

COMMERCE MENTORSHIP PROGRAM

# MIDTERM REVIEW SESSION

## ECON 102



PREPARED BY  
**JASMINE LEUNG**

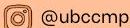
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# **Topic 1:**

# GDP (Gross Domestic Product)



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# Intro to Macroeconomics

## Macroeconomics

- The study of the economy as a whole.
  - Includes large-scale, economy-wide factors such as economic growth, inflation, unemployment, and GDP.
  - Includes markets, firms, consumers, and governments.

## GDP (Gross Domestic Product)

- Also called National Income, National Output, and National Expenditure.
- The total monetary value of all finished goods and services produced in the economy of a country during a defined time period (usually a fiscal year).
- Used to estimate the size of an economy.

# GDP (Gross Domestic Product)

## Nominal GDP

- Current dollar measure of GDP.
- Reflects changes in output and changes in prices.
- Nominal GDP =  $Q_{\text{Current}} \times P_{\text{Current}}$

## Real GDP

- Inflation adjusted measure of GDP (prices are held constant from year to year).
- Reflects changes in output produced (since prices are constant).
- Real GDP =  $Q_{\text{Current}} \times P_{\text{Base}}$

## GDP per capita

$$\bullet \text{ GDP per capita} = \frac{\text{Real GDP}}{\text{Total Population}}$$



# GDP (Gross Domestic Product)

**Question: Between nominal GDP and real GDP, which measure is more accurate indicator of economic performance?**

Real GDP is a more accurate indicator than nominal GDP. Unlike nominal GDP, real GDP factors inflation and considers price changes in its calculation.

Since prices are held constant for real GDP, any changes reflect changes in quantity/output. (Any increase in real GDP means that output has increased). However, a change in nominal GDP could just mean that prices have increased due to inflation.

As a result, real GDP provides a clearer idea of the change in total national output and economic growth.

# GDP (Gross Domestic Product)

Question: The following table shows the output and prices a country in 2022 and 2023. Calculate the nominal GDP in 2022 and 2023.

Goods produced	Price (2022)	Quantity (2022)	Price (2023)	Quantity (2023)
Bread	\$4	200	\$5	350
Cheese	\$2	50	\$3	70
Milk	\$5	100	\$7	140

$$\text{Nominal GDP} = Q_{\text{current}} \times P_{\text{current}}$$

$$\begin{aligned}\text{Nominal GDP in 2022} &= Q_{2022} \times P_{2022} \\ &= (200 \times \$4) + (50 \times \$2) + (100 \times \$5) = \$1400\end{aligned}$$

$$\begin{aligned}\text{Nominal GDP in 2023} &= Q_{2023} \times P_{2023} \\ &= (350 \times \$5) + (70 \times \$3) + (140 \times \$7) = \$2940\end{aligned}$$

# GDP (Gross Domestic Product)

Question: The following table shows the output and prices of a country in 2022 and 2023. Calculate the real GDP in 2022 and 2023.

Goods produced	Price (2022)	Quantity (2022)	Price (2023)	Quantity (2023)
Bread	\$4	200	\$5	350
Cheese	\$2	50	\$3	70
Milk	\$5	100	\$7	140

$$\text{Real GDP} = Q_{\text{current}} \times P_{\text{Base}}$$

Base year = 2022

$$\begin{aligned}\text{Real GDP in 2022} &= Q_{2022} \times P_{2022} \\ &= (200 \times \$4) + (50 \times \$2) + (100 \times \$5) = \$1400\end{aligned}$$

$$\begin{aligned}\text{Real GDP in 2023} &= Q_{2023} \times P_{2022} \\ &= (350 \times \$4) + (70 \times \$2) + (140 \times \$5) = \$2240\end{aligned}$$

# GDP (Gross Domestic Product)

Question: Suppose the country's population is 310 in 2023. Calculate the GDP per capita in 2023 using the information from the previous table.

$$\text{GDP per capita} = \frac{\text{Real GDP}}{\text{Total Population}}$$

$$\text{GDP per capita in 2023} = \frac{\$2240}{310} = \$7.23$$

# Potential GDP

## Potential GDP ( $Y^*$ )

- Also called Potential Output, Natural Rate of Output, and Full-Employment Output.
- Level of production of goods and services sustained in an economy in the long-run.
- The level of real GDP that the economy would produce at if resources are fully employed.

## Output Gaps

- **Inflationary Gap**
  - $Y > Y^*$
  - The economy is producing at more than potential.
- **Recessionary Gap**
  - $Y < Y^*$
  - The economy is producing at less than potential.

# Potential GDP

## Business Cycle

- The fluctuation of GDP over time.
- Upswings and downswings (expansions and contractions) of economic activity.

## Recession

- Two quarters of negative growth.
- Downward trend in the business cycle.

## Depression

- Major downswing and persistent low growth
- Characterized by high unemployment and pauses in economic activity.

# Measuring GDP

## Methods for Measuring GDP

- **Value Added Approach**
- **Expenditure Approach**
- **Income Approach**

### Value Added Approach

- Add up all added value during production to determine the final market value of goods produced.
- $\text{Value Added} = \text{Sales Revenue} - \text{Cost of Intermediate Goods}$
- Avoids the problem of double counting (adding the value multiple times).
- Intermediate goods: all outputs that are used as an input for another stage of production.



# Measuring GDP

Question: With the following information, use the value added approach to compute GDP.

	Sales Revenue	Cost	Value Added
Farmer grows cotton	\$2	\$1	\$1
Factory produces fabric	\$5	\$3	\$2
Manufacturer produces shirt	\$10	\$6	\$4
			<b>Total Value Added:</b>
			\$7

Value Added = Sales Revenue - Cost

# Measuring GDP

## Expenditure Approach

- Flow of expenditure needed to produce final output.
- Expenditures fall under four categories: consumption, investment, government, and net exports.
- $\text{GDP}(E) = C + I + G + NX$

## Consumption Expenditure (C)

- Expenditure made by households on goods and services.

## Investment Expenditure (I)

- Expenditures made by firms on goods that are not for present consumption.
- Includes plant and equipment, inventory, and residential construction (new housing).

# Measuring GDP

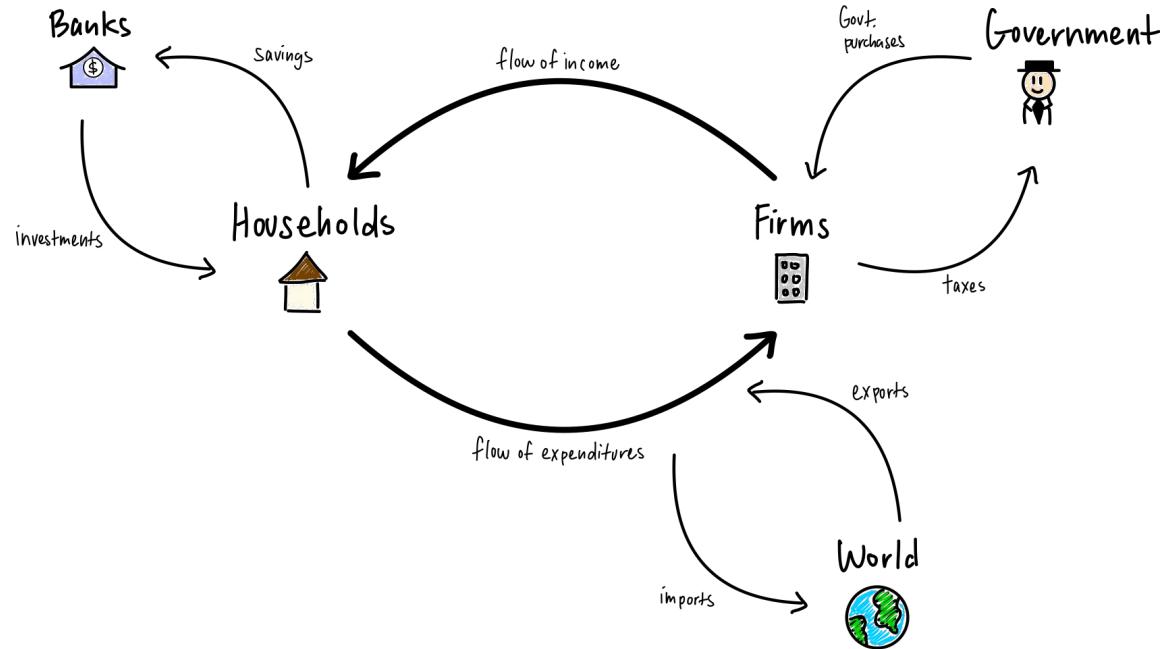
## Government Expenditure (G)

- Government purchases of goods and services.
- Excludes transfer payments (expenditures not in return for something else).

## Net Exports (NX)

- Net Exports (NX) = Exports (X) - Imports (M)
- **Exports:** goods that flow out of and money that flows into the circular flow.
  - Foreign expenditure on domestically produced goods.
- **Imports:** goods that flow into and money that flows out of the circular flow.
  - Domestic expenditure on foreign produced goods.

# Circular Flow Model



**Spendthrift Economy:** households and firms (flow of income and flow of expenditures)

**Frugal Economy:** includes banks (savings and investments)

**Governed Economy:** includes the Government (government purchases and taxes)

**Open Economy:** includes world trade (imports and exports)

# Measuring GDP

## Income Approach

- Flow of income claims by factors and non-factors on production
- $GDP(I) = \text{Factor Payments} + \text{Non-Factor Payments}$

## Factor Payments

- Wages and Salaries (payments to labour)
- Economic Rent (payment to land)
- Interest (payment to capital)
- Business Profits (payment to taxes and expenditures)

## Non-Factor Payments

- Indirect business taxes (sales and property taxes)
- Depreciation
- Subsidies (subtracted from the  $GDP(I)$  formula)

# Measuring GDP

Question: The following table provides information about a country's economic variables in 2023. Compute GDP using the expenditure approach.

Economic Variables	Amount (2023)
Consumption Expenditure	\$2972
Wages & Salaries	\$2852
Business Profits	\$905
Depreciation	\$150
Interest Income	\$1285
Investment Expenditure	\$335
Indirect Taxes	\$879
Exports	\$602
Imports	\$450
Subsidies	\$301
Government Expenditure	\$2311

$$GDP(E) = C + I + G + NX$$

$$C = \$2972$$

$$I = \$335$$

$$G = \$2311$$

$$NX = X - M = \$602 - \$450 = \$152$$

$$GDP(E) = \$2972 + \$335 + \$2311 + \$152 = \$5770$$



# Measuring GDP

Question: The following table provides information about a country's economic variables in 2023. Compute GDP using the income approach.

Economic Variables	Amount (2023)
Consumption Expenditure	\$2972
Wages & Salaries	\$2852
Business Profits	\$905
Depreciation	\$150
Interest Income	\$1285
Investment Expenditure	\$335
Indirect Taxes	\$879
Exports	\$602
Imports	\$450
Subsidies	\$301
Government Expenditure	\$2311

$$GDP(I) = \text{Factor Payments} + \text{Non-Factor Payments}$$

$$\begin{aligned}\text{Factor Payments} &= \text{Wages \& Salaries} + \text{Interest Income} + \text{Business Profits} \\ &= \$2852 + \$1285 + \$905 = \$5042\end{aligned}$$

$$\begin{aligned}\text{Non-Factor Payments} &= \text{Indirect Taxes} + \text{Depreciation} - \text{Subsidies} \\ &= \$879 + \$150 - \$301 = \$728\end{aligned}$$

$$GDP(I) = \$5042 + \$728 = \$5770$$



# Omissions from GDP

## Illegal Activities

- Not reported and difficult to measure.

## Underground Markets

- Legal transactions that are not recorded for tax evasion purposes.

## Non-Market

- Include home activities, volunteering, leisure.
- Add to economic well being, but there is no transaction.

## Free Products

- Include the internet and social media platforms
- Generate economic activity, but there is no transaction.

## Economic "Bads"

- Include negative effects to the environment, health, and well being.
- Negative externalities that detract from economic value.

# Omissions from GDP

**Question: Is GDP a good measure since it has omissions?**

Although GDP has omissions, correcting the measurement and including omissions is almost impossible. The current method of calculating GDP is the best measure available, and there isn't a more accurate method for calculating GDP.

However, the actual GDP value is actually less important than the change in GDP. The change in GDP is more relevant and useful for policy makers and implementation of fiscal and monetary policies. As long as the omissions are consistent, GDP will remain a good measure.

# GDP Deflator

## GDP Deflator

- An index of inflation that considers all goods produced in a country.
- Converts Nominal GDP to Real GDP.

- GDP Deflator = 
$$\frac{Q_{\text{Current}} \times P_{\text{Base}}}{Q_{\text{Current}} \times P_{\text{Current}}} \quad \text{Nominal GDP}$$
- GDP Deflator = 
$$\frac{\text{Real GDP}}{\text{Nominal GDP}}$$

# GDP Deflator

Question: Calculate the GDP deflator for 2021 based on the values in the following table.

	2020	2021
Nominal GDP	800	950
Real GDP	675	825

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

$$\text{GDP Deflator for 2021} = \frac{\text{Nominal GDP in 2021}}{\text{Real GDP in 2021}} = \frac{950}{825} \times 100 = 115.15$$

# GDP Deflator

Question: Using values from a previous question, calculate the GDP deflator for 2023. What is the inflation rate from 2023?

Goods produced	Price (2022)	Quantity (2022)	Price (2023)	Quantity (2023)
Bread	\$4	200	\$5	350
Cheese	\$2	50	\$3	70
Milk	\$5	100	\$7	140

Recall:

Nominal GDP in 2023 = \$2940

Real GDP in 2023 = \$2240

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

$$\text{GDP Deflator for 2023} = \frac{\text{Nominal GDP in 2023}}{\text{Real GDP in 2023}} = \frac{2940}{2240} \times 100 = 131.25$$

# GDP Deflator

Question: Using values from a previous question, calculate the GDP deflator for 2023. What is the inflation rate from 2023?

$$\text{Inflation Rate} = \frac{\text{GDP Deflator}_{\text{Year 2}} - \text{GDP Deflator}_{\text{Year 1}}}{\text{GDP Deflator}_{\text{Year 1}}} \times 100\%$$

GDP Deflator for base year is always 100.

$$\text{Inflation Rate} = \frac{131.25 - 100}{100} \times 100\% = 31.25\%$$

# GDP (Gross Domestic Product)

Question: Does the choice of base year matter when calculating real GDP and the GDP deflator? Why or why not?

When measuring real GDP, the base year has a significant impact on the calculation. The chosen base year is used to compare output and economic growth across different time periods.

For the GDP deflator, the base year serves as a reference point for calculating the inflation rate. The GDP deflator of the base year is always 100. The past prices from the base year are used to compare with current prices as a measure of inflation.

The base year is a reference point to measure changes in the economy over time. As the economy changes, the base year may no longer accurately reflect the economic situation. Choosing an appropriate base year ensures meaningful analysis of economic growth and inflation.

# GDP and Living Standards

## Question: Is GDP a good measure of living standards?

GDP is a generally good measure of material well-being. It measures production and indicates if a country is materially better or worse off. GDP accounts for income, wealth, and access to goods and services. Countries with a higher GDP generally have improved living standards.

However, GDP is not a good measure of quality of life. It does not consider other factors such as health, education, environmental quality, social factors, and cultural factors. A better measure of quality of life is the Human Development Index.

# GDP (Gross Domestic Product)

**Question: What is the difference between GDP and GNP (Gross National Product)?**

GDP is the value of finished domestic goods and services produced in a country. This includes production by a country's citizens and also foreigners in that country.

GNP is the value of finished goods and services produced by a country's citizens, both domestically and abroad. It focuses on production by all citizens of a nation rather than production within the nation. A country with high GNP indicates that the country likely engages highly in international operations and production.

# Rule of 70

## Rule of 70

- Used to determine the number of years it takes for a variable to double.
- Number of years for variable to double =  $\frac{70}{\text{Growth Rate}}$
- Can be calculated with nominal GDP or real GDP.

Question: An economist calculates Canada's average growth rate to be 5%. How long will it take Canada to double its GDP?

$$\text{Number of years for GDP to double} = \frac{70}{5} = 14 \text{ years}$$

# **Topic 2:**

## Unemployment



# Unemployment

## Labour Force

- Sum of employment and unemployment.
- **Employment:** number of people above 15 years old who are employed (full-time, part-time, temporary, self-employed).
- **Unemployment:** number of people above 15 years old who are willing and searching for work but are not employed.

## Unemployment Rate

$$\bullet \text{ Unemployment rate} = \frac{\text{Unemployed}}{\text{Labour Force}}$$

# Unemployment

**Question: Why does unemployment matter? How does unemployment affect both the macroeconomy and individual citizens?**

Unemployment affects both the macroeconomy and individual citizens of a country. In terms of the macroeconomy, unemployment results in economic waste (waste of potential output) and reduced national output. Generally, the unemployment rate and GDP have an inverse relationship. When unemployment rate increases, GDP decreases. With increased unemployment, economic activity is lower, and there is less production. On an individual level, unemployment results in human suffering by decreasing income and purchasing power.

# Unemployment

Question: There are currently 85,000 unemployed people in a town. The labour force is 500,000 people. What is the unemployment rate?

$$\text{Unemployment Rate} = \frac{\text{Unemployed}}{\text{Labour Force}}$$

$$\text{Unemployment Rate} = \frac{85,000}{500,000} \times 100\% = 17\%$$

# Unemployment

Question: Now suppose 25,000 of the unemployed people in that town become discouraged workers. What is the new unemployment rate?

$$\text{New Unemployed Value} = 85,000 - 25,000 = 60,000$$

$$\text{New Labour Force Value} = 500,000 - 25,000 = 475,000$$

$$\text{Unemployment Rate} = \frac{\text{Unemployed}}{\text{Labour Force}}$$

$$\text{Unemployment Rate} = \frac{60,000}{475,000} \times 100\% = 12.63\%$$

# Unemployment

**Question: Why may the unemployment rate not always be reliable?**

Unemployment rate does not always provide a complete and accurate picture of the employment situation.

Unemployment rate does not consider discouraged workers who are discouraged from their unsuccessful job search, stop looking for employment, and leave the labour force. This leads to an underestimation of the unemployment rate especially in an economic downswing. Even though there is still the same amount of people without jobs, discouraged workers result in a decreased unemployment rate.

On the other hand, In an economic upswing, employment increases as more workers obtain jobs. Additionally, people who previously were not seeking jobs may decide to join the labour force. This may lead to an overestimation of the unemployment rate if the rise in labour force exceeds the rise in employment.

# Unemployment

## Types of Unemployment

- **Frictional:** unemployment between jobs
- **Structural:** mismatch in skills and demand for labour
- **Cyclical:** caused by recessionary gaps in the business cycle

## Natural Rate of Unemployment

- Also called the non-accelerating inflation rate of unemployment (NAIRU)
- Rate of unemployment when the economy is at full employment
- Frictional unemployment + structural unemployment

# Unemployment

**Question: Stella was a factory worker who was recently laid off due to automation and technological advances in manufacturing. What is this type of unemployment?**

- a) Frictional Unemployment
- b) Structural Unemployment
- c) Cyclical Unemployment

**Question: Erin voluntarily left her current job in a search for a better job opportunity. What is this type of unemployment?**

- a) Frictional Unemployment
- b) Structural Unemployment
- c) Cyclical Unemployment

# **Topic 3:**

## Inflation and CPI

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# Inflation and CPI

## Inflation

- The increase in the average overall price level of goods and services in the economy.
- Price level is expressed with the CPI (Consumer Price Index).

## Inflation Rate

- Percent change in price level.
- Inflation rate = 
$$\frac{\text{Change in Price Level}}{\text{Initial Price Level}}$$

## CPI (Consumer Price Index)

- An index of the weighted average price of all goods and services of a market basket of goods (representative of consumer spending and used to track changes in prices over time).

# Inflation and CPI

## Constructing the CPI

- Determine the goods in the basket.

$$\bullet \text{ CPI} = \frac{Q_{\text{Base}} \times P_{\text{Current}}}{Q_{\text{Base}} \times P_{\text{Base}}}$$

- The CPI is the basket price in the current year divided by the basket price base year.
- CPI provides the inflation rate.

# Inflation and CPI

Question: The following table provides prices and quantities of goods in a market basket. Calculate the CPI for 2023.

Basket Goods	Price (2022)	Price (2023)	Quantity (2022)	Quantity (2023)
Apples	\$4	\$6	80	90
Oranges	\$3	\$4	100	150
Bananas	\$1	\$3	50	60

$$CPI = \frac{Q_{Base} \times P_{Current}}{Q_{Base} \times P_{Base}}$$

Base year = 2022

Current year = 2023

$$CPI \text{ of 2023} = \frac{(80 \times \$6) + (100 \times \$4) + (50 \times \$3)}{(80 \times \$4) + (100 \times \$3) + (50 \times \$1)} = \frac{1030}{670} \times 100 = 153.73$$

# Inflation and CPI

Question: Use the previously calculated CPI to determine the inflation rate in 2023.

CPI of base year is always 100.

CPI of 2022 = 100

CPI of 2023 = 153.73

$$\text{Inflation Rate} = \frac{\text{Change in Price Level}}{\text{Initial Price Level}}$$

$$\text{Inflation Rate in 2023} = \frac{153.73 - 100}{100} \times 100\% = 53.73\%$$

# Inflation and CPI

**Question: What are the issues with using CPI as a measure of increases in cost of living?**

CPI does not account for improvements in quality that come with the increased prices. If quality increases while price increases, CPI does not capture the improvement in product quality.

CPI also uses the base year quantity which means it does not account for changes in the base basket of goods. There may be changes in the base basket over time if there are new goods in the market. The basket of goods also varies across individuals due to different consumption patterns and preferences.

# Inflation and CPI

Question: In the US, a market basket of goods cost \$210 in 2021, \$250 in 2022, and \$280 in 2023. Assuming 2021 is the base year, what is the price index in 2022 and 2023?

$$\text{CPI} = \frac{\text{Cost of market basket in current period}}{\text{Cost of market basket in base period}}$$

$$\text{CPI of 2022} = \frac{\$250}{\$210} \times 100 = 119.05$$

$$\text{CPI of 2023} = \frac{\$280}{\$210} \times 100 = 133.33$$

# **Topic 4:**

## Aggregate Expenditure



# Aggregate Expenditure

## Desired Expenditure

- Intended and planned value of GDP
- Y-axis

## Actual Expenditure

- Actual value of GDP
- X-axis

## Autonomous Expenditure

- Exogenous variable
- Does not depend on Y (GDP / National Income)

## Induced Expenditure

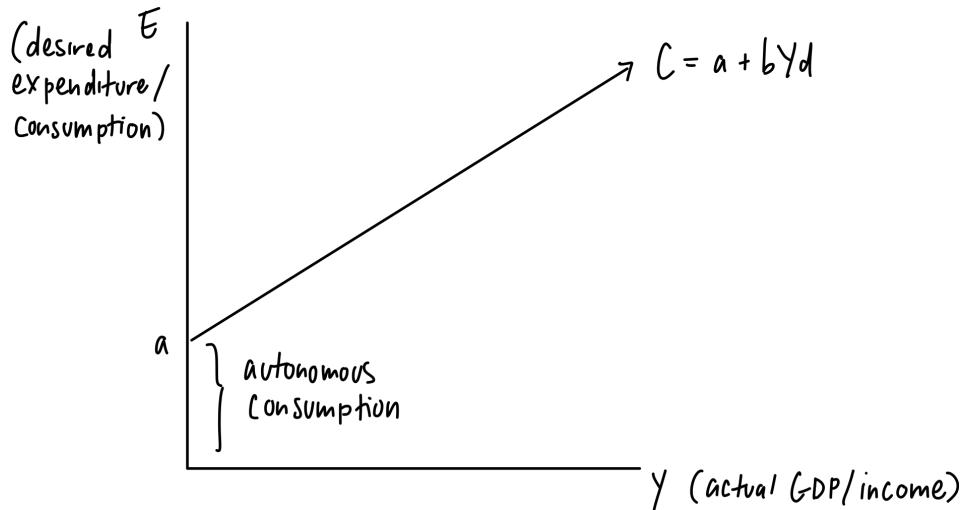
- Endogenous variable
- Function of Y



# Consumption Function

## Consumption Function

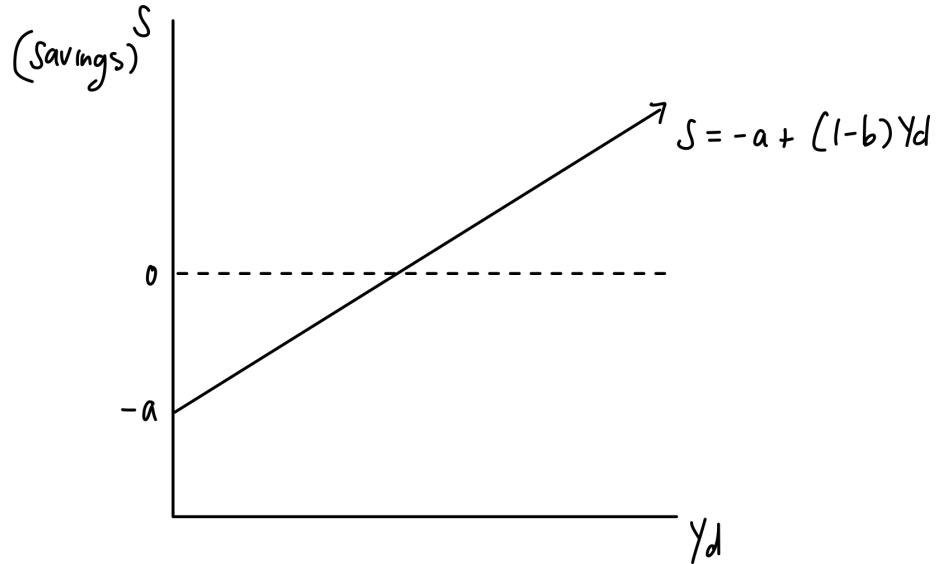
- Simplified function of aggregate expenditure.
- Relationship between desired consumption and actual GDP/income.
- $C = a + bYd$ 
  - $a$  = autonomous consumption
  - $bYd$  = induced consumption
    - $b$  = marginal propensity to consume (MPC)
    - $Yd$  = disposable income ( $Yd = Y(1 - t)$ )



# Savings Function

## Savings Function

- Consumption + Savings = Disposable Income
- $S = Y_d - C$
- $S = -a + (1 - b)Y_d$ 
  - $1 - b$  = marginal propensity to save



# Theories of the Consumption Function

**Question: Explain Keynes' theory of the consumption function?**

Keynes had a short-sighted view. His Keynesian consumption function theory was that current consumption depends largely on current disposable income ( $Y_d$ ). Consumer consumption follows changes in current income. Keynes believed that consumption is mostly induced and a dependent variable based on income.

# Theories of the Consumption Function

**Question: Explain Friedman's theory of the consumption function?**

Friedman had a forward-looking view. His Permanent Income Hypothesis stated that current consumption depends on permanent income (the present value of expected income). Consumers spend money based on their expected long-term average income. He believed that lifetime savings have a key role in determining consumption behaviour. Friedman believed that consumption is based on the average lifetime income.

# Consumption Function

## Marginal Propensity to Consume (MPC)

- Ratio of the change in desired consumption to the change in disposable income.
- $MPC = \Delta C / \Delta Yd$

## Average Propensity to Consume (APC)

- The proportion of disposable income that households want to spend.
- $APC = C / Yd$

## Marginal Propensity to Save (MPS)

- Ratio of the change in desired savings to the change in disposable income.
- $MPS = \Delta S / \Delta Yd$

## Average Propensity to Save (APS)

- The proportion of disposable income that households want to save.
- $APS = S / Yd$

# Consumption Function

Question: Annie received a raise in salary from \$70,000/yr to \$95,000/yr. Her savings increased from \$20,000 to \$30,000 per year. Calculate her MPC.

$$MPC = \frac{\Delta C}{\Delta Yd}$$

Consumption = Disposable Income - Savings

$$MPC = \frac{65,000 - 50,000}{95,000 - 70,000} = 0.6$$



# Aggregate Expenditure

## Aggregate Expenditure

- The total desired components of spending in the economy.
- Frugal economy:  $AE = C + I$
- Governed economy:  $AE = C + I + G$
- Open economy:  $AE = C + I + G + NX$

## Aggregate Expenditure Function

- $AE$  (desired) =  $a + bY$
- $a$ : autonomous expenditures
- $bY$ : induced expenditure (depends on national income)
  - $b$ : marginal propensity to spend

# Aggregate Expenditure

## Induced (variable) vs Autonomous (fixed)

- Consumption expenditures: Induced and Autonomous
- Investment expenditures: Autonomous
- Government expenditures: Autonomous
- Exports: Autonomous
- Imports: Induced

**Autonomous Expenditure:**  $C + I + G + X$

**Induced Expenditure:**  $[ MPC \times (1 - t)Y ] - mY$

$$AE = a + [ MPC \times (1 - t)Y ] + I + G + X - mY$$

# Aggregate Expenditure

Question: The United States' autonomous consumption is \$850, government expenditure is \$360, marginal tax rate is 10%, exports is \$240, investments is \$150, marginal propensity to consume is 0.8, and marginal propensity to import 0.2. Determine the aggregate expenditure function.

$$a = 850 \quad AE = a + [MPC \times (1 - t)Y] + I + G + X - mY$$

$$MPC = 0.85$$

$$t = 0.22$$

$$I = 150$$

$$G = 360$$

$$X = 240$$

$$m = 0.2$$

$$AE = 850 + [0.8 \times (1 - 0.1)Y] + 150 + 360 + 240 - 0.2Y$$

$$= 850 + (0.8 \times 0.9)Y + 750 - 0.2Y$$

$$= 1600 + 0.72Y - 0.2Y$$

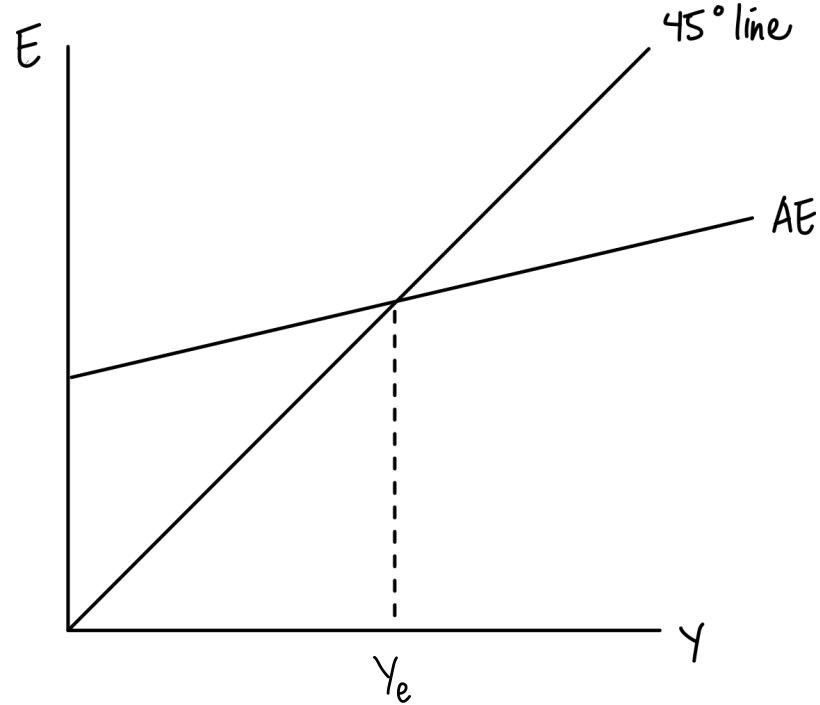
$$= 1600 + 0.52Y$$



# Equilibrium

## Equilibrium

- Stable level of GDP (GDP remains constant and does not want to change).
  - There is a tendency for GDP to move toward the equilibrium.
- Point of intersection where  $AE = Y$  (desired expenditure is equal to actual output).
- Where the  $AE$  function intersects the 45 degree line.
  - The 45 degree line is a hypothetical line that shows all points where desired expenditure is equal to actual output.



# Equilibrium

**Question: Why is  $AE = Y$  a stable equilibrium?**

$AE = Y$  is a stable equilibrium meaning that any deviation from this point will push the economy back towards it.

If  $AE > Y$ , spending is greater than production. Firms will produce more to keep up with demand. Real output increases until  $AE = Y$ .

If  $AE < Y$ , spending is less than production. Firms will produce less since they have excess inventory. Real output decreases until  $AE = Y$ .

# Equilibrium

Question: Using the previous aggregate expenditure function, solve for the equilibrium point.

Equilibrium:  $AE = Y$

$$AE = 1600 + 0.52Y$$

→ set equal to  $Y$

$$Y = 1600 + 0.52Y$$

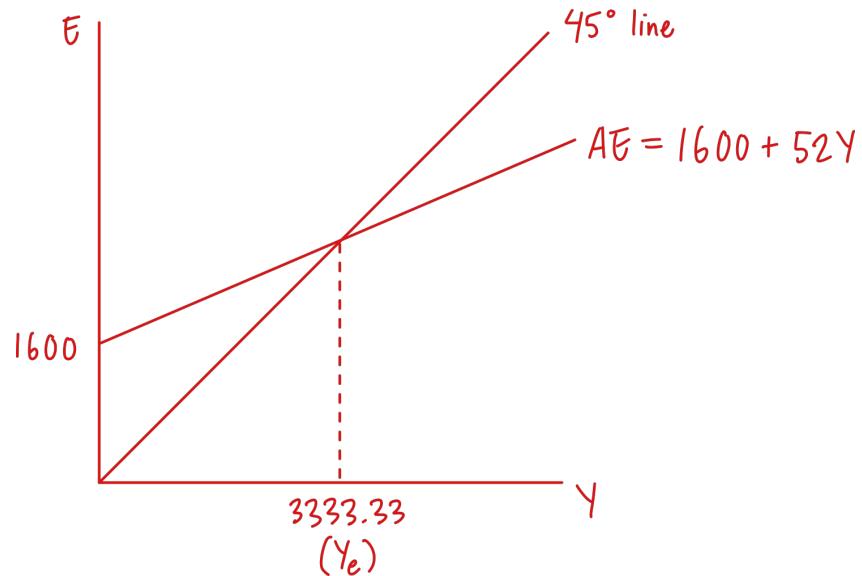
$$0.48Y = 1600$$

$$Y_e = 3333.33$$



# Equilibrium

Question: Draw a graph of the AE function. Indicate the equilibrium point on the graph.



# Equilibrium

## Equilibrium

- The equilibrium point is also where withdrawals is equal to injections.
  - The amount of money leaving the economy is equal to the amount of money entering the economy.

## Withdrawals (W)

- The induced portion of aggregate expenditures.
- Includes savings, taxes, and imports.

## Injections (J)

- The autonomous portion of aggregate expenditures
- Includes autonomous consumption, investments, government purchases, and exports.



# Equilibrium

**Question: Why is  $W = J$  a stable equilibrium?**

$W = J$  is a stable equilibrium meaning that any deviation from this point will push the economy back towards it.

If  $W > J$ , more money is leaving than entering.  $Y$  decreases.  $W$  also decreases, since withdrawals are induced, until  $W = J$ .

If  $W < J$ , more money is entering than leaving.  $Y$  increases.  $W$  also increases, since withdrawals are induced, until  $W = J$ .

# Marginal Propensity to Spend (MPSpend)

## Marginal Propensity to Spend

- The proportion of an additional dollar of income that is spent on consumption.
- MPSpend determines how much people spend.
- Slope of the AE function.
- $\text{MPSpend} = \text{MPC} (1 - t) - m$ 
  - MPC: marginal propensity to consume
  - t: tax rate
  - m: marginal propensity to import

# Marginal Propensity to Spend (MPSpend)

Question: Scarlett has \$100 in income. If there were no taxes, she would want to save \$40. Since the government taxes 15% of Scarlett's total income, she only consumes on her after-tax income. Additionally, 10% of her income is used to purchase imports. Calculate Scarlett's marginal propensity to spend.

$$\text{MPSpend} = \text{MPC} (1-t) - m$$

$$\text{MPC} = 0.6$$

$$t = 0.15$$

$$m = 0.1$$

$$\text{MPSpend} = 0.6 (1 - 0.15) - 0.1$$

$$= 0.51 - 0.1$$

$$= 0.41$$

# **Topic 5:**

## Multiplier



# Multiplier

## Multiplier

- How much a change in autonomous spending will increase GDP.
  - Autonomous spending raises income, which induces more spending and creates a continuous cycle.
- Reflects the magnifying effect of initial spending on overall economic activity and GDP.
- Multiplier =  $1 / (1 - MPSpend)$

## Change in GDP

- Change in GDP = Change in Autonomous Expenditure x Multiplier



# Multiplier

**Question: How will the injection of some amount of dollars from spending affect GDP and overall economic activity? Explain using the multiplier effect.**

When dollars are injected into an economy through spending, the multiplier effect results in a larger overall increase in GDP and economic activity (than the initial injection amount).

Spending is a continuous process. When a consumer spends money, the recipient of increased income will then spend money resulting in a cycle. Each round of spending generates more rounds of spending and leads to increased economic activity. The multiplier amplifies the impact of the initial injection amount.

# Multiplier

**Question: Explain the relationship between MP Spend and the multiplier. How does a change in one value affect the other?**

There's a direct relationship between MP Spend and the multiplier. When MP Spend increases, this means that an increased percentage of income is spent. As a result, there is a greater increase in overall spending and a larger multiplier effect.

$$\text{Multiplier} = 1 / (1 - \text{MP Spend})$$

This formula shows the relationship between MP Spend and the multiplier. When MP Spend increases, the denominator ( $1 - \text{MP Spend}$ ) decreases. Dividing 1 by a smaller number results in a larger multiplier.

# Multiplier

Question: Suppose the autonomous consumption in Canada increases by \$20 billion. MPSpend is 0.8. What is the total effect on GDP?

Change in GDP = Change in Autonomous Spending  $\times$  Multiplier

$$\text{Multiplier} = \frac{1}{1 - \text{MPSpend}}$$

$$\text{Multiplier} = \frac{1}{1 - 0.8} = 5$$

Change in GDP = \$20 billion  $\times$  5 = \$100 billion

# Multiplier

Question: What is the multiplier if a \$900,000 decrease in investment expenditure in the United States resulted in a \$1.5 million decrease in real GDP.

$$\text{Change in GDP} = \text{Change in Autonomous Spending} \times \text{Multiplier}$$

$$\text{Multiplier} = \frac{\text{Change in GDP}}{\text{Change in Autonomous Spending}}$$

$$\text{Multiplier} = \frac{-1,500,000}{-900,000} = 1.67$$

# **Topic 6:**

## **AD/AS Model**



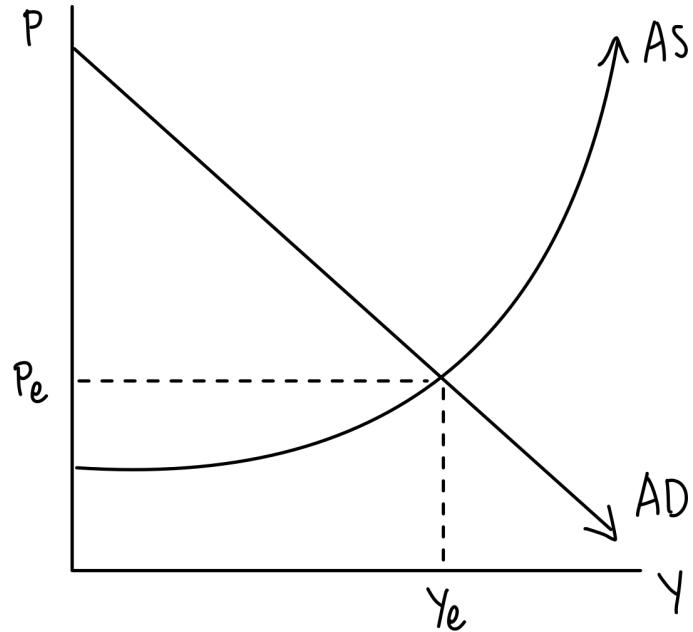
# AD/AS Model

## AD/AS Model

- Macroeconomic model of price level and output through the relationship between aggregate demand and aggregate supply.
- Used to explain fluctuations in economic activity.

## Macroeconomic Equilibrium

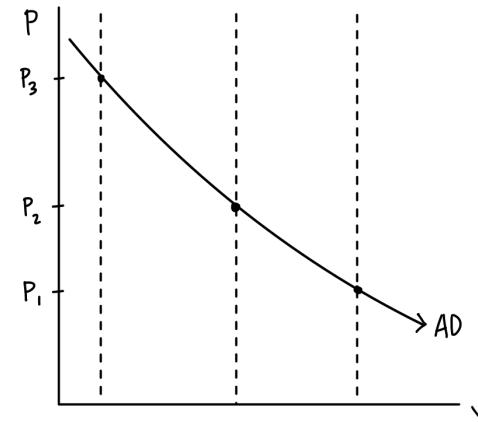
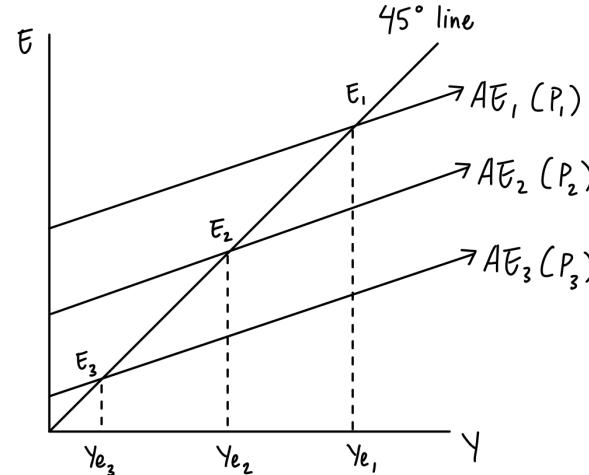
- Intersection of AD and short-run AS curves.
- $Y_e$  is the equilibrium level of GDP.
- $P_e$  is the general price level in the economy.



# Aggregate Demand

## Aggregate Demand

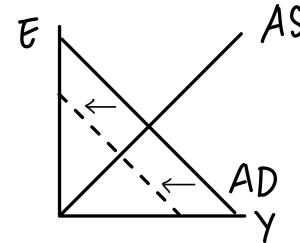
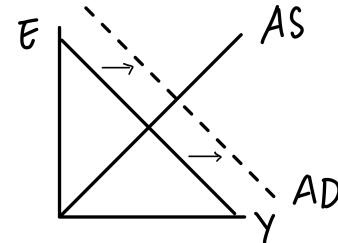
- Curve that shows the quantity of goods and services that households, firms, and the government want to buy at each price level.
- Relationship between the general price level ( $P$ ) and the level of GDP ( $Y$ ) for which  $Y = E$ .
- Combinations of  $P$  and  $Y$  where  $AE$  intersects the 45 degree line.



# Aggregate Demand Shocks

## Aggregate Demand Shocks

- An event that shifts the aggregate demand curve.
- Caused by changes in autonomous AE (eg. change in wealth, preferences, exchange rates, interest rates from monetary policy)
- Positive/Expansionary demand shock:
  - Shifts the curve to the right.
  - Increases aggregate output and price level.
- Negative/Contractionary demand shock:
  - Shifts the curve to the left.
  - Decreases aggregate output and price level.



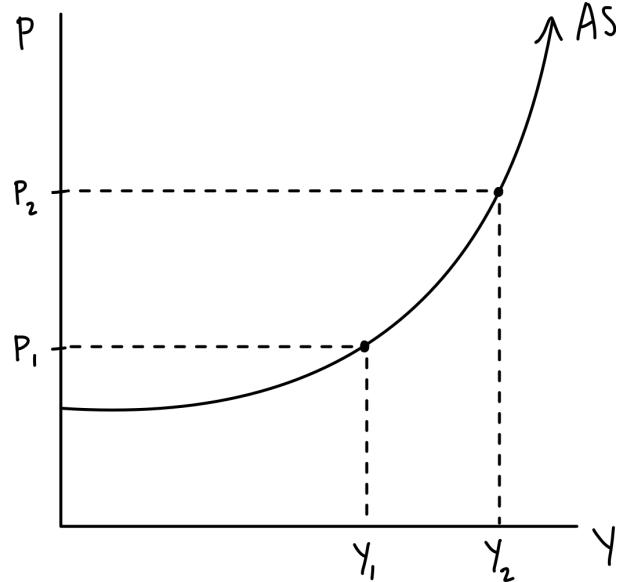
# Short-Run Aggregate Supply

## Short-Run Aggregate Supply

- Curve that shows the quantity of goods and services that firms choose to produce and sell at each price level.
- Assumptions:
  - Factor prices are constant.
  - State of technology is constant.
- Upward sloping curve that reflects unit costs.

## Law of Diminishing Marginal Returns

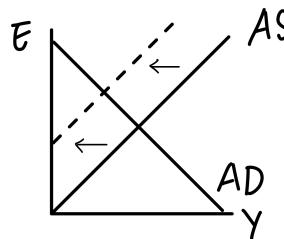
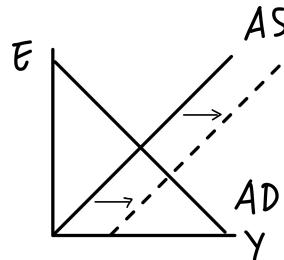
- As output increases and efficient inputs are used, costs increase since the less efficient inputs are left to be used.
- Results in an increasing slope and unit costs rising faster.



# Aggregate Supply Shocks

## Aggregate Supply Shocks

- An event that shifts the short-run aggregate supply curve.
- Caused by changes in input prices, productivity, and technology.
- Positive/Expansionary supply shock:
  - Shifts the curve to the right.
  - Increases aggregate output.
  - Decreases price level.
- Negative/Contractionary supply shock:
  - Shifts the curve to the left.
  - Decreases aggregate output
  - Increases price level.

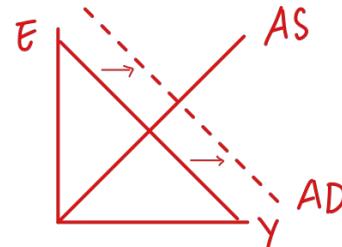


# Aggregate Demand and Supply Shocks

Question: Determine the type of aggregate demand or aggregate supply shock in the following scenarios:

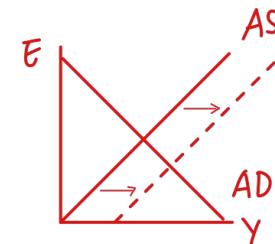
1. A 10% decrease in income taxes.

Expansionary AD Shock



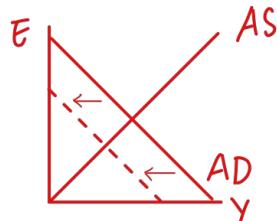
2. A significant increase in labour productivity

Expansionary AS Shock



3. The central bank raises interest rates.

Contractionary AD Shock

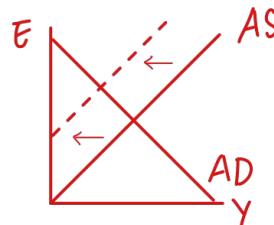


# Aggregate Demand and Supply Shocks

Question: Determine the type of aggregate demand or aggregate supply shock in the following scenarios:

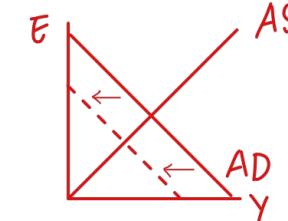
4. A sudden spike in input prices.

Contractionary AS Shock



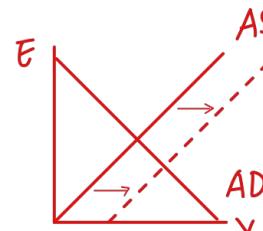
5. Consumer uncertainty during an economic downturn.

Contractionary AD Shock



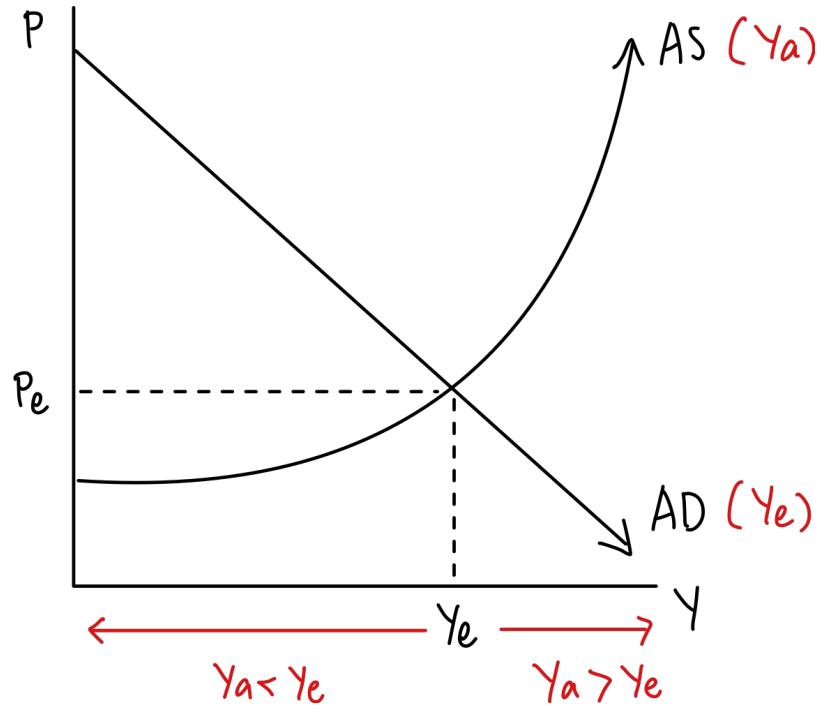
4. Increased crop yields due to good weather conditions.

Expansionary AS Shock



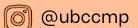
# Aggregate Demand and Supply Shocks

Question: In the AD/AS model, where would a surplus occur? Where would a shortage occur?

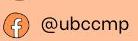


AD represents desired expenditure ( $Y_e$ ). Short-run AS represents actual output ( $Y_a$ ). When  $Y_a > Y_e$ , supply is greater than demand, and there is a surplus. When  $Y_a < Y_e$ , demand is greater than supply, and there is a shortage.

**THANK YOU!**  
**ANY QUESTIONS?**



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# Questions?