ECON 102 (RATNA)
MIDTERM EXAM REVIEW SESSION
BY PHUONG VU

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INTRODUCTION

- **Phuong Vu, second year Academic Consultant** planning to major in Accounting and Business Technology Management. I'm also a **Commerce Tutor** at **AMS Tutoring.**

  o Macroeconomics is not an extremely challenging course. To ace the exam, you need to know the key terms, the formulas for calculations, and most importantly to me, the graphs, since graphs in ECON 102 show how economic variables are related to each other.

  o I did not take ECON 102 with Professor Ratna Shrestha, however, I took COMM 295 – Managerial Economics with him last semester and became familiar with his teaching styles.

- The review materials created for this session was tailored based on Ragan textbook, Professor Ratna's slides and practice midterm up to Chapter 25.

- I will be going over the key terms and formulas, before we move on to a few sample problems. I will also hold office hours on **Monday, February 27th**, so you're very welcome to come with any extra questions!

- Please note that CMP also provides **an extra problem** set tailored for this review session, however, we will not be going over them today due to the interest of time. The answer to this extra problem set will be posted after the session, together with the answer to this review booklet. If you have any questions about the extra problem set, feel free to come and find me during office hours on Monday!

REVIEW OF KEY TERMS AND FORMULAS

CHAPTER 19: KEY MACROECONOMICS VARIABLES

1. **National output and Income:** Sum of the values of many different goods and services that are produced.
   Nominal national income: Total national income measured in current dollars.

   Nominal national income = Σ Number of units produced * Unit price

   Real national income: National income measured in constant dollars obtained from a base year. It only changes when the price changed.

   Real national income = Σ Number of units produced * Unit price in base year

   Please note, one of the most commonly used measures of national income is **Gross Domestic Product** *(GDP), which can be measured in both nominal and real terms.*

2. **Potential output/GDP (Y*): *):** The real GDP that the economy would be producing at if resources were fully employed.

   Output Gap: Number of persons (15 age or older) who are not employed, and are actively searching for a job.

   Recessionary Gap: Situation that happens when Y < Y*

   Inflationary Gap: Situation that happens when Y>Y*.

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3. **Employment:** Number of persons (15 years of age or older) who have jobs.

   Unemployment: Number of persons (15 age or older) who are not employed, and are actively searching for a job.

   Labour force: : Number of persons employed plus number of persons unemployed.

$$\text{Unemployment rate (\%)} = \frac{Number\ of\ people\ unemployed}{Number\ of\ people\ in\ the\ labour\ force} * 100$$

4. **Inflation:** A rise in the average level of all prices (the price level).

$$\text{Rate of Inflation (\%)} = \text{Rate of Inflation (\%)} = \frac{\Delta\ Price\ level}{Initial\ Price\ level} * 100$$

5. **Interest rate:** The price paid per dollar borrowed per period of time, could be determined in **nominal** or **real** terms.

6. **Consumer Price Index (CPI):** An index of the average price of a "typical" basket of goods and services consumed by households.

$$\text{CPI} = \frac{Cost\ of\ CPI\ basket\ at\ current\ prices}{Cost\ of\ CPI\ basket\ at\ base\ prices} * 100$$

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CHAPTER 20: THE MEASUREMENT OF NATIONAL INCOME

1. **Value Added = Sales Revenue – Cost of intermediate goods**

    Intermediate goods: All outputs that are used by other producer in a further stage of production.
    Final goods: Goods that are produced for consumption, investment, government or export during the period under consideration.

2. **GDP Calculation:**

    GDP from the Expenditure side:

    GDP = C + I + G + NX

    In which:
    C = Consumer Expenditure
    I = Investment Expenditure
    G = Government Expenditure
    NX = Net Exports, equals Export – Import (= X – M)

    GDP from the Income side:

    GDP = Factor Incomes + Non-Factor Payments
    In which:
    Factor Incomes consist of **Wages and Salaries, Interest Income and Business Profits.**
    Non-factor Payments consist of **(Indirect tax – Subsidies) + Depreciation.**

3. **GDP Deflator:** An index number that measures the average change in the prices of all the items included in the GDP.

    $$\text{GDP Deflator} = \frac{GDP \text{ at current prices}}{GDP \text{ at base}-period \text{ prices}} * 100 = \frac{Nominal\ GDP}{Real\ GDP} * 100$$

CHAPTER 21 + 22: SIMPLE SHORT-RUN MACRO MODEL

1. **Consumption Function:** A function that determines the relationship between desired consumption expenditure and all the variables that determined it, including Consumption, Investment, Government Expenditures and Net Exports.

   Some ratio that relates to AE model:

Average Propensity to Consume (APC): Measures the proportion of disposable income that households want to spend. $$APC = \frac{C}{Yd}$$	**Marginal Propensity to Consume (MPC):** Measures the change in desired consumption to the change in disposable income. $$MPC = \frac{\Delta C}{\Delta Yd}$$
Average Propensity to Save (APS): Measures the proportion of disposable income that households want to save. $$APS = \frac{S}{Yd}$$	**Marginal Propensity to Save (MPS):** Measure the change in desired saving to the change in disposable income. $$MPS = \frac{\Delta S}{\Delta Yd}$$

2. **The AE Function (in an economy with trade and government):**

   If we were given C = c + MPC *(1-t) Y_D, I, G, X, mY, then

   $$AE = c + MPC (1-t) * Y + I + G + (X – mY)$$
   $$= [c + I + G + NX] + [MPC * (1 – t) – m] Y$$

   In this function, **autonomous consumption = c + I + G + NX**
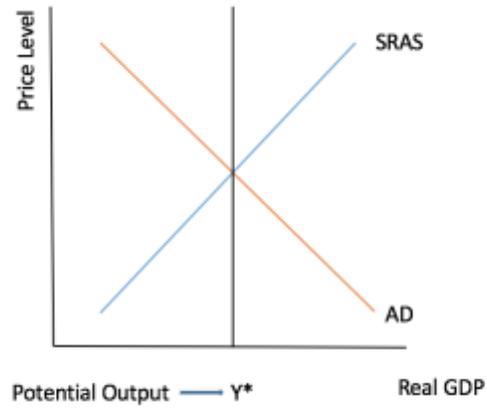   **Induced expenditure = [MPC * (1 – t) – m] Y**

3. **Equilibrium National Income Condition: AE = Y**

4. **Simple Multiplier =** $\frac{1}{1-z}$**,** in which **z = MPC * (1 – t) – m** (with Government and Trade)
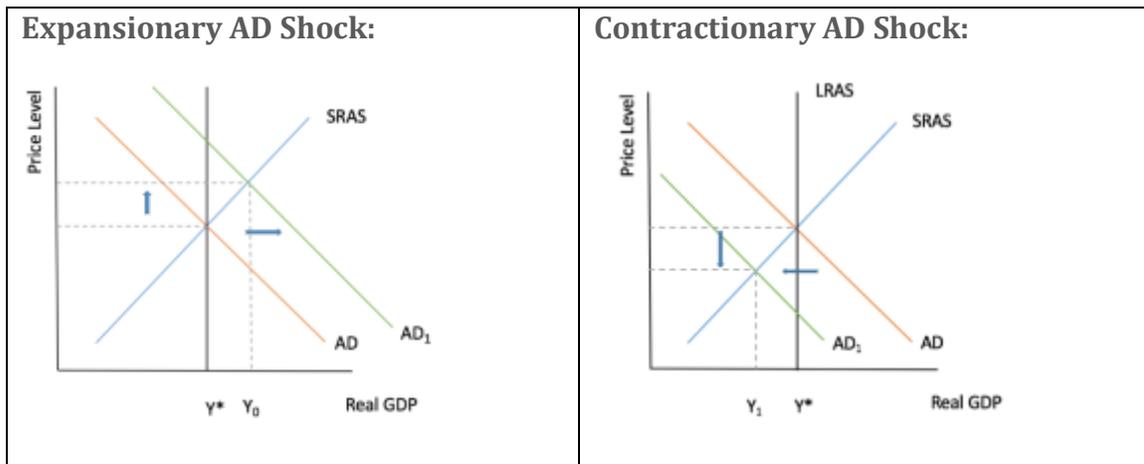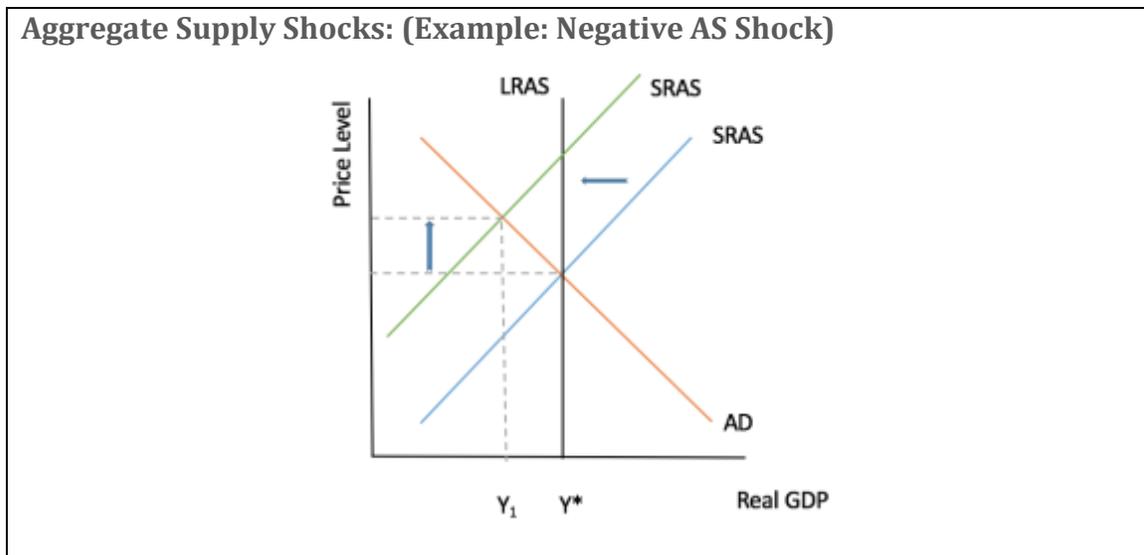
CHAPTER 23 + 24: AD/AS: FROM THE SHORT-RUN TO LONG-RUN

AD/AS Model: A macroeconomic model that explains the price level and output through the relationship of aggregate demand and aggregate supply.

Shocks in AD/AS:

Expansionary AD Shock:	Contractionary AD Shock:

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Aggregate Supply Shocks: (Example: Negative AS Shock)

Fiscal Stabilization Policy: A short-run policy set by the government, attempting to push real GDP back towards the potential output.

Two examples of Fiscal Policy could be: To cut back/ increase Government spending, or to lower/increase Tax rate.

PRACTICE PROBLEMS

Question 1 (2 marks):

You are the owner of a Cotton Candy factory that headquartered in Candyland which generates a $10 million revenue. The annual total cost of your factory is $8 million, which includes $4 million to workers at the factory, $1 million for interest payment, $2 million to sales tax and $1 million to depreciation. Your firm supports sustainability, hence was approved for a cost reduction of $1 million.

Requirement:

Calculate GDP for this Cotton Candy firm using the income approach to Accounting.

Since annual revenue is greater than annual total cost, we have to determine the business profit for this factory.

Business Profits = Total Revenue – Total Cost = $10 million - $8 million = $2 million

GDP (income side) = Factor incomes + Non-factor incomes

= (Wages and Salaries + Interest + Profits) + [(Indirect Tax – Subsidies) + Depreciation)]

= ($4 million + $1 million + $2 million) + [($2 million – $1 million) + $1 million]

= $9 million

Question 2: (2 marks)

As the Chief Economic Officer of Fisherland, you are given the following data:

	2005		2010	
Items	Quantity	Price	Quantity	Price
Fish	10	2	25	3.5
Nuts	50	1.5	75	1.75

Requirement:

Using 2005 as the base year, calculate CPI in 2010. What does this CPI imply?

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Solution:

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- Recall the formula to calculate CPI from our formula review:

$$\text{CPI} = \frac{\text{Cost of CPI market basket at current period prices}}{\text{Cost of CPI market basket at base period prices}} * 100$$

- Using 2005 as our base year, we can calculate:

Cost of 2010 CPI basket at base prices = 25*2 + 75*1.5 = $ 162.5

Cost of 2010 CPI basket at 2010 prices = 25*3.5 + 75*1.75 = $ 218.75

$$\text{CPI} = \frac{\$\,218.75}{\$\,162.5} * 100 = 134.6$$

- A CPI above 100 indicates that the price level has increased from 2005 to 2010.

Question 3 (6 marks):

The Country of Many Penguins (CMP) has recently released a document with key economic variables in 2016 as below:

CMP's President, Mr. Grump is now considering to enable some new trade deals between CMP and its neighbor countries, and he asks you – the Chief Economic Officer, to compute some measurements of current economic performance to tailor the deals to the economic trends.

Economic Variables	Amount in 2016 Dollars ($ billions)
Consumption expenditure	990.5
Government expenditure	770.2
Wages, salaries and supplement incomes	950.5
Interest and investment incomes	428.5
Investment expenditure	112.1
Depreciation	50.2
Business profits	301.4
Exports	200.7
Indirect taxes	293.2
Imports	150.0
Subsidies	100.3

Requirements:

1. Compute GDP for Country of Many Penguins from the Income side.

   GDP (Income side) = Factor incomes + Non-factor Payments

   = (Wages and Salaries + Interest + Business Profits) + [(Indirect Taxes – Subsidies) + Depreciation]

   = (950.5 + 428.5 + 301.4) + [(293.2 – 100.3) + 50.2] ($ billion)

   = $ 1923.5 billion

2. Compute GDP for Country of Many Penguins from the Expenditure side.

GDP (Expenditure side) = $C_a + I_a + G_a + NX_a$

Note that NX_a = Actual Exports – Actual Imports

GDP (Expenditure side) = 990.5 + 112.1 + 770.2 + 200.7 – 150.0 ($ billion)

= $1923.5 billion

3. President Grump is considering to increase Government expenditure by $221.3 billion, while increasing indirect taxes by the same amount. Suppose that the country is now in budget balance, will these two adjustments affect the GDP of CMP, and why does President Grump wants to increase these two accounts at one time?

Increasing Government Expenditure by $221.3 billion will increase GDP (Expenditure side) by the same amount. **Hence this change in Government Expenditure will results in a new GDP (Expenditure side) of $2144.8 billion.**

Increasing Indirect Taxes by $221.3 billion will increase GDP (Income side) by the same amount. **Hence this change in Government Expenditure will results in a new GDP (Expenditure side) of $2144.8 billion.**

While President Grump wants to increase government spending, he also has to increase his budget. Indirect tax is the main contribution to government spending, hence to increase government spending by a certain amount, President Grump might consider increasing tax by a similar amount.

Question 4 (5 marks):

BeeBee Island is a small country that only produces two goods: Mango Candy and Maple Syrup. Recently, Ministry of Commerce released the following information about the two-and-only goods produces by BeeBee-ians:

	Amount produced (units)		Unit price ($)	
	Year 1	Year 2	Year 1	Year 2
Mango Candy	2350	1200	2	3.5
Maple Syrup	3320	3122	1.5	1.75

Requirements:

1. Compute nominal GDP for year 1 and year 2 in BeeBee island. (2 marks)

   Nominal GDP = Σ Number of units produced * Unit Price
   - Nominal GDP (Year 1) = 2350 * $2 + 3320 * $1.5 = $9680
   - Nominal GDP (Year 2) = 1200 * $3.5 + 3122 * $1.75 = $9663.5

   Notice that although the price increased, nominal GDP decreases in Year 2 due to lower level of production in both Mango Candy and Maple Syrup.

2. Using year 1 as the base year, compute real GDP and the GDP deflator for each year. Identify a factor that causes the different between the real GDP and nominal GDP between the two years. (3 marks)

   - Using Year 1 as the base year:
   - Real GDP (Year 1) = 2350 * $2 + 3320 * $1.5 = $9680
   - Real GDP (Year 2) = 1200 * $2 + 3122 * $1.5 = $7083

   GDP Deflator (Yr 2) = $\frac{\text{GDP at current prices}}{\text{GDP at base-period prices}}$ * 100 = $\frac{\$9663.5}{\$7083}$ * 100 = **136.43**

- Notice that Real GDP (Year 2) < Nominal GDP (Year 2). There exists one factor that might cause this gap between Real and Nominal GDP is **Inflation**: A rise in the overall level of all prices, which can make Nominal GDP a misleading calculation to determine the change in outputs produced in a country.

Question 5 (10 marks):

Country of Many Penguins located in a small island to the north west of Canada, however, the country has a very powerful government, along with many foreign trades deals with its neighbours. Autonomous consumption for CMP is $250 million, marginal tax rate is 20%, government expenditure is $200 million, exports is $100 million, investment is $180 million, marginal propensity to consume is 0.9 and import is 0.3Y.

Requirements:

1. Write the Aggregate Expenditure function for CMP. Identify autonomous and induced expenditure components of the function. (3 marks)

   The Aggregate Expenditure function for CMP can be written as AE = C + I + G + NX, in which:

   - $C = c + MPC (1-t)*Y = 250 + 0.9*(1-0.2)Y = 250 + 0.72Y$
   - $I = 180$
   - $G = 200$
   - $NX = X – IM = X – mY = 100 – 0.3Y$

   Hence, we can rewrite AE function as:

   AE = 250 + 0.72Y + 180 + 200 + 100 – 0.3Y
   = 730 + 0.42Y

2. Identify the equilibrium condition for Aggregate Expenditure, then, calculate the Equilibrium National Income for CMP. Draw a graph to support your answers. (3 marks)

The Equilibrium Condition for Aggregate Expenditure is when AE = Y, or where desired aggregate expenditure (AE) equals actual national income (Y).

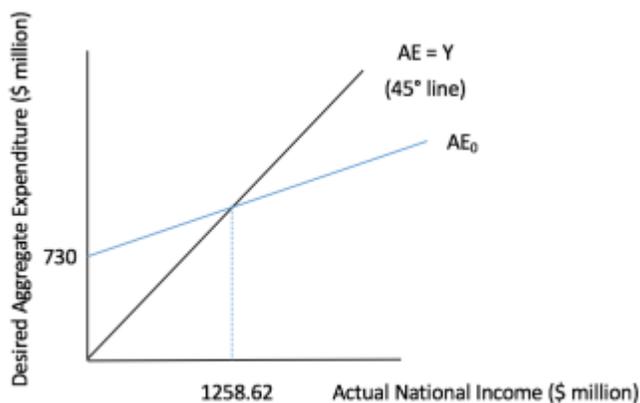To calculate the Equilibrium National Income for CMP, we would need:
AE = Y
$\Rightarrow$ 730 + 0.42Y = Y
$\Rightarrow$ 730 = 0.58 Y
$\Rightarrow$ Y = $ 1258.62 million.

The Equilibrium National Income for CMP is $ 1258.62 million.

3. Calculate the multiplier for CMP. Remember, z=MPC(1 - t) - m (1 mark)

Based on the hint, we can calculate z
z = MPC* (1 - t) – m
= 0.9 * (1 – 0.2) – 0.3
= 0.42

Therefore, simple multiplier = $\frac{1}{1-z}$ = $\frac{1}{1-0.42}$ = 1.724

4. The country is considering to increase tax rate from 20% to 25%. What is the potential effects of this change on CMP's Aggregate Expenditure function? Illustrate this change on the diagram from part 2. (3 marks)

If the country increases tax rate from 0.2 to 0.25:

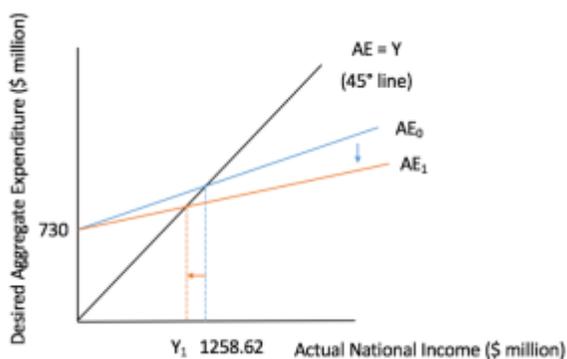**C = c + MPC* (1-t) Y = 250 + 0.9 * (1 – 0.25) Y**

= 250 + 0.675Y

Since we have re-calculated C, we can now rewrite the AE function:

AE = C + I + G + NX
= 250 + 0.675Y + 180 + 200 + 100 – 0.3 Y
= 730 + 0.375 Y

This change can be illustrated in the following diagram:


Hence, we can conclude that the change in tax rate flattened the AE curve and decreased the Equilibrium National Income to Y_1.

Question 6 (5 marks):

Recently, businesses in Candyland have recognized an upturn in business confidence, as a result of the #itscandytime trend rising among its population, hence leading to an $100 million increase in investment. Candyland's Prime Minister Jay Bean is now discussing with his colleagues about the effects of this investment boom and what it has to do with Candyland's AD/AS model.

Requirements:

1. Draw Candyland's initial AD/AS model. Identify the potential output Y* on the graph. (1 mark)

   AD/AS Graph:
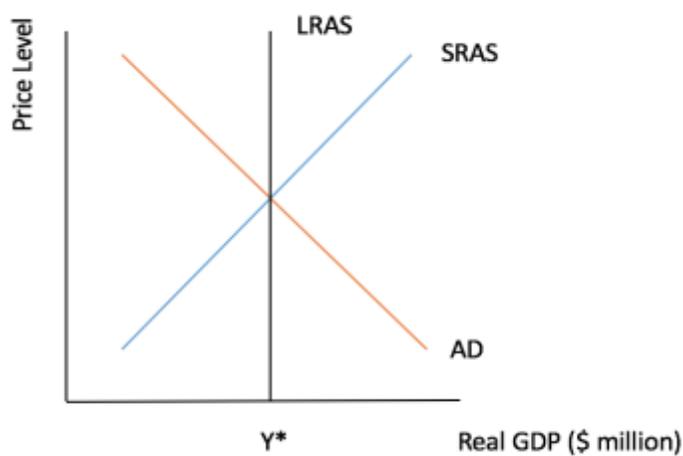
2. What does the investment boom have to do with Candyland's AD/AS model? Using the Aggregate Expenditure function learned in Chapter 23, determine the change in AD/AS model and illustrate it in the graph drawn in part 1. (2 marks).

We know that an upturn in confidence that results in an increase of investment spending also increase the **autonomous expenditure, hence shifting the AE curve upward. The upward shift in Desired Aggregate Expenditure shifts AD curve to the right, to AD_1.**
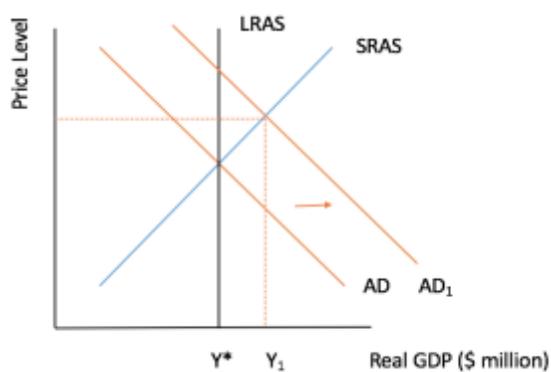
3. Prime Minister Bean wants to maintain Candyland's production is at Y*, however he realized that there exists a gap in between current Y_1 and Y*. Help Prime Minister Bean to determine two policies to bring the economy's output back to Y* (2 marks).

From observing the graph, we can see that Y_1 > Y*. The gap between the two GDPs is called "inflationary gap" because current GDP is greater than ideal output.

Recall that AE = C + G + I + NX

In this situation, to bring Y_1 back to Y*, government needs to decrease Aggregate Expenditure so that AE curve shifts down, leading to a leftward shift of AD to close the inflationary gap. There are two fiscal policies the government can do to fix this gap:

- **By cutting down Government Expenditure**, so that AE will shift down and as a result, AD will shift left. Y_1 will move back to Y*.

- **By increasing tax rates, so that Consumption will decrease**. As a result of a decrease in consumption, AE will shift down, leading to a leftward shift in AD and help Y_1 to move back to Y*.

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- END –