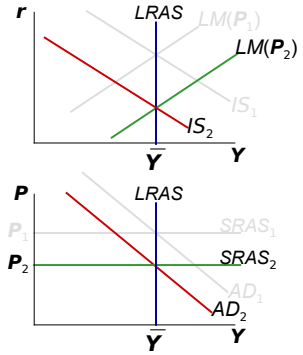


The SR and LR effects of an *IS* shock

This process continues until economy reaches a long-run equilibrium with

$Y = \bar{Y}$



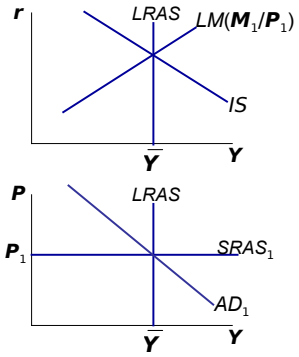
EXERCISE:
Analyze SR & LR effects of ΔM

a. Draw the *IS-LM* and *AD-AS* diagrams as shown here.

b. Suppose BOC increases ***M***. Show the short-run effects on your graphs.

c. Show what happens in the transition from the short run to the long run.

d. How do the new long-run equilibrium values of the endogenous variables compare to their initial values?



Chapter 9: The Mundell-Fleming Model and Exchange Rate Regime

The Model on Y-r Graph

Notations

IS:	$Y = C(Y-T) + I(r) + G + NX(e)$
LM:	$M/P = L(r, Y)$
Domestic rate	$r = r^*$ The world interest rate.

If the Domestic rate is higher than the world rate then the IS curve will shift to the left. More foreign investors will buy into Canada. which will increase the value of the Canadian dollar which will reduce export which shift the IS curve to the left.

If the Domestic rate is lower than the world rate then the IS curve will shift to the right. More Domestic investors will buy foreign currency which will decrease the value of the Canadian dollar which will increase export which will shift the IS curve to the right

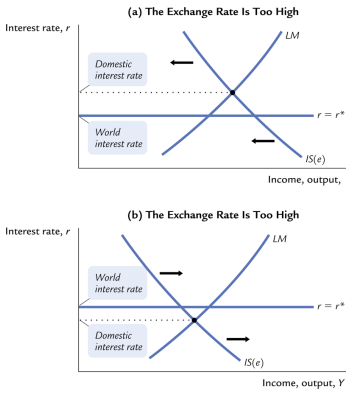


Figure 12.2 The Mundell-Fleming Model With the Exchange Rate at the Wrong Level
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

THe Model on the Y-e Graph

Another way to depict the model is to hold r constant at r^*.

IS^*	$Y = C(Y-T) + I(r^*) + G + NX(e)$
LM^*	$M/P = L(r^*, Y)$

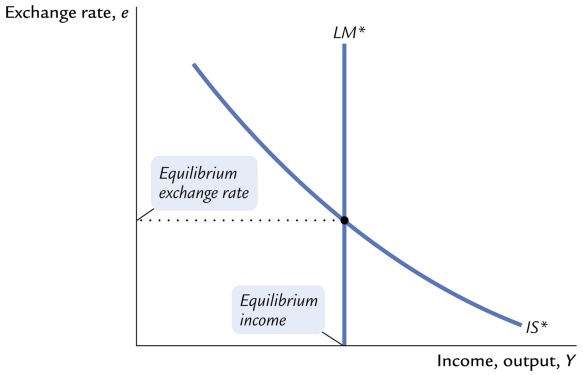


Figure 12.3 The Mundell-Fleming Model
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

Mundell-Fleming Model

Key assumption: Small open economy with perfect capital mobility $r = r^*$

Goods market equilibrium - the IS* curve

$$Y = C(Y-T) + I(r^*) + G + NX(e) \qquad (9.1)$$

where e is the nominal exchange rate or the foreign currency per unit domestic currency.

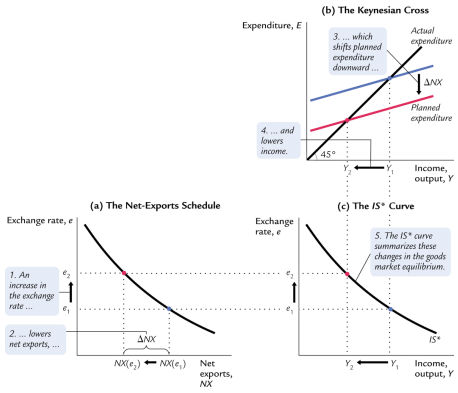


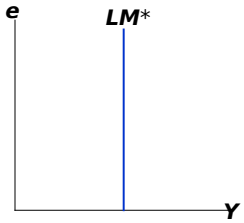
Figure 12.4 The IS* Curve
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

The *LM** curve: Money market eq'm

$$M/P = L(r^*, Y)$$

The *LM** curve

- is drawn for a given value of r^*.
- is vertical because: given r^*, there is only one value of Y that equates money demand with supply, regardless of e.



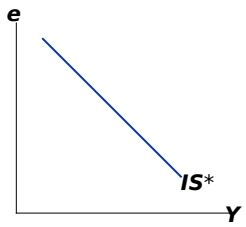
The *IS** curve: Goods market eq'm

$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

The *IS** curve is drawn for a given value of r^*.

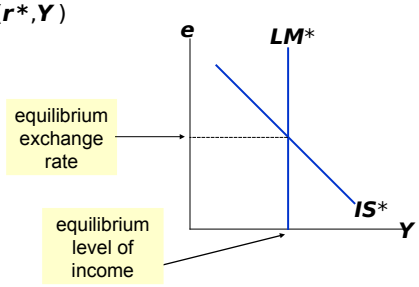
Intuition for the slope:

$$\downarrow e \Rightarrow \uparrow NX \Rightarrow \uparrow Y$$



Equilibrium in the Mundell-Fleming model

$$Y = C(Y - T) + I(r^*) + G + NX(e)$$
$$M/P = L(r^*, Y)$$



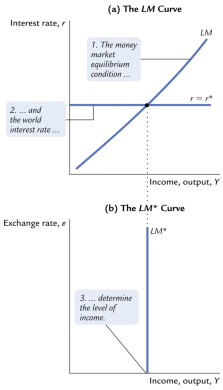


Figure 12.5 The LM* Curve
Mankiw and Scarth: Macroeconomics, Canadian Third Edition

Floating and fixed exchange rate

In a system of **Floating exchange rates**. e is allowed to fluctuate in response to changing economic condition.

In contrast, under **Fixed exchange rates**, the central bank trades domestic for foreign central bank trades domestic for foreign currency at the predetermined price.

Fiscal policy under floating exchange rates

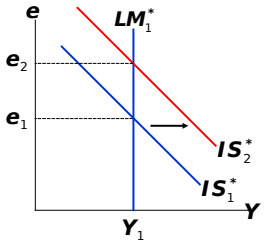
$Y = C(Y - T) + I(r^*) + G + NX(e)$

$M/P = L(r^*, Y)$

At any given value of **e**, a fiscal expansion increases **Y**, shifting *IS** to the right.

Results:

$\Delta e > 0, \ \Delta Y = 0$



Trade policy under floating exchange rates

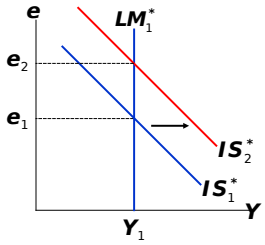
$Y = C(Y - T) + I(r^*) + G + NX(e)$

$M/P = L(r^*, Y)$

At any given value of **e**, a tariff or quota reduces imports, increases **NX**, and shifts *IS** to the right.

Results:

$\Delta e > 0, \ \Delta Y = 0$



In a small open economy with perfect capital mobility, fiscal policy cannot affect real GDP.

When "crowding out"

- **closed economy** Fiscal policy crowds out investment by causing the interest rate to rise.
- **Small open economy** Fiscal policy crowds out net exports by causing the exchange rate to appreciate.

Monetary policy under floating exchange rates

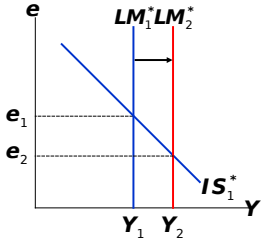
$Y = C(Y - T) + I(r^*) + G + NX(e)$

$M/P = L(r^*, Y)$

An increase in **M** shifts *LM** right because **Y** must rise to restore eq'm in the money market.

Results:

$\Delta e < 0, \ \Delta Y > 0$



Lessons about monetary policy

- Monetary policy affects output by affecting the components of aggregate demand:
  closed economy: $\uparrow M \Rightarrow \downarrow r \Rightarrow \uparrow I \Rightarrow \uparrow Y$
  small open economy: $\uparrow M \Rightarrow \downarrow e \Rightarrow \uparrow NX \Rightarrow \uparrow Y$
- Expansionary mon. policy does not raise world agg. demand, it merely shifts demand from foreign to domestic products.
  So, the increases in domestic income and employment are at the expense of losses abroad.

Lessons about trade policy

Import restrictions cannot reduce a trade deficit. Even though NX is unchanged, there is less trade.

- the trade restriction reduce imports
- the exchange rate appreciation reduces export

Less trade means fewer "gains from trade"

Import restrictions on specific products save jobs in the domestic industries that produce those products, but destroy jobs in export-producing sectors. Hence, import restrictions fails to increase total employment. Also, import restrictions create "sectorial shifts", which cause frictional unemployment.

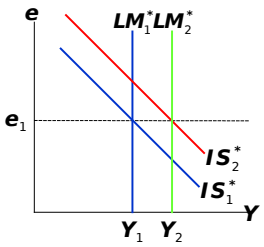
Fixed exchange rates

Under a fixed exchange rates, the central bank stands ready to buy or sell the domestic currency for foreign currency at a predetermined rate. In the Mundell-Fleming mode, the central bank shifts the LM* curve as required to keep e at its announced rate. This system fixes the nominal exchange rate. In the long-run, when prices are flexible the real exchange rate can move even if the nominal rate is fixed.

Fiscal policy under fixed exchange rates

Under floating rates, fiscal policy is ineffective at changing output.

Under fixed rates, fiscal policy is very effective at changing output.



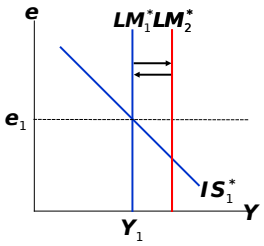
Results:

$\Delta e = 0, \ \Delta Y > 0$

Monetary policy under fixed exchange rates

Under floating rates, monetary policy is very effective at changing output.

Under fixed rates, monetary policy cannot be used to affect output.



Results:

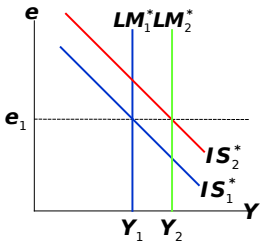
$\Delta e = 0, \ \Delta Y = 0$

Trade policy under fixed exchange rates

Under floating rates, import restrictions do not affect ***Y*** or ***NX.***

Under fixed rates, import restrictions increase ***Y*** and ***NX.***

But, these gains come at the expense of other countries: the policy merely shifts demand from foreign to domestic goods.



Summary of policy effects in the Mundell-Fleming model

	type of exchange rate regime:					
	floating			fixed		
	impact on:					
Policy	***Y***	***e***	***NX***	***Y***	***e***	***NX***
fiscal expansion	0	↑	↓	↑	0	0
mon. expansion	↑	↓	↑	0	0	0
import restriction	0	↑	0	↑	0	↑

Interest-Rate Differentials

Two reason why r may differ from r^*

- **country risk:** The risk that the country's borrowers will default on their loan repayments because of political or economic turmoil. Lenders require a higher rate of interest to compensate for this increase risk.
- **expected exchange rate changes:** If a country's exchange rate is expected to fall, then its borrowers must pay a higher rate of interest to compensate lenders for the expected currency depreciation.

Differentials in the M-F model

Difference

$$r = r^* + \theta \tag{9.2}$$

Where θ is a risk premium, assumed exogenous. Substitute r into the IS* and LM* equation

$$Y = C(Y - T) + I(r^* + \theta) + G + NX(e) \tag{9.3}$$

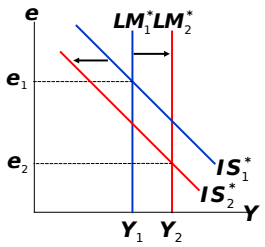
$$M/P = L(r^* + \theta, Y) \tag{9.4}$$

The effects of an increase in θ

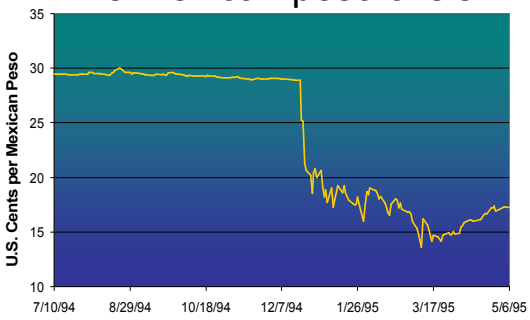
*IS** shifts left, because
$\uparrow\theta \Rightarrow \uparrow r \Rightarrow \downarrow I$

*LM** shifts right, because
$\uparrow\theta \Rightarrow \uparrow r \Rightarrow \downarrow(M/P)^d$,
so Y must rise to restore money market eq'm.

Results:
$\Delta e < 0$, $\Delta Y > 0$



CASE STUDY: The Mexican peso crisis



The effects of an increase in θ

- The fall in e is intuitive:
  An increase in country risk or an expected depreciation makes holding the country's currency less attractive.
  Note: an expected depreciation is a self-fulfilling prophecy.
- The increase in Y occurs because
  the boost in NX (from the depreciation)
  is greater than the fall in I (from the rise in r).

Why income might not rise?
The central bank may try to prevent the depreciation by reducing the money supply. The depreciation might boost the price of imports enough to increase the price level (which would reduce the real money supply). Consumers might respond to the increased risk by holding more money. Each of the above would shift the LM* curve leftward.

Why income might not rise

- The central bank may try to prevent the depreciation by reducing the money supply.
- The depreciation might boost the price of imports enough to increase the price level (which would reduce the real money supply).
- Consumers might respond to the increased risk by holding more money.

Each of the above would shift *LM** leftward.

The Peso crisis didn't just hurt Mexico

- U.S. goods more expensive to Mexicans
  - U.S. firms lost revenue
  - Hundreds of bankruptcies along U.S.-Mexican border
- Mexican assets worth less in dollars
  - Reduced wealth of millions of U.S. citizens

Understanding the crisis

- In the early 1990s, Mexico was an attractive place for foreign investment.
- During 1994, political developments caused an increase in Mexico's risk premium (θ):
  - peasant uprising in Chiapas
  - assassination of leading presidential candidate
- Another factor:
  The Federal Reserve raised U.S. interest rates several times during 1994 to prevent U.S. inflation. ($\Delta r^* > 0$)

Understanding the crisis

- These events put downward pressure on the peso.
- Mexico's central bank had repeatedly promised foreign investors that it would not allow the peso's value to fall,

  so it bought pesos and sold dollars to "prop up" the peso exchange rate.
- Doing this requires that Mexico's central bank have adequate reserves of dollars.
  Did it?

The rescue package

- 1995: U.S. & IMF set up $50b line of credit to provide loan guarantees to Mexico's govt.
- This helped restore confidence in Mexico, reduced the risk premium.
- After a hard recession in 1995, Mexico began a strong recovery from the crisis.

Dollar reserves of Mexico's central bank

December 1993	$28 billion
August 17, 1994	$17 billion
December 1, 1994	$ 9 billion
December 15, 1994	$ 7 billion

During 1994, Mexico's central bank hid the fact that its reserves were being depleted.

CASE STUDY: The Southeast Asian crisis 1997-98

- Problems in the banking system eroded international confidence in SE Asian economies.
- Risk premiums and interest rates rose.
- Stock prices fell as foreign investors sold assets and pulled their capital out.
- Falling stock prices reduced the value of collateral used for bank loans, increasing default rates, which exacerbated the crisis.
- Capital outflows depressed exchange rates.

▯ *the disaster* ▯

- Dec. 20: Mexico devalues the peso by 13% (fixes e at 25 cents instead of 29 cents)
- Investors are ***SHOCKED!*** – they had no idea Mexico was running out of reserves.
- ↑θ, investors dump their Mexican assets and pull their capital out of Mexico.
- Dec. 22: central bank's reserves nearly gone. It abandons the fixed rate and lets e float.
- In a week, e falls another 30%.

Data on the SE Asian crisis

	exchange rate *% change from 7/97 to 1/98*	*stock market* *% change from 7/97 to 1/98*	*nominal GDP % change 1997-98*
Indonesia	-59.4%	-32.6%	-16.2%
Japan	-12.0%	-18.2%	-4.3%
Malaysia	-36.4%	-43.8%	-6.8%
Singapore	-15.6%	-36.0%	-0.1%
S. Korea	-47.5%	-21.9%	-7.3%
Taiwan	-14.6%	-19.7%	n.a.
Thailand	-48.3%	-25.6%	-1.2%
U.S.	n.a.	2.7%	2.3%

Floating vs Fixed

Arguments for floating rates

- allows monetary policy to be used to pursue other goals (stable growth, low inflation)

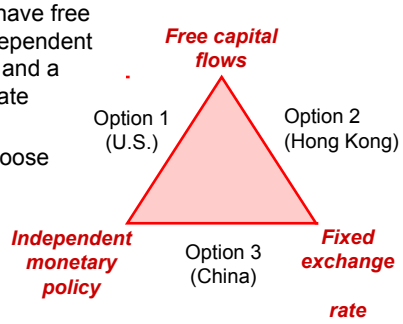
Arguments for fixed rates

- avoids uncertainty and volatility, making international transaction easier.
- disciplines monetary policy to prevent excessive money growth and hyperinflation.

The Impossible Trinity

A nation cannot have free capital flows, independent monetary policy, and a fixed exchange rate simultaneously.

A nation must choose one side of this triangle and give up the opposite corner.



Deriving the *AD* curve

Why *AD* curve has negative slope:

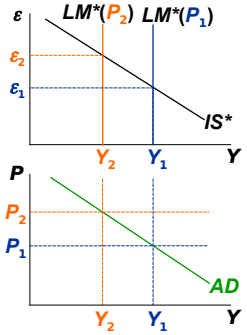
$\uparrow P \Rightarrow \downarrow(M/P)$

$\Rightarrow LM$ shifts left

$\Rightarrow \uparrow \varepsilon$

$\Rightarrow \downarrow NX$

$\Rightarrow \downarrow Y$



Mundell-Fleming and the *AD* curve

- So far in M-F model, P has been fixed.
- Next: to derive the *AD* curve, consider the impact of a change in P in the M-F model.
- We now write the M-F equations as:

$$(IS^*) \quad Y = C(Y - T) + I(r^*) + G + NX(\varepsilon)$$

$$(LM^*) \quad M/P = L(r^*, Y)$$

*(Earlier in this chapter, **P** was fixed, so we could write **NX** as a function of **e** instead of ε.)*

From the short run to the long run

If $Y_1 < \bar{Y}$, then there is downward pressure on prices.

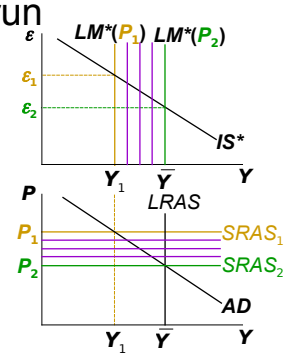
Over time, P will move down, causing

$(M/P)\uparrow$

$\varepsilon \downarrow$

$NX \uparrow$

$Y \uparrow$



Large: Between small and closed

- Many countries – including the U.S. – are neither closed nor small open economies.
- A large open economy is between the polar cases of closed & small open.
- Consider a monetary expansion:
  - Like in a closed economy, $\Delta M > 0 \Rightarrow \downarrow r \Rightarrow \uparrow I$ (though not as much)
  - Like in a small open economy, $\Delta M > 0 \Rightarrow \downarrow \varepsilon \Rightarrow \uparrow NX$ (though not as much)

Chapter 10: Professor's Villains

LaunchPad Minion

Medium Website psychic, neutral evil

Armor Class Collectively 15
Hit Points 10
Speed 2 weeks

STR	DEX	CON	INT	WIS	CHA
29 (+9)	10 (+0)	17 (+3)	12 (+1)	11 (+0)	15 (+2)

Senses —
Languages Algebra, Macroeconomic
Challenge 1 (200 XP)

Coverage

Everything that is in the chapter in question.

Composition

Multiple Choice. 10 MC questions

First Midterm Champion

Large paper psychic, neutral evil

Armor Class 20
Hit Points 40
Speed 75 minutes

STR	DEX	CON	INT	WIS	CHA
23 (+6)	14 (+2)	21 (+5)	16 (+3)	13 (+1)	20 (+5)

Senses —
Languages Algebra, Macroeconomic
Challenge 8 (3,900 XP)

Coverage

This will only cover content from Chapters 1-3.

Composition

Multiple Choice. There are 20 MC question on the midterm.

Short Answer. There are 4 short answer question on the midterm.

> **Note**
> For the short answer question you only need to do 3, anymore then the first three are counted.

Second Midterm Champion

paper psychic, neutral evil

Armor Class 25
Hit Points ?
Speed 75 minutes

STR	DEX	CON	INT	WIS	CHA
23 (+6)	14 (+2)	21 (+5)	16 (+3)	13 (+1)	20 (+5)

Senses —
Languages Algebra, Macroeconomic
Challenge 8 (3,900 XP)

Coverage

Chapter 4.1, 4.2, 4.4, 4.5, 9, 10, and 13.1

Composition

Multiple Choice. 20 MC questions

Short Answer. 3 short answer questions choice of 4.

> **Note**
> For the short answer question you only need to do 3, anymore then the first three are counted.

Final Foe

Gargantuan paper psychic, neutral evil

Armor Class 40
Hit Points ?
Speed 120 minutes

STR	DEX	CON	INT	WIS	CHA
30 (+10)	14 (+2)	29 (+9)	18 (+4)	17 (+3)	28 (+9)

Senses —
Languages Math, Macroeconomic
Challenge 23 (50,000 XP)

Coverage

Everything

Composition

?

Legend

Armor Class is the weight as a percentage of the final grade.
Hit Points is the amount of marks.
Speed is the duration of the exam/assignment.

Chapter 11: Credits

General

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