



ECON 102 (RATNA) FINAL EXAM REVIEW SESSION

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Introduction:

- Thank you for coming to Commerce Mentorship Program's Review Session for **ECON 102** – customized for Professor **Ratna K. Shrestha**'s session. These materials were prepared by CMP's second-year Academic Consultant **Phuong Vu**, based on Professor Shrestha's curriculum and Ragan Macroeconomics textbook.
- This final exam is CUMULATIVE, covers chapters 19-30 and 34. The term review and practice questions are here to help you to solidify your understanding about ECON 102. Format on the actual exams might include: True/False, Multiple Choice and Long Answers questions (both quantitative and qualitative).
- Besides today's session, I'll hold office hours on **Tuesday, April 25th**, from 1-3PM at HA 194. Come find me with any questions you have and I'll be very happy to help out!



CHAPTER 19 & 20:

Introduction to Macroeconomics and the Measurement of National Income

1. **Output Gap** = $Y - Y^*$ = Actual Output – Potential Output

2. There is two ways to measure changes in price level:

$$\text{Rate of Inflation} = \frac{\text{Price of CPI Basket Current Year} - \text{Price of CPI Basket Base Year}}{\text{Price of CPI Base Year}}$$

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

3. Unemployment rate measures the number of people (≥ 15 years of age) who are not employed and are actively searching for a job, expressed as a percentage of the labour force.

$$\text{Unemployment rate} = \frac{\text{Number of people who are unemployed}}{\text{Number of people in the labour force}} * 100$$

4. (*) Interest rate is the price paid per dollar borrowed per period of time, could be measured by nominal term or real term.

5. To measure the contribution of a firm to its total output, we can use the concept of Value Added.

$$\text{Value Added} = \text{Sales Revenue} - \text{Cost of intermediate Goods}$$

6. GDP measures total value of goods and services produced in the economy during the given period.

$$\text{GDP (Expenditure)} = C + I + G + (X-M)$$

Please note that only purchases activities are included in GDP Expenditure, because GDP Expenditure is an estimation of the value of goods and services produced in the economy. For that reason, transfer payments is not included in GDP Expenditure.

$$\begin{aligned} \text{GDP (Income)} &= \text{Factor Income} + \text{Non-factor Payments} \\ &= (\text{Wages/ Salaries} + \text{Interest} + \text{Business Profits}) + (\text{Indirect Taxes} - \text{Subsidies} + \text{Depreciation}) \end{aligned}$$



CHAPTER 21 & 22:

Short-run Macro Model

1. Consumption Function:

Consumption Function determines the relationship between **consumption, investment, government expenditure and net exports** ($= X - M$)

2. Aggregate Expenditure formula:

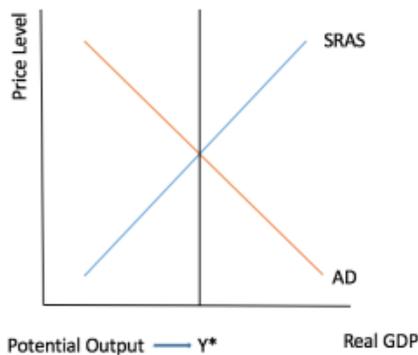
Without Government and Trade	With Government and Trade
$z = \text{MPC}$	$z = \text{MPC} (1 - t) - m$
Simple multiplier = $\frac{1}{1 - z}$ $= \frac{1}{1 - \text{MPC}}$	Simple multiplier = $\frac{1}{1 - z}$ $= \frac{1}{1 - [\text{MPC} * (1 - t) - m]}$
$\text{AE} = C + I$	$\text{AE} = \text{Autonomous Exp.} + \text{Induced Exp.}$ $= [c + I + G + X] + [\text{MPC} * (1 - t) - m] Y$
	<i>Notes: c stands for autonomous consumption. m stands for marginal propensity to import. t stands for tax rate.</i>

3. The Equilibrium National Income condition occurred where $\text{AE} = Y$, and is occurred at the intersection of **Aggregate Expenditure curve** and the **45-degree line**.

Chapter 23 & 24:

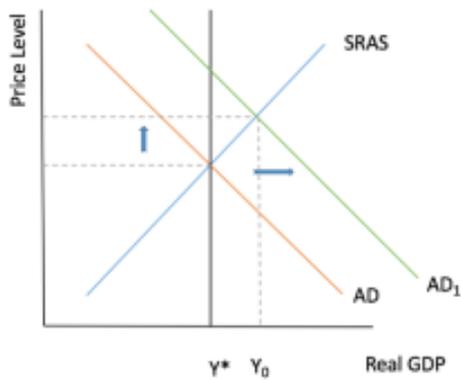
Aggregate Demand & Supply

The AD/AS model explains the movements of price level and real GDP through the relationship of AD and AS.

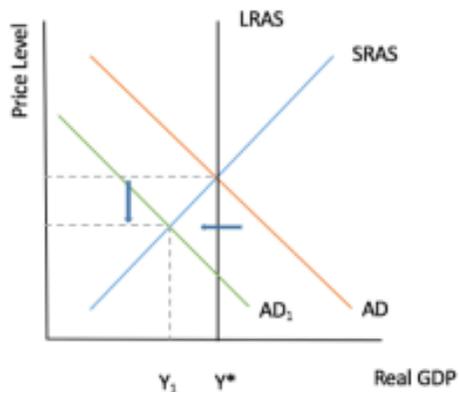


Aggregate Demand

Expansionary AD Shock:

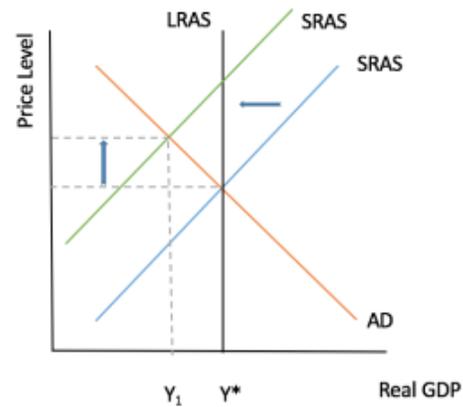


Contractionary AD Shock:



Aggregate Supply

Example: Negative AS shock.



CHAPTER 25:

GDP Accounting

Given: F = total available stock of factors.

F_e = employed stock of factors.

The GDP Accounting Equation can be written as:

$$\mathbf{GDP = F * Fe/F * GDP/Fe}$$

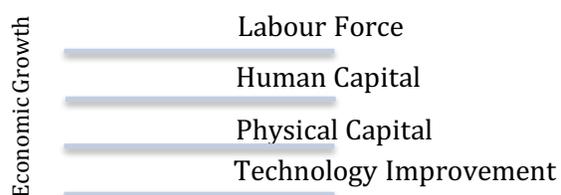


1. Short-run Change in GDP	2. Long-run Change in GDP
<p>- Factor utilization rate (F_e/F): <i>In the short run, to catch the opportunity of making a profitable sale from an increase in demand of the goods, firms increase their Factor Utilization Rate from hiring more workers and increasing the operations of physical capitals, etc.</i></p>	<p>- Supply of factors: <i>In long-term future, the economy is capable to leverage capital and labour supply, therefore changes in the supply of factors affects GDP in the long run.</i></p> <p>- Factor productivity: <i>Productivity growth changes slowly over time, due to better production technology and human capital.</i></p>

CHAPTER 26:

Long-run Economic Growth

Economic Growth: Sustained and long-run increases in the level of real GDP.



Theories of Investment, Savings and Growth.

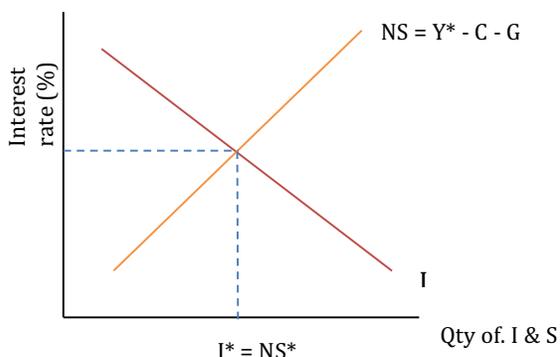
In long-run analysis: Real GDP = Y^* (desired output) and interest rate varies to determine equilibrium.

In the long run, saving equals investment. ($S = I$).

National Savings = Private Savings + Public Savings

$$= Y^* - T - C + T - G$$

$$= Y^* - C - G$$



Consider the two scenarios:

- **If national savings supply increases:**

- Savings supply shift to the right.
- Interest rate drop, making it cheaper to loan. As a result, quantity of investment and savings increases.

- **If investment demand increases:**

- Investment demand shifts to the right, pushing interest rate up. Lenders want to lend more money because they can make greater return, hence at the new equilibrium, interest rate and quantity of investment and savings increases.

Neoclassical theory of growth:

Neoclassical theory of growth is based on the idea that 4 forces of economic growth can be connected by **The Aggregate Production function**.

$$GDP = F_T (L, K, H)$$

Where: $F_T =$ *Aggregate Production Function*

$L =$ *Labour*

$K =$ *Capital*

$H =$ *Human Capital*

This function suggests:

1. *Diminishing marginal returns.*

Adding one additional worker will add less to total output.

2. *Constant returns to scale*

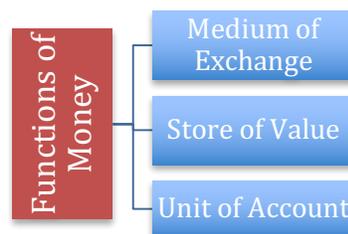
If all inputs (L,K and H) are increased by X times, total output (GDP) is also going to be increased by X times due to greater scale of production.

Newer growth theories:

1. New knowledge is **not** subject to diminishing marginal return because of the growing potential of knowledge driven technological change.
2. Embodying new technology **increase**, rather than decrease marginal returns, explaining growth in per capita income.
3. Endogenous technology changes **respond to market signals**, including prices and profits. These technological changes rise from intentional investment decision (R&D decisions) made to maximize profits.

CHAPTER 27, 28 & 29:

Money, Interest and Economic Activity.



Expansion of money from a single new deposit:

Suppose that the bank has a target reserve ratio of v (%), which means that they want to keep $v\%$ from all deposits on the bank's reserve and loan the rest:

$$\Delta \text{ in deposit} = \frac{\Delta \text{ Reserves}}{v}$$

In the case of **cash drain**, if people want to maintain c (%) of the cash they deposited into the account, and the bank still has a target reserve ratio of v (%):

$$\Delta \text{ in deposit} = \frac{\text{New Cash Deposit}}{c+v}$$

Present Value and Interest Rate: (Please refer to the session livestream for detail solution)

Cotton the Cat is buying a Government Bond.

- Face Value = 1000
 - Term = 1 year
 - Coupon rate = 8%
 - Market rate = 9%
- Coupon = $1000 * 8\% = \$80$

$$PV = \frac{1080}{(1+0.09)} = \$930.83$$

What if the term is 2 years?

$$PV = \frac{80}{(1+0.09)} + \frac{1080}{(1+0.09)^2} = 982.41$$

Mr. Grumpy is also buying Government Bond.

- Face Value = 1000
- Term = 1 year
- Coupon rate = 8%
- Market rate = 7%

$$PV = \frac{1080}{(1+0.07)} = 1009.35$$

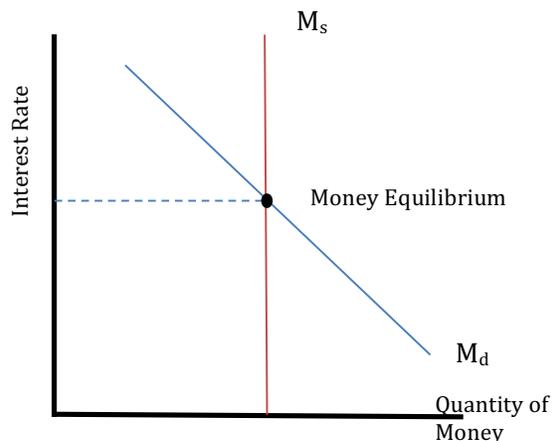
What if the term is 2 years?

$$PV = \frac{80}{(1+0.07)} + \frac{1080}{(1+0.07)^2} = 1018.08$$

- If **market rate > coupon rate** then **bond yield is increased** and **bond price is decreased**. (Selling at a discount)

- If **market rate < coupon rate** then **bond yield is lower** and **bond price is increased**. (Selling at a premium)

Money Market:



- *Expansionary monetary policies:* Reducing interest rate, which increases consumption, increasing AE and shift AD rightward.
- *Contractionary monetary policies:* Increasing interest rate, and as a result, consumption decreases, AE decreases and AD is shifted to the left.

Factors that influence Md:

$$M_d = M_d(i; Y; P)$$

Examples:

- Interest rate decreases, M_d shifts rightward.
- GDP increases, transactions increases and M_d shifts rightward.
- Price level increase, money depreciates and M_d shifts rightward.

The monetary transmission mechanism:

The process where change in M_d affects AD.

1. Δ Interest rate:

M_d / M_s changes (shift right or left), hence interest rate will change.

2. Δ Desired Investment and Consumption:

Interest change, leading to an increase in investment, and this change is directly tight up to a change in consumption.

3. Change in Aggregate demand:

Change in consumption will lead to a change in AE, which will directly shift AD curve.

CHAPTER 30:

Inflation & Disinflation

Overall inflation effects on wages:

$$\text{Change in Nominal Wages} = \text{Output-gap effect} + \text{Expectational effect}$$

$$\text{Change in Real Wages} = \text{Changes in Nominal Wages} - \text{Inflation Rate}$$

$$\text{Actual Inflation} = \text{Output-gap Inflation} + \text{Expected Inflation} + \text{Supply-shock Inflation}$$

- When inflation is too high, there is Disinflation. **Disinflation** is the process of **reducing sustained inflation**.

Disinflation Phase 1: Removing monetary validation by increasing interest rate to tighten the monetary policy, hence decreasing growth rate of money supply. AD curve stops shifting, while AS curve continues to shift upward due to continual expectations about inflation.

Disinflation Phase 2: Stagflation happens due to expectations and increase in rate. Output falls, inflation continues. Actual output is now smaller than desired output, leading to two possible scenarios: AD moves up, or AS to move down.

- The **cost of Disinflation** is the loss of output that was generated in the process and is measured by **sacrifice ratio**.

$$\text{Sacrifice ratio} = \frac{\text{Loss in real GDP (\%)}}{\% \text{ point of inflation reduced}}$$

CHAPTER 34:

Exchange Rates and Balance of Payments

The Balance of Payments:

$$\text{BoP} = \text{CA} + \text{KA} = 0$$

↓ ↓

_____ acc. _____ acc.

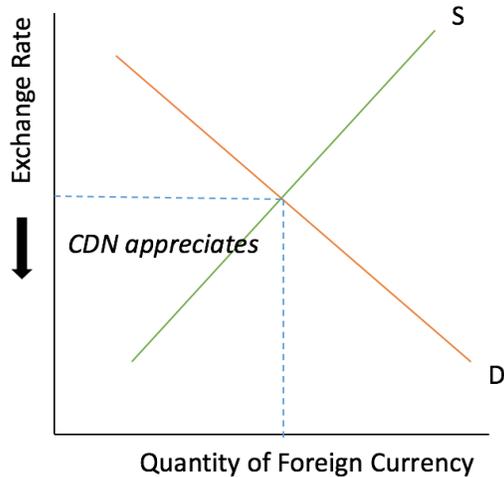
- If CA/KA > 0, foreigners owe Canadians
- If CA/KA < 0, Canadians owe foreigners
- If CA/KA = 0, neither party owed the other



Exchange Rates:

- When Canadian dollars **appreciate**, **exchange rate decreases**. So it takes **less** units of domestic currency to purchase foreign currency.
- When Canadian dollars **depreciate**, **exchange rate increases**. So it takes **more** units of domestic currency to purchase foreign currency.

The Foreign-Exchange Market



Shifts in the foreign-exchange market:

- When the world prices of a Canadian export increases, it is **cheaper** to buy from Canada, hence **demand for Canadian dollar** will shift to the **right**, and eventually, Canadian dollars **appreciate**.
- When the foreign price of imports decreases, it is **more expensive** to buy from Canada, hence **demand for Canadian dollar** will shift to the **left**, and eventually, Canadian dollars **depreciate**.

Current Account Deficit: **Borrowing money** from the rest of the world or **selling** capital assets to the rest of the world.

In Chapter 34, we learnt the following equation:

$$CA = (S-I) + (T- G)$$

Meaning that changes in **private savings**, **investment** and government budget deficit could cause Account Deficit.

However, current account deficit **is not undesirable at all times**.



PRACTICE PROBLEMS

Notes:

The problems below are aimed to prepare students for long answers/ calculation question in ECON 102 exam. In the second half of today's session will go over some sample Multiple Choice questions on a game-based platform named Kahoot!, and go over the practice problems after that.

Kahoot can be accessed through <https://kahoot.it/#/>, and the Game PIN will be provided during the session.



1. Measurement of National Income and Price Level.

The vast majority (99.9%) of Country of Many Penguin's population are Penguins Students, so the country consumes 4 goods: Candy, Coffee and Bagels. Details about the good is enclosed in the following table:

	2012		2013		2014	
	Qty	Price	Qty	Price	Qty	Price
Candy	10	1	12	2	7	2.5
Coffee	7	2	19	2	15	2
Bagels	19	1	21	2	17	2

Requirements:

1. If we use 2012 as the base year, what's the CPI in 2014? How about we set 2013 as the base year? Compare the two CPIs and interpret the difference in the two figures.

$$\text{CPI 2014 (base year 2012)} = \frac{2.5 \cdot 7 + 2 \cdot 15 + 2 \cdot 17}{1 \cdot 7 + 2 \cdot 15 + 1 \cdot 17} = 1.51$$

$$\text{CPI 2014 (base year 2013)} = \frac{2.5 \cdot 7 + 2 \cdot 15 + 2 \cdot 17}{2 \cdot 7 + 2 \cdot 15 + 2 \cdot 17} = 1.045$$

CPI 2014 (base year 2012) is greater than CPI 2014 (base year 2013). The reason behind this difference is because between 2012 and 2014, prices have been increasing by so much more comparing to price changes between 2013 and 2014. Hence, using 2013 as a base year will lead to a smaller figure for CPI 2014 comparing to using base year 2012.

2. Using 2013 as the base year, calculate the 2014 GDP deflator and interpret the meaning of this calculation.

$$\text{Nominal GDP} = 7 \cdot 2.5 + 15 \cdot 2 + 17 \cdot 2 = 81.5$$

$$\text{Real GDP} = 7 \cdot 2 + 15 \cdot 2 + 17 \cdot 2 = 78$$

$$\text{GDP Deflator} = 81.5 / 78 \cdot 100 = 104.5$$

GDP Deflator = 104.5 means that the price level has increased by 4.5% from 2013 to 2014.

3. Continue to use 2013 as the base year, calculate the inflation rate for the year 2014 and interpret this answer. How does inflation rate (obtained from CPI) differ from GDP Deflator?

$$\text{CPI basket in 2014} = 7 \cdot 2.5 + 15 \cdot 2 + 17 \cdot 2 = 81.5$$

$$\text{CPI basket in 2014 (2013 base year)} = 7 \cdot 2 + 15 \cdot 2 + 17 \cdot 2 = 78$$

$$\text{Rate of inflation} = (81.5 - 78) / 78 \cdot 100\% = 4.5\%$$

In this case, GDP deflator and Inflation rate measure the same thing: they both measure changes in price level. (Don't let the question trick you!)

However, if we extend this type of questions to more complex problems, we can say that CPI calculation can include anything bought by consumers (including foreign goods), while GDP Deflator measures the price of domestic goods and nothing imports. Also, GDP Deflator took into account all goods and services, while CPI calculation is only made up of consumer's purchases.



2. Expansion of money from deposit.

Recently, the BOP (Bank of Penguins) have released these information:

ASSETS		LIABILITIES	
Loans	\$ 220 000	Deposits	\$ 270 000
Reserve	\$ 50 000		

Requirements:

1. *If the Bank of Penguins has lent out all the money that it can, what is its reserve ratio?*

$$\begin{aligned}\text{Reserve Ratio} &= \text{Total Reserve} / \text{Total Deposits} \\ &= 50\,000 / 270\,000 \\ &= 0.1852 \text{ or } 18.52\%\end{aligned}$$

2. *If the minimum reserve ratio is 4%, how much in excess reserve does the Bank of Penguins now hold? If the bank does not hold any excess reserve, how will its assets and liabilities change?*

If the bank holds minimum reserve, hence:

$$\begin{aligned}\text{Reserves} &= \text{Total Deposit} * \text{Minimum Reserve Ratio} \\ &= 270\,000 * 4\% \\ &= \$10\,800\end{aligned}$$

$$\text{Amount of excess reserve is} = 50\,000 - 10\,800 = \$39\,200$$

If the bank does not hold excess reserve, then its new assets and liabilities will be:

Deposit: \$ 270 000 (a change in the decision of holding excess reserve has nothing to do with changing amount of deposit).

Reserve: \$ 10 800 (minimum reserve at 4% required reserve ratio).

Loans: \$ 280 000 - 10 800 = \$269 200

3. *Out of the \$ 270 000 deposited, now people want to hold on to another \$15 000 in cash, and hold another \$20 000 in excess reserve. The minimum reserve ratio is 4%. What is the change in deposit in this situation?*

Keep in mind that people now would like to keep 15 000 in cash.

$$\text{The amount kept for reserve} = 270\,000 * 0.04 + 20\,000 = 30\,800$$

Therefore, the new changes in deposit would be:

Deposit: \$270 000

Amount retained to cash for customers: \$15 000

Reserve: \$30 800

Loans: 270 000 - 15 000 - 30 800 = \$224 200



3. **Bonds & Present Value.** (For information about PV “timeline”, please refer to the livestream of today’s session).

Linda is considering buying a bond issued by Government of Canada. The information includes:

- (1) Face value = \$ 3500
- (2) Coupon rate = 7%, coupon paid annually
- (3) Market rate = 10%
- (4) Term = 2 years

Requirements:

1. **Calculate the current price of the bond. Compare the Present Value of the bond to its face value. Using what you learnt from ECON 102, explain why is that the case?**

$$\text{Coupon} = \$ 3500 * 7\% = 245$$

In year 1: Received \$245 in coupon

In year 2: Received \$245 in coupon and 3500 in Face Value

$$PV = \frac{245}{(1+0.1)} + \frac{245+3500}{(1+0.1)^2} = \$3317.77$$

2. **Calculate the yield on this bond. Why do bond yield and market interest normally go on the same direction?**

The total amount that bond issuer paid at maturity is $3500 + 245 * 2 = 3990$

Let’s call the yield on this bond r. We have the following equation:

$$3317.77 * (1+r)^2 = 3990$$

$$(1+r)^2 = 1.2026$$

$$r = 0.097 = 9.7\%$$

3. **Linda decided to go and purchase the bonds yesterday. This morning, while reading the news, Linda found out that current market rate jumped to 6%, and she became confused. Help Linda to calculate the current price of a similar bond, and explain to her whether if she should be upset.**

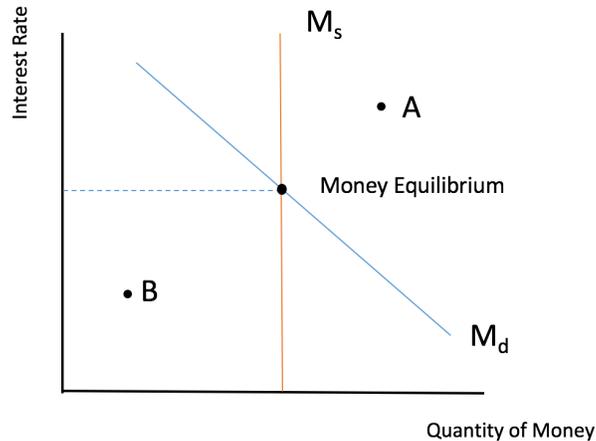
The current market price of this similar bond is:

$$PV = \frac{24}{(1+0.06)} + \frac{245+3500}{(1+0.06)^2} = \$3564.17$$

Linda should NOT be nervous, because this change in market rate has increased the price of this similar bond on the market. Linda was able to purchase the bond at a cheaper price (\$3317.77 comparing to \$3564.17), therefore she should be happy!

4. Money demand and supply:

The diagram below shows the demand for money and the supply of money.



1. *Is it possible for the economy to operate at point A and B? Explain.*

No, it is not possible for an economy to operate at point A or B.

At point A, the interest was too high comparing to the Money Demand. Such quantity of money should result in a lower interest rate.

The situation at point B is the opposite: the interest at point B is too low. At such low amount of quantity of money available on the market, interest rate should be so much higher.

2. *Describe the process to bring an economy with excess money supply back to equilibrium. What about the process for excess money demand?*

For excess money supply:

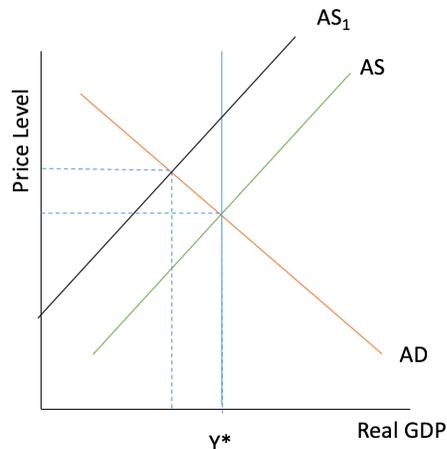
Because there is more money supply comparing to money demand on the market, interest rate will gradually decrease. As the interest rate now decrease, a higher quantity of money is favored because the lower interest rate stimulates consumption. The result is a greater quantity of money, along with a lower interest rate on the market.

For excess money demand:

Because there is more money demand comparing to supply on the market, the interest rate will be pushed upwards, since people are currently willing to pay more on interest to obtain the money they need. As the interest is now shift upwards, some people who cannot afford the higher interest payment will be no longer interested, which decreases the quantity of money required on the market. At the new equilibrium is a higher interest rate and lower quantity of money.

5. Inflation and Disinflation.

Consider the following AD/AS graph. Recently, a **contractionary AS Shock** occurs in Country of Many Penguins, shifting aggregate demand to AS_1 ,



- a. Explain the initial effect of this contractionary AS shock to the economy. Illustrate your answer on the diagram above.

The **contractionary AS Shock** shift AS curve to the left, reducing the amount of Real Output produced. A recessionary gap is created, since output is no longer at its desired state. And finally, price level increases, purchasing power decreases, and dollar depreciates.

- b. What kind of actions can the Bank of Penguins take to maintain the economy's Desired Output? Explain in words and illustrate it on the diagram above.

Bank of Penguins can first of all, tighten up the money supply on the market, to make sure that the AD could not shift. Due to expectations about inflation and output gap, the wages rise and AS shift leftwards. As output continues to fall, the recessionary gap grows. Inflation keeps growing, however, at a smaller rate. However, the recession gap causes the wages rate to fall slowly, then Real GDP is achieved, the recessionary gap is cleared and inflation also decrease.

- c. 1 year after the contractionary AS shock, President of Bank of Penguins announced a plan to end the sustain inflation. What is the measure of the cost of this process and how is it calculated, given that the President of BoP wants to reduce inflation by 12% with an Output Loss of \$120m, with a potential output of 720m?

The cost of disinflation is measured by sacrificed ratio.

$$\% \text{ loss in real GDP} = \$120\text{m} / \$720\text{m} = 16.67\%$$

$$\begin{aligned} \text{Sacrifice Ratio} &= \% \text{ loss in GDP} / \% \text{ reduction in the rate of inflation} \\ &= 16.67\% / 12\% \\ &= 1.39 \end{aligned}$$

