

## CHAPTER 4 DETERMINATION OF INCOME AND EMPLOYMENT

### INTRODUCTION

The determination of income and employment is central to macroeconomic analysis, as it shapes the overall health of an economy. This chapter explores how the interaction between aggregate demand and aggregate supply determines national income and employment levels. The components of both demand and supply are outlined to explain their roles in shaping economic output. The chapter also delves into the concepts of propensity to consume and propensity to save, distinguishing between average and marginal propensities, which reflect how income is distributed between consumption and savings. The discussion extends to involuntary unemployment and full employment, highlighting their significance in achieving economic stability. Using a two-sector model, the chapter explains how income and employment levels are determined in a simplified economy, examining the pivotal role of the investment multiplier and its workings in magnifying the effects of investment on income. The chapter further addresses the problems of excess and deficient demand, explaining how imbalances can lead to inflationary or recessionary pressures. It concludes with an analysis of policy measures to correct these imbalances, focusing on the availability of credit and changes in government spending as tools to stabilize the economy and ensure balanced growth.

### TOPICS COVERED

1. Aggregate demand, aggregate supply, and their components
2. Propensity to consume and propensity to save (average and marginal)
3. Meaning of involuntary unemployment and full employment
4. Determination of income and employment: two-sector model
5. Concept of investment multiplier and its working • Problems of excess and deficient demand
6. Measures to correct excess and deficient demand - availability of credit, change in government spending

### AGGREGATE DEMAND, AGGREGATE SUPPLY, AND THEIR COMPONENTS

**1. Aggregate demand (AD)** refers to the total quantity of goods and services demanded across all levels of an economy at a particular price level and in a given period. It is represented as the total amount of goods and services that households, businesses, the government, and foreigners are willing to purchase.

#### Components:

1. **Consumption (C):** This is the total expenditure by households on goods and services. It is the largest component of aggregate demand.
2. **Investment (I):** Refers to spending by businesses on capital goods such as machinery, equipment, and buildings.
3. **Government Spending (G):** This includes all government consumption, investment, and transfer payments.
4. **Net Exports (X-M):** This is the difference between a country's exports (X) and imports (M). Positive net exports contribute to aggregate demand, while negative net exports reduce it.

$$\text{Formula: } AD = C + I + G + (X-M)$$

## EX-ANTE AND EX-POST AGGREGATE DEMAND

- **Ex-Ante AD:** Planned or desired level of aggregate demand in the economy.
- **Ex-Post AD:** Actual level of aggregate demand realized in the economy.

**2. Aggregate Supply (AS)** represents the total quantity of goods and services that producers in an economy are willing and able to supply at a given overall price level.

$$AS = C + S$$

The Aggregate Supply represents national income.

$$AS = Y \text{ (National Income)}$$

### Components:

1. **Short-Run Aggregate Supply (SRAS):** Reflects the total output supplied in the short run when at least one factor of production is fixed.
2. **Long-Run Aggregate Supply (LRAS):** Shows the total output supplied when all factors of production are variable, representing the economy's potential output. \
3. **Examples:** During a recession, AD might fall due to decreased consumption and investment, leading to a leftward shift in the AD curve. An increase in government spending on infrastructure can boost AD, shifting the AD curve to the right.

## CONSUMPTION FUNCTION

- **Definition:** The relationship between consumption and disposable income.
- **Formula:**  $C = C_a + c Y$ 
  - $C_a$  = Autonomous consumption (consumption when income is zero)
  - $c$  = Marginal propensity to consume (MPC)
  - $Y$  = Disposable income
- **Autonomous Consumption**
  - Consumption that occurs regardless of income level.
  - Represents essential consumption required for survival.
  - Not influenced by changes in current income.
  - Includes basic needs like food, housing, and utilities.
- **Induced Consumption**
  - Consumption that changes in response to changes in income:
  - Directly related to the level of income.
  - Increases with rising income and decreases with falling income.
  - Represents additional consumption beyond the basic level.

**Propensity to Consume:** The propensity to consume is the fraction of income that households spend on consumption rather than saving. There are two key measures:

- **Average Propensity to Consume (APC):** This is the ratio of total consumption to total income. It shows what portion of income is spent on consumption on average.
  - $APC = C / Y$
  - $APC > 1$ ; Consumption exceeds national income
- APC will **never be zero**: APC will never be zero because independent use exists even at zero national income.
- **Marginal Propensity to Consume (MPC):** This is the ratio of the change in consumption to the change in income. It reflects the additional consumption from an additional unit of income.
  - $MPC = \Delta Y / \Delta C$

## SAVING FUNCTION

- **Definition:** Represents the relationship between total savings and total income in an economy.
- **Formula**

$$S = Y - C$$
  - S = Total savings
  - Y = Total income
  - C = Total consumption

### Deriving the Saving Function

- **Consumption Function:**  $C = C_0 + cY$ 
  - $C_0$  = Autonomous consumption (consumption when income is zero)
  - $c$  = Marginal Propensity to Consume (MPC)
  - Y = National income
- **Savings Function:**
  - Substitute the consumption function into the savings formula:  $S = Y - (C_0 + cY)$
  - Simplify to:  $S = -C_0 + (1 - c)Y$ 
    - $C_0$  = Negative autonomous consumption (part of total savings when income is zero)
    - ( $1 - c$ ) = Marginal Propensity to Save (MPS)

**Propensity to Save:** The propensity to save is the fraction of income that households save rather than spend on consumption.

1. **Average Propensity to Save (APS):** This is the ratio of total savings to total income.  $APS = S / Y$ . It shows the percentage of total income that is saved. Savings can never be equal or greater than income, so APS cannot be one or more than one.
2. **Marginal Propensity to Save (MPS):** This is the ratio of the change in savings to the change in income.  $MPS = \Delta S / \Delta Y$ . Indicates the additional savings resulting from an additional unit of income. MPS ranges from 0 to 1. MPS is a slope of the saving curve. Slowly, MPS is permanent.

## Relationship between APC and APS:

$$APC = C / Y$$

$$APS = S / Y$$

The sum of the average propensity to consume and the average propensity to save must equal 1 because all income is either consumed or saved. This is based on the fundamental economic identity:  $C + S = Y$ ; Dividing this by  $Y$ , we get:  $C/Y + S/Y = Y/Y$

Simplified:  $APC + APS = 1$

Relationship:  $APC + APS = 1$

## Relationship between MPC and MPS:

$$MPC = \Delta C / \Delta Y$$

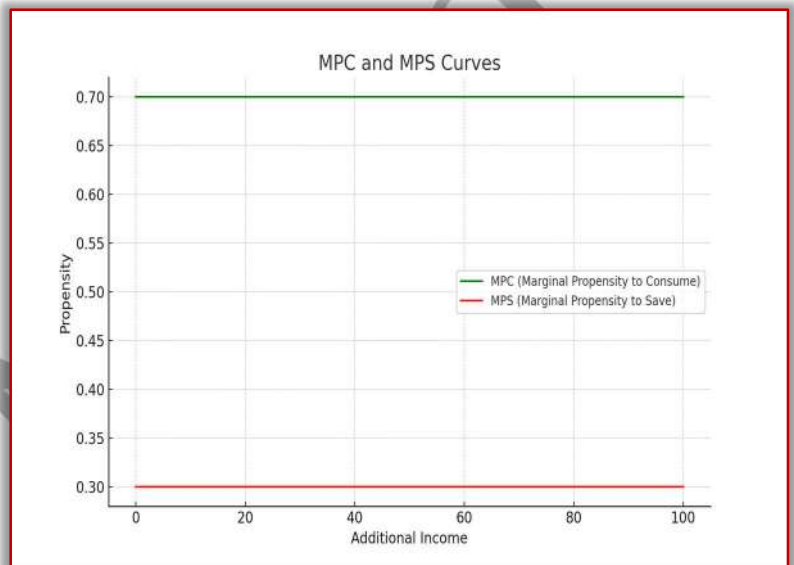
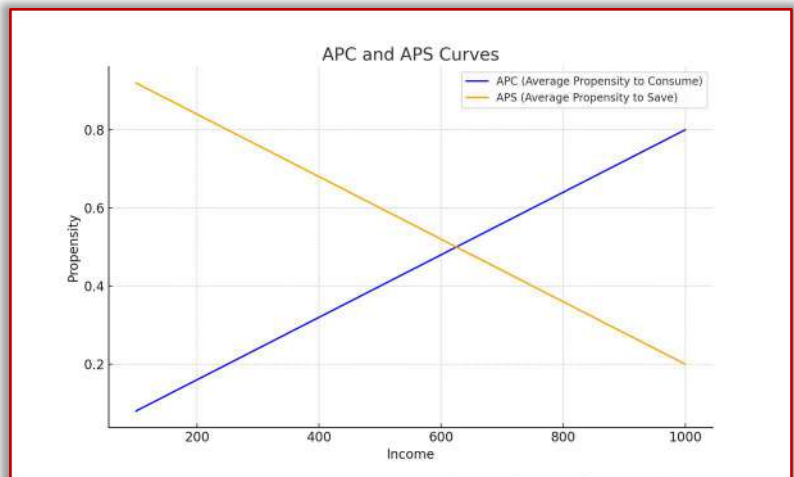
$$MPS = \Delta S / \Delta Y$$

The sum of the marginal propensity to consume and the marginal propensity to save must equal 1 because all additional income is either consumed or saved. This is derived from the economic identity:  $\Delta C + \Delta S = \Delta Y$ ;

Dividing this by  $\Delta Y$ , we get:  $\Delta C/\Delta Y + \Delta S/\Delta Y = \Delta Y/\Delta Y$ ; Simplified:  $MPC + MPS = 1$

$MPC + MPS = 1$ , as any change in income is either consumed or saved.

**Examples:** If a household earns an additional \$1,000 and spends \$800, the MPC is 0.8, and the MPS is 0.2.



## INVESTMENT FUNCTION

- **Definition:** The investment function represents the relationship between the level of investment and various economic factors, typically including income or output.

- **Formula:**

$$I = I_0 + bY$$

- $I$  = Total investment

- $I_0$  = Autonomous investment (investment when income is zero)
- $b$  = Marginal efficiency of investment (a coefficient indicating the sensitivity of investment to changes in income)
- $Y$  = National income or output

### Types of Investment

- Autonomous Investment:** Investment that occurs regardless of the level of national income or output.
- Induced Investment:** Investment that varies with changes in the level of national income.

### Ex-Ante Investment:

1. Planned or intended investment before it actually occurs.
2. Based on expectations and forecast.
3. Reflects the investment that businesses plan to make given their expectations of future economic conditions.

### Ex-Post Investment:

1. Actual investment that has occurred after the fact.
2. Reflects the actual amount of investment made, which may differ from planned investment due to unforeseen circumstances or changes in economic condition.

## EQUILIBRIUM LEVEL OF INCOME

### 1. AD-AS Approach

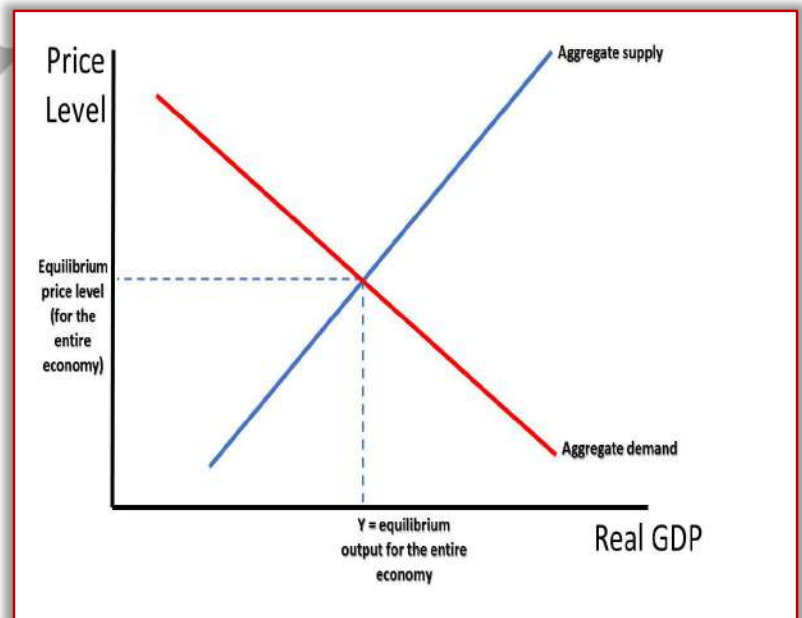
The equilibrium level of income in the Two-Sector Model is determined at the point where aggregate demand (AD) equals aggregate supply (AS). This equilibrium ensures that the total output produced by firms is fully purchased by households, resulting in no unintended changes in inventory levels.

Formula:

$$Y = C + I$$

Where:

- $Y$  is the national income.
- $C$  is consumption expenditure by households.
- $I$  is investment expenditure by firms.



## Explanation:

- **Aggregate Demand (AD):** In the two-sector model, AD is the total spending on goods and services, which includes consumption (C) and investment (I).
- **Aggregate Supply (AS):** AS is the total output produced by firms, which equals national income (Y).

At equilibrium,  $Y = C + I$ , meaning the income generated in the economy is fully used for consumption and investment.

## Example:

Suppose in an economy, the consumption function is given by  $C = 100 + 0.8Y$  and investment is  $I = 200$ . The equilibrium income level can be determined as follows:

$$Y = C + I = 100 + 0.8Y + 200$$

$$Y - 0.8Y = 300$$

$$0.2Y = 300$$

$$Y = 300 / 0.2 = 1500 \text{ units}$$

Thus, the equilibrium level of income in this economy is 1500 units.

## 2. Savings-Investment Equality

In the Two-Sector Model, savings (S) must equal investment (I) for the economy to be in equilibrium. This relationship ensures that the income not spent on consumption by households is used by firms for investment purposes.

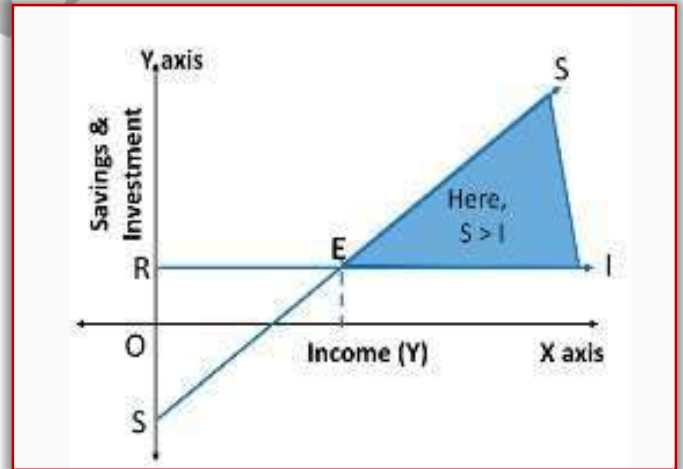
Formula:  $S = I$

**Explanation: Savings (S):** The portion of income that households do not spend on consumption is saved. Savings represent deferred consumption and provide the funds necessary for investment.

**Investment (I):** Firms use savings to finance investment in capital goods, which leads to the production of more goods and services in the future.

### Mechanism:

When savings equal investment, the economy is in equilibrium, meaning that the total amount of income generated is either spent on consumption or invested in the production of capital goods.



**Diagram:** Households are saving more and consuming less. So, there is less demand of products. Due to this, the firm will decrease production till the time Savings become equal to Investment.

**Example:**

In the previous example, with equilibrium income  $Y = 1500$ , if the marginal propensity to consume (MPC) is 0.8, then the marginal propensity to save (MPS) is 0.2. Thus, savings would be:

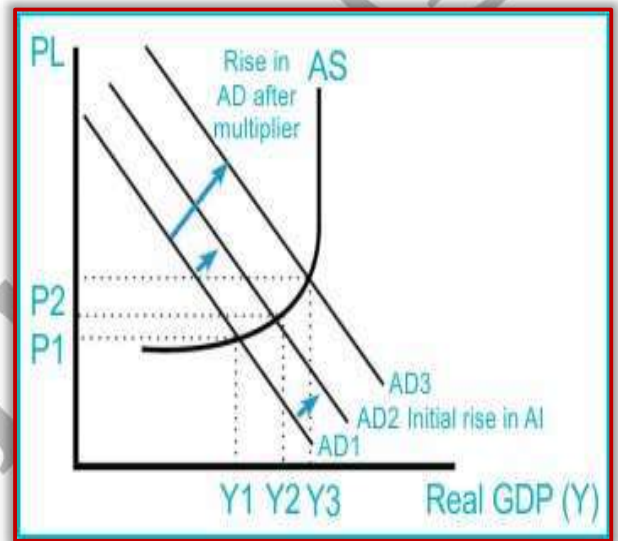
$$S = MPS \times Y = 0.2 \times 1500 = 300 \text{ units}$$

Since  $S = I = 300$  units, the economy is in equilibrium.

**MULTIPLIER**

The multiplier refers to the phenomenon where an initial change in spending (such as investment or government spending) leads to a larger overall change in national income or output.

- **Explanation:** When there is an initial increase in spending, it increases income for others in the economy, who then spend a portion of this income, leading to further increases in income and output. This process continues in successive rounds, multiplying the impact of the initial spending.
- **Formula: Multiplier =  $1 / (1 - MPC) = 1 / MPS$**
- **MPC (Marginal Propensity to Consume):** The fraction of additional income that is spent on consumption.
- **MPS (Marginal Propensity to Save):** The fraction of additional income that is saved. Since  $MPC + MPS = 1$  the multiplier can be expressed using either MPC or MPS.
- **Interpretation:**
- A higher MPC leads to a larger multiplier effect because more of the additional income is being spent, generating further increases in income and output.
- Conversely, a higher MPS leads to a smaller multiplier because less of the additional income is spent.



**The Investment Multiplier**

The investment multiplier measures the change in national income resulting from a change in investment. It captures the idea that an initial increase in investment leads to a chain reaction of increased income, consumption, and further income increases, amplifying the total impact on the economy.

Formula:

$$k = 1 / (1 - MPC) \text{ or } k = 1 / MPS$$

Where:  $k$  is the investment multiplier.  $MPC$  is the marginal propensity to consume.  $MPS$  is the marginal propensity to save.

Explanation: An increase in investment raises income, which, in turn, increases consumption (since a portion of the additional income is spent on goods and services). This increased consumption further raises income in successive rounds, leading to a multiplied effect on total income.

### Example:

If the  $MPC$  is 0.8, the multiplier would be:  $k = 1 / (1 - 0.8) = 1 / 0.2 = 5$ . This means that for every unit of investment, national income increases by 5 units. For example, if investment increases by 100 units, the total increase in income would be:  $\Delta Y = k \times \Delta I = 5 \times 100 = 500$  units. Thus, an initial investment of 100 units leads to a total increase in income of 500 units.

The Two-Sector Model provides a foundational understanding of how income and employment are determined in a simplified economy consisting of households and firms. By analyzing the equilibrium level of income, savings-investment equality, and the investment multiplier, economists can gain valuable insights into the mechanisms that drive economic growth and stability. These concepts are essential for policymakers as they design strategies to promote sustainable economic development.



## EMPLOYMENT

Unemployment is one of the most critical indicators of economic performance and well-being. The analysis of unemployment is essential for understanding the health of an economy, particularly the concepts of involuntary unemployment and full employment. These concepts help policymakers design appropriate strategies to achieve economic stability and growth.

**Involuntary Unemployment**: Involuntary unemployment occurs when individuals who are willing and able to work at the prevailing wage rate are unable to find employment. This type of unemployment is not due to personal choice but rather due to factors beyond the control of the workers, such as economic downturns, technological changes, or inadequate demand for goods and services.

### Causes of Involuntary Unemployment:

- **Demand-Deficient (Cyclical) Unemployment**: This type of involuntary unemployment occurs during periods of economic recession or downturns when the overall demand for goods and services decreases, leading to reduced production and, consequently, layoffs. Example: During the global financial crisis of 2008-2009, many businesses experienced a significant drop in demand, leading to widespread layoffs and a sharp increase in involuntary unemployment.



- **Structural Unemployment:** Structural unemployment arises when there is a mismatch between the skills of the workforce and the demands of the labor market. This can be due to technological advancements, changes in consumer preferences, or globalization. Example: The decline of the coal mining industry in certain regions led to structural unemployment as workers with specific skills found it difficult to transition to other industries.
- **Technological Unemployment:** Technological unemployment occurs when advancements in technology lead to the automation of jobs, reducing the need for human labor in certain sectors. Example: The automation of manufacturing processes has led to the displacement of many assembly line workers, contributing to involuntary unemployment.
- **Institutional Unemployment:** Institutional factors, such as labor market regulations, minimum wage laws, and union activities, can sometimes lead to involuntary unemployment by increasing the cost of hiring workers or restricting flexibility in the labor market. Example: A significant increase in the minimum wage might lead some employers to reduce their workforce, resulting in involuntary unemployment among low-skilled workers.

**Data Insight:** According to the International Labor Organization (ILO), global unemployment rates surged during the COVID-19 pandemic in 2020, leading to significant involuntary unemployment, especially in sectors like hospitality, tourism, and retail.

**Full Employment:** Full employment is the level of employment where there is no involuntary unemployment. It includes only frictional and structural unemployment, which are considered normal in a dynamic economy. Full employment does not imply zero unemployment but rather a situation where the only unemployment present is voluntary or due to the natural turnover in the labor market.

#### **Components of Full Employment are following**

- **Frictional Unemployment:** Frictional unemployment occurs when individuals are temporarily unemployed while transitioning from one job to another or entering the labor force for the first time. Example: A recent college graduate who is searching for their first job is experiencing frictional unemployment.
- **Structural Unemployment:** As discussed earlier, structural unemployment is due to a mismatch between workers' skills and the demands of the labor market. It is considered part of full employment because it reflects the economy's ongoing adjustments. Example: Workers in declining industries, such as traditional manufacturing, who need to retrain for jobs in emerging sectors like renewable energy, are structurally unemployed.

**The Natural Rate of Unemployment:** The natural rate of unemployment is the sum of frictional and structural unemployment. It represents the unemployment rate when the economy is at full employment. Example: If frictional unemployment is 3% and structural unemployment is 2%, the natural rate of unemployment would be 5%.

**Data Insight:** Historically, advanced economies such as the United States and Germany have achieved full employment with unemployment rates between 4% and 5%, which corresponds to their natural rates of unemployment.

## Comparison of Involuntary Unemployment and Full Employment

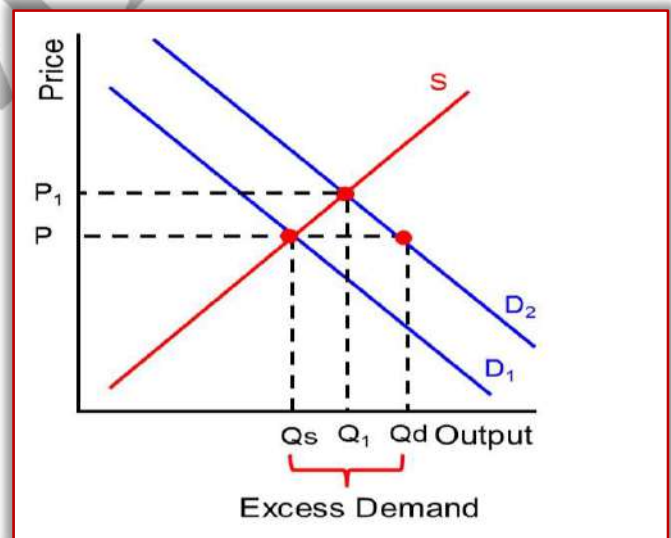
- **Unemployment Levels:** Involuntary unemployment indicates that there is an excess supply of labor, leading to higher unemployment rates. Full employment indicates that the labor market is in equilibrium, with only natural unemployment present.
- **Economic Implications:** Involuntary unemployment often leads to lower consumer spending, reduced economic growth, and increased government expenditure on social welfare programs. Full employment contributes to higher economic output, increased consumer spending, and greater overall economic stability.
- **Policy Responses:** Governments may respond to involuntary unemployment with expansionary fiscal and monetary policies to stimulate demand and create jobs. To maintain full employment, governments focus on policies that enhance labor market flexibility, provide job training, and encourage innovation.

Understanding involuntary unemployment and full employment is essential for policymakers and economists as they seek to maintain a stable and growing economy. Involuntary unemployment represents a significant challenge, often requiring targeted policy interventions to address. On the other hand, achieving and maintaining full employment is a key objective for any economy, as it maximizes the use of resources and promotes sustained economic growth.

## EXCESS DEMAND AND DEFICIT DEMAND

**EXCESS DEMAND:** Occurs when the total demand for goods and services (Aggregate Demand or AD) in an economy exceeds the total supply (Aggregate Supply or AS) at the level of full employment. This imbalance results in upward pressure on prices.

- **Consequences:**
  - **Inflation:** Prices rise because the demand for goods and services is greater than what the economy can supply.
  - **Overheating of the Economy:** The economy operates beyond its sustainable capacity, leading to inefficiencies and potential long-term instability.



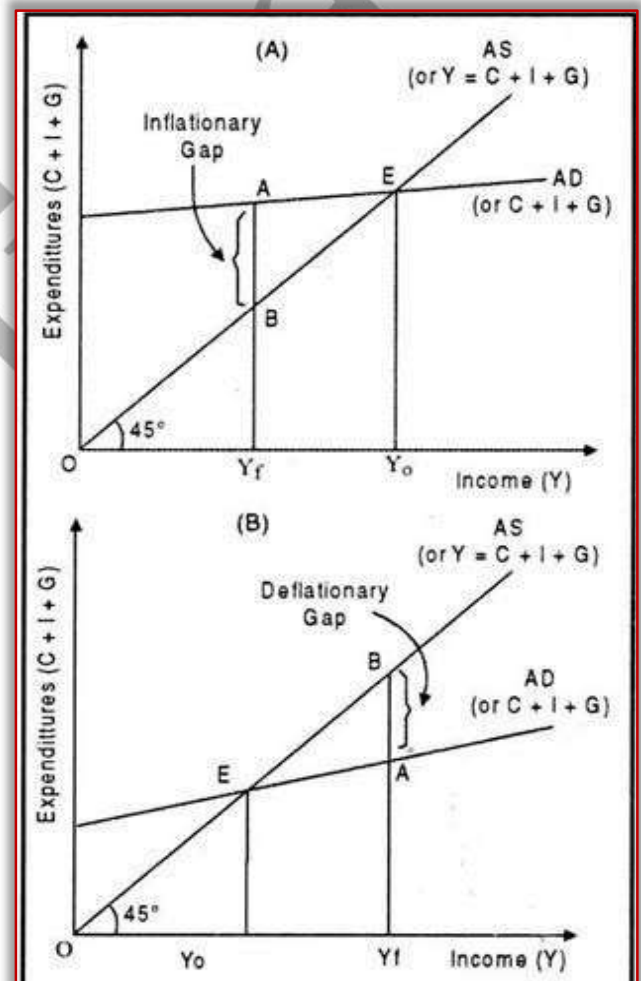
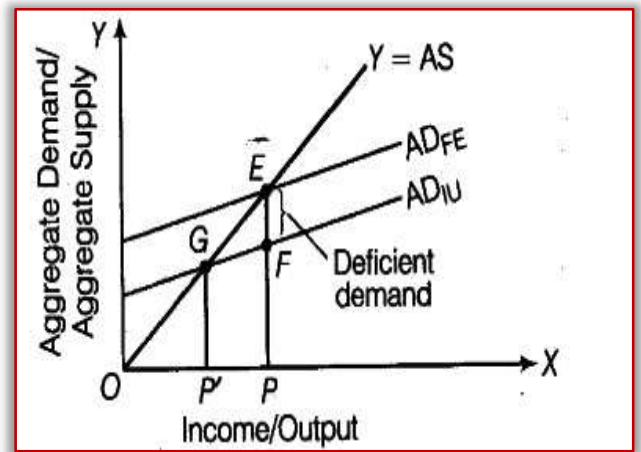
**DEFICIENT DEMAND:** Occurs when the total demand for goods and services (Aggregate Demand or AD) in an economy is less than the total supply (Aggregate Supply or AS) at the full employment level. This results in underutilization of resources. **Consequences** are following:

1. **Unemployment:** Lower demand leads to reduced production, causing job losses

2. **Recession:** Prolonged deficient demand can slow down economic growth, leading to a recession characterized by falling GDP and economic stagnation.

### Comparison of Excess and Deficient Demand

- **Impact on Prices:** Excess Demand: Leads to rising prices (inflation). Deficient Demand: Leads to falling prices (deflation).
- **Impact on Output:** Excess Demand: Can lead to an overheated economy with unsustainable growth. Deficient Demand: Results in underutilization of resources, leading to unemployment and economic contraction.
- **Policy Responses:** Excess Demand: Often requires contractionary monetary or fiscal policies to cool down the economy and control inflation. Deficient Demand: Typically addressed with expansionary monetary or fiscal policies to boost demand and reduce unemployment.



### Inflationary Gap

- When actual output exceeds potential output at full employment, due to excess demand.
- $AD > AS$  at full employment.
- Drives up prices as demand outstrips supply.
- Increased general price levels.
- Strain on resources and potential for long-term instability.

### Deflationary Gap

- When actual output is less than potential output at full employment, due to deficient demand.
- $AD < AS$  at full employment.
- Decreases production and lowers price levels.
- Increased job losses due to reduced production.
- Economic slowdown and potential deflation.

## TO CORRECT EXCESS DEMAND AND DEFICIT DEMAND

**FISCAL POLICY:** Fiscal policy refers to general government and revenue policies used to achieve its objectives.

- **Tax Changes**
  - **Excess Demand: Increase Taxes:** Raise income or sales taxes to reduce disposable income, thereby decreasing consumer spending and investment. **Example:** During World War II, many countries, including the United States, raised taxes to curb excess demand and prevent wartime inflation.
  - **Deficit Demand: Decrease Taxes:** Lower income or sales taxes to increase disposable income, boosting consumer spending and investment. **Example:** The tax cuts implemented in the U.S. during the early 2000s aimed to stimulate economic growth by increasing disposable income and consumer spending.
- **Change in Public Expenditure**
  - **Excess Demand: Decrease Government Spending:** Reduce expenditure on public projects, services, and benefits to lower overall demand in the economy. **Example:** The UK government implemented austerity measures following the 2008 financial crisis to reduce public spending and control rising inflation.
  - **Deficit Demand: Increase Government Spending:** Governments can boost deficient demand by increasing spending on infrastructure, public services, and other projects. Increased government spending directly raises aggregate demand, stimulating economic activity. **Example:** The American Recovery and Reinvestment Act of 2009, implemented in response to the Great Recession, involved significant government spending to boost aggregate demand and reduce unemployment.
- **Shift in Public Borrowing**
  - **Excess Demand: Reduce Public Borrowing:** Decrease government borrowing to avoid increasing the money supply and adding to inflationary pressures.
  - **Deficit Demand: Increase Public Borrowing:** Borrow more to finance increased government spending, which can boost aggregate demand and counteract economic slowdown.
- **MONETARY POLICY:** It is policy of the central bank to control the amount of money available and the presence the debt in the economy.
  - **Quantitative Measures**
    - **Bank Rate:** The bank rate at which the central bank borrows money from commercial banks without collateral.
      - **Excess Demand: Increase Bank Rate:** Raise the rate at which commercial banks borrow from the central bank. This makes borrowing costlier, reducing the money supply and aggregate demand.
      - **Deficit Demand: Decrease Bank Rate:** Lower the rate to make borrowing cheaper, encouraging banks to lend more and increase aggregate demand.

- **Cash Reserve Ratio (CRR):** The small percentage of deposits banks must keep as cash with the central bank, limiting how much they can lend.
  - **Excess Demand: Increase CRR:** Raise the percentage of deposits banks must keep as reserves, reducing their lending capacity and curbing the money supply.
  - **Deficit Demand: Decrease CRR:** Lower the percentage, increasing the amount of money banks can lend, thereby boosting the money supply and aggregate demand.
- **Statutory Liquidity Ratio (SLR):** The percentage of a bank's deposits that must be kept in liquid assets like cash or government securities, influencing their lending ability.
  - **Excess Demand: Increase SLR:** Raise the percentage of liquid assets banks must hold, reducing their ability to extend loans and thus controlling inflation.
  - **Deficit Demand: Decrease SLR:** Lower the percentage, allowing banks to increase their lending, which can stimulate economic activity.
- **Open Market Operations (OMO):** The central bank buying or selling government bonds to control the amount of money in the economy.
  - **Excess Demand: Sell Government Securities:** The central bank sells securities to absorb excess liquidity from the banking system, reducing the money supply and controlling inflation.
  - **Deficit Demand: Buy Government Securities:** The central bank purchases securities to inject liquidity into the banking system, increasing the money supply and stimulating economic activity.
- **Qualitative Measures**
  - **Credit Rationing:** The process of limiting the amount of credit or loans that banks can extend to borrowers, typically used to manage excessive borrowing or ensure funds are allocated to priority sectors.
    - **Excess Demand: Restrict Credit:** Impose limits on the amount of credit banks can extend to certain sectors to control excessive borrowing and spending.
    - **Deficit Demand: Expand Credit:** Relax credit restrictions to make more funds available for borrowing and investment.
  - **Moral Suasion:** Persuading banks to follow certain lending practices or policies through advice and encouragement, rather than through strict regulations.
    - **Excess Demand: Encourage Restraint:** The central bank advises banks to be cautious in their lending practices to avoid overheating the economy.
    - **Deficit Demand: Encourage Lending:** The central bank persuades banks to increase lending and investment to stimulate economic activity.
  - **Direct Controls**
    - **Excess Demand: Impose Credit Controls:** Set limits on the amount and terms of credit that can be offered to prevent excessive borrowing and inflation.

- **Deficit Demand: Remove Credit Controls:** Lift restrictions on credit to encourage more borrowing and spending.

## PARADOX OF THRIFT

It is an economic principle that states when individuals collectively increase their savings by reducing consumption, it can lead to a decrease in overall economic activity. This occurs because reduced spending lowers aggregate demand, which causes businesses to cut back on production and employment. Consequently, the decrease in income and employment can lead to a reduction in total savings across the economy, despite the initial intention to save more. This paradox highlights the conflict between individual savings behavior and its broader impact on economic health.