

Chapter 1q

$x \propto y \Rightarrow$ Positive relationship

$x \propto \frac{1}{y} \Rightarrow$ negative relationship

$$\text{Output gap} = Y - Y^* = \text{actual} - \text{Potential}$$

- * $Y^* > Y$ Potential > Actual
- * $Y > Y^*$ Actual > Potential

- Recessionary gap
Inflationary gap

(cyclical unemployment) > 0
Cyclical unemployment < 0

$$\text{Unemployment Rate} = \frac{\text{No. of Unemployed}}{\text{Labour force}} * 100$$

- * frictional une \Rightarrow natural turnover
- * structural une \Rightarrow mismatch of jobs

$$\text{Employment Rate} = \frac{\text{No. of employed}}{\text{Population}} * 100$$

Nominal Interest rate \Rightarrow the rate in money terms
Real Interest rate \Rightarrow the rate in Purchasing Power

$$\text{Exchange Rate} \Rightarrow x \text{ CAD} = 1 \text{ USD}$$

$$\text{Productivity} = \frac{\text{Output}}{\text{Labour Input}} = \frac{\text{Real GDP}}{\# \text{ Workers} * \text{Average hours}}$$

Real GDP per hour worked

$$\text{Inflation \%} = \frac{\text{New CPI} - \text{Old CPI}}{\text{Old CPI}} * 100$$

CPI

$$Q) \text{ CPI}_{2018} = 136.8$$

$$\text{CPI}_{2020} = 138.1$$

$$\text{Inflation Rate} = ?$$

$$\frac{138.1 - 136.8}{136.8} * 100 = 0.95\%$$

$$Q) 1 \text{ CAD} = 5.05 \text{ Yuan}$$

$$x \text{ CAD} = 1 \text{ Yuan}$$

$$\Rightarrow x \cdot 5.05 = 1 \text{ CAD} \Rightarrow x = \frac{1}{5.05} \text{ CAD} \Rightarrow 0.2 \text{ CAD}$$

Exchange Rate

Q) Determine **Unemployment Rate** of the following

a) LF = 22

$$\text{Unemployed} = 1.6 \quad \text{Unemployment Rate} = \frac{1.6}{22} * 100 = 7.3\%$$

$$\text{Population} = 42$$

b) Employed = 14 Unem = 17 - 14 = 3 $\Rightarrow \frac{3}{17} * 100 = 17.6\%$

$$LF = 17$$

C) Unemployed = 800,000

$$\text{Unemployed} = 2,250,000 \Rightarrow LF = \frac{\text{Unemployed}}{\text{Total Population}} = \frac{800,000}{2,250,000} * 100 = 36.2\%$$

d) LF = 9,100,000

$$\text{Unemployed} = 400,000 \Rightarrow \frac{400,000}{9,100,000} * 100 = 4.4\%$$

Pop = 14,300,000

Q) Total Expenditure 2009 = 1100

Total Expenditure 2010 = 1194

$$\Rightarrow CPI = \frac{1194}{1100} * 100 = 108.5$$

if 2009 is
base year

$$CPI_{2009} = 100$$

$$CPI_{2010} = 108.5$$

$$\text{Inflation rate} = \frac{108.5 - 100}{100} * 100 \Rightarrow 8.5\%$$

CPI & Inflation

full employment is when Actual GDP = Potential GDP

* Structural and frictional unemployment exists when economy is at full employment

Q) Lending \$80

Receiving \$88

Inflation rate is at 6%

What is Real Interest rate

Real interest rate = nominal interest rate - Inflation rate

$$\begin{aligned} &= \frac{88.80}{80} * 100 - 6 \\ &= 10 - 6 \\ &= 4 \end{aligned}$$

Q) The Canadian dollar Price of a euro dropped from \$1.40 to \$1.30, this represents _____ and as a result it's _____ expensive for Canadians. (Appreciation, less)

$$CPI = \frac{\frac{\text{Quantity}_{\text{base year}} * \text{Price}_{\text{varied year}}}{\text{Quantity}_{\text{base year}} * \text{Price}_{\text{base year}}} * 100}{\text{Quantity}_{\text{base year}} * \text{Price}_{\text{base year}}}$$

$$\text{Real GDP} = \frac{\text{Quantity}_{\text{varied year}} * \text{Price}_{\text{base year}}}{\text{Quantity}_{\text{base year}} * \text{Price}_{\text{base year}}}$$

} know the
differences

Chapter 20

Value added = revenues - non-labour costs

= Sales revenue - cost of intermediate goods

Total value added = GDP

- GDP = total production in economy

- can be counted by using :

- Total value added domestic production
- total expenditure domestic output
- Total income domestic production

Total Expenditure = Consumption (C) + Investments (I) + Government Purchases (G) + Net exports (NX)

Consumption includes :

- Durable goods
- non-durable goods
- Semi-durable goods
- Services

Investment includes :

$$\text{Gross Investment} = \text{Net} + \text{Depreciation}$$

bi-directional causation equation.

Government Purchases include :

- exclude transfer payments
such as (EI, pensions, interest on debt)

net exports include :

$$NX = X - IM = \text{Export} - \text{Import}$$



includes government purchases bought from another country

Total Income = Net domestic Income + (indirect taxes - Subsidies) + Depreciation
(factor income) (non-factor payments)

$$= (\text{Profit} + \text{Wages} + \text{Interest}) + (\text{indirect taxes} - \text{subsidies}) + \text{Depreciation}$$

$$\text{GDP Inflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} * 100$$

Q) nominal GDP₁₉₈₅ = 498.1

$$\text{nominal GDP}_{2017} = 2144.4 \quad \text{GDP}_{1985} * (1+g)^{32} = \text{GDP}_{2017}$$

average growth rate = ? $g \Rightarrow 4.67\%$

no. of years = 32

1- wages & salaries	50,000
2- Interest income	2,000
3- Personal consumption	39,000
4- Personal Savings	300
5- Personal Income taxes	250
6- Government Purchases	10,000
7- Indirect taxes	1,175
8- Subsidies	300
9- Business Profits	4,650
10- Exports	3,500
11- Net private investments	9,500
12- Imports	3,900
13- Depreciation	1,500

$$\begin{aligned} \text{Expenditure} &= C + I + G + (X - IM) \\ \text{GDP} &= 39,000 + (9500 + 1500) + 10,000 + (3500 - 3900) \\ &= 59,600 \end{aligned}$$

$$\begin{aligned} \text{Income GDP} &= (50,000 + 2,000 + 4,650) + (1750 - 300) + 1500 \\ &= 59,600 \end{aligned}$$

	<u>milk Q</u>	<u>milk P</u>	<u>honey Q</u>	<u>honey P</u>
Year 1	120	3	40	6
Year 2	140	3	24	5

$$\text{Nominal GDP (Year 1)} = (120 * 3) + (40 * 6) = \$600$$

$$\text{Nominal GDP (Year 2)} = (140 * 3) + (24 * 5) = \$540$$

$$\begin{aligned} \text{Percentage change} &= \frac{540 - 600}{600} * 100 \\ &= -10\% \end{aligned}$$

$$\text{Real GDP (Year 1)/base} = (120 * 3) + (40 * 6) = \$600$$

$$\text{Real GDP (Year 2)/base year 1} = (140 * 3) + (24 * 6) = \$564$$

$$\text{Percentage change} = -6\%$$

$$\text{GDP deflator (Year 1)} = \frac{600}{600} * 100 = 100\%$$

$$\text{GDP deflator (Year 2)} = \frac{540}{564} * 100 = 95\%$$

$$\text{Real GDP (Year 1) base/year 2} = \$560 \Rightarrow \text{GDP deflator} = \frac{600}{560} * 100 = 107.14\%$$

$$\text{Real GDP (Year 2) base/year 2} = \$540 \Rightarrow \text{GDP deflator} = \frac{540}{540} * 100 = 100\%$$

The measures of real GDP growth depend on the choice of base year because of different relative prices in different years

Q) when outsourcing employees, companies' value added is decreases
however the value added in the economy does not change

Q) what's the value added, when a Canadian farmer pays \$300 for seeds, which she sells to a produce distributor for \$1200. The distributor sells the beets to a restaurant for \$1500, who then sells \$2500 worth of beet salad.

	Canadian Farmer	Produce Distributor	Restaurant	All Firms
A. Purchases from other firms	300	1200	1500	
B. Value of Product	1200	1500	2500	
B-A = Value added.	900	300	1000	$\Rightarrow \$2200$

Q) $\text{Value added} = \text{Revenue} - \text{Expenditure of input}$

double counting = adding all the input & output

Overestimate if double counting > value added $\Rightarrow \frac{\text{Sum of sales} - \text{Value added}}{\text{Value added}} * 100$

Expenditure side includes: (examples)

Ca • furniture by consumers

Ia • furniture by firms

Ia • new-machinery by Canadian-owned forest companies

US Ia • Canadian-owned companies located in the U.S. on new machinery

Ia • increase in business inventories

NXa • Purchase of Canadian-produced software

Net domestic income as a factor cost = wages & salaries + interest income + business profits

The measures of Real GDP growth (and growth in the deflator) depend on the choice of base year because of different relative prices in different years.

The percentage change in prices is calculated by percentage change in the GDP inflator $\frac{\text{new GDP inflator} - \text{old}}{\text{old}}$

Chapter 21

Desired Aggregate Expenditure

- Autonomous : does not depend on income
- Induced : depends on income

$$AE = C_a + I_a + G_a + (X_a - I_M a)$$

Desired Consumption Expenditure

- Consumption
- Savings

• Disposable income (Y_D) is after-tax income

- no government or taxes $\Rightarrow Y = Y_D$
- Consumption \propto income

- Marginal Propensity to consume (MPC) = $\frac{\Delta C}{\Delta Y_D}$
- Average Propensity to consume (APC) = $\frac{\text{Total } C}{\text{Total } Y_D}$
- $APC \propto \frac{1}{\text{income}}$

The Savings function: $S = -A + (1-b) * Y_D$

- Average Propensity to Save : $APS = \frac{S}{Y_D}$
- Marginal Propensity to Save : $MPS = \frac{\Delta S}{\Delta Y_D}$
- $APC + APS = 1$ and $MPC + MPS = 1$

below the 45° line :

Consumption function $\propto \frac{1}{\text{Savings function}}$

$$Y < C$$

$$S < 0$$

$CF \uparrow \Rightarrow \Delta \text{wealth} \uparrow$

$\Delta \text{interest rate} \downarrow \Rightarrow CF \propto \text{wealth, expectations}$
 $\Delta \text{expectations} \uparrow \propto \frac{1}{\text{interest rate}}$

at the intersection point :

$$Y_D = C$$

$$S = 0$$

$SF \downarrow \Rightarrow \Delta \text{wealth} \downarrow$

$\Delta \text{interest rate} \uparrow \quad SF \propto \text{wealth}$
 $\Delta \text{expectations} \uparrow \quad SF \propto \frac{1}{\text{interest rate}} \propto \frac{1}{\text{expectations}}$

above the 45° line :

$$Y > C$$

$$S > 0$$

changes in autonomous Exp

Desired Investment expenditure :

- inventory accumulation
- Real interest Rates
- Residential construction
- New plant & equipment

$$\text{Real interest rate} \propto \frac{1}{\text{Plants \& equipment}} \times \frac{1}{\text{inventories}} \times \frac{1}{\text{residential construction}}$$

$$AE = C + I$$

Absence of no government & international trade

Equilibrium National income : $AE = Y_D$

- below • $AE > Y$ inventories \downarrow , Real GDP \uparrow , output \uparrow (inventory decumulation)
- above • $AE < Y$ inventories \uparrow , Real GDP \downarrow , output \downarrow (inventory accumulation)

Parallel shift is caused by changes in autonomous consumption or investment.

$$\text{Interest rate} \propto \frac{1}{SF, CF}$$

Simple multiplier = $\frac{1}{1-z}$ where $z = MPS$, ΔA is change in autonomous expenditure

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

- multiplier = 1, Flat AE

- multiplier = large, Steep AE

$z \uparrow \Rightarrow AE$ steepness $\uparrow \Rightarrow$ Simple multiplier $\uparrow \Rightarrow$ equilibrium national income \uparrow

- optimism $\Rightarrow AE \uparrow \Rightarrow GDP \uparrow$

$z \propto$ Simple multiplier

- pessimism $\Rightarrow AE \downarrow \Rightarrow GDP \downarrow$

Change in national income = Multiplier * Δ in autonomous spending.

Suppose national income is less than its equilibrium amount (for example, think of unintended changes in inventories so that). That is, desired national income is more than the actual one. Hence, the desired consumption is more than the actual one. Some of the desired expenditure must either be frustrated or take the form of purchases of inventories of goods that were produced in the past. As firms see their inventories being depleted, they will increase production, thereby increasing the level of national income.

desired aggregate expenditure \Rightarrow vertical axis
Actual National Income \Rightarrow horizontal axis

$$S = -200 + 0.4 Y_D \Rightarrow C = 200 + 0.6 Y_D$$

$I = i + \alpha Y$ \Rightarrow the simple multiplier will become negative if $\alpha + z > 1$

- (Q) Revival of consumer confidence leads to increased spending
 \Rightarrow the CF shifts up and the AE function shifts up, equilibrium national income increases
- (Q) High mortgage rates discourages new house purchase
 \Rightarrow the Ia function shifts down, and the AE shifts down, equilibrium national income decreases
- (Q) Concerns over future leads to a reduction in inventories
 \Rightarrow The Ia function shifts down, AE function shifts down, equilibrium national income falls
- (Q) Accelerated depreciation allowances in the new federal budget set off boom on equipment purchases \Rightarrow The Ia function shifts up, the AF function shifts up, equilibrium national income increases
- (Q) Consumers spend as stock market soars
 \Rightarrow The Ca shifts up, the AF shifts up, equilibrium national income increases
- (Q) According to the Paradox of Thrift, attempts to change the level of saving will
 \Rightarrow cause the aggregate savings line to shift up, lowering equilibrium national income
- (Q) Finance minister pledges to cut income-tax rates.
 \Rightarrow equilibrium national income increases \Rightarrow AE rotates upward
- (Q) U.S imposes import restrictions on Canadian lumber
 \Rightarrow equilibrium national income decreases \Rightarrow AE shifts downward

Chapter 22

Net tax revenue = taxes - transfer payments

$$T = tY$$

- $G < T \Rightarrow$ budget surplus

- $G > T \Rightarrow$ budget deficit

budget balance

$$\text{Surplus} = T - G$$

$$IM = mY$$

$$\text{Taxes} \propto \frac{1}{\text{income}}$$

$$\text{transfer Payments} \propto \text{income}$$

$$\text{Import} \propto \text{GDP}$$

$$m = \text{marginal propensity to import}$$

- foreign income $\propto X \propto NX$ shifts upward
- Canadian prices $\propto \frac{1}{X} \propto IM$ rotates up
 NX shifts down, steeper
- imports $\propto \text{income}$
- income $\propto \frac{1}{NX}$

$$NX = X - mY$$

↑ autonomous

- $Y \uparrow \Rightarrow NX \downarrow$
 $Y \downarrow \Rightarrow NX \uparrow$

$$Y \propto \frac{1}{NX}$$

$$m \propto \frac{1}{NX}$$

$$AE = C + I_0 + G_0 + X_0 + \underbrace{(b(1-t) - m)}_{\text{autonomous}} Y$$

$\overbrace{\qquad\qquad\qquad}^{\text{b} = MPC}$

$$Z = b(1-t) - m$$

$$Z = MPC(1-t) - m$$

Net Exports

$$\begin{array}{ll} NX \uparrow & \text{equilibrium } Y \uparrow \\ NX \downarrow & \text{equilibrium } Y \downarrow \end{array}$$

$$\begin{array}{ll} t \downarrow & AE \uparrow \text{steeper} \\ t \uparrow & AE \downarrow \text{flatter} \end{array}$$

$$Z = \frac{1}{1 - (MPC(1-t) - m)}$$

$\Downarrow Z \propto \frac{1}{m}$

Government Spending

$$\begin{array}{ll} G \uparrow & AE \uparrow \text{equilibrium } Y \uparrow \\ \text{net tax } \downarrow & AE \uparrow \text{rotate upward} \end{array}$$

$$\text{Real interest rate} \propto \frac{1}{C} \propto \frac{1}{I}$$

(Q) disposable income as a function of National income

$$Y_D = (1-t) \cdot Y$$

$$\text{net tax rate} \propto \frac{1}{\text{marginal propensity to import.}}$$

$$\text{net tax rate} \propto \frac{1}{\text{Simple multiplier}} \propto \frac{1}{\text{equilibrium National Income}}$$

Q) $C = 500 + 0.6 Y_D$

$t = 0.25$

$C = 500 + (0.6 * (1 - 0.25) * 3000) = 1850$

$Y_D = 3000$

$Y_D = (1 - 0.25) * 3000 = 2250$

$APS = \frac{S}{Y_D} = \frac{400}{2250} = 0.17$

APS = ?

$Savings = Y_D - C = 2250 - 1850 = 400$

$\text{or } APC = \frac{C}{Y_D} = \frac{1850}{2250} = 0.82 \Rightarrow I = APC + APS \Rightarrow APS = 0.17$

Q) a depreciation of Canadian dollar leads to _____ in exports and _____ in imports
 (increase, decrease)

Q) $C = 100 + 0.6 Y_D$

$I = 150$

$AE = 100 + 150 + 250 + 400 + (0.6 * (1 - 0.25) - 0.15) * Y$

$G = 250$

$Y = 900 + 0.25V \Rightarrow Y = 1125$

$X = 400$

$T = 0.25Y$

$\text{Surplus} = T - G = (0.25 * 1125) - 250 = 31.25$

$IM = 0.25X$

Government budget Surplus in equilibrium = ?

- Fiscal Policy affects

- Government Purchases, G

- Net tax rate, t

- more common in a recessionary gap

- To eliminate a recessionary gap, a government would increase G , or reduce t .

- $Z \propto$ Simple multiplier

- Shifts in simple multiplier = parallel shifts

- Increase in simple multiplier \Rightarrow decrease in marginal propensity to import

Applications of Simple Multiplier:

- * Monetary Policy Report

Public day care $\Rightarrow G \uparrow$

- * Federal/Provincial child-care agreements

Child benefit, transfer payments $\Rightarrow t \downarrow$

- * Pandemic Support Programs

- * Fall in cryptocurrency \Rightarrow wealth $\downarrow \Rightarrow C \downarrow$

- * Rise in housing prices \Rightarrow wealth $\uparrow \Rightarrow C \uparrow$

- interest Rate $\propto \frac{1}{AE} \propto \frac{1}{\text{income}}$

Output gap (% of Potential) = $\frac{\text{Actual} - \text{Potential GDP}}{\text{Potential}} * 100 \Rightarrow$

- \ominus if $y < y^*$
- \oplus if $y > y^*$

the higher the level of government expenditure, the lower the national savings will be.

Canadian Prices of import $\propto \frac{1}{Nx}$ downward

- level Private Savings = \$ 175
- investment expenditure = \$ 100
- export = \$ 50
- imports = \$ 100

Public Saving = ?

$$\text{Public Savings} = T - G \quad S + (T - G) = I + (X - IM)$$

therefore

$$\boxed{\text{Public Savings} = -125}$$

$$175 + (T - G) = 100 + (50 - 100)$$

$$175 + (T - G) = 50$$

$$T - G = -125$$

Value of multiplier for an open economy with government is smaller than the value for a closed economy with no governments.

Increase in the net tax rate will decrease the value of marginal propensity to spend and decrease the value of the simple multiplier

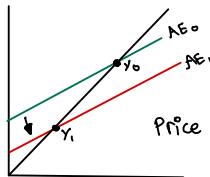
National income is demand-determined when firms have excess capacity.

Chapter 23

If Prices rise ↑

- consumption falls ↓
- Exports fall ↓
- imports rise ↑
- AE ↓ Shifts downwards

- NX shifts downward
- Equilibrium y drops



$$\text{Price } \downarrow \Rightarrow \text{wealth } \uparrow \Rightarrow C \uparrow \Rightarrow AE \uparrow$$

Price increases ⇒ downward shift in AE ⇒ Parallel shift across the Y-axis
⇒ GDP goes down
⇒ Real GDP falls

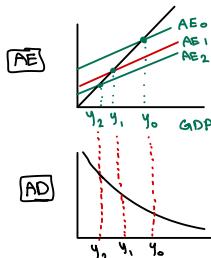
- Price $\propto \frac{1}{\text{real value of money holding}}$

AD Aggregate Demand

Prices ↑ ⇒ AE shifts downward ⇒ AD moves upward

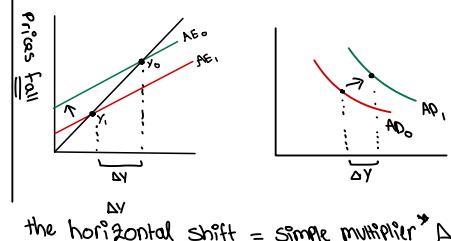
- ↳ People are poorer
- ↳ imports rise, foreign goods are cheaper
- ↳ exports fall ↳ GDP falls

↳ moves left & upward



Shifts in the AD curve (aggregate demand shock)

if AE shifts upward ⇒ Shock ⇒ increases equilibrium and shifts AD to the right



if G spending ↑ ⇒ AE goes ↑ ⇒ AD shifts to the right

if G spending ↓ + tax rates ↑ ⇒ AD shifts to the left ⇒ G↓ ⇒

AE ↓ ⇒ AD shifts left ⇒ t↑ ⇒ AE rotates down ⇒ AD shifts left.

foreign prices ↓ ⇒ exports ↓ ⇒ imports ↑ ⇒ AE down ↓ ⇒ AD shifts left

CAD Appreciation of imports $\propto \frac{1}{\text{exports}}$
⇒ AE shifts & rotates down

A change in price level leads to two effects on AE:

- by changing wealth ⇒ changes desired consumption
- by changing international relative prices ⇒ changes desired net exports

The AD curve shifts horizontally when any elements of autonomous expenditure changes. Simple multiplier is the size of the shift.

$$\text{domestic Price levels} \propto \frac{1}{\text{net exports}}$$

$$\text{domestic price level} \propto \frac{1}{\text{Real Private Sector wealth}}$$

$$\text{Autonomous Expenditure} \propto AE \propto AD$$

↑
upward ↑
right

Private Sector wealth & AE function

• if domestic prices increase then: (exogenous change)

- cash holders experience a reduction in wealth
 - level of aggregate (private sector wealth) would decline
 - AE shifts downward

 - bank account deposit holders and holders of household mortgages would experience reduction in wealth
 - level of aggregate (private sector wealth) would not change
 - AE does not change

 - leads to transfer of wealth away from foreign bondholders and toward domestic bond issuers
- d. Individuals and entities possessing corporate bonds promising to pay bondholders \$10,000 on January 1, 2025, would experience a reduction in wealth, the level of aggregate (private sector) wealth would not change, and the AE curve would not change.
- e. Those holding government bonds that promise to pay the holders \$10,000 on January 1, 2025, would experience a reduction in wealth, the level of aggregate (private sector) wealth would decline, and the AE curve would shift downward.

$$\text{Private Sector real wealth} = \frac{\text{Private Sector nominal wealth}}{\text{Price level}} = \frac{M}{P} \quad AE = C + \left(\frac{M}{P}\right)Y$$

Q) why do M & P enter the AE function?

A) nominal value of assets, a rise in the price level reduces the real value of those assets & leads to less desired AE.

AS Aggregate Supply

relates the price level to the quantity of output that firms would like to produce or sell.

level of tech (constant)
Set of factor Prices (constant)

Price of firm output

Q) why is the AS curve upward sloping?

- A)
- increase in production \Rightarrow increases costs
 - many firms face diminishing returns
 - as output rises \Rightarrow constraints bind
 - companies move to costlier methods to increase output

horizontal AS curve

- when output is low:
* firms have excess capacity
* costs don't rise quickly
- when output is near Y^* :
* costs rise as output rises
* firms sell at a higher price

Aggregate Supply Shock Anything that increases firm's costs cause the AS curve to shift up. [factor prices, Tech]

AS curve Left and Upward (Decrease in AS)

- increase in input prices (wages)
- Tech deterioration
- decrease in labour productivity

negative shock

AS curve shifts Right & down (increase in AS)

- decrease in input prices (wages)
- Tech improvement.
- decrease in binding minimum wages
- reduce firms costs

Positive shock

AS curve shifts Right & upward (movement)

- increase in demand for Canada's exports
- increase in business confidence \Rightarrow increase firm desired investment.

• Macroeconomic equilibrium occurs at the intersection of AD and AS curve.

- if AS curve is upward sloping, a Positive AD shock will cause the price level to increase and real GDP to increase.
- A Positive AS shock will cause the price level to decrease and real GDP to increase.
- An increase in autonomous government spending is a positive AD shock \Rightarrow causes an upward shift of AE \Rightarrow rightward shift of AD Upward sloping AS curve, there will be an increase in the price level \Rightarrow leads to partial downward shift of AE

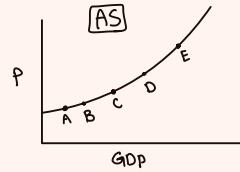
Slope of the AD :

- determined by the slope of AE
- higher MPC or lower tax rate \Rightarrow steeper AE \Rightarrow larger multiplier \Rightarrow larger effect on price changes \Rightarrow flatter AD curve

Action	Causes shift in	equi GDP	Price level
increase in world price of oil - Canada is net exporter	AD/AS	inc	inc
Prices increase \Rightarrow output is used by firms, Canada is net exporter	AD/AS	inc	inc
reducing government spending	AD	dec	dec
reduce corporate income tax rate	AD	inc	inc
increase government purchases in a global recession	AD	inc	inc
large increase in demand for Canadian exports	AD	inc	inc
decrease in world price of oil - Canada is net importer	AD/AS	dec	dec
Reduce desired investment.	AD	dec	dec

Q) Assume the economy has a horizontal AS curve, a leftward shift in the AD curve _____.

range of multiplier \Rightarrow
largest at Points A, B
Smallest at Points D, E



A) a decrease in real GDP and no changes in prices _____.

Q) Consider AS/AD curves, An increase in government purchases will have no impact on equilibrium GDP if _____.

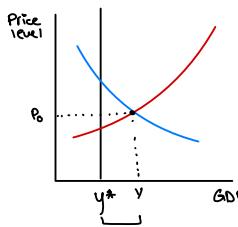
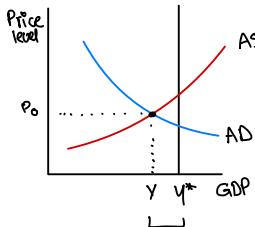
A) The AS curve is vertical.

Q) An increase in interest rates in Canada would lead to: _____.

interest rate $\uparrow \Rightarrow C \uparrow, I \downarrow \Rightarrow AE \downarrow \Rightarrow AD$

Chapter 24

Output gaps in the short-run:



$$\text{Output gap} = y - y^*$$

recessionary gap

- high supply of labour
- wages & unit costs fall
- low profit for firms
- AS $\uparrow \downarrow$ \Rightarrow returning output to potential
- AS \Rightarrow shifts right

- high demand for labour
- wages & unit costs rise
- high profits for firms
- AS $\uparrow \downarrow \Rightarrow$ Price level \uparrow

Adjustment Process (sticky wages)

- inflationary gaps typically raises wages rapidly
- recessionary gaps often reduces wages slowly

This adjustment from output gap to factor prices - is summarized by the Philips Curve

- in our model, the level of potential output y^* , acts as an "anchor" for the economy. Given that the short-run equilibrium is determined by the AD & AS curves, wages & other factor prices will adjust, shifting the AS curve, until output returns to y^*

• was originally drawn as a negative relationship between unemployment rate and the rate of change in nominal wages

- ↳ $y > y^* \Rightarrow$ demand for labour $\uparrow \Rightarrow$ wages \uparrow
- ↳ $y < y^* \Rightarrow$ supply of labour $\uparrow \Rightarrow$ wages \downarrow
- ↳ $y = y^* \Rightarrow$ No excess \Rightarrow wages = constant

- in short-run, factor prices are constant
level of potential output is constant
changes in Real GDP are caused by AS & AD

- in Adjustment Process, factor prices are flexible & responsive to output gaps
Potential output is assumed to be constant & acts as an anchor for real GDP for AS & AD

- Q1) Begin with $y = y^*$

Sudden Increase in exports \Rightarrow Demand Shock \Rightarrow AD right \Rightarrow Inflationary gap

Firms unit costs $\uparrow \rightarrow$ AS left \Rightarrow equilibrium = Potential output at a higher Price level

- Q2) Begin with $y = y^*$

Drop in business confidence & investment \Rightarrow Demand Shock \Rightarrow AD left \Rightarrow recessionary gap

Firms unit costs $\downarrow \Rightarrow$ AS right \Rightarrow equilibrium will slowly restore when = Potential output at a lower Price

- Q3) Begin with $y = y^*$

Price of electricity $\uparrow \Rightarrow$ Supply Shock \Rightarrow AS left \Rightarrow recessionary gap

If wages are downwardly sticky \Rightarrow economy's adjustment could be slow & recession will persist for long time

- Q4) Begin with $y = y^*$

Price of electricity $\downarrow \Rightarrow$ Supply Shock \Rightarrow AS right \Rightarrow inflationary gap

Firm unit costs $\uparrow \rightarrow$ AS left \Rightarrow equilibrium = Potential output at the initial Price level

- In the long run, total output is determined by Potential output

, aggregate demand determines Price level

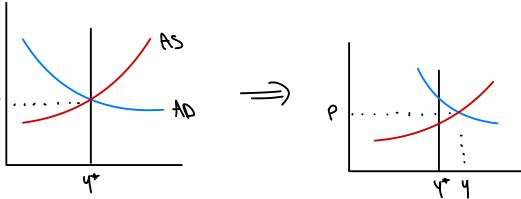
- If school drop out rate was zero \Rightarrow Productivity \uparrow (permanent) & Potential output \uparrow

- income tax $\downarrow \Rightarrow$ investment $\uparrow \Rightarrow$ AD right \Rightarrow Real GDP (short-term) \uparrow

Potential GDP (long-run) \uparrow

- Characteristics of AS/AD model in the long-run

\Rightarrow Tech is assumed to be constant



\Rightarrow Real GDP $>$ Potential GDP

Inflationary gap

excess demand for all factor inputs

Labour Shortage will emerge

Firms have above-normal Sales \Rightarrow

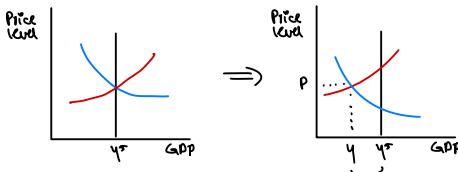
accuse to some new upward pressure on workers

Factor Prices & wages rise

increase firms unit costs

AS shifts Left

Real GDP $\downarrow \Rightarrow$ price level \uparrow



\Rightarrow Potential GDP $>$ Real GDP

Recessionary gap

excess supply of factor inputs, labour

Labour Surpluses will emerge

Firms will have below-normal sales

resist any upward pressure on and/or seek reduction in wages

Factor Prices & wages fall.

firms' unit cost decrease

AS shifts Right

real GDP $\uparrow \Rightarrow$ price level \downarrow

- in a demand shock, the economy will adjust back towards y^* in the long-run by bringing lower wages
leftward shift
- Policymakers may want to use a fiscal expansion to restore output back to y^* rather than wait for the long-term adjustment because of sticky wages

Expansionary AD shocks (Positive AD)

- The adjustment process eventually eliminates any boom caused by a demand shock, returning $y \Rightarrow y^*$
- Price levels $\uparrow \Rightarrow$ inflationary gap eliminated $y^* \leftarrow y$

Contractionary AD shocks (negative AD)

- The economy's adjustment process works following negative demand shocks too
- Although it may be slower because of "sticky wages"
- Price level falls further $\downarrow \Rightarrow$ Recessionary gap eliminated $y \rightarrow y^*$

chapter 25

Economic Growth

• Benefits

- Rising living standards
- Higher income leads to many better outcomes
 - ↳ Consumption (inc) ↳ better health status ↳ higher life expectancy ↳ more attention to environ issues

• Costs

- Investment is a primary source of economic growth
- higher $I \Rightarrow C_f \rightarrow C_f$ for now $\Rightarrow C \uparrow \vee \uparrow$ future // Tradeoff
- Economic growth may bring less stability
 - ↳ Creative destruction
 - ↳ Structural unemployment

Chapter 26

• Nature of money (Three functions of money)

• Medium of exchange

→ easily recognizable → eliminates the need to barter → widely accepted

• Money as a store of value

→ money = holding purchasing power
inflation → stable value

• Money as a unit of account

→ used by people, firms to account for transaction

Gresham's Law : Undebased money will be driven from circulation. (high-inflation)
good

ORIGINS OF MONEY :

• Metallic money

↳ easily recognizable, divided into small units

clipping
↑

→ Gresham's Law - "bad money drives out good."
you keep the nice bills

• Paper money

→ started as deposit slips that could be traded.

→ move to fractional system but convertible to valued commodity - gold standard.

• Fiat money

→ convertible money is limited to supply of gold

• moving to a non-convertible currency increases flexibility for governments.

Fiat Money

• medium of exchange

→ fiat money is widely accepted → may be used to pay taxes

• Store of value

→ if govt controls inflation, money = effective store of value → with hyperinflation, fiat money loses this func.

• money as a unit of account

→ widely used for transactions → no intrinsic value

Modern money : Deposit money

- most "money" is now held electronically = deposit money
 - medium of exchange → debit cards and/or cheques
 - store of value → Identical to physical money, less likely to get lost
 - A unit of account → No difference
- not (treasury bill)
not (stocks)

Canadian Banking system

- Central bank → Gov owned → monetary policy
- Commercial bank → other trust companies → Act between savers & borrowers
- sole money-issuing authority
→ regulates banking activities

Functions of the central Bank

- buys & sells gov securities → controls the money supply
→ printing money increases bank liabilities
 - supports the financial markets
→ tender of last resort
→ responds to banking shocks
- if you wants to ↑ amount of money circulation is to buy securities back from people (buys bonds)

Commercial Banks

- includes privately owned banks → Accepts deposit, & provide credit ⇒ loans

Chartered Banks Balance Sheet

TABLE 26-2 Consolidated Balance Sheet of the Canadian Chartered Banks, March 2018 (millions of dollars)

Assets		Liabilities	
Reserves (including deposits with Bank of Canada)	40 092	Demand and notice deposits	1 172 163
Government securities	267 598	Term deposits	658 307
Mortgage and non-mortgage loans	2 220 402	Government deposits	17 639
Canadian corporate securities	155 894	Foreign-currency liabilities	2 794 992
Foreign-currency and other assets	2 859 722	Shareholders' equity	319 194
Total	5 543 708	Other liabilities	581 413
		Total	5 543 708

includes physical money banks have on-demand + money they have at Bank of Canada

↳ includes all deposits made

Commercial Bank Reserves

- banks need to have cash to meet demands → 2.2% reserve ratio

→ fractional reserve system

- Some countries mandated reserve ratios
- banks have target reserve ratios

Definitions of money supply

M1: • Includes currency & chequing accounts at chartered banks

• no longer used with advancing tech

M2: M1 + notice deposits

deposits at

M2+: M2 + other financial institutions + money market funds

How is money created?

- a new deposit can come in different sources
 - immigration reduction in household cash saving
 - when Bank of Canada buys bonds
- with more deposit = more currency they can lend out

Target reserve & money creation

- assume v is the target reserve ratio
- A new deposit will increase total deposits by $1/v$ times the new deposit
- $v = \text{target reserve ratio}$ Reserves increase by the same amount

• Works in reverse

- when money in money supply (Bank of Canada, immigration) sells bonds total deposit must fall by $1/v$

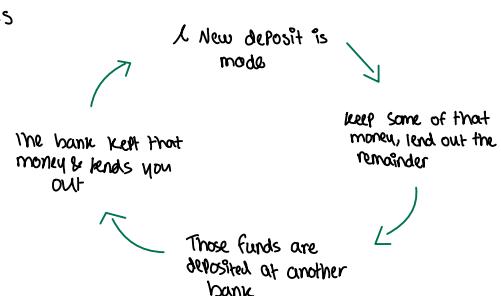
$$(-100) * \frac{1}{0.2} = -500$$

- if there's money held out of bank (%)

$$\text{then } 100 * \frac{1}{c+v} = 100 * \frac{1}{0.05+0.02} = \$1,428.57$$

- debasing coinage was a common cause of inflation.

- Canadian banking system is fractional & holds a reserve ratio of deposits



- Target Reserve ratio = $\frac{\text{Target Reserves}}{\text{Total deposits}}$
- Actual reserves = Actual Reserve ratio * Deposits
- Excess Reserve = Actual Reserves - Target reserves

commercial banks

assets % (reserves & loans)

- Deposits at Bank of Canada
- Mortgage loans
- Foreign currency reserve
- Cash reserves

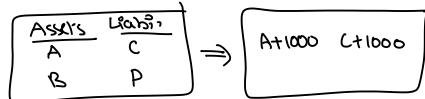
Liabilities % (Deposits & capital)

- Shareholder's equity
- Government deposits
- Demand deposits
- Notice (term) deposits

$$\text{Reserve ratio} = \frac{\text{Reserves}}{\text{Total deposits}} * 100$$

$$\text{Value of owner's investment} = \frac{\text{Total capital}}{\text{Total capital + Deposits}} * 100$$

- if we deposit \$1000 onto Balance sheet



- if we withdraw \$1000 then $\Rightarrow A-(1^*1000), B-(2^*1000)$

- Eventual Δ reserves = Eventual Δ Deposits * Target Reserve Ratio

$$\Delta \text{Deposits} = \frac{\text{New cash deposit}}{C+V+E}$$

V % target reserve ratio
 C % cash drain
 E % Excess cash ratio (if any)

$$\Delta \text{Reserves} = \frac{V+E}{C+V+E} * \text{new cash deposit}$$

$$\Delta AE_t = \Delta Y_{t-1} * MPC$$

$$\Delta GDP = \frac{\Delta AE}{1-MPC}$$

- the smaller the target ratio the more money will be created.

Chapter 27

$$\bullet \text{PV} = \frac{R}{(1+i)^n} \quad \text{PV} \propto 1/\text{interest rate}$$

- PV of a bond is \propto to the market interest rate
- Interest rate and bond yields tend to move together.
- Interest rate \propto demand for bonds
- Market Price bond = PV of bond
- Demand of bonds & money are inversely related
- Price \propto interest rate
(bond yield)

Yield

- Yield equilibrates over similar bonds
- Yield curve or term structure
- Riskiness \rightarrow higher risk leads to lower price, higher yield

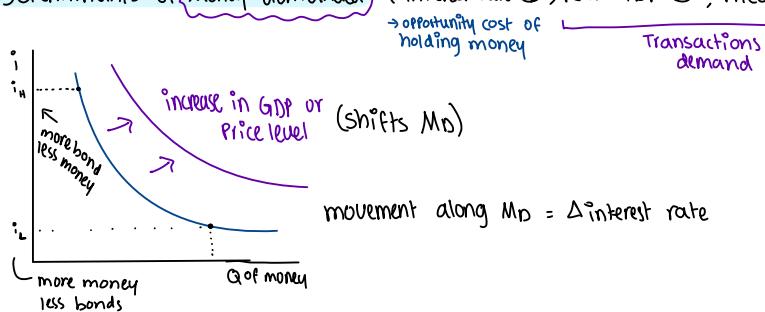
. if Market Price $<$ Present value
 \rightarrow excess demand for bonds
 \rightarrow drives up price

. if Market Price $>$ Present Value
 \rightarrow less demand
 \rightarrow excess supply reduces price

Reasons to hold money

- Transactions demand \rightarrow planned expenditure
- Precautionary demand \rightarrow unplanned expenditure
- Speculative demand \rightarrow expect interest rates to rise

Determinants of Money demanded



Relations

Bonds ($i \oplus, GDP \ominus, P \ominus$)

Money ($i \ominus, GDP \oplus, P \oplus$)

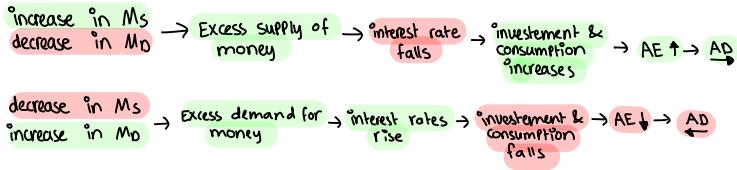
\uparrow
Md shifts

- Excess supply of money \rightarrow interest rate falls
- Excess demand for money \rightarrow interest rate rises
- Money demand is higher in recovery periods
- demand for money \propto equilibrium interest rate
- Supply of money \propto equilibrium interest rate $\downarrow \Rightarrow \uparrow$
- .

Money Transmission Mechanism $\Rightarrow \Delta \text{Supply/demand} \rightarrow \Delta \text{interest} \rightarrow C \& I \rightarrow AE \rightarrow AD \rightarrow \text{Real GDP}$

- Link between monetary equilibrium & interest rate
- Link between interest rate & desired expenditure
- Link between desired expenditure & real GDP

Summary of Monetary Transmission Mechanism



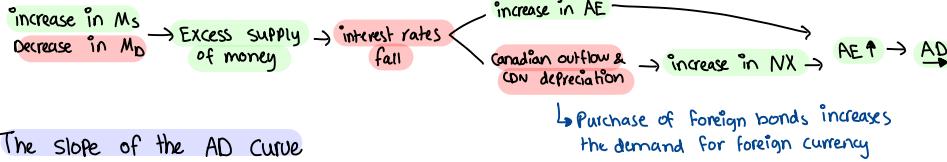
Equilibrium Interest rate

- . if $i < i^E$
 - people hold more money
 - sell bonds
 - bond prices decrease
 - interest rate increases until $i = i^E$
- . if $i > i^E$
 - people hold less money
 - buys bond
 - bond prices increase
 - interest rates dec. until $i = i^E$

An open-Economy modification

- Canada is an open economy affected by international economy (Trade)
- Capital mobility responds to changes in interest rate
- increase in money supply causes:
 - ① Lower interest rates
 - ② Outflow of Canadian capital
 - ③ Reduction in value of CAD (Depreciation)
 - ④ Increase in NX
 - Export more
 - Import less
 - ⑤ strengthens net effect on AE
- changes in interest rate have larger effects in open economies

The Open-Economy Monetary Transmission



The Slope of the AD Curve

- . $\Delta \text{Price} \rightarrow \Delta \text{Wealth}$ Price ↑ → People are Poorer ↓
- . $\Delta \text{Price} \rightarrow \Delta \text{NX}$ Price ↓ NX
- . $\Delta \text{Price} \rightarrow \Delta \text{Mo}$ Price ↓ interest rate Price ↑ C, I, NX

→ monetary expansion in U.S. will cause a capital flow toward Canada, appreciation of CAD, thus slows AD therefore Bank of Canada might initiate expansionary policy.

Money Neutrality is the idea that change in the money supply do not have real effects on the economy

How does it look like?

- . Mo shifts up as P and Y adjust to new long-run equilibrium
- . interest rate returns to its initial level.

Short-Run non-neutrality of Money

- . the short-run effect of a change in the money supply depends on the extent of the shift of the AD curve

- Keynesians**: Argued monetary policy was not effective . Mo was relatively flat . Id curve was relatively steep
- Monetarists**: Argued monetary policy was effective . Mo was relatively steep . Id curve was relatively flat

Long-Run Neutrality of money

→ Hysteresis: the growth rate of y^* may be affected by the short run Path of real GDP

why?

- Δ money supply $\rightarrow \Delta$ interest rate $\rightarrow \Delta$ investment & technological changes
- long period of unemployment, workers can lose human capital, this can affect y^* and its growth rate

Changes in money supply

- An increase in money supply is not neutral in the short run, since it caused a change in real variables
- An increase in money supply is neutral in the long run, since it did not affect any real variables, The real money supply has not changed in the long run. results in inflation

• Reduction in $\rightarrow AD \leftarrow$ recessionary \rightarrow equilibrium GDP \downarrow Short-run \rightarrow long run: factor \downarrow prices $\downarrow \rightarrow AS$

• Money Supply has NO effect on the real GDP

• if ID is flat, large Δ investment

• if ID is steep, small Δ investment

• if MD is flat, ΔM_s has a small change

• if MD is steep, ΔM_s has a larger change

Chapter 28

- For any given money demand curve, any central bank must choose between:
① targeting M_s ② targeting i
- Both cannot be targeted independently

why not target the money supply?

- Difficult to know the slope of money demand
- Difficult to know when the money demand curve will shift
- Difficult to control the money supply - banks can charge target reserve ratios
 - If the bank targets the money supply, the interest rate will fluctuate
 - If the interest rate affects behaviour, why not just target interest rate directly. ③ Bank is unsure of position of M_d curve

① Banks don't control the process of deposit expansion carried out by commercial banks
② Bank is unsure if changes in i will have effect on M_s

The bank of Canada chooses to implement its monetary Policy by targeting interest rates because:

- The bank can influence i more easily than it can affect M_s
- Instability of money demand
- Easier to communicate its policy through changes in i

How does BoC set the interest rates?

- Targets the overnight interest rate → rate charged on loans between commercial banks
- Announces bank rate, 0.25% point above the overnight rate → offers to lend money to banks at this rate
- Sets a deposit rate, 0.25% points below the overnight rate → pays this rate on all deposits at the BoC borrowing rate
- Banks have an incentive to set their overnight rates close to the target → keeps actual overnight rate within 0.5%

The money Supply is Endogenous

- As the BoC changes its target for the overnight rate:
 - other interest rates change
 - banks lending changes
 - banks' demand for currency changes
- if the bank responds by supplying currency or buying currency from commercial banks
- The need for open-market operations ← BoC changes the amount of currency in circulation through
- These transactions are done passively by the BoC

BoC chooses to set Policy to affect economy Remember $i \propto I, C, NX$

- Expansionary Policy → Reduces overnight interest rate → Eventually increases M_s (growth rate) Purch. bond
- Contractionary Policy → Increases overnight interest rate → Eventually decreases M_s (growth rate) Sell. bond

The Monetary Transmission Mechanism



- If the government decides to sell bonds → decreases Money Supply
- Starting in 2008, central banks started to engage in "quantitative easing"
 - Buying long-term bonds (mostly government, some corporate)
 - Increases Price for those bonds, reducing long-term interest rates
 - Directly affecting long-term interest rates should enhance monetary Policy
- As interest rates rise, banks will likely shift to quantitative tightening → Selling portfolios of long-term bonds

What could a central bank focus on?

- inflation
- The Price level
- GDP or the unemployment rate
- Some combinations of these (i.e. nominal GDP)

what is the advantage of inflation?

- Long-term inflation is commonly caused by Monetary Policy
- Inflation is easy to measure
- Goals are easy to communicate

when gov. Purchases bonds

- BoC liability side + bond price
- Banks increase lending

when gov. Sells bonds

- commercial bank reserves increase however the Δ is 0
- BoC liabilities = Δ liabilities - amount

Why is inflation a problem?

- inflation is costly - continually adjusting prices take work
 - inflation can lead to unintended income redistribution
 - uncertainty about inflation makes it hard for firms/individuals to plan investments
 - relative prices change, altering purchase decisions
 - inflation is one variable on which monetary policy can have a systematic and sustained influence
- the current inflation targeting by BoC is 2%

The role of the output gap

- in the short run, when an output gap opens, the BoC has two choices:
 - Allow the adjustment process to operate
 - Intervene with monetary policy
- Since output gaps put pressure on inflation, the BoC monitors the output gap & may intervene in order to keep output near potential → thereby keeping inflation within the target band.

Inflation Targeting & the output gap

- when $y < y^*$ (inflationary), Bank Pursues contractionary monetary policy
 - when $y > y^*$ (recessionary), Bank Pursues expansionary monetary policy
- (appreciation of CDN)
(depreciation of CDN)

Complications in inflation targeting

① Volatile Food & Energy Prices

- Prices of many goods included in CPI are determined in world markets
- these may change suddenly for reasons unrelated to Canadian output gaps
- the bank also monitors core inflation

② The exchange rate & monetary Policy

- The bank must identify the cause of any exchange rate change before determining the appropriate policy response
- Consider an depreciation of CDN caused by an increase in demand for exports
- Or an appreciation of CDN caused by an increase in demand for Canadian bonds

- if there is an increase in productivity which shifts AS & Potential GDP to the right → BoC doesn't do anything since this is not a predicted inflation (expected)
- There is no output gap
- Price level goes down but changes in MS is uncertain

Policy Lags

- Fiscal Policy → decision & execution lags → similar for monetary policy
- These lags are short for monetary policy, further lags are critical
- Expenditure responds slowly to changes in interest rate
- Multiplier process takes time
- 4-12 months to affect real GDP, 18-24 months more to affect price

Destabilizing Policy

- Long & variable lags → Some monetarists argued that central banks should not try to stabilize national income
- They argued that attempts to stabilize will more likely be destabilizing
 - They advocate the use of a monetary rule
 - Increases bank reserves at a constant rate
- Monetary Policy must be forward-looking → often creates difficulties when Policy is tightened now because of expected future inflation
- in the long-run equilibrium if BoC chooses to implement expansionary monetary policy, what is the outcome in the short-run?
 - increase Price level & Real GDP
- in the long-run equilibrium if BoC chooses to implement expansionary monetary policy, what is the outcome in the long-run?
 - increase Price level

Chapter 29

what is inflation?

- inflation is a rise in the average level of prices
- commonly measured as the annual percentage change in CPI \Rightarrow core inflation
- anticipated vs. unanticipated inflation
- first step: add sustained/constant inflation to the model

why do wages change?

- Output Gap
 - $y > y^*$ \rightarrow excess demand for labour $\rightarrow y^* > y$ \rightarrow excess supply of labour
 - $y = y^*$ \rightarrow unemployment at NAIRU (natural rate)
- Expected inflation
 - some workers/firms raise wages in advance of inflation

$$\text{Changes in money wages} = \text{output gap effect} + \text{expectational effect}$$

Inflation Expectations

- backward-looking expectations (anchored at 2%)
 - \rightarrow what has inflation been in the recent past?
 - \rightarrow does not respond to expected policy changes

Forward-looking expectations

- \rightarrow consider current economic conditions
- \rightarrow account for changes in gov. policy
- \rightarrow extreme version - rational expectations

Wages & Aggregate Supply

- wages rise \Rightarrow AS curve shifts up (to the left) \Rightarrow inflationary \Rightarrow price levels rise (negative supply shock)
- wages fall \Rightarrow AS curve shifts down (to the right) \Rightarrow deflationary \Rightarrow price levels fall

Decomposing inflation (3 major effects):

$$\text{Actual inflation} = \text{output gap inflation} + \text{expected inflation} + \text{supply shock inflation}$$

\downarrow directly affects wages \downarrow indirectly affects wages

Examples:

- output-gap inf & unemployment is low \Rightarrow high competition for employers
- expected inf: wage bargaining
- supply-shock inf: oil prices rise

Constant Inflation

- How does BoC respond to expectations of inflation?
 - \rightarrow may validate expectations
 - \rightarrow set the overnight interest rate such that inflation meets expectations
 - \rightarrow leads to an increase in the money supply that matches the increase in money demand
- To reduce inflation - must increase interest rates to a deflationary policy
 - \rightarrow when expectations of inflation are higher than desired - policy may generate a recession.
- If expected inflation = actual inflation then \Rightarrow ① $y = y^*$ ② no output gap

- If people expect wages to rise \Rightarrow AS curve shifts left \Rightarrow Expansionary monetary policy \Rightarrow AD curve shifts right \Rightarrow AD = AS Price rises (constant inflation)
- Output gap depends on Excess demand \Rightarrow \oplus inflation \ominus recession \odot no output gap
- Change in nominal wages = Excess demand + inflation expectations

Demand Shocks

- Demand inflation results from a rightward shift in the AD curve
- A demand shock that is not validated produces only temporary inflation
Validation $\hat{=}$ means more expansionary policy
- The initial change is an inflationary gap
- If BoC does not increase Ms \Rightarrow AS curve shifts left, causing temp inflation
- If BoC increases Ms \Rightarrow AS & AD curves both shift up - causing a continuing inflationary gap, & further inflation

with monetary validation:

- the AD curve shifts further to the right
- keeping an open inflationary gap
- Continued validation turns a transitory inflation into sustained inflation.

Supply Shocks

- Inflation caused by AS shifts unrelated to excess demand is called supply inflation
- if wages fall only slowly (when $y < y^*$), the return to y^* after a non-validated negative supply shock will be slow
- if there is monetary validation, there will be a rightward shift in the AD curve and the return to y^* will be faster
- Monetary validation of a negative AS shock causes the initial rise in P to be followed by a further rise
- One potential danger of validation \Rightarrow wage-Price spiral could be created
- Sustained inflation only occurs if there is sustained monetary expansion

Accelerating Inflation

- As long as inflationary gap persists, expectations of inflation will be rising \rightarrow increases the rate of inflation

Causes of Inflation

- Anything that increases AD will cause P to rise
- Anything that increases factor prices will decrease AS & cause P to rise
- Unless continual monetary expansion occurs, such increases in P must eventually come to a halt

Consequences of Inflation

- in the short run, demand inflation tends to be accompanied by an increase in output above y^*
- in the short run, supply inflation tends to be accompanied by a decrease in output below y^*
- when costs & prices have been fully adjusted, shifts in either AD or AS affect P but leaves output unchanged

Conclusions

- Without monetary validation, positive AD shocks cause temporary inflation & output returns to y^* & higher P
- Without monetary validation, negative AS shocks cause temporary inflation & output returns to y^* & no change in P
- Inflation initiated by either AD or AS shocks can only be sustained with continuing monetary validation

The process of disinflation

① Removing monetary validation

- Reduce the rate of monetary expansion
- Raise interest rate to reduce M_s
- AD stops shifting, AS curve shifts up due to inflation expectations

② Stagflation

- Caused by continued shifts in AS curve: • Slow to adjust expectations
- Wage momentum
- AS curve shifts to a recessionary gap

③ Recovery

- takes output to y^* and P is stabilized: Either ① wages fall → AS shifts down & right
- ② BoC increases M_s , shifts AD up & left
- Recession gets us back to y^*

The cost of disinflation

$$\text{Sacrifice Ratio} = \frac{\text{Cumulative loss in Real GDP (\% of } y^*)}{\text{reduction in the rate of inflation } (\inf_0 - \inf_1)}$$

Sacrifice Ratio is high when:

- Expectations are slow to change
- Wages don't change quickly during adjustment process
- Disinflation
- Expectations are backward-looking

• BoC announcements for rises in inflation rate

SR is low

• Forward-looking \Rightarrow quickly adjust, AS shifts up more quickly

- Real GDP will be lower if they announce it in advance
- higher Real GDP if they don't

SR is low

- Central banks are more credible \Rightarrow expectations are less guided by past inflation
- More influenced by announcement of inflation target

Chapter 30

Changes in Employment

- The long run: changes in employment roughly match changes in the labour force
- The short run: employment & unemployment fluctuate considerably
- the labour force is more stable
- if you quit part time job & go to school
→ unemployment rises

Changes in Unemployment

- Unemployment usually falls during booms & rises during "slowdowns": short-run fluctuations.
- Over longer periods, unemployment changes more due to structural changes in the labour force.

gross flow > net flows in
in labour the labour market

Flows in the Labour Market

- The level of activity in the labour market may be better shown by the flows into and out of unemployment:
- Roughly 400,000 workers flow in both directions each month

Measurement Problems

- The official data underestimate the full effects of recessions on unemployment because they do not include:
 - discouraged workers leaving the labour force
 - underemployed workers

Consequences of Unemployment

- Two important costs associated with unemployment are:
 - lost output and income
 - permanent cost of output that is not produced
- Personal costs
 - long term unemployment may lead to decline in labour productivity
 - measure unemployment for 27+ & 52+ weeks
 - Hysteresis effect

Unemployment Fluctuations

- Cyclical unemployment: the difference between actual unemployment and the amount that would exist when $y = y^*$ (real GDP is different from Potential GDP)
- when $y = y^*$ there is still ① frictional ② structural

Market-clearing Theories

- According to new classical theories, shocks to technology and tastes can explain unemployment fluctuations

Characteristics of new classical theories:

- | | | |
|--|---|---|
| ① agent continuously optimize | ② market continuously clear | → wages & price flexibility plays a leading role |
| • New classical explanations therefore looks for reasons why employment fluctuates | • Any unemployment that may exist is voluntary, no involuntary unemployment | → unemployment doesn't change in market-clearing theories since wages respond to AS shocks → AS shock returns to Potential. |

Non-Market-Clearing Theories

- Central idea: wages are sticky & the market does not clear
- Involuntary unemployment or labour shortages
- AS shock → Negative AS Shock → unemployment rises then slowly falls back to the NAIRU
- Positive AS Shock → unemployment falls then slowly rises back to the NAIRU

Explanations for sticky wages

① Long-Term Employment Relationships

- the wage rate does not fluctuate to continuously clear the market
- insurance value associated with stable wages
- On-the-job training makes employee turnover expensive

② Menu costs

- renegotiating wages is not costless
- continuously changing prices & wages are costly

③ Union bargaining

- wages as average revenue product vs. marginal revenue product
- wages are more influenced by "insiders" than by "outsiders"
- keeps wages high, even in the face of declining demand

④ Efficiency wages

- firms may find it profitable to pay higher than market clearing wages so that workers put forth greater effort.

Convergence of Theories

- Both theories predict that in the long run, the unemployment rate comes back to U^* (NAIRU)
- They differ strongly in the short run

• New classical model predicts U is always U^*

→ short-run is no different than long-run

• New Keynesian model have U away from U^* until long-run

→ clear distinction between short run & long run

What determines the NAIRU?

• Frictional Unemployment

→ is caused by the time required for labour to move from one job to another

→ normal turnover of labour - e.g. ① new university graduates looking for jobs ② quit one job to look for another or move cities

→ these people are still looking for work

③ are fired or laid off

• Structural Unemployment

→ is due to a mismatch between what employers want and what workers have: regional, occupational, or industrial mismatches

→ can follow trade agreements that alter incentives to produce specific products

→ resource prices may shift demand in some provinces

Structural unemployment will rise if:

- ① greater pace of structural change in economy
- ② some government policies restrict mobility

Why does the NAIRU change?

① Demographic shifts

- greater labour-force participation by groups with high unemployment rates increases the NAIRU
- youths (15-24) tend to have much higher unemployment rates than "prime age" (25-65) individuals

$$\text{average duration of unemployment spell} = \frac{\text{unemployment}}{\text{monthly outflow from unemployment}}$$

$$\% \text{ of worker } \#1 = \frac{NAIRU - UR_{\text{worker } \#2}}{UR_{\text{worker } \#1} - UR_{\text{worker } \#2}}$$

$$\text{Proportion of worker } \#2 = 1 - \% \text{ of worker } \#1$$

$$NAIRU = [UR_{\text{worker } \#1} * \% \text{ labour force participation worker } \#1] + [UR_{\text{worker } \#2} * \% \text{ labour force participation worker } \#2]$$

② Hysteresis

- in some models, the level of NAIRU can be influenced by the level of the actual rate of unemployment ← hysteresis
- the unemployed might become "unemployable" as their skills wear out
- the "insiders" may keep wages high following a negative shock

Increases in NAIRU

- increase in ET program
- decrease in labour force by groups with low unemployment rates
- increase in labour force by groups with high unemployment rates

↑
increase in frictional

③ Globalization & structural change

- if pace of structural change increases, the NAIRU will rise
- trade liberalization might have this effect

④ Policy & labour market flexibility

- Any government policy that reduces labour-market flexibility is likely to increase NAIRU
- general human capital, retaining policies
- Social structures, EI

• Uneven GDP growth → cyclical Unemployment

⑤ Commodity prices

Reducing Cyclical Unemployment

- Fiscal stabilization policy can increase aggregate demand → increases government spending/transfers
- Monetary stabilization policy has a secondary effect of reducing unemployment

• Reduce taxation

• involuntary unemployment

Reducing Frictional Unemployment

- Reduce employment insurance benefits, or make access to the benefits more restrictive
 - People are more likely to accept a poorer job
- Not all frictional unemployment is bad
 - Searching for an appropriate job may increase economic efficiency
 - shortened search duration may lead to increased employee turnover
 - Some evidence show that higher levels of U.S. employment insurance would increase economic efficiency

Reducing Structural Unemployment

- There is a social interest in reallocating resources to where they are most valuable:
 - often conflicts with entrenched private interests
- Limiting change by restricting trade → May be costly in the long run
- Paying for retraining, education, moving
- Many governments have programs aimed specifically at industries affected by trade.

Chapter 31

- Private Savings = $y^* - C - T$

- Public Savings = $T - G$

Government spending

- Net tax revenue (T) = taxes collected - total transfers
- Government expenditure must be financed by either ① tax revenue ② borrowing
- Since T is the government's net tax revenue, the budget constraint becomes
 $G + i^* D = T + \text{borrowing}$
 $\Rightarrow \text{Borrowing} = (G + i^* D) - T$

Gov Expenditure = Tax Revenue + Borrowing

Contains:

→ gov. Purchases G

→ debt-service payments $i^* D$

→ transfers

Debt: Total stock of financial liabilities for the government

- A budget Surplus or deficit is the difference between current revenue & current expenditure (flow of debt)
- Debt is a level, deficits & surplus are the changes in debt.

The government's annual budget deficit is: ① the government's borrowing ② change in stock of debt

Budget Deficit = $\Delta D = (G + i^* D) - T$

budget deficit \Rightarrow debt rises
budget surplus \Rightarrow debt falls

Actual
↑

• The Primary budget deficit is deficit on non-interest part of the budget \Rightarrow Primary Budget = Total budget - Debt-service Payments

$$\Rightarrow (G + i^* D - T) - (i^* D) = G - T$$

\hookrightarrow Actual \hookrightarrow Primary

→ Shows if the current tax revenue can cover government's spending

Modern Monetary Theory (MMT)

- Gov. could create money to pay for spending
- Increases in money supply would shift AD interest rates are less important
- Tax Policy/borrowing can then be used to control inflation
- Dramatically alters the monetary / fiscal policy distinction

The Stance of Fiscal Policy

- Fiscal Policy is the use of the government's tax and spending Policies in an effort to influence the level of GDP
- For a given set of tax and spending Policies, the budget deficit is negatively related to real GDP
 \rightarrow The budget deficit function shows this negative relationship between the deficit and Y
- Higher national income \Rightarrow higher tax revenue and lower transfer payments
- Fiscal Policy determines the position and slope of the budget deficit function
- Changes in Real GDP lead to movements along a given budget deficit function
- Government spending & debt-service \Rightarrow Autonomous

$$Y < Y^* \Rightarrow ABD > CAD$$

$$Y > Y^* \Rightarrow ABD < CAD$$

Cyclically Adjusted deficit (CAD)

- Is the budget deficit that would exist with the current Policies if $Y = Y^*$
- Taxes & transfer payments change with income
- Often called "structural deficit"
- Calculated based on Y^*
- Expansionary fiscal policy increases CAD & moves the budget deficit function up.

During recessionary gaps ($Y < Y^*$), the actual budget deficit exceeds the structural budget deficit. During inflationary gaps ($Y > Y^*$), the actual budget deficit is less than the structural budget deficit.

Debt Dynamics

- $\Delta d = x + (r-g) * d$
 - $d \rightarrow$ debt-to-GDP ratio
 - $x \rightarrow$ gov. primary budget deficit as % of GDP
 - $r \rightarrow$ real interest rate
 - $g \rightarrow$ growth rate of real GDP
 - $\Delta d \rightarrow$ change in debt-to-GDP ratio
 - if $r > g \Rightarrow d$ will rise \Rightarrow there is primary surplus
 - if $r = g \Rightarrow$ Primary budget is enough to keep d constant
 - if $r < g \Rightarrow$ Primary deficits are sustainable
- reflects ability to pay
→ the lower the better

if government spending goes up \rightarrow Actual, Primary & cyclically adjusted budget deficits will all increase

government deficits doesn't have direct effects on household spending

$NS = Y^* - C - G$ → Assume an increase in budget deficit reduces national savings

$$G \propto NS$$

Crowding Out: is the reduction in private expenditure caused by an expansionary fiscal policy:

- higher interest rates (investments)
- ↑ ↓
- appreciated currency (net exports)
- ↑ ↓

Closed economy

Fiscal Expansion could be either: ① increase in G ② reduction in $T \Rightarrow$ ① increases deficits ② reduces NS ③ $i \uparrow$ ④ $I \downarrow$

If Y^* increases, crowding out is less complete \rightarrow the larger increase in Y^* , the less private expenditure will be crowded out

in open economy, as interest rates rise \rightarrow there is an inflow of foreign financial capital \Rightarrow appreciates the currency \Rightarrow crowding out of net exports

Government Debt & Monetary Policy

- Inflation is good for anyone that owes money, including the government
 - Changes in debt ratio depends on growth of nominal GDP
 - Government debt may create expectations of inflation to eliminate the debt
 - Creates expectations of inflation \Rightarrow wages $\uparrow \Rightarrow AS \uparrow$
 - Increases inflation, interest rates, & the price level
 - considers a very high debt-to-GDP ratio
 - creditors may come to expect monetization of debt
 - an increase in inflation expectations
 - makes monetary policy more difficult
- Debt incurred to finance public investment may result in no burden for future generations

Government debt & fiscal policy

- gov. often tries to implement counter cyclical fiscal policy
- deficits in recession
- surpluses in booms
- high debt-to-GDP ratio may restrict the gov. severely
- May be unable to have stabilizing fiscal policy

The Potential Problem with large public debt leads some people to consider formal fiscal rules to prevent the excessive build-up of debt

① Annually Balanced Budgets

- Tax revenue is low when expansionary fiscal policy might be helpful
- leads to Pro-cyclical fiscal policy \rightarrow which increases the instability in the economy

② Cyclically Balanced Budgets

- require the government's budget to be balanced over a full economic cycle
- requires to maintain a structural surplus
- less restrictive, more political
- Desirable in principle, but very difficult to define & implement