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Topic 1:

GDP (Gross Domestic Product)

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 = Current Q x Current P

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 = Current Q x Base P

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

GDP (Gross Domestic Product)

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

GDP (Gross Domestic Product)

Question: The following table shows the output and prices of 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

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

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.

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.
- Value Added = Sales Revenue - 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	
Factory produces fabric	$5	$3	
Manufacturer produces shirt	$10	$6	
			Total Value Added:

Measuring GDP

Expenditure Approach
- Flow of expenditure needed to produce final output.
- Expenditures fall under four categories: consumption, investment, government, and net exports.
- 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.
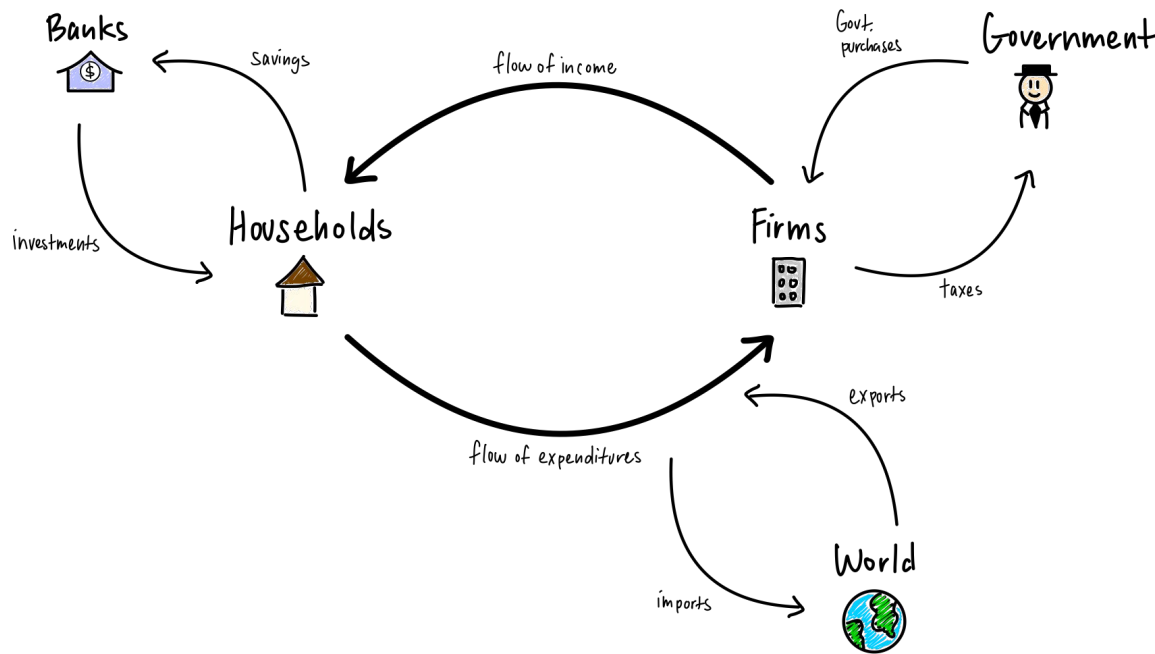   - Domestic expenditure on foreign produced goods.

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) = Factor Payments + 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)

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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

Measuring GDP

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

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

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: Do omissions from GDP matter?

GDP Deflator

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

- GDP Deflator = $\dfrac{Q_{Current} \times P_{Current}}{Q_{Current} \times P_{Base}}$

- GDP Deflator = $\dfrac{\text{Nominal GDP}}{\text{Real GDP}}$

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

GDP Deflator

Question: Using values from a previous question, calculate the GDP deflator for 2023. What is the inflation rate from 2022 to 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

GDP (Gross Domestic Product)

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

GDP and Living Standards

Question: Is GDP a good measure of living standards?

GDP (Gross Domestic Product)

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

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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 = $\dfrac{70}{\text{Growth Rate}}$

- 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?

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
- Unemployment rate = $\dfrac{\text{Unemployed}}{\text{Labour Force}}$

Unemployment

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

Unemployment

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

Unemployment

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

Unemployment

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

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

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 = $\dfrac{\text{Change in Price Level}}{\text{Initial Price Level}}$

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.

- CPI = $\dfrac{Q_{Base} \times P_{Current}}{Q_{Base} \times P_{Base}}$

- 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.

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

Inflation and CPI

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

Inflation and CPI

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

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?

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

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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))

E (desired expenditure / consumption)

$C = a + bYd$

a

autonomous consumption

Y (actual GDP/income)
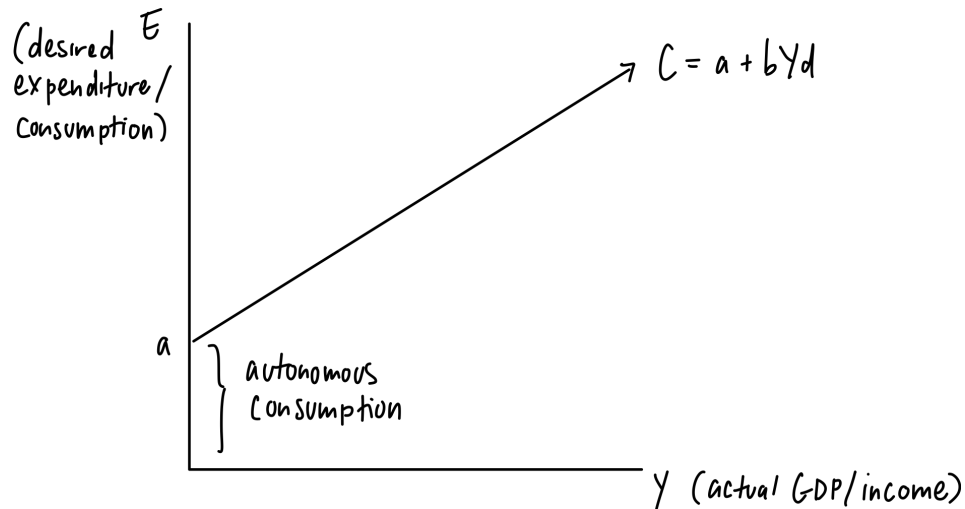
Savings Function

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

(Savings) S

$$S = -a + (1-b)Yd$$

0

$-a$

Yd
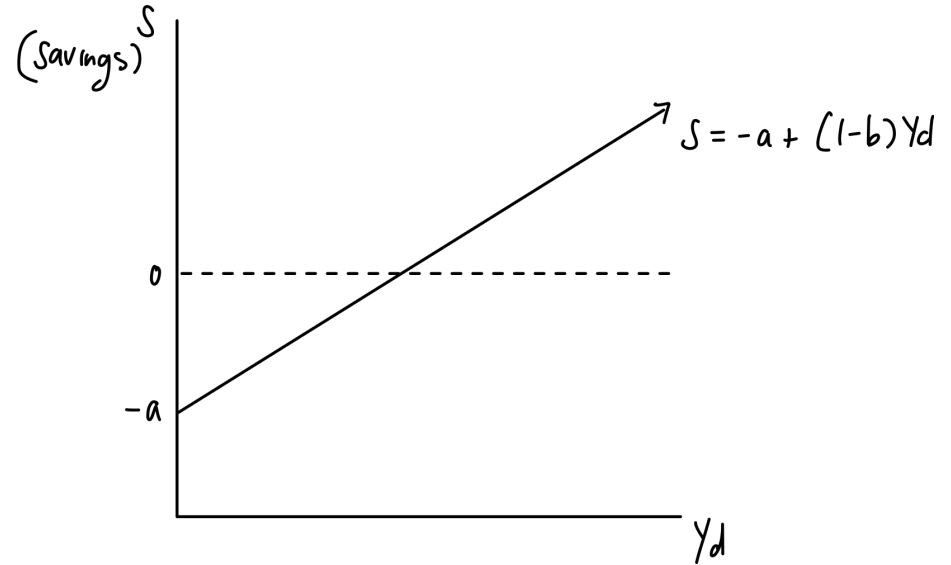
Theories of the Consumption Function

Question: Explain Keynes' theory of the consumption function?

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Theories of the Consumption Function

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

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.
- MPC = $\Delta S / \Delta Yd$

Average Propensity to Save (APS)
- The proportion of disposable income that households want to save.
- APC = 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.

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 x (1 - t)Y] - mY

AE = a + [MPC x (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.

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.

E

45° line

AE

Y

ye
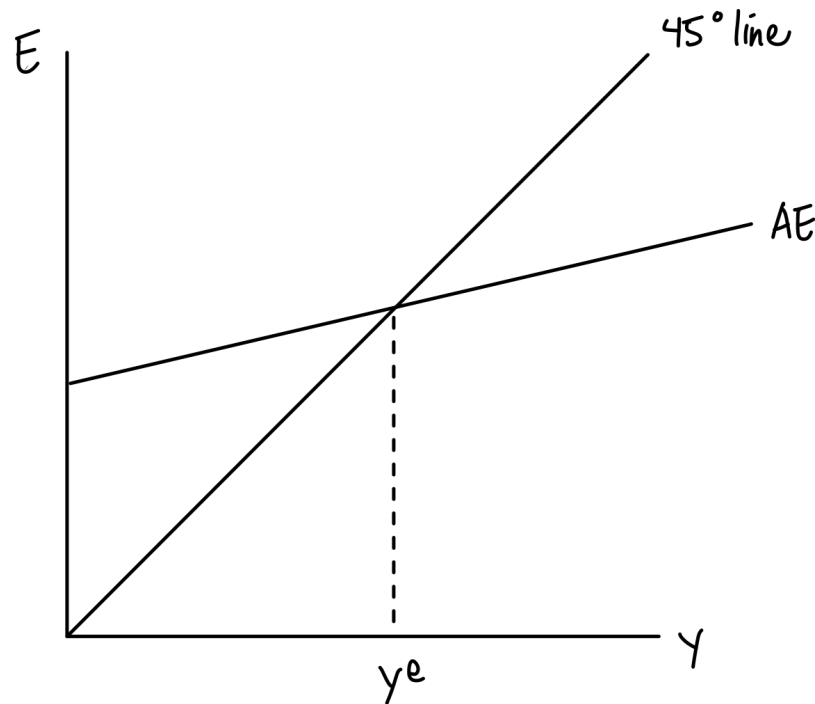
Equilibrium

Question: Why is AE = Y a stable equilibrium?

Equilibrium

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

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

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

Equilibrium

Question: Why is W = J a stable equilibrium?

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.
- MPSpend = 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.

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.

Multiplier

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

Multiplier

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

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.

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.
- Ye is the equilibrium level of GDP.
- Pe is the general price level in the economy.
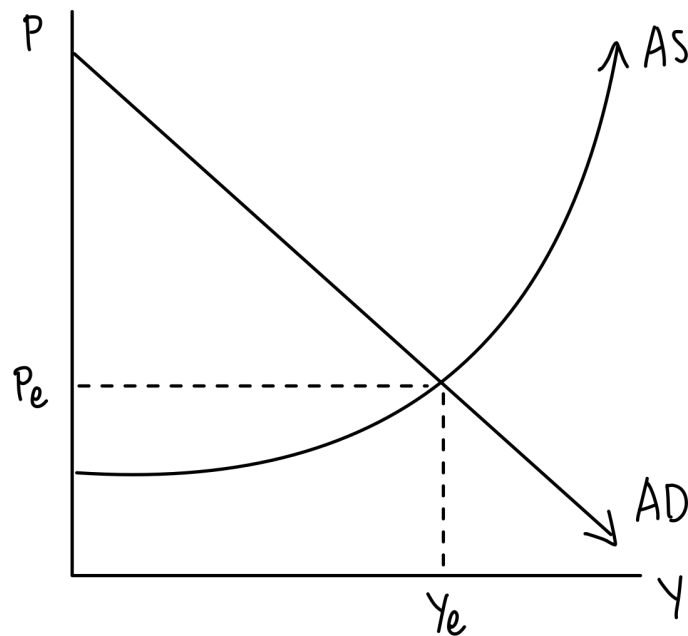
Aggregate Demand

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.
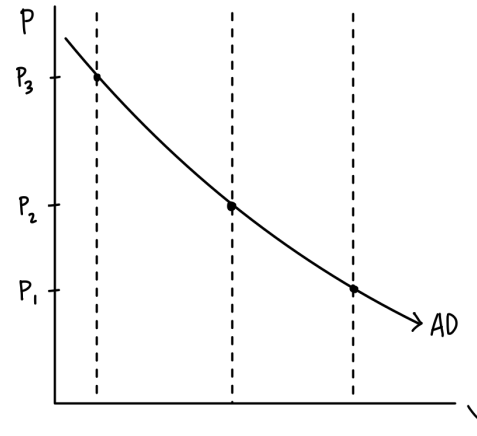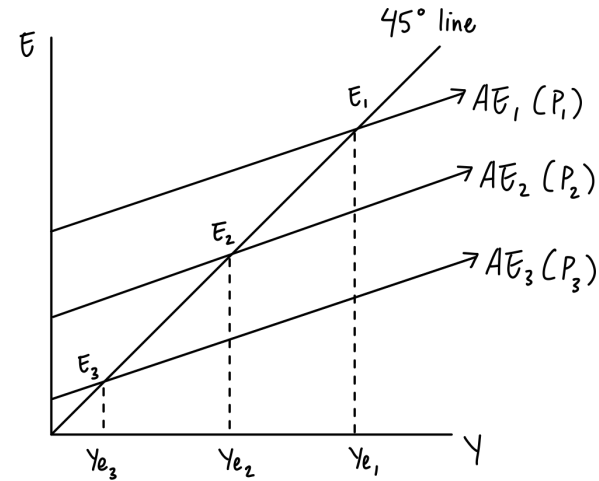
Aggregate Demand Shocks

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.
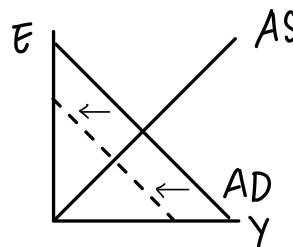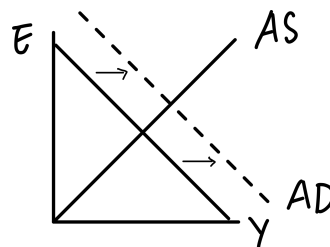
Short-Run Aggregate Supply

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.
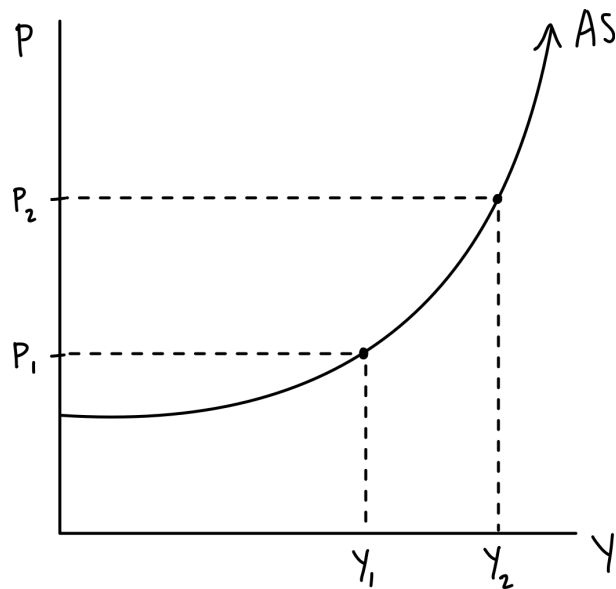
Aggregate Supply Shocks

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.
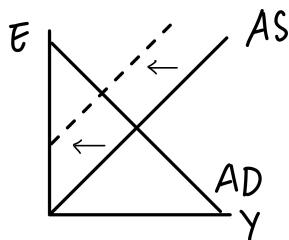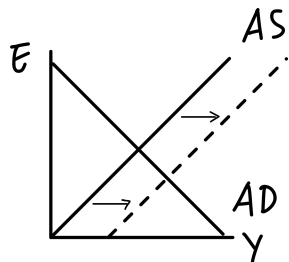
Aggregate Demand and Supply Shocks

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

1. A 10% decrease in income taxes.

2. An significant increase in labour productivity

3. The central bank raises interest rates.

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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.

5. Consumer uncertainty during an economic downturn.

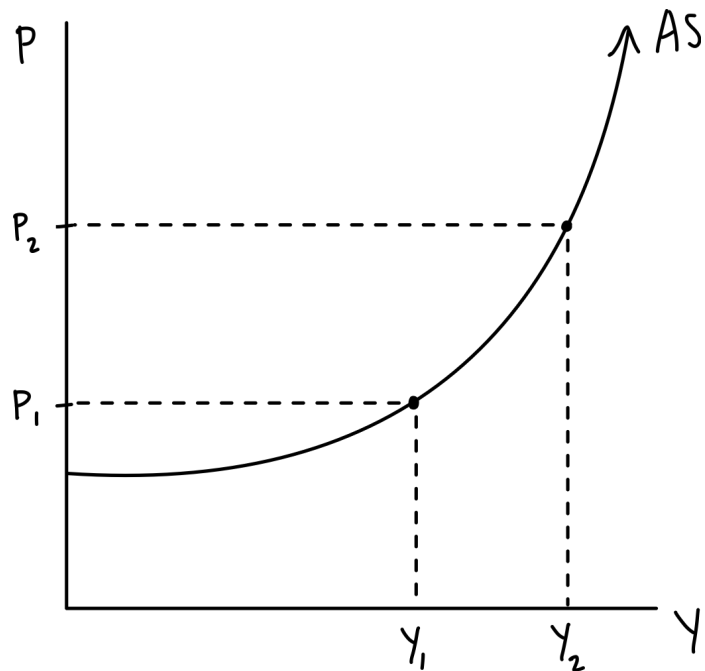6. Increased crop yields due to good weather conditions.

Aggregate Demand and Supply Shocks

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

THANK YOU!

ANY QUESTIONS?

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Questions?