

Ch 6 Macroeconomics.

- Studies the overall or aggregate economy
- The overall price level, not individual prices.
- Total production in the economy, not the production by individual firms.
- Adjustment changes across the whole economy
- Unemployment, interest rates, business cycles, inflation, exchange rates, and economic growth will be studied

Gross Domestic Product (GDP)

- The total value of all the goods and services produced
- Production of output generate income
- Measured in dollars

Nominal National Income (Current) Dollars)

- Dollar Value of total output.

Real GDP

- Measures income at base period
- Nominal GDP - Inflation = Real GDP
- Price level changes are removed and only changes in production remains.

Changes in Real GDP

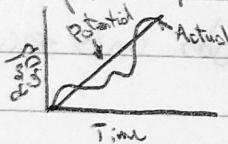
- Measures change in production.

Potential GDP (y^*)

- Potential national income (output)
- What the economy could produce as normal
- Often called full-employment income.

Output Gap

- The difference between potential & actual
- Denote potential by y^* and actual output by y
- Output = $y^* - y$



- Recessionary Gap - when actual income is less than potential
- Inflation Gap - when actual income exceeds potential.

When GDP is below Potential

- Output and incomes are lost
- Can never recover these losses

When GDP is above potential

- Can generate inflation
- Growth in potential GDP can increase future incomes but increase in average income doesn't mean increase ~~for all~~ for all (not all benefit)

Employment

- Number of adult workers (15 and up) who have jobs.

Unemployment

- number of individuals not employed actively searching for jobs

Labour force

- Total number of people who are either employed or unemployed.

Discouraged Workers

- Not actively seeking work.
- Not counted as unemployment

Part-Time Workers

- Maybe seeking a full-time position; Considered employed

Unemployment Rate

- Percentage of the labour force that is unemployed
- Unemployment Rate = $\frac{\# \text{ of people unemployed}}{\# \text{ of people in labour force}} \times 100$ ($UR = \frac{U}{LF} \times 100$)

Full Employment ($Y=Y^*$)

- Some unemployment exists
 - Frictional or Structural

Frictional Unemployment

- Caused by normal turnover of labour (retirement etc).

Structural Unemployment

- Occurs because of a mismatch between available workers & jobs.

Full Employment

- Occurs when all unemployment is frictional and structural
- There is no cyclical unemployment
- At Potential GDP (y^*)
- Natural rate of unemployment (U^*) exists at y^*

Unemployment (U) changes over the business cycle

- During Recession $\rightarrow U$ is above U^*
- During Inflation/Bumps $\rightarrow U$ is below U^*

Cyclical Unemployment

- When $U > U^*$ which exists at y^*

Seasonal U

- U may rise by 3% in Jan
- StatsCan seasonally adjusts figure to remove this so you can see trends clearly

Effects of Unemployment

- Economic Problems - loss of output, loss of skills etc.
- Immense Human Suffering - Illness, Breakdowns etc
- Social Problems - Homelessness, crime etc.

Price Level

- The average level of prices in the economy

Inflation

- The rate at which the price level is changing

Consumer Price Index (CPI)

- the most common measure of the price level
- based on the price of a typical consumer 'basket' of goods & services.
- CPI for the base period is always 100
- CPI in later years shows prices as a ratio of the price in the base period.
- $$\text{CPI} = \frac{\sum P + Q_0}{\sum P_0 Q_0} \times 100$$

Ex.

Goods	Qty	Price	Expenditure	Current Period	
Chocolates	100	\$10	\$1000	\$15	\$1500
Ice Wine	50	\$50	\$2500	\$60	\$3000
Books	70	\$30	\$2100	\$30	\$2100
			\$5600		

a) Find the CPI in the Current Period

$$\text{CPI} = \frac{6600}{5600} \times 100$$

$$\text{CPI} = 117.857$$

b) What is the inflation rate

$$\text{IR} = \frac{117.857 - 100}{100} \times 100$$

$$\text{IR} = 17.857\%$$

Inflation

- Inflation Rate - The percentage change in CPI
 - Calculated annually
 - $\frac{P_2 - P_1}{P_1} \times 100$
- Effects of Inflation - Money is the financial yardstick (measurement)
 - Purchasing power of money changes with inflation
 - Real value of money changes with inflation
 - Inflation changes value of any sum that is fixed in nominal terms (M).
- Fully Anticipated Inflation - If included in all financial contracts inflation has no real effects
- Unanticipated Inflation - benefits those with an obligation to pay money
 - Harms those entitled to receive money
- Inflation is hard to forecast accurately which adds to the uncertainty of economic life.
- Just because inflation rates fall, doesn't mean prices aren't rising

Interest Rate

- The borrowing price of borrowing funds
- Expressed as a percentage
- Many interest rates move together
 - Prime rate, bank rate
- Inflation affects interest rates - Nominal vs Real rates
 - Nominal Interest Rate - the price expressed in money terms

- Real Interest Rate - Price expressed in terms of purchasing power
- Nominal - Inflation = Real
- Borrowing depends on real rate of interest not the nominal

The International Economy

Foreign Exchange - Foreign Currencies

• Foreign Exchange Markets - where foreign currencies are traded

• Exchange rates - # of Canadian dollars required to purchase a unit of a foreign currency

- The Canadian dollar price of foreign currency

• Depreciation of the Canadian Dollar

- Means the Canadian dollar is worth less on the foreign exchange market
- Exchange rate has increased

• Internal Value of the Canadian Dollar

- The purchasing power of the dollar is constant

• External Value of the Canadian Dollar

- The foreign currency price of the Canadian dollar
- the opposite of exchange rate

• Ex 1 Canadian dollar is worth .7755 US Dollars.

$$\text{Exchange Rate} = \frac{1}{.7755} = 1.2895 \rightarrow 1.2895 \text{ CAD for } 1 \text{ USD}$$

$$\text{External Value} = \frac{1}{1.2895} = .7755 \rightarrow 1 \text{ CAD for } .7755 \text{ USD}$$

• International trade accounted for in:

- Balance of payments

- ↳ Records all of int'l payments made for goods and services

- Trade accounts

- ↳ Part of the balance of payments that records transactions in goods & services

- ↳ Imports & exports

• Trade Balance: Net Exports

- Difference between value of exports and value of imports

$$- NX = X - IM$$

- Both exports and imports are very large

- $\approx 40\%$ of GDP

- Trade Balance is actually very small (4%)

National Output and Value Added

- Production occurs in stages - many firms produce outputs that are used as inputs by other firms.
- Intermediate Goods/Services - outputs of firms that are used as inputs by other firms.
- Final products - outputs that are not used as inputs by any other firms.

Value Added

- Measures each firm's contribution to total output
- The amount of market value that is produced by that firm
- Value added = Revenue - Costs of Goods
- Ex. A company buys iron ore for \$200. The company then produces steel and sells it for \$500
 - Iron Ore is the intermediate good and the steel is the output.
 - $\text{Value Added} = \$500 - \$200 = \$300$
- Total value added for a product = final selling price of product
- Ex.

Product	Selling Price	Value Added
Cotton	\$2	\$2
Cloth	\$5	\$3 (\$5-2)
Shirt	\$20	<u>+ \$15 (20-5)</u>
	\$4	\$20
Total Value Added		
Final Selling Price		Total Value Added.

Gross Domestic Product

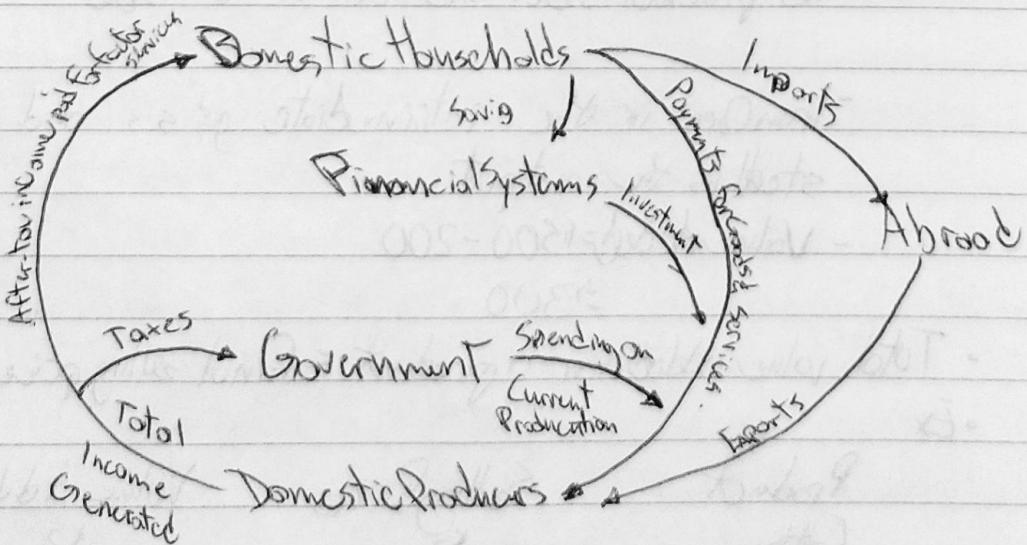
- Total value added in the economy
- measure of all final output that is produced in the economy, value at market prices
- Adding up added values avoids ~~double~~ Double counting
- Must not add up each firms output - overestimating GDP

National Income Accounting: The Basics

- 3 different ways of measuring national income:

- 1- Add up the total value added from domestic production
 - 2- Adds up the total expenditure on domestic output
 - 3- Adds up the total income from domestic production
- The circulation of income yields 3 measures of GDP.

The Circular Flow of National Income & Expenditure



GDP from the Expenditure Side

- Add up expenditures needed to purchase final output produced in year)

- 4 expenditure categories.

- 1 - Actual Consumption Expenditure (C) = Expenditure on all final consumer goods in year.

- 2 - Actual Gross Investment Expenditure (I) = Expenditure on goods not for present consumption including new plant and equipment, inventory accumulation, new residential construction.

- I is used in 2 ways
 - Replacement Investment - maintain capital stock
 - Net Investment - Adds to capital stock.

- Gross $I = \text{Depreciation} + \text{Net } I$

- All of Gross Investment is included in GDP because it's new production.

- 3 - Government Purchases of goods (G) - Doesn't include transfers payments

- Government output must be measured by cost since there isn't a market price.

- 4 - Net Exports ($NX = X - IM$)

- Exports (X) - purchases of Canadian goods - part of the total expenditure on Canadian output

\rightarrow Imports (IM) - Purchase of foreign goods by Canadians

- Not spent on Canadian output

$$\bullet \quad GDP = C + I + G + X - IM$$

GDP from the Income Side

- GDP is the sum of factor incomes plus indirect taxes (net subsidies) plus depreciation
 - Factor Incomes Included - Wages & Salaries
 - Interest
 - Business Profits
- Sum of these factor incomes is net domestic income at factor cost.
- To get market prices add in "non-factor" payments
- To move from factor to market prices add
 - Indirect taxes and subtract subsidies.
- To move from Net to Gross add depreciation of physical capital
- Must add these back to get the true value of production
- GDP from income side equals:
 - $\text{GDP} = \text{Net Domestic income at factor cost} + \text{indirect taxes (less subsidies)} + \text{depreciation}$

GDP and GNP

- GDP - Measures total output produced in Canada
 - Total income earned from that production
 - Eg. Includes profits earned by foreigners on investments in Canada
- GNP - Measures the total income received by Canadian residents
 - No matter where income generated.
 - Eg. Includes income earned by Canadian residents on investments abroad.

- GDP - better measure of domestic economic activity
- GNP - better measure of the economic well-being of country's residents.

- Another important measure - Disposable Personal Income

HH = Households

$$[DPI] = GNP - (\text{any part not actually paid to HH})$$

- Personal income taxes paid by HH plus
- Transfer payments received by HH

Real and Nominal GDP

- Total GDP, valued at current prices, is nominal GDP
- GDP at constant (base year) prices is real GDP
- Convert from nominal to real GDP using a GDP deflator.

$$\text{- GDP Deflator} = \frac{\text{GDP at current price}}{\text{GDP at base year}} \times 100$$

or

$$\text{- GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100.$$

GDP Deflator

- Most comprehensive price index
- Includes prices of all goods & services produced in the country
- Can't use a fixed basket of goods
- Goods produced change each year.
- Below is the economy of Hideway where 3 final goods are produced: Tacos, Tequila, and Hot Tamales.

	Current Output	Current Period Price	Base Period Price
Tacos	100 dozen	12	10
Tequila	60 bottles	30	25
Hot Tamales	50 kg	20	20
Total Expenditures:		4000	3500

a) What is the nominal GDP in the current period?

\$4000

b) What is the Real GDP in the current period?

\$3500

c) What is the GDP Deflator in the current period?

$$= \frac{\text{Nominal}}{\text{Real}} \times 100$$

Real

$$= \frac{4000}{3500} \times 100$$

$$= 114.2857$$

- Conclusion: prices have rose by 14.3% since the base year.

$$\frac{P_2 - P_1}{P_1} \times 100$$

P₂

$$= \frac{114.2857 - 100}{100} \times 100$$

$$= 14.2857 \Rightarrow 14.3\%$$

• CPI and GDP Deflator move together

- Some inflationary forces affect both of them

• CPI tracks consumer prices.

• GDP Deflator tracks prices of all goods produced in Canada.

• Differences

- If the world price of coffee increases, CPI is increased

- But since CND produces no coffee that has no effect on the GDP Deflator.

Limitations: Omittions from the GDP

- GDP does not measure economic activity outside of regular and legal market
 - Illegal activities (drug, prostitution)
 - The underground economy (tax-avoided transactions)
 - Home Production (Housework, D-I-Y projects)
 - Economic costs (pollution)
- Are salaries of cops a bad? - Is it just an offset to the bad? (criminals)
- GDP doesn't measure all aspects of human welfare.

Living Standards: Output and Productivity

- Real GDP increased over the past century for 2 reasons:
 - An increase in inputs - land, labour, or capital used in production.
 - An increase in the amount of output produced per unit of input
- Per Capita output - is the output per person ($GDP/\text{Population}$) - measures the average output or income per person.
- Per capita is a good measure of changes in average standard of living.
- Income is important part of well-being
 - GDP is a very good measure of income.
 - Changes in GDP good measure of change in economic well-being
 - (As long as unmeasured economic activity changes little).

$$\bullet \text{Labour Productivity} = \frac{\text{GDP}}{\text{total # of hours worked}}$$

- Changes in productivity better measure changes in overall living standards, than changes in GDP per capita.

- This is only part of overall well-being
 - Other factors may contribute to quality of life (Health, security, environment).

Desired Expenditure

- Total desired expenditure (Aggregate Expenditure or AE):

- What would be spent, given Y , on domestically produced goods & services.

- AE has 4 categories - 1-Desired Consumption (C)

2-Desired Investment (I)

3-Desired Government Purchases (G)

4-Net Exports ($NX = X - IM$)

$$\text{Aggregate Expenditure} = AE = C + I + G + X - IM$$

• I, G, X are autonomous expenditures (don't change with nation income)

• C, IM are induced expenditures (change with national income Y)

• Ex.- There is C & I but no G or foreign sector.

$$AE = C + I$$

- (C) Keynesian Consumption Function

- Relationship between C and variables that influence it

- In this case, C, is influenced by income.

Desired Consumption Expenditure (C)

• Disposable Income - either consume (G) or save (S)

• Consumption - Determined by current real disposable income (Y_D)

- Ceteris Paribus

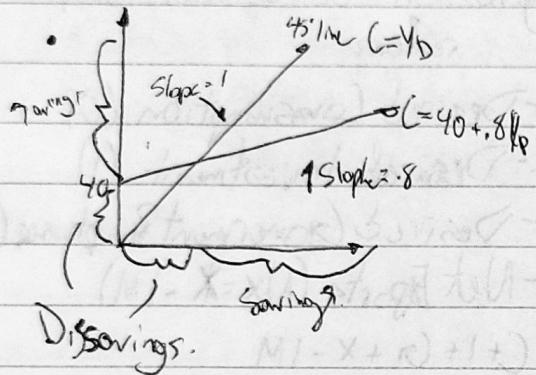
• Simple (Keynesian) Consumption Function

$$C = \bar{a} + b Y_D$$

- Where " a " is autonomous consumption expenditure, " b " Y_D is induced consumption expenditure.

$$\begin{aligned}Ex + C &= \bar{a} + bY_D \\&= 40 + .8(100) \\&= 40 + 80 \\&= 120\end{aligned}$$

Y_D	C
0	\$40
\$100	\$120
\$200	\$200
\$300	\$280



Marginal Propensity to Consume (MPC):

- Change in desired consumption divided by change in disposable income.
- Slope of the consumption function
 - $MPC_{YD} = \frac{\Delta C}{\Delta Y_D}$
- In the example above - $MPC_{YD} = \frac{80}{100} = .8$
- $C = 40 + .8 Y_D$

Y_D	C	ΔY_D	ΔC	$\frac{\Delta C}{\Delta Y_D}$	$\frac{C}{Y_D}$	S	MPS	APS
\$0	\$40					-40		
\$100	\$120	\$100	\$80	.8	1.2	-20	0.2	-2
\$200	\$200	\$100	\$80	.8	1	0	0.2	.00
\$300	\$280	\$100	\$80	.8	.93	20	0.2	.07

- MPC_{YD} is constant because slope is constant

Average Propensity to Consume (APC_{yp})

- Total consumption divided by total disposable income
 - $APC_{yp} = \frac{C}{Y_D}$
- APC_{yp} falls as income rises.

Savings Function

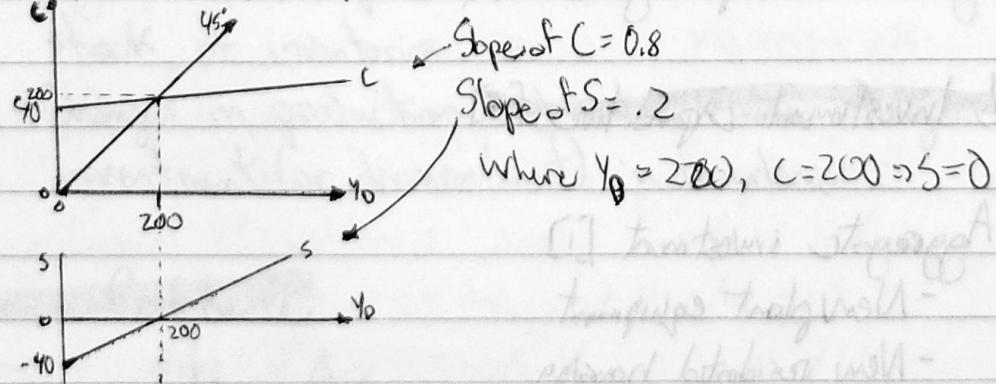
- Marginal Propensity to save (MPS_{yp})
 - Change in desired saving divided by change in disposable income
 - $MPS_{yp} = \frac{\Delta S}{\Delta Y_D}$

- Average Propensity to save (APS_{yp})
 - Total desired savings divided by total disposable income

$$APS_{yp} = \frac{S}{Y_D}$$

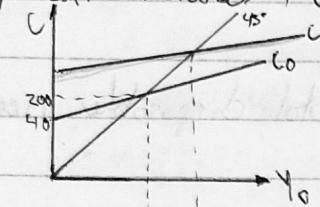
$$APC + APS = 1$$

$$MPC + MPS = 1$$



- When Y_D changes
 - C changes; more direct
 - All other changes affecting C ; shift the consumption function
 - If wealth increases: shift consumption function.

Eg. Wealth increases, C shifts up, S shifts down, to C_1 and S_1



- $C = \bar{a} + bY_d$
- $S = -\bar{a} + (1-b)Y_d$
- C function may also shift when
 - Interest rates change
 - Many durable goods bought on credit (cars, tractor)
 - Causes C to shift down when there is
 - Don't affect nondurables
 - Expectations Change about future economy affect spending
 - Expect good future $\rightarrow C$ rises.

Desired Investment Expenditure [I]

- Aggregate investment [I]
 - New plant equipment
 - New residential housing
 - New accumulations to inventory
 - Gross $I = \text{Depreciation} + \text{Net } I$
- Autonomous Investment [I]
 - Most volatile component of GDP
 - Changes often occur with economic fluctuations
 - [I] is autonomous
 - Does not change with GDP.

- The 3 most main determinants of I are

1 - Real Interest Rate

2 - Changes in Inventories (sales)

3 - Business Confidence

The Real Rate of Interest and I

Real Interest Rate

- Opportunity Cost - of using money (either borrowed or retained) for investment
- A rise in real interest rate affects
 - a - Opportunity cost of holding on inventory rises
 - b - Residential Construction - higher mortgage costs
 - c - Investment in plant and equipment - cost rises.

→ Desired I falls

Changes in Sales

- Higher levels of production and sales lead to larger desired stock of inventories
- Changes in production and sales cause changes in investment (or disinvestment) in inventories.

Business Confidence

- If business confidence is high, firms invest now to earn money

Business confidence and consumer confidence may rise and fall together

- I is autonomous - does not change with Y

The Aggregate Expenditure Function

- Aggregate Expenditure Function (~~AE~~)
 - level of desired aggregate expenditure (AE) at each level of actual national income (Y)
 - $AE = C + I$

• Consumption Function

$$- C = 40 + .8Y$$

• Investment function

$$- I = 20$$

• AE Function

$$- AE = C + I$$

$$= 40 + .8Y + 20$$

$$AE = 60 + .8Y$$

• Suppose $Y = 100$

$$- AE = 60 + .8Y$$

$$C = 40 + .8Y$$

$$= 60 + .8(100)$$

$$C = 40 + .8(100)$$

$$AE = 140$$

$$C = 120$$

• Equation of the line:

$$- AE = 60 + .8Y$$

- Slope of AE is Marginal Propensity to Spend

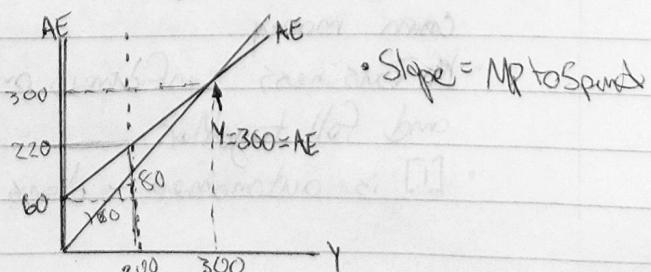
- Extra spending when national income rises by \$1

- When national income rises by \$1, spending rises by \$.80 (MP to spend = $\frac{\Delta Y}{\Delta AE} = .8$)

- MP to spend is not the same as MPC

- MPC is the extra consumption spending when Y rises by \$1

Y	C	I	AE
0	40	20	60
100	120	20	140
200	200	20	220
300	280	20	360



- Equilibrium

- Autonomous

Equilibrium of National Income

- Equilibrium is the state of balance
- No pressure to change
- Equilibrium occurs when $AE = Y$
- Desired $AE = \text{Actual } AE = \text{Production}$
- Desired Spending ($C + I$) = production in economy (Y)
- $AE > Y$, inventories fall, pressure for output (Y) to increase (increase production)
- $AE < Y$, inventories ~~rise~~, pressure for output (Y) to fall (decrease production)
- $AE = Y$ is equilibrium, where AE equals Y

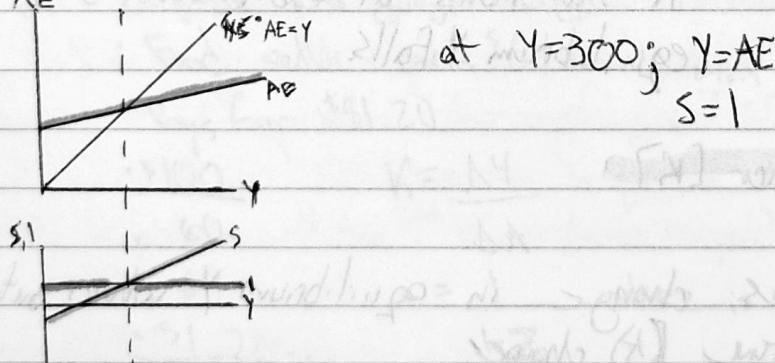
Desired Saving and Desired

• Recall $S = Y - C$

• In this simple case $S = Y - C$

• In equilibrium, $Y = AE$ and $S = I$

• AE

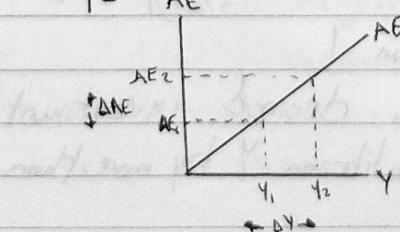


Changes in Equilibrium National Income

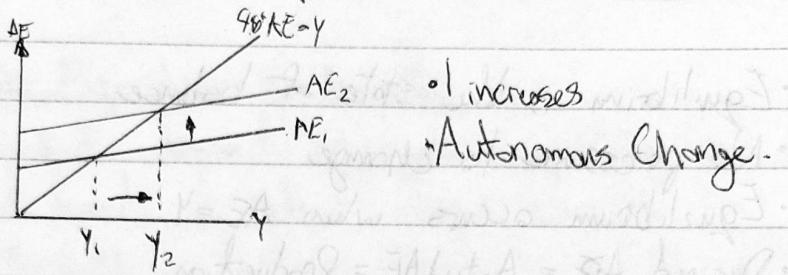
• Two Types of Changes

- 1 - AE

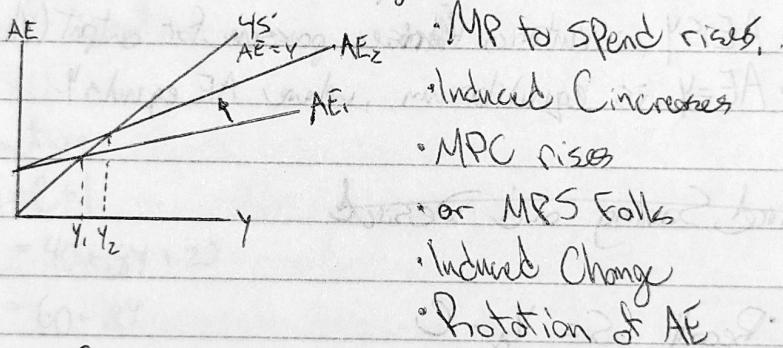
$$z = \frac{\Delta AE}{\Delta Y}$$



• 2-a) AE line shifts parallel to itself



b) Slope of AE changes



- Note that: • If AE rises at each level of Y , equilibrium Y rises
- If AE falls at each level of Y , equilibrium Y falls

The Multiplier (K)

• Measures change in equilibrium Y when autonomous expenditure (A) changes.

• A is the change in I , G , or S .

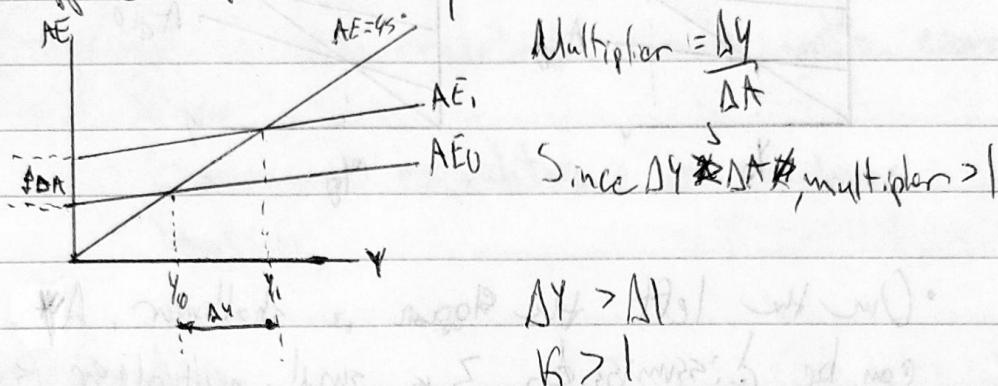
• Change in national income divided by change in autonomous expenditure that caused it

$$K = \frac{\Delta Y}{\Delta A}$$

• The multiple is greater than 1

• Ex. \$1 billion increase in desired investment expenditure increase equilibrium Y by more than a billion

- Suppose AE rises by A.

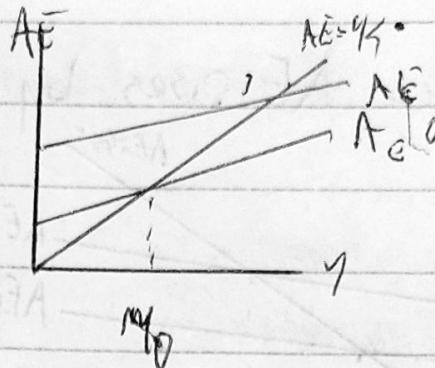
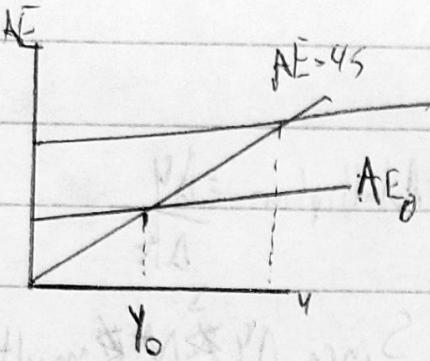


Why is the Multiplier > 1 ?

- Ex assume the marginal propensity to spend out of national income = 80%.

- Joe pays you \$100 for CDs
- You buy a shirt worth $\frac{100}{0.8} = \$125$.
- Short Mktw earns $\frac{125}{0.8} = \$156.25$
- 5 spends 40% dollars on food
- Food seller earns $\frac{156.25}{0.8} = \$195.31$
- Pays for $\frac{195.31}{0.8} = \$244.13$
- \$100 $k = \frac{\Delta Y}{\Delta A}$
- \$125 $= \frac{1}{1-0.8}$ where 2 is slope of AE line
- \$156.25 $= \frac{1}{1-0.8}$
- \$244.13 $= \frac{1}{1-0.8}$
- \$500 $= \frac{1}{1-0.8}$
- \$625 $= \frac{1}{1-0.8}$
- \$781.25 $= \frac{1}{1-0.8}$
- \$937.50 $= \frac{1}{1-0.8}$
- \$1103.12 $= \frac{1}{1-0.8}$
- \$1265.62 $= \frac{1}{1-0.8}$
- \$1452.73 $= \frac{1}{1-0.8}$
- \$1653.41 $= \frac{1}{1-0.8}$
- \$1870.51 $= \frac{1}{1-0.8}$
- \$2104.38 $= \frac{1}{1-0.8}$
- \$2355.86 $= \frac{1}{1-0.8}$
- \$2624.39 $= \frac{1}{1-0.8}$
- \$2909.83 $= \frac{1}{1-0.8}$
- \$3203.26 $= \frac{1}{1-0.8}$
- \$3504.63 $= \frac{1}{1-0.8}$
- \$3813.93 $= \frac{1}{1-0.8}$
- \$4131.20 $= \frac{1}{1-0.8}$
- \$4456.48 $= \frac{1}{1-0.8}$
- \$4790.73 $= \frac{1}{1-0.8}$
- \$5133.95 $= \frac{1}{1-0.8}$
- \$5486.13 $= \frac{1}{1-0.8}$
- \$5847.27 $= \frac{1}{1-0.8}$
- \$6217.37 $= \frac{1}{1-0.8}$
- \$6596.43 $= \frac{1}{1-0.8}$
- \$6984.45 $= \frac{1}{1-0.8}$
- \$7381.43 $= \frac{1}{1-0.8}$
- \$7787.37 $= \frac{1}{1-0.8}$
- \$8192.27 $= \frac{1}{1-0.8}$
- \$8596.13 $= \frac{1}{1-0.8}$
- \$8998.95 $= \frac{1}{1-0.8}$
- \$9399.73 $= \frac{1}{1-0.8}$
- \$9799.45 $= \frac{1}{1-0.8}$
- \$10198.13 $= \frac{1}{1-0.8}$
- \$10596.73 $= \frac{1}{1-0.8}$
- \$10994.27 $= \frac{1}{1-0.8}$
- \$11391.73 $= \frac{1}{1-0.8}$
- \$11788.13 $= \frac{1}{1-0.8}$
- \$12184.45 $= \frac{1}{1-0.8}$
- \$12580.73 $= \frac{1}{1-0.8}$
- \$12976.95 $= \frac{1}{1-0.8}$
- \$13373.13 $= \frac{1}{1-0.8}$
- \$13769.27 $= \frac{1}{1-0.8}$
- \$14165.33 $= \frac{1}{1-0.8}$
- \$14561.37 $= \frac{1}{1-0.8}$
- \$14957.33 $= \frac{1}{1-0.8}$
- \$15353.27 $= \frac{1}{1-0.8}$
- \$15749.13 $= \frac{1}{1-0.8}$
- \$16145.05 $= \frac{1}{1-0.8}$
- \$16540.93 $= \frac{1}{1-0.8}$
- \$16936.81 $= \frac{1}{1-0.8}$
- \$17332.67 $= \frac{1}{1-0.8}$
- \$17728.51 $= \frac{1}{1-0.8}$
- \$18124.33 $= \frac{1}{1-0.8}$
- \$18520.15 $= \frac{1}{1-0.8}$
- \$18915.93 $= \frac{1}{1-0.8}$
- \$19311.67 $= \frac{1}{1-0.8}$
- \$19707.33 $= \frac{1}{1-0.8}$
- \$20093.01 $= \frac{1}{1-0.8}$
- \$20478.67 $= \frac{1}{1-0.8}$
- \$20864.33 $= \frac{1}{1-0.8}$
- \$21250.01 $= \frac{1}{1-0.8}$
- \$21635.67 $= \frac{1}{1-0.8}$
- \$22021.33 $= \frac{1}{1-0.8}$
- \$22406.95 $= \frac{1}{1-0.8}$
- \$22792.57 $= \frac{1}{1-0.8}$
- \$23178.13 $= \frac{1}{1-0.8}$
- \$23563.67 $= \frac{1}{1-0.8}$
- \$23949.13 $= \frac{1}{1-0.8}$
- \$24334.55 $= \frac{1}{1-0.8}$
- \$24720.93 $= \frac{1}{1-0.8}$
- \$25107.27 $= \frac{1}{1-0.8}$
- \$25493.53 $= \frac{1}{1-0.8}$
- \$25880.73 $= \frac{1}{1-0.8}$
- \$26268.87 $= \frac{1}{1-0.8}$
- \$26657.01 $= \frac{1}{1-0.8}$
- \$27045.13 $= \frac{1}{1-0.8}$
- \$27433.27 $= \frac{1}{1-0.8}$
- \$27821.33 $= \frac{1}{1-0.8}$
- \$28209.35 $= \frac{1}{1-0.8}$
- \$28597.33 $= \frac{1}{1-0.8}$
- \$28985.27 $= \frac{1}{1-0.8}$
- \$29373.13 $= \frac{1}{1-0.8}$
- \$29761.01 $= \frac{1}{1-0.8}$
- \$30148.87 $= \frac{1}{1-0.8}$
- \$30536.73 $= \frac{1}{1-0.8}$
- \$30924.55 $= \frac{1}{1-0.8}$
- \$31312.33 $= \frac{1}{1-0.8}$
- \$31699.15 $= \frac{1}{1-0.8}$
- \$32086.93 $= \frac{1}{1-0.8}$
- \$32474.67 $= \frac{1}{1-0.8}$
- \$32862.33 $= \frac{1}{1-0.8}$
- \$33250.01 $= \frac{1}{1-0.8}$
- \$33637.67 $= \frac{1}{1-0.8}$
- \$34025.33 $= \frac{1}{1-0.8}$
- \$34413.01 $= \frac{1}{1-0.8}$
- \$34799.67 $= \frac{1}{1-0.8}$
- \$35187.33 $= \frac{1}{1-0.8}$
- \$35575.01 $= \frac{1}{1-0.8}$
- \$35962.67 $= \frac{1}{1-0.8}$
- \$36350.33 $= \frac{1}{1-0.8}$
- \$36738.01 $= \frac{1}{1-0.8}$
- \$37125.67 $= \frac{1}{1-0.8}$
- \$37513.33 $= \frac{1}{1-0.8}$
- \$37891.01 $= \frac{1}{1-0.8}$
- \$38278.67 $= \frac{1}{1-0.8}$
- \$38666.33 $= \frac{1}{1-0.8}$
- \$39053.95 $= \frac{1}{1-0.8}$
- \$39441.57 $= \frac{1}{1-0.8}$
- \$39829.13 $= \frac{1}{1-0.8}$
- \$40216.73 $= \frac{1}{1-0.8}$
- \$40594.33 $= \frac{1}{1-0.8}$
- \$40971.95 $= \frac{1}{1-0.8}$
- \$41349.57 $= \frac{1}{1-0.8}$
- \$41727.13 $= \frac{1}{1-0.8}$
- \$42094.73 $= \frac{1}{1-0.8}$
- \$42462.33 $= \frac{1}{1-0.8}$
- \$42830.01 $= \frac{1}{1-0.8}$
- \$43197.67 $= \frac{1}{1-0.8}$
- \$43575.33 $= \frac{1}{1-0.8}$
- \$43953.01 $= \frac{1}{1-0.8}$
- \$44330.67 $= \frac{1}{1-0.8}$
- \$44708.33 $= \frac{1}{1-0.8}$
- \$45086.01 $= \frac{1}{1-0.8}$
- \$45463.67 $= \frac{1}{1-0.8}$
- \$45841.33 $= \frac{1}{1-0.8}$
- \$46219.01 $= \frac{1}{1-0.8}$
- \$46596.67 $= \frac{1}{1-0.8}$
- \$46974.33 $= \frac{1}{1-0.8}$
- \$47352.01 $= \frac{1}{1-0.8}$
- \$47730.67 $= \frac{1}{1-0.8}$
- \$48108.33 $= \frac{1}{1-0.8}$
- \$48486.01 $= \frac{1}{1-0.8}$
- \$48863.67 $= \frac{1}{1-0.8}$
- \$49241.33 $= \frac{1}{1-0.8}$
- \$49619.01 $= \frac{1}{1-0.8}$
- \$50000.00 $= \frac{1}{1-0.8}$

- Initial increase in I or $\$1.00$
- Note: Higher MP to spend out of national income raises multiplier ($z \uparrow k \uparrow$)



- On the left the slope is shallower, A can be dismissed, z is small, multiplier is small
- AE is steep, ΔY is large, ΔI is large, multiplier is large

Ex $z = .5$

$$\begin{aligned} \text{multiplier} &= 1/(1-z) \text{ if the government taxes} \\ &= 1/(1-.5) \text{ by } \$100, \text{ prices by } \$200 \\ &\approx 2 \end{aligned}$$

Ex $z = .8$ if investment increase by \$100, Y rises by \$500.

$$\begin{aligned} &= \frac{1}{(1-.8)} \\ &= 5 \end{aligned}$$

- In Canada we have a shallow slope
 - 1- Imports are large
 - 2- Taxes also create leakage from the circular flow of income.
 - Slope is around .2, and the multiplier is about 1.25

Chapter 11.2. Introducing Government.

(Not in textbook).

- Government is an important variable in the economy

Fiscal Policy

- Government expenditures or purchases
- Taxation

Government Spending

- G_1 is part of desired AE
- Transfer payments (Pensions etc.)
 - Not a government purchase
 - Only a flow of funds from government to HH
 - Affects disposable income and HH spending

Tax Revenues

- Net Taxes (T) = total tax revenue - total transfer payments
- Tax Rates are autonomous policy variables but varies with GDP
 - $T = tY$, where t = marginal propensity to tax
Note: t includes all taxes, so when Y rises by ΔY , tax revenues rise by $t \cdot (\Delta Y)$.

The Budget Balance ($T-G_1$)

- G_1 is autonomous
- Taxes are induced
 - $(T - G_1) = \text{purchases}$
- If $T > G_1$, there is a surplus
- If $T < G_1$, there is a deficit.
- As Y rises, T rises
 - tax revenue rise
 - transfer payments fall

Provincial and Municipal Governments.

- G includes all levels of governments in desired AE

Net Export Function

Exports (X)

- autonomous with respect to Canadian national income

Imports ($IM = mY$)

- rise as national income increases

- not autonomous

- Indirect or depends on GDP

Marginal Propensity to import (m)

- change in imports caused by a % change in GDP

$$\Delta M \quad MPM = m = \frac{\Delta M}{\Delta Y} = .2$$

$$\Delta Y$$

Net Export Function

$$NX = X - IM$$

- falls as national income rises

- X is constant

- IM increases as GDP [Y] increases.

$$\text{If } X > IM$$

- foreigners buy more C\$ (C\$ Canadian dollars)

- To buy exports

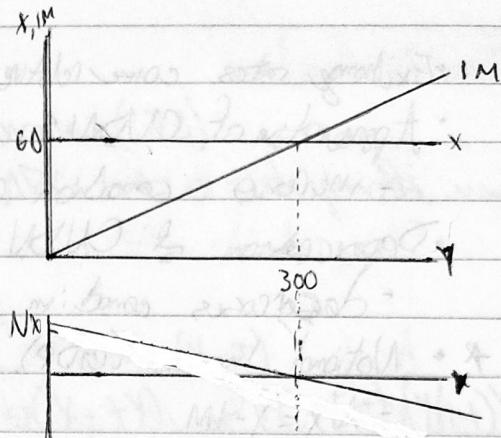
- Canada accumulates more foreign currency

- Uses foreign currency to buy foreign income earning assets

- Similar to investment

- Produces future income.

Y	X	IM	X-IM
0	60	0	60
100	60	20	40
200	60	40	20
300	60	60	0
400	60	80	-20



- NX function holds: national income constant
domestic and foreign prices
Exchange rate

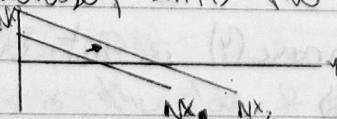
• If $IM > X$

- Canadians sell Canadian dollars
- Buy more imports from foreigners
- Canadians' trading partners accumulate Canadian \$
- C\$ rises to buy Canadian assets
- Liability for Canada
- Income will flow to foreigners.

Shifts in the Net Export Function

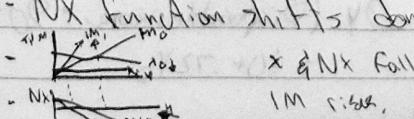
Foreign Income

- If foreign incomes increase, certain portions of Canadian exports (X) increase, shifts the NX function up.



Domestic and Foreign Prices

- A rise in Canadian prices relative to foreign prices reduces exports, and cause X function to shift down, and imports increase so IM rotates up.
- NX function shifts down and gets steeper.



- Exchange rates convey relative prices to exchange.
- Appreciation of CNDN \$
 - increase Canadian prices relative to foreign prices
- Depreciation of CNDN \$
 - decreases Canadian price relative to foreign prices.
- * • National Income (GDP) increasing ($Y \uparrow$) (Economy is strengthening)
 - $NX = X - M$
 - $= X - mY$
 - $= X - m(Y \uparrow)$
 - \therefore
 - $NX(\uparrow) = X - m(Y \uparrow) \Rightarrow \text{Imports are induct.}$

• The economy is weakening ($Y \downarrow$)

- $NX = X - M$
- $= X - m(Y \downarrow)$

$NX(\downarrow) = X - m(Y \downarrow) \Rightarrow \text{Imports are induct.}$

Equilibrium GDP

- Where desired aggregate expenditure (AE) equals national income
- $AE = Y$
- Include; Government ($T = G$), Net exports ($NX = X - M$)
- Adjustment consumption
 - with government, national income (Y) is not the same as disposable income (Y_D)
 - $Y_C = Y - T$
- With Taxes
 - disposable income (Y_D) < national income (Y)
 - Suppose $T = .1Y$ (Taxes = 10% of Y)
 - Then, $Y_D = Y - .1Y = .9Y$ (Disposable income = 90%).
 - Consumption = $10 + .8Y_D = 10 + .72Y_D$
 - $= 10 + .8(.9Y_D)$

- With income taxes

- MPC out of national income (.72)

- is less than the MPC out of disposable income (.6)

$$\text{To i.e. } MPC_y < MPC_{yD}$$

- Generally:

$$C = \bar{a} + bY_D \quad \text{or} \quad C = \bar{a} + b(Y - T)$$

$$(\text{Since } T = tY \quad C = \bar{a} + b(Y - tY) \quad \text{or} \quad C = \bar{a} + b(Y(1-t)))$$

$$AE = C + I + G + X - IM$$

$$C = \bar{a} + bY_D \quad \text{or} \quad C = \bar{a} + b(Y(1-t))$$

$$I, G$$

$$T = tY$$

$$X, IM = mY$$

So,

$$AE = \bar{a} + b(Y(1-t)) + I + G + X - mY$$

$$= \underbrace{\bar{a} + I + G + X}_{\text{autonomous}} + \underbrace{(b(1-t) - m)Y}_{\text{Induced (depends on Y)}}$$

$(Y = EA)$

$\Delta AE = \Delta Y$

$$(1) \Delta Y = \frac{1}{b(1-t)} \Delta AE$$

Change in Aggregate Expenditure (AE) when national income (Y)

Changes	ΔAE	ΔY
---------	-------------	------------

PP	02	02
PP	02	02
PPS	02	02

$$\Delta AE = \Delta Y$$

$$\Delta Y = \frac{1}{b(1-t)} \Delta AE$$

$$\Delta Y = \frac{1}{b(1-t)} \Delta AE$$

given by induced expenditures

$$\text{or } b(1-t) - m$$

$$MPC_y = MPM$$

This is the slope of the AE line.

or, MP to spend out of national income [Z]

The AE Function

- $AE = C + I + G + X - IM$
- Slope of the AE line = Marginal propensity to spend out of national income (α)
- Assume Y rises by \$1:
 - \$72 was spent on consumption (~~MPC_{YI}~~)
 - 20% of extra consumption is on imports
 - desired spending on domestic production rises by only \$20 ($\alpha = .52$)

Equilibrium National Income

- When desired aggregate expenditure equals national income ($AE = Y$)

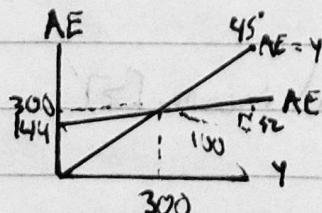
Ex. $MPC_{YI} = b = .80$

$MPT = t = .10$

$MPM = m = .20$

Y	$C = 110 + .72Y$	$I = 50$	$G = 34$	$X = 50$	$-IM = .2Y$	AE
0	110	50	34	50	0	144
100	182	50	34	50	20	196
200	254	50	34	50	40	248
300	326	50	34	50	60	300
400	398	50	34	50	80	352

• Equilibrium National Income is \$300 ($Y = AE$)



Slope = $\alpha = .52$
Equilibrium ≈ 300

~~AE > Y~~

- Sales greater than production
- Depletes inventories
- Firms increase production

~~AE < Y~~

- Sales less than production
- Inventories build up
- Firms decrease production

~~AE = Y~~

- Equilibrium
- Sales equal production

$$AE = C + I + G + X - IM$$

- $C = 10 + .8Y_D$, $I = 50$, $G = 34$, $X = 50$, $IM = .2Y$, $T = .1Y$
- Eliminate Y_D : $-Y_D = Y - T$
 $= Y - .1Y$

$$Y_D = .9Y \text{, then } C = 10 + .8(.9Y)$$

$$C = 10 + .72Y$$

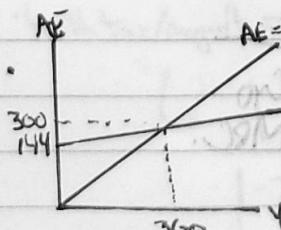
$$\bullet AE = 10 + .72Y + 50 + 34 + 50 - .2Y$$

= $144 + .52Y$
 in $y = mx + b$ form.

Autonomous

Induced

~~AE~~ will always be positive (if negative, done wrong).



$$\text{Slope} = .52$$

$$\text{Equilibrium} = 300 \Rightarrow Y = AE$$

$$Y = 144 + .52Y$$

$$Y - .52Y = 144$$

$$Y = \frac{144}{.48}$$

When $Y = AE$ we can

solve for the equilibrium with 1 variable.

Another Ex

$$\cdot C = 500 + .8Y_D, I = 400, G = 200, X = 400, M = 164,$$

$$T = .34$$

$$\begin{aligned} \cdot C &= 500 + .8Y_D \\ &= 500 + .8(Y - .3Y) \\ &= 500 + .8(.7Y) \\ &= 500 + .56Y \end{aligned}$$

Getting rid of unknown Y_D

$$\begin{aligned} \cdot AE &= C + I + G + X - M \\ &= 500 + .56Y + 400 + 200 + 400 - 164 \end{aligned}$$

$$\begin{aligned} &= 1500 + .4Y \\ \cdot AE &= Y \\ &= Y = 1500 + .4Y \end{aligned}$$

$$Y - .4Y = 1500$$

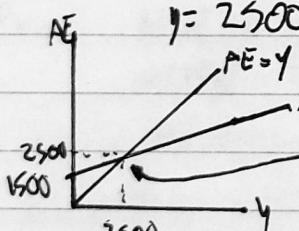
$$.6Y = \frac{1500}{.6}$$

$$Y = 2500$$

$$AE = Y$$

$$AE = 1500 + .4Y$$

Solving for Y .



mid/living
arbitrage taxes effect.

mid/living
arbitrage taxes effect.

mid/living
arbitrage taxes effect.

mid/living
arbitrage taxes effect.

$$M = T, P_S = M, O_S = X, P_E = D, O_E = I, P_G = G, P_X = X, P_I = I.$$

$$T - P_E = Y - .4Y \text{ (arbitrage)}$$

Changes in Equilibrium National Income.

$$(P_E)Y - .4Y = 0$$

The Multiplier with Taxes and Imports.

$$P_S - O_S + P_E + O_E + P_G + P_I = 3A$$

With no government and no international traffic:

$Z = \text{the MPC of disposable income (MPC}_{DY})$

$$\text{Simple multiplier} = \frac{1}{1 - \text{MPC}_{DY}} = \frac{1}{1 - Z}$$

With taxes and imports $Z \neq \text{MPC}$.

$$Z = \frac{1 - \text{MPC}_{DY}}{1 - \text{MPC}_{DY} - T - P_I}$$

$$Z = \frac{1 - \text{MPC}_{DY}}{1 - \text{MPC}_{DY} - T - P_I}$$

$$Z = \frac{1 - \text{MPC}_{DY}}{1 - \text{MPC}_{DY} - T - P_I}$$

- Imports and income taxes make Z smaller.
 - Simple multiplier (k) becomes smaller also.
 - With imports
 - Some spending is flowing out of the country to pay for foreign goods.
 - With taxes
 - Income taxes reduce household income and spending.
- $$Z = MPC_y - MPM$$

Example #1 Consider a closed economy with no imports.

- No income tax; national income = disposable income;
- No imports; $MPC_{y,p} = .8$
- Income rises by \$100, spend \$80 ... Multiplier (k) is equal to:

$$Z = \frac{1}{1 - MPC}$$

$$(XVA) Z = \frac{1}{1 - .8} = 5$$

Example #2

- Income tax = .14; imports = .24; $MPC_{y,p} = .8$
- Income rises by \$100; After tax Y_D rises by 90%;
- \$72 is spent ($90 \times MPC_{y,p}$); from the \$72, \$20 goes on imports ($.24 \times 20$) and \$52 domestically ($72 - 20$)
- With tax/import $\Rightarrow Z = MPC_{y,p} (1 - t) \cdot m$ where $t = MRT$ and $m = MPM$

$$\begin{aligned} Z &= \frac{1}{1 - .24(1 - .14)} \\ &= \frac{1}{1 - (.8(.9) - .24)} \\ &= 2.08333 \end{aligned}$$

- Autonomous Expenditure (A) rises by \$100 stagnant
 - Real GDP rises since $\Delta A + k = \Delta Y$ without stagnation
- $$100 + 2.0833 = \Delta Y \quad \text{stagnant still}$$
- $\rightarrow 208.33 = \Delta Y$ long run

Net Exports

~~long run~~ ~~independent~~ ~~short run~~ ~~short term~~

Exports

- Autonomous

- Independent of level of domestic national income N/A

• Demand for Canadian exports depends on

- foreign income more favorable; exports up
- foreign and domestic prices foreign oil up
- Exchange rate change Dollar up every month
- Consumer taste of taste

• Equilibrium Y rises, NX shifts down

• Equilibrium Y falls, NX shifts up

• Multiplier applies to changes in NX (ΔNX)

$$- \Delta A = \Delta X$$

$$- \Delta X \cdot k = \Delta Y$$

• if $m \uparrow$ (or mY) then $z \downarrow$ and $k \downarrow$ ↑ decrease

Fiscal Policy

$S = \$100M$; $P.S. = \text{stagnant}$; $P.L. = \text{not wanted}$

i) • Discretionary Policy HA; ODI and economic growth

• Use G & T policies ($G + T \times 100$) through RST

- to influence desired AE , D , and Y from

ii) • Stabilization policy $G + T = 0 \Leftrightarrow \text{stagnant still}$

- Attempts to stabilize Y at or near Y^*

$(S - (P)P_1) \downarrow$

$\rightarrow EEEBO.S =$

$S-1$

$I =$

• Example: National Income is below equilibrium ($Y < Y^*$)

- G increases by \$100 mil

- AG leads to ~~new long-run AD shift~~

- A change in equilibrium national income, ΔY

- Change in national income equals $\Delta Y = \Delta G \times K$

~~National Income~~ - Suppose $Z = 0.52$

$$\text{Multiplier} = K = \frac{1}{1-Z}$$

$$\Delta Y = 100 \text{ mil} \times 2.08$$

$$1 - Z = 1 - 0.52$$

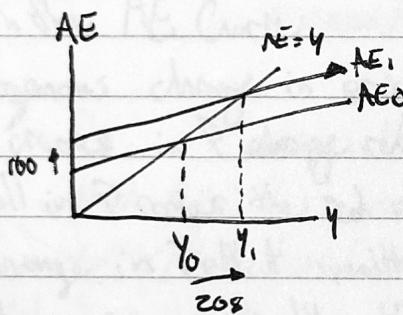
$$\Delta Y = 208 \text{ million}$$

$$= 2.08$$

208 mil is the increase in national income

- G increase by 100

AE shifts up by \$100 mil.



- Reduce Taxes to raise national income

- Lower income tax rate raises the MPC_y

- Increases Z - AE function get steeper.

- MPC_{Spending} = Z: $[MPC_{Cyc}(1-t)-m] = \text{Slope of AE line}$

$$\Leftrightarrow \text{if } t = .2; MPC_{y_0} = .8 \quad m = .4$$

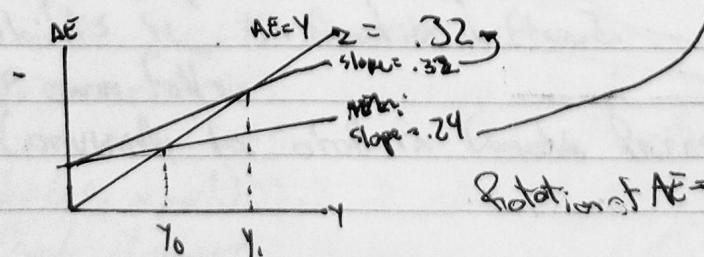
$$Z = (.8(1-.2) - .4)$$

$$= .24$$

$$\Leftrightarrow \text{if } t = .1$$

$$Z = (.8(1-.1) - .4)$$

marginal propensity to import



$$\text{Rotation of AE} = \frac{\Delta AE}{\Delta Y}$$

- Lower tax rate increases slope of AE line (Z), and raises equilibrium Y.

Limitations of the Income-Expenditure Approach.

- Simple AE model based on ~~the~~ OA -
Price level being constant
- GDP depends on demand.
- The demand is determined by the model

Ch. 12. Output and Prices in the Short Run

Intro

• Shocks and price changes:

1 - Exogenous change in price level - Demand side changes.

2 - Factor Supply Side change in factor prices.

3 - Macro equilibrium - Demand, supply, and price level.

The Demand Side of the Economy

• Shifts in the AE Curve

1 - Exogenous change in price level, P

- increase in P reduces the real value of money

- fall in P raises the real value of money holdings.

- Change in P affect wealth of bondholders and debt bond issuers.

- Change in wealth affect consumption (C):

- Increase in P reduce private-sector wealth

- Decreases desired consumption

- AE curve shifts down.

- Fall in P increase private-sector wealth

- Increase desired consumption

- AE curve shifts up.

- Price changes affect Net exports (NX)

- Prices rise in Canada - foreign prices are constant

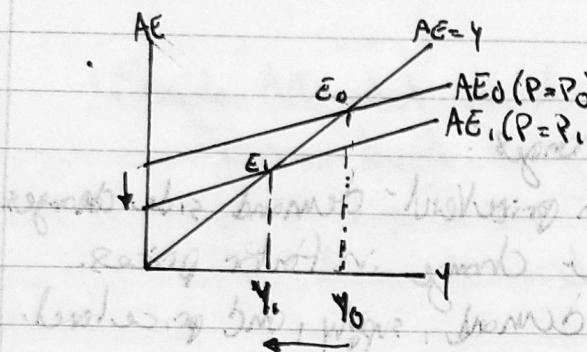
- Canada's Exports fall, Imports rise.

- Shifts the NX function leftward

- AE curve falls

- Conversely for fall in Canadian Prices

Changes in Equilibrium GDP

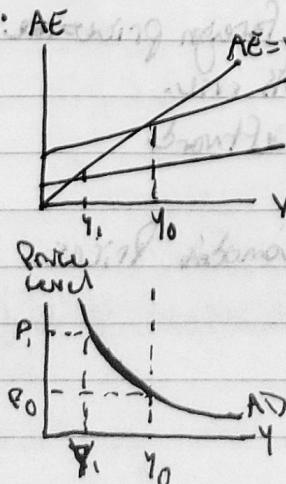


- An increase in price from P_0 to P_1
- Reduces private sector wealth
- Reduces desired AE
- AE curve shifts down
- Shifts equilibrium level of real GDP (y)
- C & NX fall

The Aggregate Demand Curve

- Aggregate Demand (AD) curve
- relates equilibrium real GDP to the price level
- For any given price level, AD shows the real GDP where desired aggregate expenditure equal actual GDP ($AE = y$)
- Changes in price level
- Causes shifts in AE curve
- Causes movement along AD curve

Price Changes

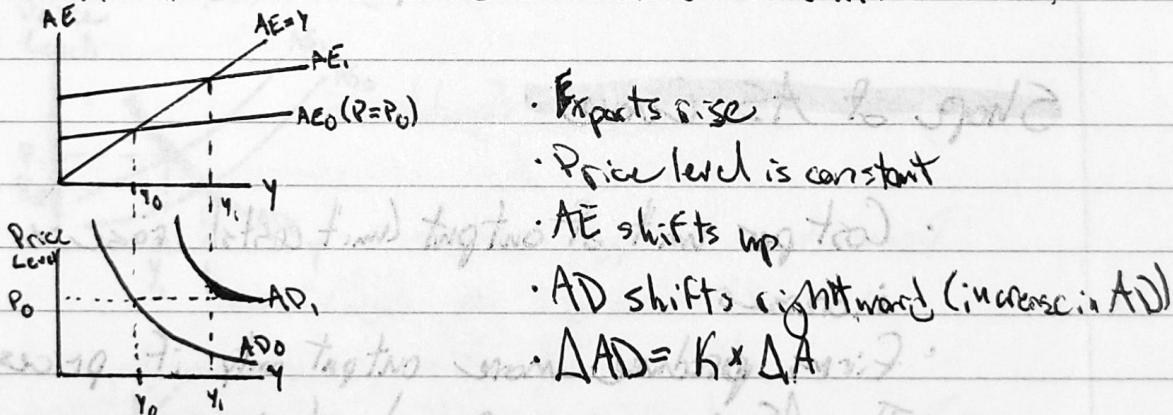


- Change in P shown by movement along Aggregate Demand curve
- Decrease in P - increase in quantity demanded

- AD increases (shift)
 - At any given price level
 - Any positive shock (increase in exports)
 - Increases equilibrium GDP
 - Increases AD - shifts AD rightward
 - Any negative shock (fall in investment (I))
 - Decreases equilibrium Y
 - Decreases AD - shifts the AD leftward

~~Two factors affect AD shift~~

• $K \times \Delta A$ measures size of horizontal shift of AD curve



Summary

1) Price level changes

a) AE line shifts up or down (G changes
(real balances effect) and NX change)

b) move up or down AD curve.

eg Price level rises - AE shifts down (G & NX fall),
move left and up AD curve

2) Autonomous Expenditure (I, G, X) changes

a) AE line shifts up or down

b) AD curve shifts right or left

eg I increases - AE shifts up, AD shifts right

• More demanded at the same price level.

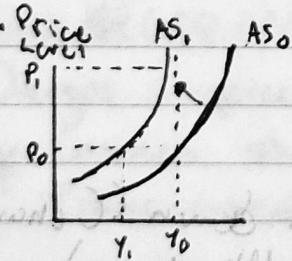
The Supply Side of the Economy

The Aggregate Supply curve

- Short Run Aggregate supply (AS) curve
- relates price level to quantity of output
- firms want to produce/sell
- AS curve assumes - technology and factor prices are constant

Shape of AS Curve

- Cost per unit of output (unit costs) rise as output increases
- firms produce more output only if prices increase
- The AS curve is upward sloping.



- Changes in factor prices or productivity
- Change Costs
- Shift AS curve

Increase in factor prices or a decrease in productivity shifts AS leftward
At AS₀, firms will supply Y_0 only if price level rises.
At AS, firms supply Y_1 .

AS Gets Steeper as Output Prices rise

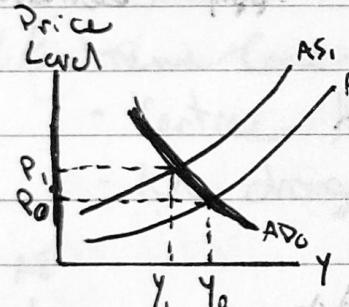
When output is low, firms have excess capacity.

- Firms have excess capacity
- Output increases without causing large increase in input cost
- Only a small increase in price is needed to induce firms to expand production.

As Output Gets Closer to Capacity

- Increases in output cause larger increases in unit cost
- Larger price increases needed to induce firms to expand output.

Contractionary Supply Shock



Shifts in AS

Input prices change - wages rise

- Firms produce less at the same price level
- Or, firms supply some amount only if prices are higher
 - AS shifts leftward - decreases
- Opposite is factors costs fall
 - AS shifts rightward - increases

Productivity changes - output per worker rises

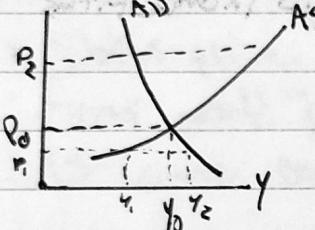
- Firms produce more at the same level
- AS shifts rightward - increase

A Macroeconomic Equilibrium

Only at intersection of AS and AD :

Demand & supply behaviour is consistent

Price



Only at P_0 : no changes

Output demanded = Output Supplied

At P_1 : Demand > Supply

At P_2 : Supply > Demand

Changes in the Macro Equilibrium

Demand and supply shocks

- cause changes in equilibrium

- shocks shift demand or supply curves

Demand shocks are either expansionary or contractionary.

Expansionary:

- Shifts AD curve right

- Increasing D & Y

Contractionary:

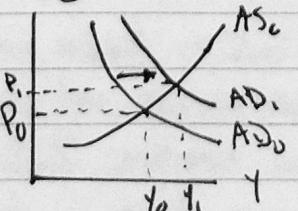
- Shifts AD curve left

- decreasing D & Y

Aggregate Demand Shocks

Expansionary Demand Shock

Price

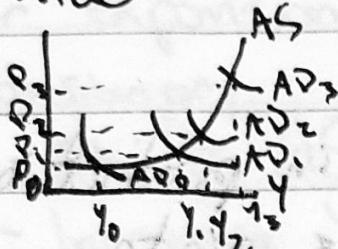


Both P & Y have increased.

- Slope of AS curve is important

- determines what happens when AD shifts.

- Price

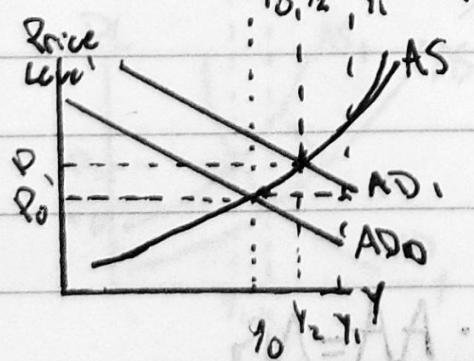
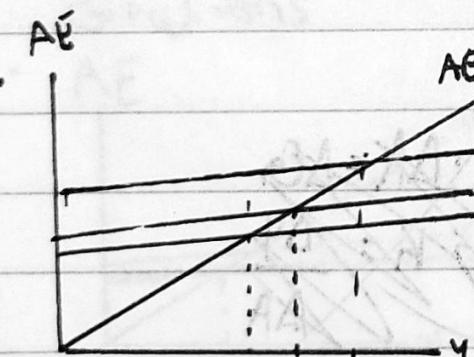


- Steeper AS curve

- Greater the price effect
- Smaller the output effect

Extreme Case

- Vertical AS curve
- No change in real GDP



.. AD rises to AD_1 ,

$AE_1 (P=P_1)$, .. AE rises to AE_1 ,

$AE_0 (P=P_0)$, P initially unchanged

.. AS slopes upward

.. Increased AD

.. Pushes P to P_1

.. Higher price level

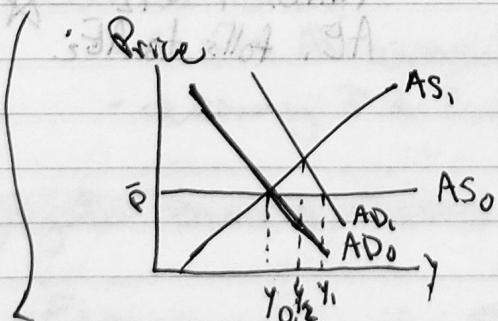
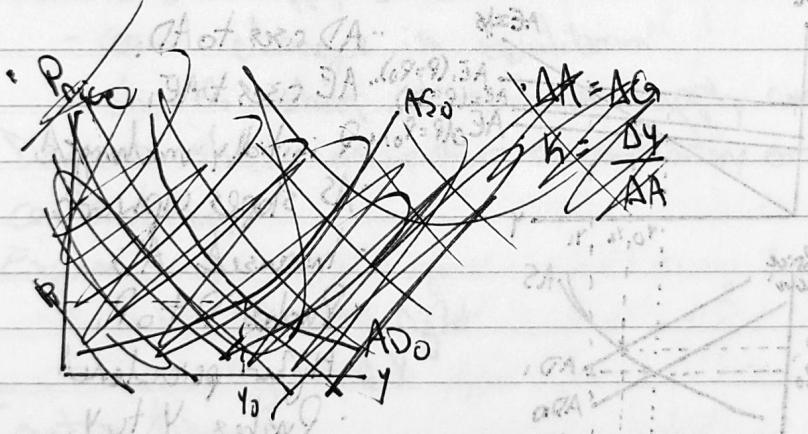
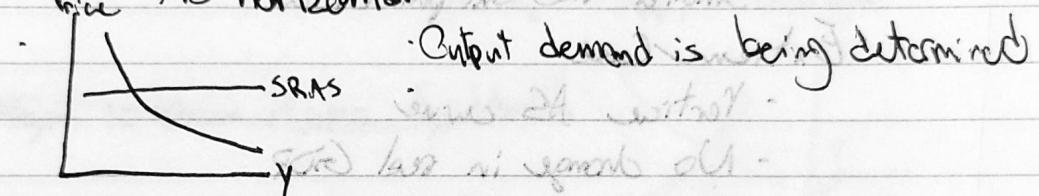
.. Pushes Y to Y_1 \cancel{P} rest

.. AE_1 falls to AE_2

Horizontal or Keynesian SRAS

At initial equilibrium:

- Other extreme
- Output increased
- No increase in cost in production
- During depression Keynes wrote
 - unemployment is high
 - output below potential
 - AS horizontal

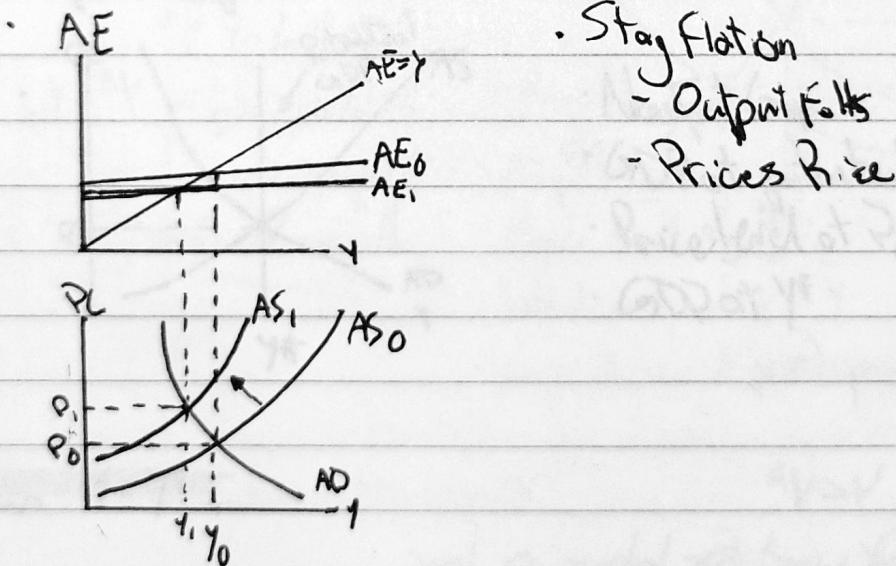


$$\begin{aligned} &\cdot \Delta A = \Delta G \\ &\cdot K = \frac{\Delta Y}{\Delta A} = \frac{\Delta Y}{\Delta G} \\ &\cdot K_F = \frac{Y_1 - Y_0}{\Delta G} \quad K_F = \text{Fixed prices} \\ &\cdot K_V = \frac{Y_2 - Y_0}{\Delta G} \quad K_V = \text{Varying prices} \\ &\cdot K_F > K_V \end{aligned}$$

ZnC
Midterm
Question.

Aggregate Supply Shocks

- Either expansionary or contractionary
- Expansionary
 - Shifts AS rightward
 - Increases Y
 - Decreases P
- Contractionary
 - Shifts AS leftward
 - Decreases Y
 - Increases P
- Supply shocks cause P & Y to change in opposite directions



Complications

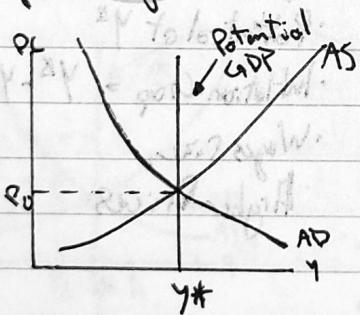
- Many economic events
- Change in raw materials
- Causes both aggregate demand and aggregate supply shock
- Focuses on which shift is greater.

Chapter 13 The Long Run

The Long Run

- GDP and prices adjust to reach equilibrium in the long run
- Assume technology is constant
- Factor prices now change
- Begin with long run equilibrium ~ GDP at Potential.
- Potential GDP (Potential Output) - all productive resources (factors of production) used at their normal rates of utilization

No Output Gap



- No Output Gap
- GDP at potential
- Price level at P_0
- GDP at y^*

(Short Term vs
Long Run
(Adding Potential))

When $y = y^*$,

- Unemployment rate = Natural Rate of Unemployment (U^*)
- U^* includes both structural and frictional unemployment

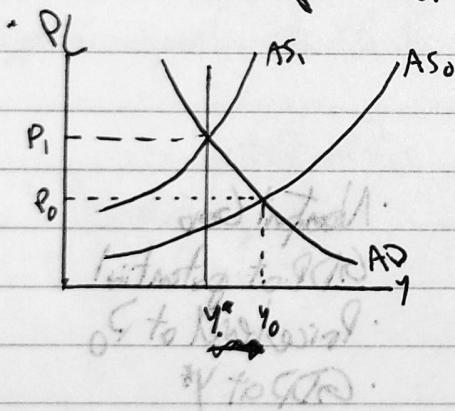
Output Gaps

- If actual output is below potential, have recessionary output gap ($y < y^*$)
- If actual output is above potential, have inflationary output gap ($y > y^*$)

Inflationary Output Gap

When $Y > Y^*$

- Demand for labour is high (big K/L)
- Booms lead to
 - high profits
 - high demand for labour
- wages and production costs rise
- Higher production costs shift AS left
- Prices rise
- Output decline = Equilibrium GDP falls to y^*



• Equilibrium at y_0, P_0

• Potential at y^*

• Inflation Gap = $y^* - y_0$

• Wages rise,

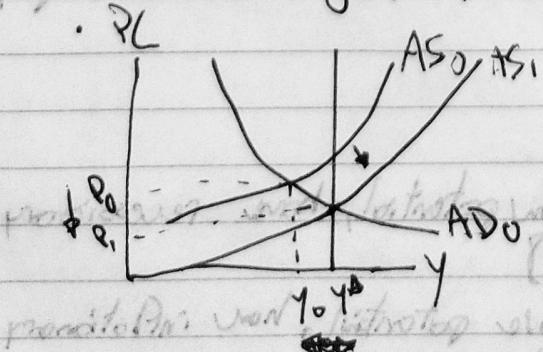
• Higher Prices

A Recessionary Gap

When $Y < Y^*$

- Demand for labour is low

- Low profits, wages fall, production falls, AS curve shifts right, output rises, prices fall



• Output falls

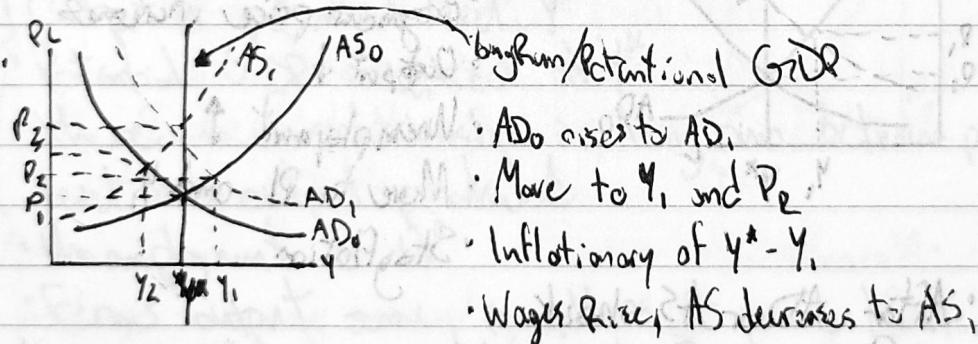
• Output is too low

Speed of Factor-Price Adjustment

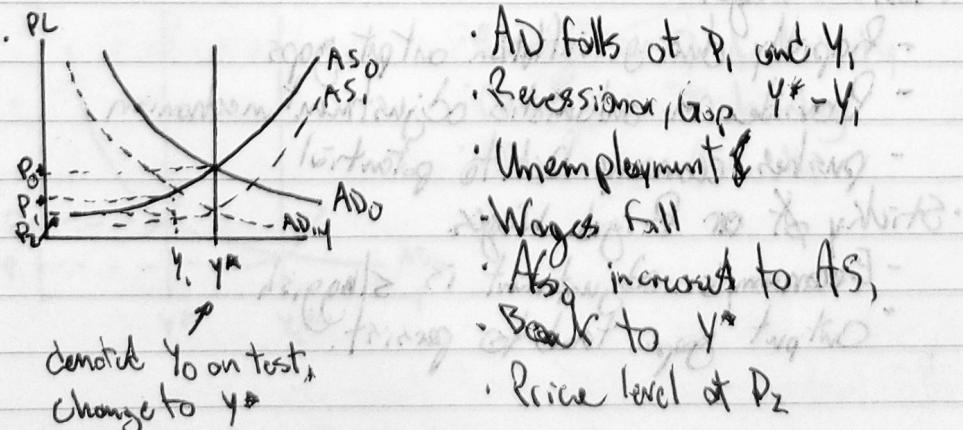
- Factor-Prices adjust at different speeds
- Booms cause wages to rise
- Slumps cause wages to fall
- In long run, potential output is unchanged
 - shock raises short run GDP above or below Y^*
 - Wages and other factor prices adjust
 - GDP returns to Y^*

Demand and Supply Shock

Long Run - Positive AD Shock



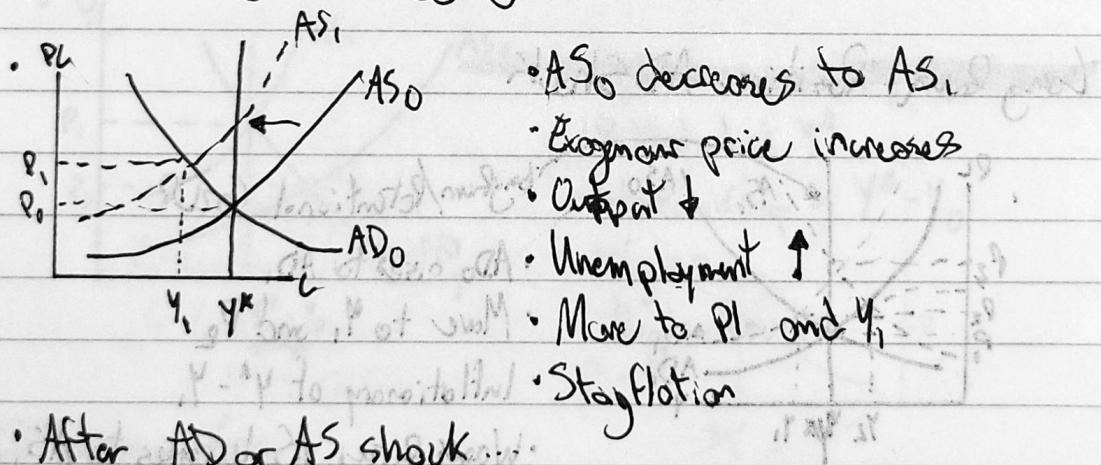
Long Run - Negative AD Shock



Self-Adjustment Mechanism

- Returns economy to potential GDP
- i.e. it removes unemployment, if wages fall
- Wages rates "sticky in a downward direction"
- If wages fall or not fall
- Supply curve may not shift rightward
- It may not return to Y^* (Natural rate of unemployment) at Y^* (full employment) until demand rises.

Long Run - Negative Aggregate Supply Shock



- After AD or AS shock...
- Wage flexibility determines speed economy returns to Y^*

Flexible Wages

- Rapidly during inflation output gaps
- Provide an automatic adjustment mechanism
- pushes economy back to potential

Sticky or Rigid Wages

- Economy's adjustment is sluggish
- Output gaps tend to persist

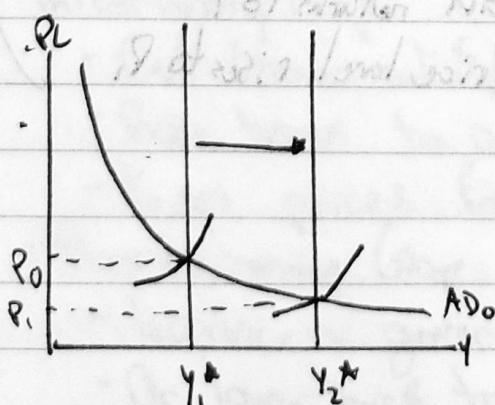
Economic Shocks and Business Cycles

- AD and AS subject to continual random shocks
- Automatic adjustment mechanism converts shocks into cyclical fluctuations in real GDP
- Lags cause changes in output to be extended over long periods of time

Long Run Equilibrium

- Excess Demand or Supply of labour (and other factors) will be eliminated.
- Full employment of factors
- Output at potential level, Y^*
- Potential GDP is vertical at Y^*
- There is no relationship in long run between price level and output produced
- Unemployment is U^*
- Firms' output same, regardless of price level.

Potential GDP may increase over time



- Change in Productivity
- Change in Technology
- Economic Growth

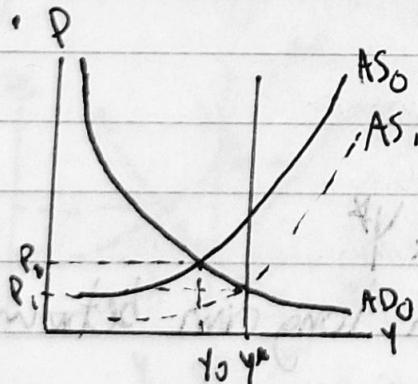
Fiscal Policy and the Business Cycle

Fiscal Stabilization

- fiscal Policy - Use government taxes and spending
 - to stabilize level of GDP at potential
 - maintain full employment

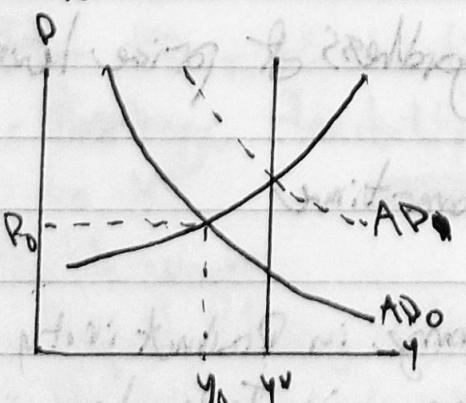
If $Y < Y^*$ (Recessionary Gap)

- wait for gap to close on its own (long time)
- Or use fiscal policy, increase government spending
- Or increase cut taxes to increase private spending



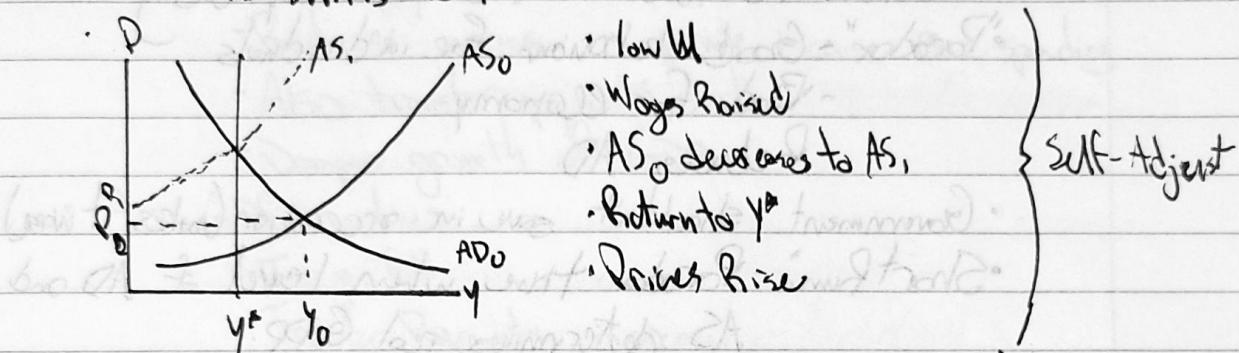
- At Y_0, P_0 it is slow but:
 - Wait for wages to fall
 - AS₀ shifts to AS₁
 - Price level falls to P_1 .
 - Can take a long time.
- Left-Adjusted model

Alternative:

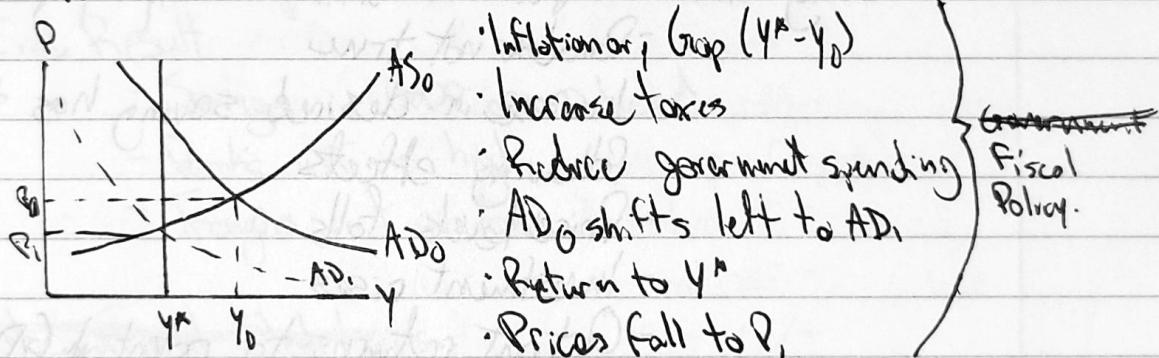


- Increase government spending
 - Cut taxes
 - Shifts AD₀ rightward
 - GDP returns to Y^*
 - Price level rises to P_1
- Fiscal Policy.

- If $Y > Y^*$ (Inflationary Gap)
 - Wait for wages to rise
 - AS shifts left
 - Or use fiscal policy, lower AD, raise taxes, AD shifts left.



• Alternative



Role of Fiscal Policy

- Inflationary Gap
 - Cut Government Spending
 - Raise taxes to reduce private spending
 - Keep prices from rising
- Recessionary Gap
 - Increase in government spending
 - Or lower taxes to encourage private sector spending
 - Avoids long wait to return to potential GDP

• Self Adjust will

- Very slow
- With price increases
- Long-lasting unemployment

Paradox of Thrift

(good) $y < y^*$ \downarrow

wisdom of crowd not fools

- An increase in saving (less spending) by public and sectors

- Reduces the level of Real GDP (by reducing AD)

- "Paradox" - Good behavior for individuals

- Bad for economy

- Reduces AD

- Government shouldn't save in recession (makes it worse)

- Short Run: Paradox true when level of AD and AS determines real GDP.

- Long Run: Output determined only by position of y^*

- Paradox not true

- Increase in desired saving has the following effects

- Price levels falls

- Investment rises

- Output returns to potential GDP (y^*)

Automatic vs. Discretionary Policy

Discretionary Fiscal Policy

- Government changes in G and/or T \downarrow

- Shifts AD curve \downarrow

- To change real GDP \downarrow

Automatic Stabilizer

- Fiscal System: Progressive Taxes & Transfer Payments

Automatic Stabilization

- As GDP increases...
 - Income increases
 - Tax payments increase
 - Reduces increase in private income & bc spending
 - Also transfer payments decline
 - Dampens growth of GDP
- As GDP declines...
 - Taxes fall
 - Transfer Payments increase
 - Dampens decline in real GDP
- End Result
 - Swings in GDP are reduced
 - Peaks not as high
 - Troughs not as low

Automatic Fiscal Stabilizers

- desirable, work well

Concerns about Discretionary Fiscal Policy

- Long and uncertain lags.
- Impossible to "fine tune" small exact changes in GDP
- Temporary vs. Permanent Changes in policy.
- Temporary tax changes may have little effect

Fiscal Policy and Growth Desirability

- Speed & automatic adjustment mechanism
- Fast - less need for fiscal policy
- Slow - Greater need for fiscal policy.

Fiscal Stabilization Policy has Consequences

- An increase in G
 - Temporarily increases real GDP
- Too big of an increase in G
 - Fewer amount of investment in long run
 - = "crowding out" private investors
 - May reduce potential growth
- Lower Taxes may
 - Stimulate I
 - increase in potential GDP
 - But still needs to fund schools, medical care, etc.

Chapter 14 Money and Banking

Two Perspectives on Money

- The Classical View of Money
 - Relative prices and real GDP determined only by real things
 - Technology and Preferences
 - Money is neutral
 - Change in the money supply causes no change in real variables
 - Change in the money supply does lead to a proportional change in the price level.
- The Modern View
 - Short Run - Changes in money do generate changes in output and other real variables
 - Long Run - money is neutral
 - changes in money and the price level are closely linked
 - Countries with high inflation rates often have higher rates of growth in the money supply

The Nature of Money

- Money is a medium of exchange
- Acceptable as payment of goods and services
- Without money, bartering system is used
- Bartering is inefficient
- Requires a double coincidence of wants.
- Money is a store value
- Money is a unit of account

The Origins of Money

- Metallic Money
 - Coin worth market value
 - led to debasing
- Gresham's Law
 - "bad money drives out the good"
 - One with greater intrinsic value will be driven out of circulation.
- Paper Money
 - backed by precious metal
 - convertible on demand
 - referred to as banknotes because it was issued by private banks
- Fractionally backed paper money
 - Goldsmiths didn't need 1 oz of gold for every receipt
 - issued more "receipts" than gold
- Fiat Money
 - paper or coinage
 - neither backed by nor convertible into anything else.
 - declared as legal tender
- Most money is fiat money

Modern Money

• Deposit Money

- Money held by the public in form of deposits with commercial banks and other financial institutions.

• bank deposits are money

• Money Creation

- Banks create money by issuing more promises to pay (deposits) than they have available in their cash reserves.

The Canadian Banking System

- Consists of ① the Central Bank, ② commercial banks

• Central Bank

- Acts as a bank to commercial banking system

- Usually government-owned

- Sole money-issuing

- Bank of Canada is the Central Bank in Canada.

- Operates under system of joint responsibility

- Operates monetary policy on a day-to-day basis

- Free of political influence

- Ultimately answerable to parliament

- Basic Functions - banker to commercial banks

- banker to federal government

- regulate money supply

- regulate, support, monitor financial markets

Banker to Commercial Banks

- Accepts deposits
- Transfers funds to other commercial banks to settle debts
- Lends to commercial banks (last resort)
- Greatest liability of Canada is notes in circulation.

Banker to Federal Government

- Holds some government deposits
- May lend to federal government by buying treasury bills (short term bonds) or regular bonds
- Important for conduct of monetary policy

Regulator of Money Supply

- Controls money supply
- Two main liabilities of BOC:
 - Currency in circulation
 - Commercial bank reserves
- Controlling liabilities, controls money supply.

Regulate and Support Money Markets

- Financial Institutions

- banks borrow short and lend long.

- Problems

- unexpected interest rate rise
 - banks must pay higher interest rates to keep deposits
 - funds loaned at a lower rate

- BOC can adjust interest rates to prevent these problems

- sometimes the 4 Fns conflict

Commercial Banks in Canada

- Privately owned
- Profit-seeking institutions
- Provide a variety of financial services
 - accepting deposits
 - making loans, etc
- Bank Act
 - Provides for commercial banks
 - Other financial institutions
 - credit unions, trust companies, etc.

Interbank Activities

- Banks cooperate with each other in some areas
 - "Pool" very large loans
 - Credit Cards operated by groups of banks
- Banks operate clearing house
 - settle interbank debts each day
 - transfer funds to settle cheques
- If bank A owes bank B money, it transfers ~~its~~ money from its account at BOC.
- Savings Deposits are much larger than demand deposits.

Reserves

- Money in demand deposits at bank
- Bank keeps part of deposits
- lends out the rest
- Reserves - portion of the new deposit that is kept.
 - normally quite small
 - only a small fraction of depositors want money at any time
 - needed to assure depositors can withdraw on demand.

- Banks reserve ratio

- Fraction of deposits it actually holds as reserves

- Reserves held as

- Vault cash

- Deposits with central bank

- Banks target reserve ratio

- Fraction of its deposits it wants to hold as reserves

- target ratio was legally imposed until 1992

- Now determined by the bank itself

Canadian Banking System

- Fractional-reserve System

- banks reserves approx 3%

- Bank rush to withdraw funds

- Banks run out of reserves

- Banks borrow reserves from BOC

- Excess reserves

- Any reserves in excess of target reserves

- Excess reserves are loaned out

Money Creation by Banking System

- Assumption

- banks can invest in only one kind of asset: loans

- Only demand deposits

- Fixed target reserve ratio

- no cash drain from banking system

The Creation of Deposit Money

- reserve ratio (v) of 20%

- ratio of reserve to deposits (R/D) = $v = .2$

Assets	Liabilities	
Cash/Reserves 200	Deposits 1000	• New deposit of \$100
Loans 900	Capital 100	• Raises liabilities and assets (immediate reserves)
1100	1100	by the same amount

Assets	Liabilities
Cash/Reserves 300	Deposits 1200
Loans 900	Capital 100
1200	1200

• target reserves = $.2 * 1100 = 220$

• $1200 - 220 = 980$

• banks now lend at the excess reserves of \$80 ($980 - 900$)

• bank returns to 20%.

Assets	Liabilities
220	1100
980	100
1200	

• \$80 in new loans in Firstbank

• Second bank receiving:

- new deposits of \$80 (ΔD)

- target reserves of \$16 ($.2 * 80 = 16$)

- Excess reserves of (Second bank) \$4

Assets	Liabilities
Cash +16	Deposits +80
Loans +64	Capital +0
+80	+8

$\Delta D = \Delta R$

Deposits = +

Withdrawals = -

• A single new deposit begins sequence of deposit creation

• Deposit Multiplier = $D_M = \frac{1}{v} = \frac{1}{.2} = 5$ (one atm)

• $D_M * \Delta D = \text{Total } \Delta D \text{ or } D_{MS}$

Bank	New Deposits	New Loans	Addition to Reserves
1 st	+100.00	+80.00	+20.00
2 nd	80.00	64.00	16.00
3 rd	64.00	51.20	12.80
Total	+500 (5 × 100)	+400 (5 × 80)	+160 (5 × 20)

- v is the target reserve ratio
- no cash drain
- banking system will change its deposits by $\frac{1}{v}$ times any change in reserves
- $AD = DR_{eserves} \sqrt{v}$

• In the last Example

$$- v = .2 \text{ or } 20\%$$

$$- \text{New deposit} = \$100$$

$$\leftarrow \text{Find increase in deposits} = +100 \times \frac{1}{v}$$

$$= +100 \times \underline{1}$$

$$\underline{.2}$$

$$= \$500$$

- Deposit creation does not happen automatically
- If banks do not lend excess reserves
- Deposits do not expand

Excess Reserves and Cash Drains

• Cash drain

- HH carry a fixed fraction of their funds in cash
- deposits creation process damped
- If c is the ratio of cash to deposits ($\frac{C}{D}$) that people want to maintain
- final change in deposits given by:
 - $\Delta D_{\text{final}} = \Delta \text{Reserves} \cdot \frac{1}{c+V}$
 - $m_m = \frac{1}{c+V}$
money multiplier $c+V$

• if $V = 20\%$,

$$C = 10\%$$

• HH deposits an additional \$100

• Deposits (money) will change by:

$$\frac{\$100}{1 + 0.2} = \frac{\$100}{1.2} = \$33.33$$

• a new bank deposit of \$100 increase total bank deposits by \$33.33

• less than case with no cash drain (\$500).

• Bank 1

- receives \$100

- keeps \$20 in reserves

- lends out \$80

• Borrower

- keeps \$8 in cash

- deposits \$72 in bank 2

• Bank 2

- keeps \$14.40 in reserves

- lends out \$57.60

• End result

- deposits up by \$33.33

The Money Supply

- total supply quantity of money in the economy at any time
- consists of currency plus various types of deposits

Kinds of Deposits

- Various definitions of the money supply
 - depending on the types of deposits included.

Definitions of the Money Supply

- Narrow Definition - $M1 = \text{currency} + \text{demand (checkable) deposits}$
- Broader Definition - $M2 = M1 + \text{saving deposits at commercial banks}$
- Still Broader Measure - $M2^+ = M2 + \text{deposits at institutions that are not commercial banks}$

Near Money and Money Substitutes

- Near Money
 - assets that are a store of value
 - readily converted into a medium of exchange (money)
 - not themselves money
 - Term deposit
 - Good store of value (earns interest)
 - Poor medium of exchange
- Money substitutes
 - temporary medium of exchange
 - not a store of value
 - Eg credit card
 - Choice between keeping money or chequing account
 - depend on need for convenience vs. interest earnings

Choosing a Measure

- no perfect ~~measure~~ definition of money, near money, or money substitute.
- New financial assets are continually being developed
 - Serve some or all functions of money

The Role of the Bank of Canada

- Commercial banking system can create a multiple expansion of bank deposits when it receives a new deposits
- Shows that the money supply is related to the reserves of the banking system
- Control reserves

Chapter 15.1 Money, Interest Rates, and Economic Activity

Financial Assets

- 1- Money - currency plus checkable deposits
- 2- Bonds - bought and sold in bond market
 - bond is a promise to make payments at dates in the future.
- Present Value is the current value of one or more payments or receipts made in the future - the (discounted) present value (PV) of the bond.

Present Value and the Interest Rate

- Asset pays \$100 in one year's time
- Interest rate (i) is 6% per year
- Present Value of the asset equals: $PV = \frac{100}{1+i}$

$$= \frac{100}{1.06}$$

$$= 93.34$$

- The present value of any asset that yields a stream of payments over time is negatively related to the interest rate.

Present Value and Market Price

- PV of an asset is the highest someone would pay to own the future stream of payments from the asset.
- Any price lower than PV creates excess demand for the asset.
- The equilibrium market price of an asset is the PV of the income stream that the asset produces.

formula

- The present value of R dollars, received t years in the future, is $PV = \frac{R}{(1+i)^t}$

- Thus, annual stream of R dollars, for t years has a PV of; $PV = \frac{R}{(1+i)} + \frac{R}{(1+i)^2} + \dots + \frac{R}{(1+i)^t}$

- Ex. In 1 year, \$100 bond comes due, pay 10% interest thus, pays \$110 (R) next to U.S. government

$$PV = \frac{R}{(1+i)^t}$$

$$= \frac{110}{(1+0.1)}$$

$$= 100 \text{ dollars or } \$100 \text{ per year face value}$$

say so to value of \$100 in 1 year

$$= 100 = 104.76 \text{ dollars next to U.S. government}$$

- If interest rate increase to 8%, what's the bond worth

$$PV = \frac{R}{(1+i)^t}$$

$$= \frac{110}{(1+0.08)}$$

$$= 100$$

so it's worth less than \$100 to U.S. government

$$= \$91.65$$

- As interest rate rises, present value falls.

- Extreme Case of Perpetuity

- never comes due

- pays interest forever

- Assume, Perpetuity pays \$10 in interest, every year. Bond \$100, $i=5\%$.

- Formula for perpetuity = $\frac{R}{i}$

$$= \frac{10}{0.05}$$

$$= \$200$$

The Interest Rate and Market Price

- Negative relationship between interest rates and asset prices
 - If interest rate falls
 - present value of an asset with a given income stream will rise
 - A rise in market price of an asset with a given income stream
 - is equivalent to a decrease in rate of return earned by the asset.

Stocks and Bonds

- Income earning assets
 - Bonds (debt) generate a stream of interest payments.
 - Stock (equity) generate a stream of dividend payments.
- Demand for money
 - Lump all income earning assets as bonds.
 - Bonds → earn interest
 - Money → earns no interest.

The Demand for Money

- Money balances you want to hold
- Opportunity cost of holding any money balance
 - is interest earned if money used to purchase bond.
- Three motives for holding money.
 - Transaction Motive
 - Precautionary Motive
 - Speculative Motive.

The Transaction Motive

- Transactions balance~~of individuals~~ - Money balances held to make payments
- If GDP is larger
 - More transactions
 - Economy holds larger transaction balances
- If interest rate is higher
 - Fewer transaction balances held
 - = interest rate is opportunity cost of holding money

The Precautionary Motive

Precautionary Balances

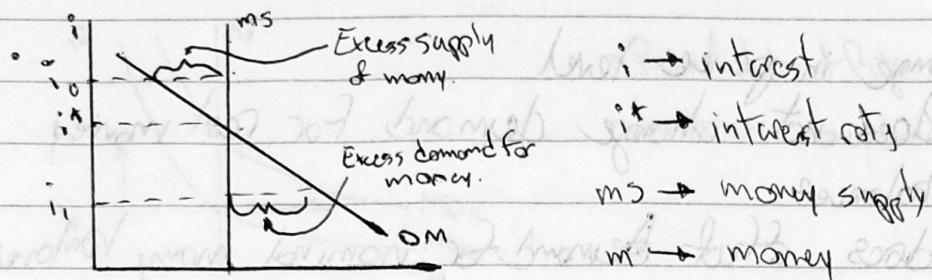
- held to protect against uncertainty of the timing of cash flows
- If interest rate is high
 - Fewer precautionary balances are held
 - higher opportunity cost

The Speculative Motive

Speculative Balances

- held because of uncertainty of prices of financial assets
- bonds
- If interest rates change
 - bond prices change
 - Rate of return uncertainty
- Hold money to diversify
 - financial portfolio
 - reduce risks

Money vs Interest Curve



- At i_0 - we have a high rate of interest
 - Opportunity cost of holding money is high
 - we expect interest rates to fall.
 - Buy bonds \rightarrow to make capital gains \rightarrow drives down money balances.
- At i_1 - we have a low rate of interest
 - O.C. of holding money is low
 - Expected interest rates to ~~fall~~ increase
 - Sell bonds \rightarrow avoid capital loss \rightarrow drive up money balances

Real vs. Nominal Money

- Nominal Money (M)
 - Actual amount of money
 - Currency plus bank deposits
- Real Money ($\frac{M}{P}$)
 - nominal money divided by the price level
 - it is the purchasing power of money.
- If price level rises by 10%.
 - nominal money falls by 10%
 - real money is constant.

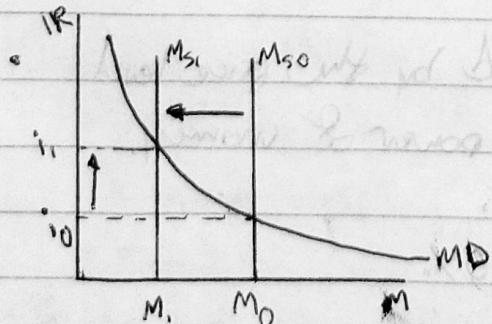
Real and Nominal Money Balances

- Change in price level
 - does not change demand for real money balances
 - does affect demand for nominal money balances.
- Ceteris paribus, nominal demand for money balances varies in direct proportion to price level.

Monetary Transmission Mechanism

- Changes in supply and demand for money affect aggregate demand
- Three Stages - 1- Change in demand or supply changes equilibrium interest rate
- 2- Change in interest rate leads to change in desired investment expenditure
- 3- Change in investment leads to a change in aggregate demand

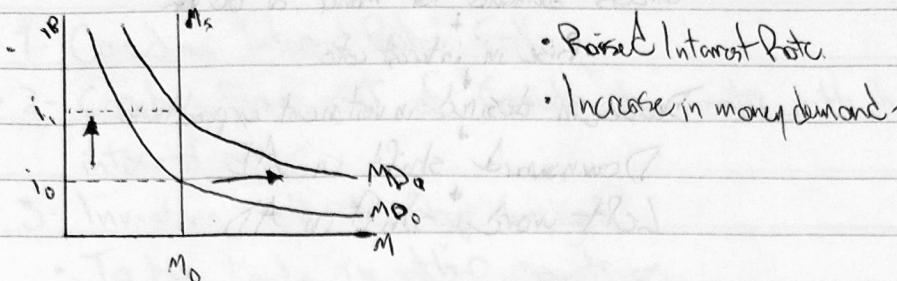
1- Change in Money Supply [$M_s \downarrow$]



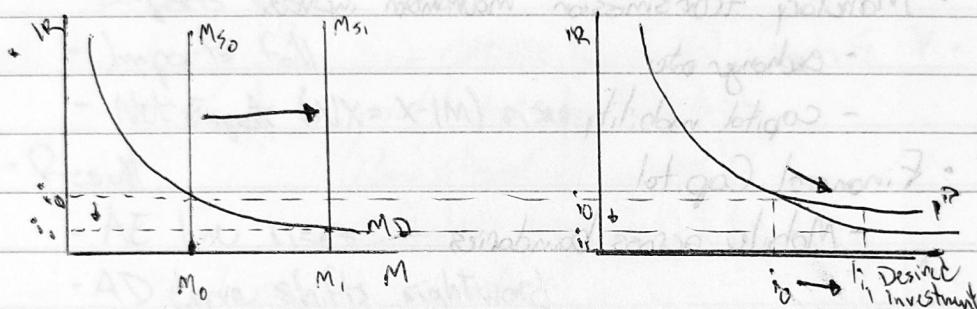
• Money Supply decreases

• Interest Rate rises.

(Change in Demand for Money [M_D]: Y↑ or P↑)



2) Change in Interest Rate (lead to Change in Investment: i↑ for M_D)

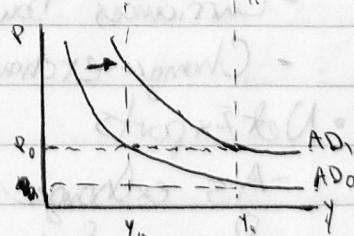
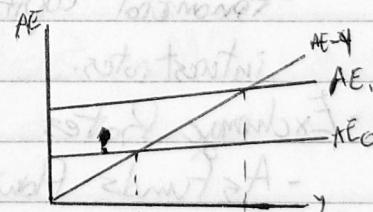


- Money Supply Increases \rightarrow i decreases \rightarrow I increases

3) Increase in Investment

- Raises AE (shift)
- Increase AD (shift)
- NB: Y₁ cuts AD, at old price level P₀

$$\Delta AE = \Delta I$$



- Increased supply \downarrow or \downarrow decrease in demand for \uparrow
 - Excess supply at old interest rates
 - ↑ Fall in interest rates
 - ↑ Increase in desired investment expenditure
 - ↑ Upward shift in AE
 - ↑ Rightward shift in AD

- Decrease in supply of \$ or Increase in demand for \$
Excess demand for money at old i
Rise in interest rate
Decrease in desired investment expenditure
Downward shift in AE
Leftward shift in AD

Open Economy

- Monetary transmission mechanism includes
 - Exchange rate
 - Capital mobility
- Financial Capital
 - Mobile across boundaries

Changes in Ms Changes Interest Rate Lead to

- Capital Flows
 - financial capital flows to country with highest interest rates.
- Exchange Rates
 - As funds flow across the border
 - Currencies bought and sold
 - Change exchange rates
- Net Exports
 - As exchange rates change
 - Prices of imports and exports change
 - Country's national income (Y) changes

Canadian MS Increases

- 1- Canadian Interest Rates Fall
- 2- Capital flows out of Canada to country with higher interest rates
- 3- Investors sell \$C [buy foreign\$]
 - To buy bonds in other countries
 - \$C depreciates.
- 4- As \$C falls
 - Exports rise
 - Imports fall
 - Net Export ($NX = X - IM$) rises.
- Result
 - AE line rises
 - AD curve shifts rightward
 - Canadian National Income (Y) increases

Summary (Open Economy)

- MS ↑
- AD ↑
- 1- Investment (Internal)
 - $i \downarrow$
 - $I \uparrow$
- 2- Exchange and Net Exports (External)
 - $i \downarrow$
 - Capital outflows
 - Currency depreciation ↓
 - $NX \uparrow$

- Increase in MS

or Decrease in MP

Excess Supply of Money

Interest Rate Fall

Increase in Investment

Capital Outflow and
Currency Depreciation

Increase in NX

Upward Shift in AE

Rightward shift in AD

Negative Slope of AD Curve

- If P rises - fall in real wealth

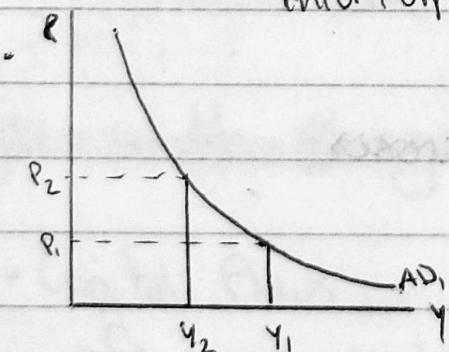
- International Substitution (Foreign for domestic goods)

- Intertemporal Substitution

• Increase in price level

• Movement along AD

• Decrease in quantity of real GDP Demanded

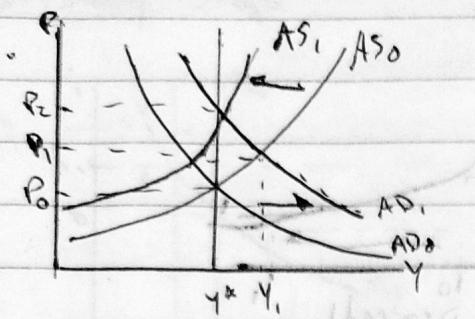


Changes in Money Supply (Monetary Forces) Affect the Economy

- Size of effects on i, I, Y?

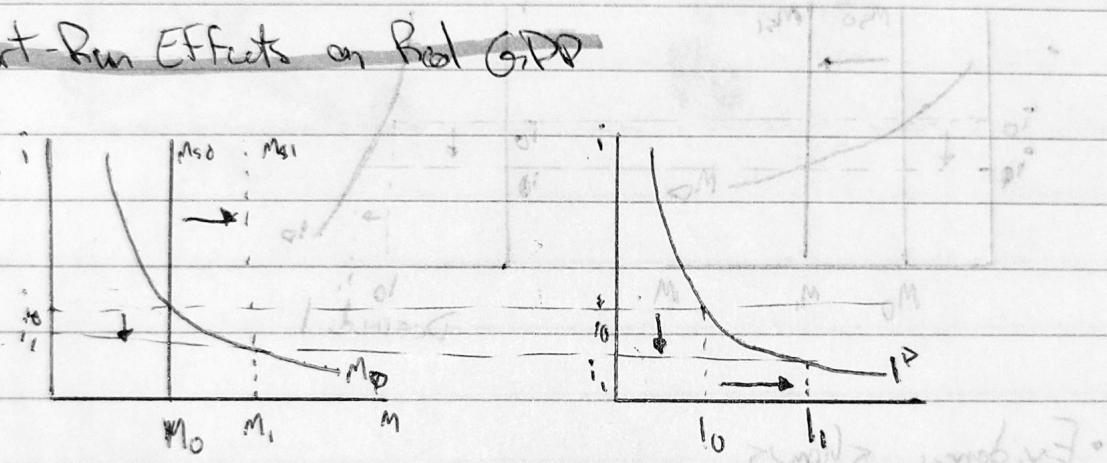
- Distinguish between long run from short run changes

Long-Run Effects on Real GDP



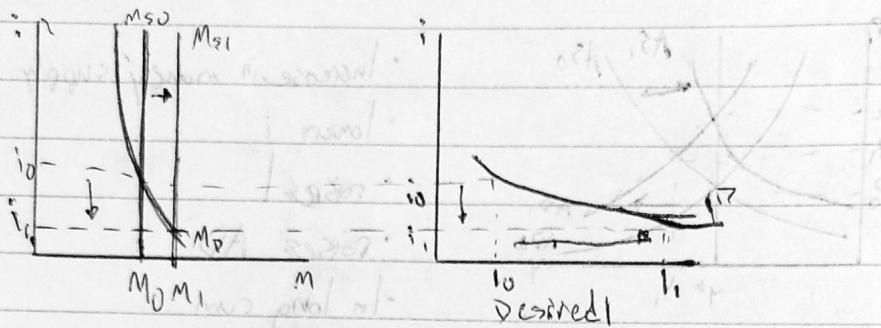
- Increase in money supply
- lowers i
- raises I^P
- raises AD
- In long run
- AS decreases
- End at Y^* and P_0

Short-Run Effects on Real GDP

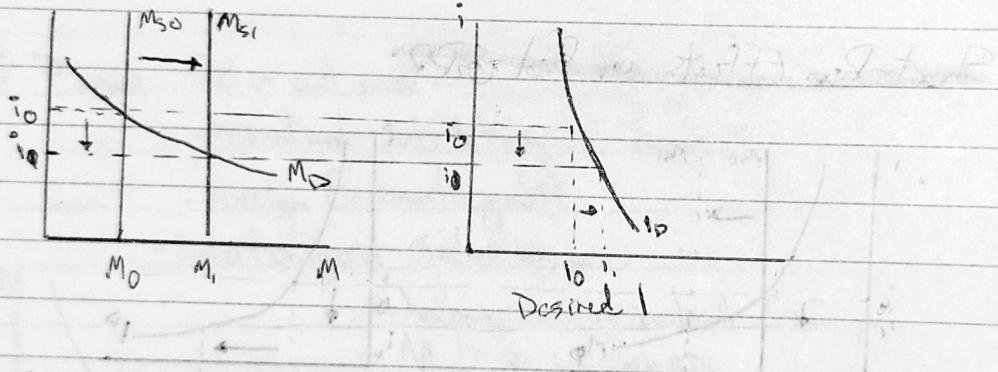


- Effects of change in M_s on AD depends on slope of M_D curve and on slope of I^P curve
- Steeper M_D curve
 - Greater change in interest rates from change in M_s
- Flatter I^P curve
 - Greater change in investment from any given change in interest rate
- Monetary policy more effective with steep M_D curve and flat I^P curve.

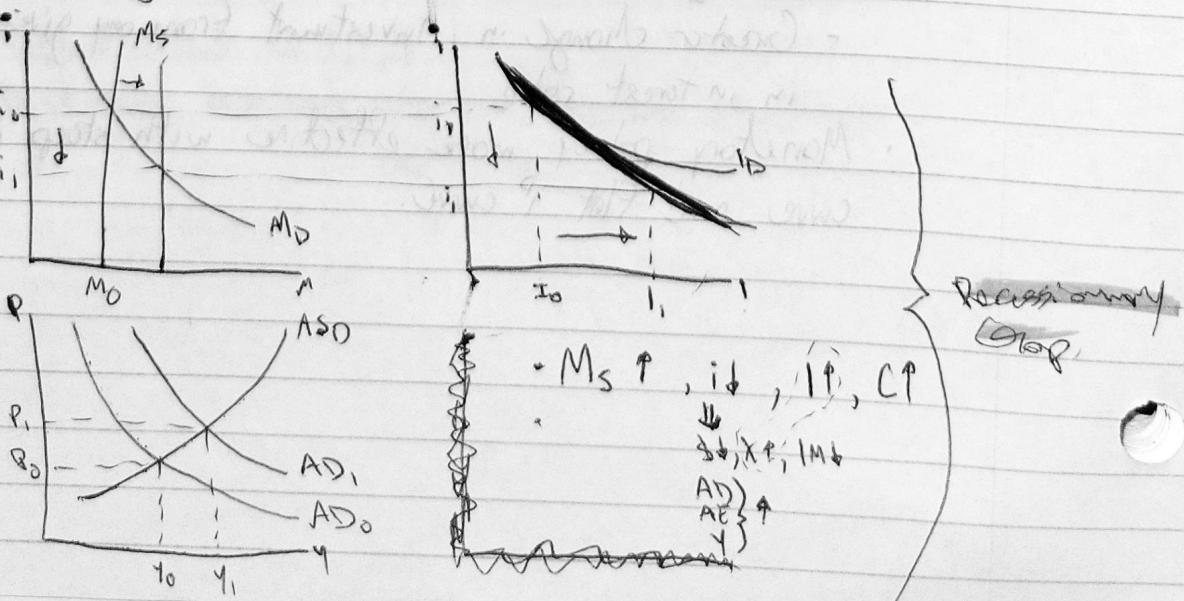
M monetary Policy More Effective (Monetarist)



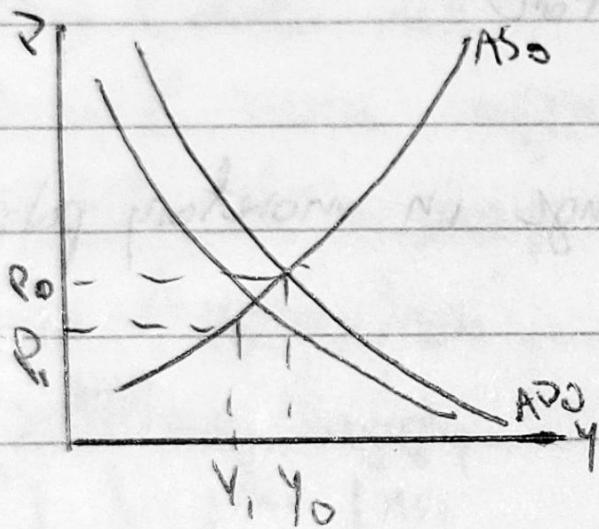
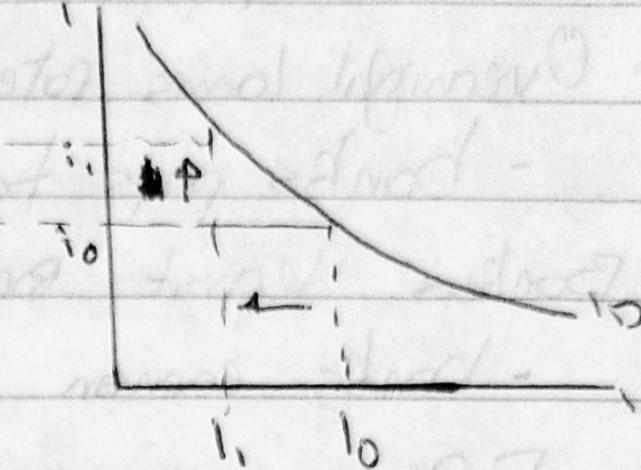
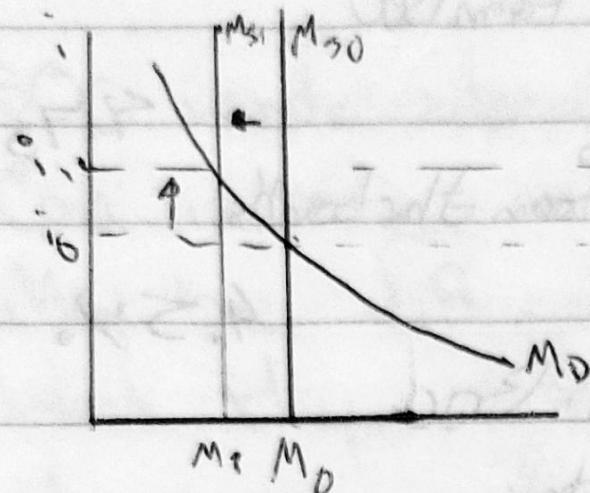
M Monetary Policy Less Effective (Keynesian)



- Evidence shows
 - M_D is steep
 - Slope of ID is uncertain
- Result
 - Monetary policy is effective when business expectations are good



Inflationary Gaps



MS ↑, i ↑, i ↑, C ↓
 \$↑, X↑, IM↑
 AD) GE ↓

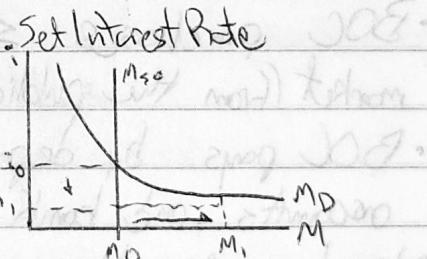
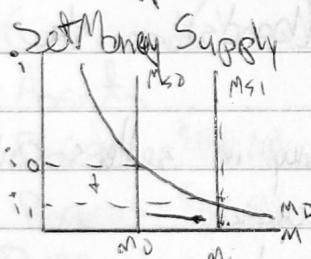
• Bank Rates In order

- Bank Rate
 - Banks pays this to borrow from BoE
- Overnight loans rate
 - banks pay to borrow from other banks
- Bankers deposit rate
 - banks earn on deposits in BoE
- When BoE announces bank rate
 - It sets off three rates.
 - Change in bank rate \rightarrow change in monetary policy

Chapter 15.2 Monetary Policy in Canada

How does Bank of Canada Implement Monetary Policy?

- BOC wants interest rates to fall
- Can increase money supply to cause i to fall
- May be difficult to hit target.
- Instead they set:
 - M_D curve sets demand for money at new i
 - Bank uses open market operations to supply that quantity of money.
- Two Approaches:



- BOC uses set interest rates.
- BOC change control MS but it can influence it.
- BOC can't accurately predict M_D
- * • M_S is endogenous - not controlled by BOC but by HH, firms, and commercial banks.

Bank Sets Interest Rates.

- Bank announces its target overnight interest rate at specific dates
- Overnight interest rate - the rate at which banks charge each other for short term loans
 - Influences other interest rates.
- Automatically sets bank rate.
- Bank rates lie between bank rate (^{upper}) and (lower limit)

How to set MS

- How does BOC control MS?
- Recall - most money is deposit money (bank accounts)
 - bank accounts are 65% M1 and 90% M2
- BOC controls deposits money by controlling reserves
- Uses several tools
- Main tool is open market operations

Open-Market Operations

- BOC purchases securities (bonds) on the open market (from the public).
- BOC pays by depositing money in sellers' bank accounts, and bank reserves increase.
- banks can then expand deposits, increasing money supply

Open Market Purchase by BOC from Public

- Private Households

Assets

Bonds -\$10,000

Liabilities

No change

Deposits +\$10,000

"

- Commercial Banks

Assets

Reserves +\$10,000

Liabilities

Demand Deposits +\$10,000

- Bank of Canada

Assets

Bonds +\$10,000

Liabilities

Commercial Bank Deposits +\$10,000

- Ex 1- BOC announces reduction in overnight interest rate.
- 2- Banks lower interest rates - get greater demand for loans
- 3- banks seek to get greater funds for loans by selling bonds
- 4- BOC provides more funds for banks by buying government bonds from them, bank reserves increase, banks have more to lend, MS increases
 - Called open market purchase of government bonds.

Open Market Purchase of Bonds from Commercial Bank.

• Commercial Bank

Assets

Bonds - \$100,000

Reserves + \$100,000

Liabilities

No change

• BOC

Assets

Bonds + \$100,000

Liabilities

Commercial Bank Deposit + \$100,000

• The reserves of the commercial bank increase by \$100,000

• With additional reserves banks can expand loans - deposits increase

• MS increases

• Money is being "created"

• Or banks have excess reserves

↳ Shortage of good borrowers

↳ So BOC sells bonds to the bank

↳ This reduces bank reserves and MS.

↳ This is called open market side of government bonds.

↳ Money 'disappears'

Open Market Sales to the Public

- BOBC sells bonds to the public
 - Effects opposite to purchasing securities from the public.
 - Public buys securities with funds in bank accounts
 - bank deposits are reduced, bank deposits fall.
 - With lower reserves, banks lend less, deposits are reduced and money supply shrinks
 - Money "disappears"

Expansionary Monetary Policy

- BOC increases MS, lowers interest rate (↓)

Contractionary Monetary Policy

- BOBC may reduce MS, interest rate increases or, BOC increases MS slower than M_D , interest rates still increase
- Why?
 - Demand for money grows \Rightarrow G↑ does
 - Ex G↑ 5% and MS↑ 2%, and since there is a demand for money, interest rates rise.

Government Deposit Shifting

Government Deposit to Commercial Bank

- Commercial Bank

Assets	Liabilities
--------	-------------

Reserves + \$100,000	Govt Deposit + \$100,000
----------------------	--------------------------

- BSC

Assets	Liabilities
--------	-------------

Govt Deposit + \$100,000	
--------------------------	--

Government Deposit from Commercial Bank

- Commercial Bank

Assets	Liabilities
--------	-------------

Reserves - \$100,000	Govt Deposit - \$100,000
----------------------	--------------------------

- BSC

Assets	Liabilities
--------	-------------

Govt Deposit + \$100,000	
--------------------------	--

Targeting Inflation

- BSC's monetary policy target: Inflation

- Why?

- Inflation causes uncertainty, is damaging to the economy. How?

- Harms those not protected by indexed incomes

- Reallocates incomes between workers and firms, between borrowers and lenders

- Undermines price signals to economy.

- 2- Most central banks believe monetary policy most important determinant to sustained inflation
- Effects of inflation differ in short run and long run
- In short run, monetary policy can effect real variables - employment, GDP, etc.
- In long run, economy returns to y^* and monetary policy primarily affects inflation rate.
- ↪ Given uncertainty caused by inflation and importance of MS - in causing inflation in long-run: BOC has a set inflation target
- ↪ Prices increase at 1-3% per year

Role of Output Gap

- BOC monitors output gap, as monetary policy can affect gap in short run
- Eg - If $y > y^*$
 - wages rise
 - AS decreases
 - Price level rises,
} Inflation
- If $y < y^*$
 - wages fall
 - AS increases
 - Price level decreases
} Deflation

Inflation Targeting can be Stabilization Policy

- If $GDP > y^*$, pressures for prices to rise, BOC uses contractionary policy (i rises)
- If $GDP < y^*$, price increase small, BOC uses expansionary policy (i falls)

Complications in Inflation Targeting

- Volatile Food and Energy Prices
 - These prices often set abroad, do not reflect output gaps in Canada
- BOC relies on measure of core inflation ignores prices of food, energy, and sales taxes.
- Better indicator of state of economy than core inflation.

Exchange Rate

- Canada is a heavy trading nation, exchange rate matters and it can change
- BOC watches exchange rate but it may be confusing signal
- 2 Examples (assume GDP at Potential):
 - ①- World Price of Canada's ~~BBB~~ X increases - so GDP, incomes and \$C rises.
 - Now how inflationary gap ~~not above~~.
 - BOC uses contractionary monetary policy
 - Reduces money supply
 - raises interest rates.
 - ②- World demand for Canadian Assets rises, foreigners buy more \$C to buy Canadian Assets, NX falls
 - Precessionary Gap
 - BOC uses expansionary monetary policy
 - BOC wants to lower interest rates to raise AD.
- In both cases \$C (Canadian dollar) rose, but for different reasons
- BOC must take care to understand reason for exchange rate change.

Lags in the Conduct of Monetary Policy

- Effectiveness of monetary policy is affected by time lags.
- Time lags may be long and variable, for several reasons
 - Changes in expenditure take time
 - The multiplier process takes time
- Time lags make monetary policy difficult
 - BOC estimates 9-12 months for policy to effect GDP.
 - another 9-12 months to effect price level.
- ∴ BOC policy must be forward-looking
- This can be potentially difficult
 - Miss judgement of future.

Inflation Targeting

- Since 1991, BOC has inflation target
 - prices increase between 1 & 3%.
 - 2% is desired
- Canada has been able to deal with this.