



Aggregate Demand (AD)

- *Aggregate Demand* is the sum of spending by *consumers* (e.g., on ***cars, food items, tourism***, etc.), *businesses* (***investment on construction of houses and factories, machines and equipments***), *government* (***spending on highways, missiles***) and the rest of the world (***exports and imports***).

Aggregate Supply (AS)

- *Aggregate Supply* refers to the total quantity of goods and services that the nations' ***business houses are willing to produce and sell during a given period.***

Price Indexes

- CPI measures the retail prices of a fixed “*market basket*” of several goods and services purchased directly by the consumers / households. *The CPI is the index most relevant to consumers.*

The basket usually covers the items of consumption in day-to-day life such as food, clothing, housing, fuel, transport, education, medicine, electricity, entertainment, etc.

- WPI contains prices of *raw materials and semi-finished goods beside the prices of imported goods and final consumer items.*

NI Accounting : Some Important Definitions

GDP: It is a measure of all *currently domestically produced final goods and services evaluated at market prices.*

Market transactions such as exchanges of *previously produced houses, cars, factories, and exchanges of stocks and bonds and other assets are not included in GDP.*

GDP includes *currently produced goods, not goods produced in the past.*

GDP includes *tangible goods* (like DVDs, mountain bikes, mineral water, Mobile Phones) and *(intangible) services* (dry cleaning, music concerts, cell phone service, internet service, Spa service).

Non-market productive activities and the underground economy are left out.

- **Gross National Product (GNP)**
 - The value of all *final goods and services* produced by a country's factors of production and sold on the market in a given time period.

GNP = GDP + Net Factor Income from Abroad (NFIA)

NFIA = Factor Income Received from Abroad *minus* Factor Income Paid Abroad

NFIA is the (net) ***interest earnings, profits and dividends*** coming into India from our assets owned overseas matched against the flow of profits and other income from foreign owned assets located within India.

In recent years, many foreign firms have set up production plants here whilst Indian firms have expanded their operations overseas and become multinational organisations.

GDP – “*Output*”

- **Gross Domestic Product** is the market value of final goods and services produced within a country during a specific time period, usually a year.
 - **Valued at Market Value**
 - **Only Final Goods and Services Count:**
Sales at intermediate stages of production are not counted as their value is embodied within the final-user good. Their inclusion would result in double counting.
 - **Excludes financial transactions and income transfers** since these do not reflect production.
 - Must be produced **within the geographic boundaries** of the country.
 - **Net additions to inventory** are current period output so are also included.

National product at market prices indicates the total amount paid by the (final) purchasers of output whereas, national income at factor cost measures the total amount earned by the factors of production for their contribution to the final output.

$$\text{GDP}_{\text{MP}} \text{ (or } \text{GNP}_{\text{MP}}\text{)} = \text{GDP}_{\text{FC}} \text{ (or } \text{GNP}_{\text{FC}}\text{)} + \text{Indirect Taxes} \\ - \text{Subsidies}$$

$$\text{GDP}_{\text{FC}} + \text{NFIA} = \text{GNP}_{\text{FC}}$$

$$\text{GNP}_{\text{FC}} - \text{Depreciation} = \text{NNP}_{\text{FC}}$$

$$\text{GDP}_{\text{FC}} - \text{Depreciation} = \text{NDP}_{\text{FC}}$$

$$\text{NDP}_{\text{FC}} + \text{NFIA} = \text{NNP}_{\text{FC}}$$

Depreciation is the consumption of capital in the production process — the wearing out of plant and equipment.

National Income

In computing NI, consider total GNP, *not* GDP. Because, GNP *includes* income earned by Indian residents and firms but *excludes* earnings of foreign residents and firms from production in India.

GNP – Depreciation = NNP and

NNP – Indirect taxes and Other = NI

Indirect taxes include both *sales* and *excise taxes*. ‘Other’ includes Bad Debts to the business sector, among other things.

MEASURING THE COST OF LIVING

The goal of the CPI is to measure changes in the *cost of living*.
The CPI tries to gauge how much incomes must rise in order to maintain a constant standard of living.

Existence of *substitution bias*

When prices change, they do *not all change proportionately*. Some prices rise by more than others. Consumers respond to these differing price changes!

Yet the CPI is computed assuming a *fixed basket* of goods.

Hence, the index overstates the increase in the cost of living from one year to the next.

National Income Accounting Equation: $Y = C + I + G + (X - M)$

$$Y + TR - T = C + I + [G + TR - T] + (X - M)$$

$$Y_D = C + I + [G + TR - T] + (X - M)$$

But, $Y_D = C + S$

$$C + S = C + I + [G + TR - T] + (X - M)$$

$$S - I = [G + TR - T] + (X - M)$$

**Saving-Investment
Gap**

**Budget Deficit /
Surplus**

**Trade Surplus
/ Deficit**

Keynes's Conjectures

- APC falls as income rises. Rich people save a higher proportion of their income than the poor.
- MPC lies between 0 and 1; i.e. $0 < \text{MPC} < 1$. There is empirical evidence that wealthier people have a lower MPC than the poor.
- Income is the primary determinant of consumption and that the interest rate does not have any important role – stark contrast to the beliefs of the classical economists. Keynes did not have interest rate in his formulation of consumption function.

AIH (The Keynesian Consumption Theory)

Keynes hypothesized that consumption demand has two components: *autonomous* and *induced* consumption.

The corollary of the Keynesian consumption function provides the saving function:

- (i) MPS is $(1-b)$; and
- (ii) APS *increases as income increases.*

Note that, $MPC + MPS = 1$ and $APC + APS = 1$.

Rich people and rich countries have high saving rates in comparison to poor people and poor countries.

Life - Cycle Hypothesis (LCH)

Albert Ando, Franco Modigliani & Richard Brumberg

1954, 1957, 1963

Individuals generally plan their consumption and savings behavior in the best possible way over their life times.

Consumption plans are made so as to achieve a smooth or even level of consumption by saving during periods of high income and dissaving during periods of low income.

Income varies *systematically* over people's life time — saving allows people to move income from those times in life when income is high to those times when it is low — this fact of consumer behavior forms the basis of LCH.

The LCH views savings as resulting mainly from individual's desires to provide for smooth consumption in old age. This theory identifies the *age structure of the population as an important determinant of consumption and saving behavior*.

LCH (contd.)

APC is
$$\frac{C}{Y} = \alpha \left(\frac{W}{Y} \right) + \beta$$

In the short run, high income corresponds to a low APC. But, over the long run wealth and income grow together, resulting in a constant wealth-income ratio and thus a constant APC — this way Modigliani solved Kuznet's consumption puzzle.

In the short run, wealth is constant. However, in the long run as wealth increases the consumption function shifts upward. This upward shift prevents the APC from falling as income increases.

Friedman (1957): Consumption depends primarily on permanent income. For example, if a person receives a permanent raise of Rs. 10,000 per year, his consumption will rise by about as much. But if a person wins lottery of Rs. 10,000, he will not consume it all in one year. Instead, he will spread the extra consumption over the rest of his life time. **Thus, people spend their permanent income, but they save rather than spend most of their transitory income.**

Friedman concluded that we should view the consumption function as approximately

$$C = \alpha Y^P$$

α measures the fraction of permanent income consumed.

Relative Income Hypothesis

James Duesenberry (1949)

RIH states that the satisfaction (or utility) an individual derives from a given consumption level depends on its *relative* magnitude in the society (e.g., relative to the average consumption) rather than its absolute level.

It is based on a postulate that has long been acknowledged by psychologists and sociologists, namely that individuals care about status.

Ratchet Effect

Downward rigidity in consumption was observed, which implies that while consumers raised their consumption expenditures in the face of rising incomes they were too reluctant to reduce their consumption expenditures when their incomes fell.

This is known as the *ratchet effect*.

Business Fixed Investment

Gross investment expenditures of a firm are conceptually broken up into two parts: net investment expenditures on new capital goods and replacement investment expenditures on the depreciated stock of capital. The latter includes both maintenance expenditures on usable capital inherited from the past, and expenditures to replace the obsolete capital goods.

Net Investment
↓ **Replacement Investment**
Continuous Framework $I \equiv \frac{dK}{dt} + \delta K_{t-1}$ $0 < \delta < 1$

Discrete Framework $I \equiv K^* - K + \delta K_{t-1}$

δ is the depreciation rate

Business Fixed Investment

Gross investment expenditures of a firm are conceptually broken up into two parts: net investment expenditures on new capital goods and replacement investment expenditures on the depreciated stock of capital. The latter includes both maintenance expenditures on usable capital inherited from the past, and expenditures to replace the obsolete capital goods.

Net Investment
↓ **Replacement Investment**
Continuous Framework $I \equiv \frac{dK}{dt} + \delta K_{t-1}$ $0 < \delta < 1$

Discrete Framework $I \equiv K^* - K + \delta K_{t-1}$

δ is the depreciation rate

MARGINAL EFFICIENCY OF CAPITAL

Investment, in the theory of income and employment, means an addition to the nations physical stock of capital like building of new factories, new machines as well as any addition to the stock of finished goods or the goods in the pipeline of production.

Investment has to create income and employment.

Marginal efficiency of investment is the highest expected rate of profit which is likely to be had by a marginal increase in the rate of investment.

MEC must never fall below the current rate of interest, if investment is to be worthwhile.

Investment-Accelerator Relationship

The Traditional Accelerator Model

Maurice J. Clark (1917)

A simple *linear* relationship between changes in the capital stock of the firm and changes in its flow of output.

“the acceleration principle ... suggests that an increase in the growth rate of output — an *acceleration* — is needed to increase the level of investment”, Branson (1989).

Assumptions:

- firms invest proportionally to the variations in demand; and
- firms observe only the demand for their own products.

$$I = f(\Delta Y_t, \Delta Y_{t-1}, \dots, Y_{t-1}, Y_{t-2}, \dots)$$

Why the Aggregate-Demand Curve Is Downward Sloping?

- The AD is not downward sloping for the reasons a demand curve in microeconomics is downward sloping (*substitution* and *income effects*).

The AD Curve in Macroeconomics is Downward Sloping because

- The Price Level and Consumption: **The Wealth Effect**
- The Price Level and Investment: **The Interest Rate Effect**

The Price Level and Consumption: The Wealth Effect

- A decrease in the price level makes consumers feel more wealthy, which in turn encourages them to spend more.
- This increase in consumer spending means larger quantities of goods and services demanded.

Intuitive Explanation: Consider the money that you hold in your wallet and your bank a/c. The nominal value of this money is fixed but its real value is not. When prices fall, these dollars/rupees are more valuable because they can now be used to buy more goods and services. Thus *a decrease in the price level makes consumers/households feel more wealthy, which in turn encourages them to spend more.*

The second reason for the downward slope of the aggregate demand curve is Keynes's interest-rate effect. Recall that the quantity of money demanded is dependent upon the price level. That is, a high price level means that it takes a relatively large amount of currency to make purchases. Thus, consumers demand large quantities of currency when the price level is high. When the price level is low, consumers demand a relatively small amount of currency because it takes a relatively small amount of currency to make purchases. Thus, consumers keep larger amounts of currency in the bank. As the amount of currency in banks increases, the supply of loans increases. As the supply of loans increases, the cost of loans--that is, the interest rate--decreases. Thus, a low price level induces consumers to save, which in turn drives down the interest rate. A low interest rate increases the demand for investment as the cost of investment falls with the interest rate. Thus, a drop in the price level decreases the interest rate, which increases the demand for investment and thereby increases aggregate demand.

Price Level and Investment: The Interest Rate Effect

A lower price level *reduces* the interest rate, which encourages greater spending on investment goods. This increase in investment spending means a larger quantity of goods and services demanded.

Intuitive Explanation: Lower the price level, the less money households need to hold to buy the goods and services they want. When the price level falls, therefore, households try to reduce their holdings of money by lending some of it out. **A household might deposit its excess money in an interest bearing savings account, and the bank would use these funds to make more loans.** As households try to convert some of their excess money into interest bearing assets, they drive down interest rate. **Lower interest rate encourage borrowing by firms that want to invest in new plants and equipments and by households who want to invest in real estate.**

Price Level and Net Exports: The Exchange Rate Effect

Intuitive Explanation: A lower price level in India lowers the interest rate. Indian investors will seek higher returns by investing abroad. As the Indian investors move their assets overseas, it increases the supply of rupees in the for-ex market. The increased supply of rupees causes the rupee to depreciate relative to other currencies. Because each rupee buys fewer units of foreign currencies, foreign goods become more expensive relative to domestic goods. This increases Indian exports of goods and services and decreases imports of goods and services. Net exports increase.

The (Autonomous) Investment Multiplier

$$\frac{\Delta Y}{\Delta \tilde{I}} = \frac{1}{(1 - C')}$$

Take $\dot{C} = 0.75$. Then the multiplier value will be = 4

Take $\dot{C} = 0.80$. Then the multiplier value will be = 5

Take $\dot{C} = 0.90$. Then the multiplier value will be = 10

Larger the MPC, greater the multiplier effect

The Investment & G - Multipliers

$$\frac{\Delta Y}{\Delta G} = \frac{\Delta Y}{\Delta \tilde{I}} = \frac{1}{(1 - MPC)} \rightarrow 1$$

$$\frac{\Delta Y}{\Delta G} = \frac{\Delta Y}{\Delta \tilde{I}} = \frac{1}{MPS} \rightarrow 1$$

Larger the MPS, smaller the multiplier effect

The Balanced Budget Multiplier

Additional govt. expenditure is financed by additional taxation

$$Y = C(Y-T) + \tilde{I} + G$$

Assume that investment is autonomous and fixed

$$dY = \dot{C} dY - \dot{C} dT + d\tilde{I} + dG \quad d\tilde{I} = 0$$

$$dT = dG$$

$$(1 - \dot{C}) dY = (1 - \dot{C}) dG$$

$$\left. \frac{dY}{dG} \right|_{dG=dT} = \frac{(1 - C')}{(1 - C')} = 1$$

THE TAX MULTIPLIER

Disposable Income = Income *minus* Taxes

Increase in Tax *reduces* the Disposable Income.

But Consumption is a rising function of Disposable Income.

With rise in tax, DI will be falling and so would be Consumption demand.

Consumption demand comprises the single largest portion of aggregate demand in the economy.

Hence, AD would fall.

The Sticky Wage Model

- ✓ When the nominal wage is stuck, a rise in the price level lowers the real wage, making labor relatively cheaper.
- ✓ The lower real wage induces firms to hire more labor.
- ✓ The additional labor hired produces more output.

This positive relationship between the price level and the amount of output implies that the aggregate supply curve slopes *upward* during the time when the nominal wage cannot adjust.

$$W = w \times P^e$$

Nominal Wage Target Real Wage Expected Price Level

Then the real wage turns out to be:

$$\frac{W}{P} = w \times \frac{P^e}{P}$$

Real Wage Target Real Wage $\frac{\text{Expected Price Level}}{\text{Actual Price Level}}$

Real wage deviates from its target if the actual price differs from the expected price level. When the actual price level is greater than expected, the real wage is less than its target; when the actual price level is less than expected, the real wage is higher than its target.

Summary

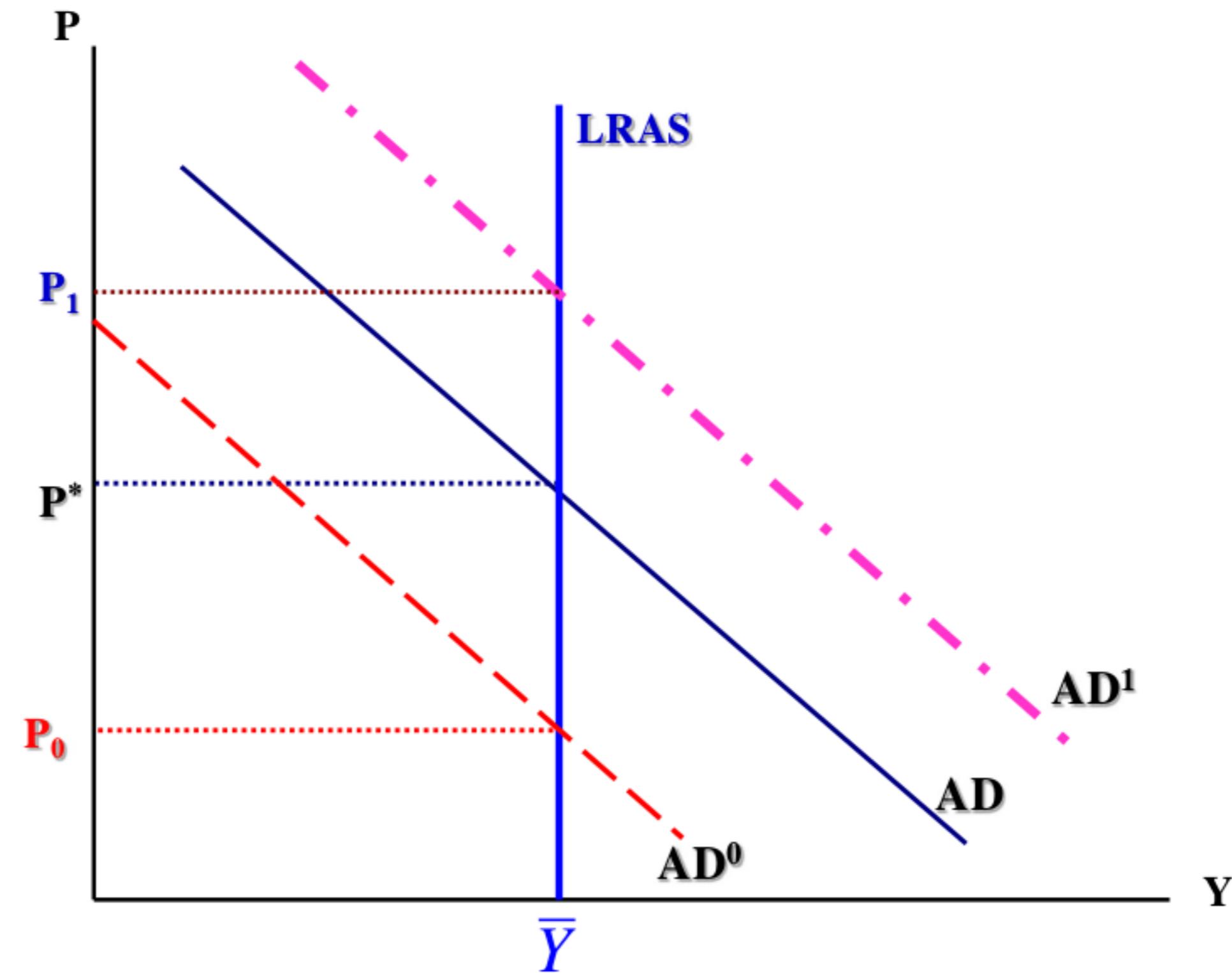
Because nominal wage is *sticky*, an unexpected change in the price level moves the real wage away from then target real wage, and this change in the real wage fluctuates the amount of labor hired and output produced.

$$\text{SRAS: } Y = \bar{Y} + \alpha(P - P^e); \alpha > 0$$

This is also called the Lucas supply curve, named after Robert Lucas.

Output deviates from its natural level when the price level deviates from the expected price level.

Long Run Aggregate Supply Curve



$$W = w \times P^e$$

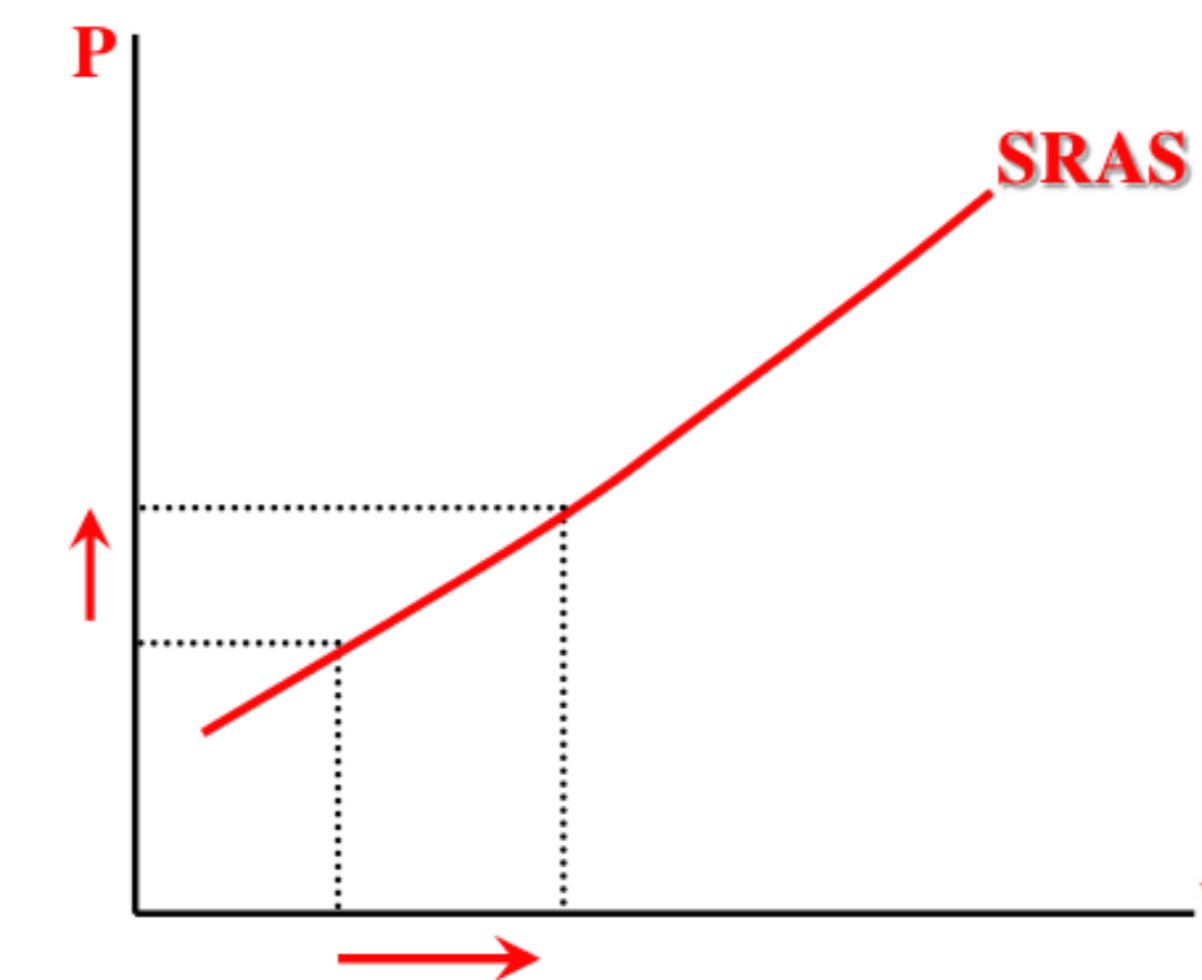
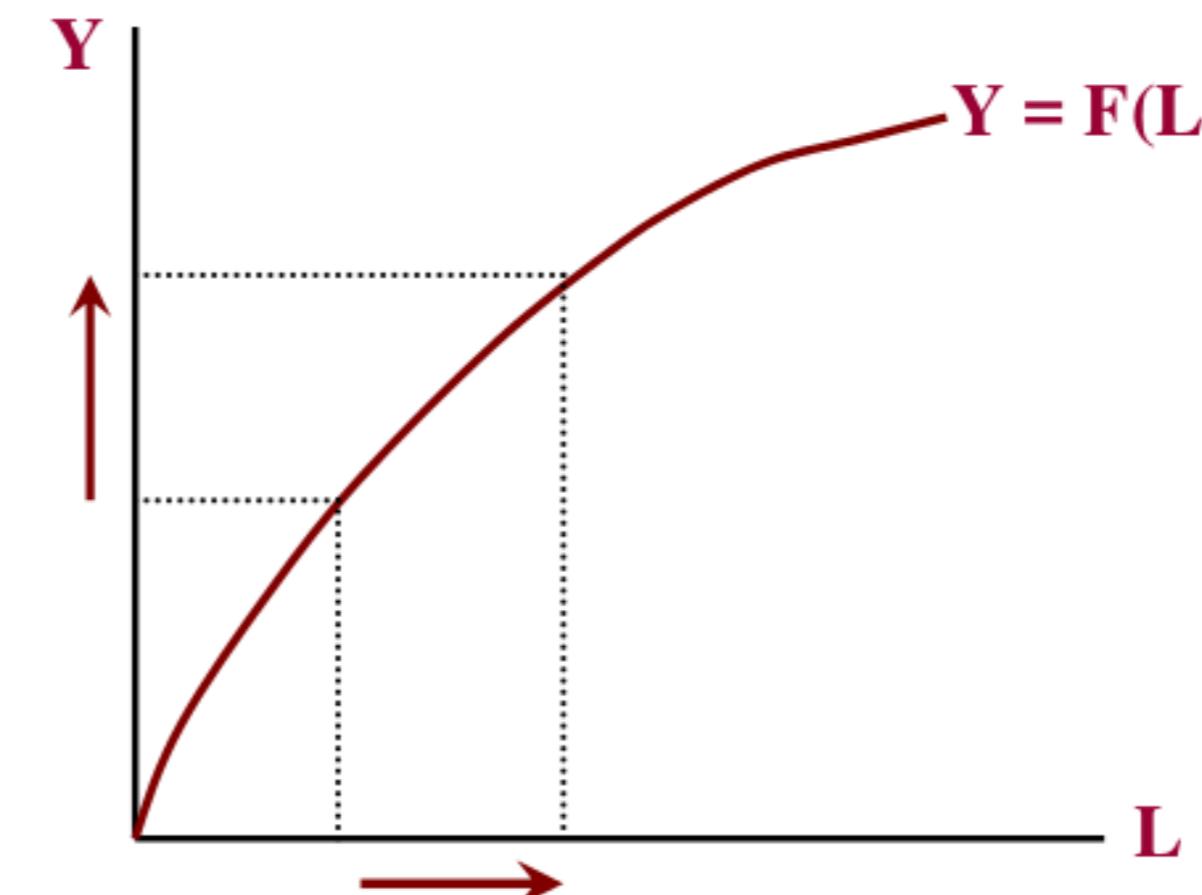
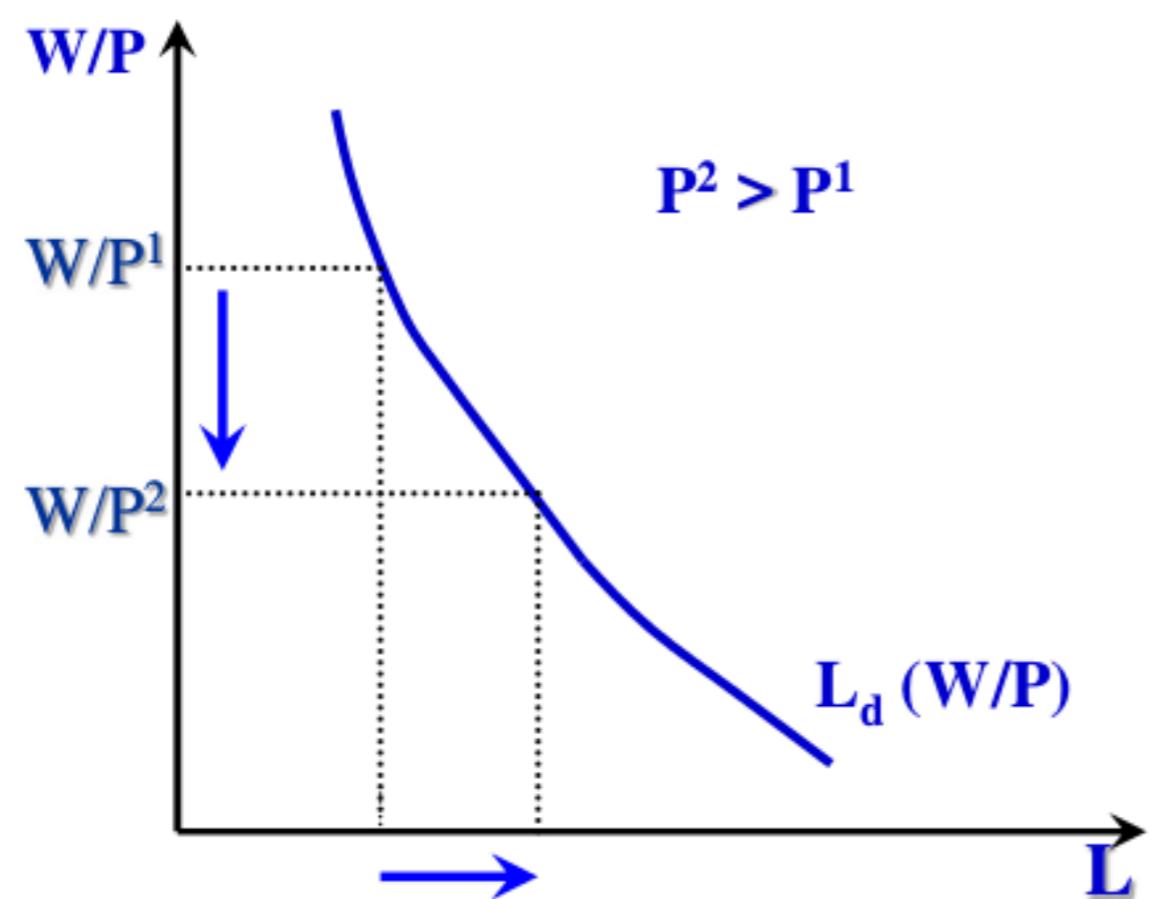
Nominal Wage Target Real Wage Expected Price Level

Then the real wage turns out to be:

$$\frac{W}{P} = w \times \frac{P^e}{P}$$

Real Wage Target Real Wage $\frac{\text{Expected Price Level}}{\text{Actual Price Level}}$

Real wage deviates from its target if the actual price differs from the expected price level. When the actual price level is greater than expected, the real wage is less than its target; when the actual price level is less than expected, the real wage is higher than its target.



Derivation of the SRAS Curve

MONEY MULTIPLIER

MONEY MULTIPLIER

Supply of money is an *increasing* function of *reserve money*.

$$M^S = m \text{ RM} \quad \text{where } m > 1$$

$$m = \frac{M^S}{RM}$$

The money multiplier is the ratio of stock of money to the stock of high powered money.

Money Supply is: $M = \text{Currency} + \text{Deposits}$
 $(CU) \quad (D)$

High-Powered money consists of *Currency* plus *Reserves*:

Therefore, $H = CU + R$

Money Supply can be re-written as: $M = \left(\frac{CU}{D} + 1\right)D = (curr + 1)D$

H can be re-written as: $H = (curr + res)D$

$$H = \left(\frac{CU}{D} + \frac{R}{D}\right)D$$

Therefore, $M = \left(\frac{curr + 1}{curr + res}\right)H = mH$

CRR (***Cash Reserve Ratio***) refers to a portion of deposits (as cash) which banks have to keep with the RBI. This serves two purposes: it ensures that a portion of bank deposits is totally risk free; and secondly, *it enables the RBI to control liquidity in the economy, and thereby inflation.*

Note that cut (increase) in CRR means more (less) money in terms of loan chasing the same number of borrowers, hence interest rate comes down (goes up).

Banks are also required to invest in government securities as a part of their SLR (***Statutory Liquidity Ratio***) requirements. The government securities (also known as *gilt-edged securities or gilts*) are bonds (e.g., IDBI, UTI bonds) issued by the Central government to meet its revenue requirements.

REPO & REVERSE REPO

A **repo** is a **repurchase agreement**. Under a repo transaction, the bank sells government securities to the RBI bank with an agreement to repurchase (buyback) the same securities at a predetermined date. The **reverse repo is the mirror image of repo transaction.**

SBI

Selling government securities to RBI with an agreement of repurchasing (buying back) them within 14 days. Therefore, RBI buying the securities temporarily for a short-term.

Repo: Injects Liquidity

SBI

Buying government securities from the RBI with an agreement of selling them back within 14 days. Therefore, RBI is selling the securities temporarily for a short-term.

Reverse Repo: Absorbs Liquidity

The more the number of trips to the bank, means the less individual A hold money with him and larger the amount of interest earnings.

$$\text{Real Money Balance} \left(\frac{M^d}{P} \right) = L(Y, r)$$

where $L_Y > 0$ and $L_r < 0$

The higher the interest rate, more money to be parked with the banks and less money to be hold in hands for transactions purposes.

$$\text{Real Money Balance} \left(\frac{M^d}{P} \right) = L = k Y - \kappa r \quad k, \kappa > 0$$

'Y' being the money income and 'r' being the interest rate.

The more the number of trips to the bank, means the less individual A hold money with him and larger the amount of interest earnings.

$$\text{Real Money Balance} \left(\frac{M^d}{P} \right) = L(Y, r)$$

where $L_Y > 0$ and $L_r < 0$

The higher the interest rate, more money to be parked with the banks and less money to be hold in hands for transactions purposes.

$$\text{Real Money Balance} \left(\frac{M^d}{P} \right) = L = k Y - \kappa r \quad k, \kappa > 0$$

'Y' being the money income and 'r' being the interest rate.

SPECULATIVE DEMAND FOR MONEY

- ✖ Speculation = buying an asset in the hopes that its price will rise, e.g., a bond.
- ✖ Bond price vary inversely with interest rate, i.e., *if interest rate rises, bond price falls.*
- ✖ So, lower the interest rate, the more you might expect them to rise and bond prices to fall, so you would hold fewer bonds and more money.

THE CLASSICAL VIEW

THE QUANTITY THEORY OF MONEY

$$M^S \times V = P \times Y$$

Money Supply \times Velocity[†] = Price \times Output

Classicalists assumed V and Y to be fixed.

Therefore, *price level is proportional to the money stock.*

[†] It measures the rate at which money circulates in the economy.

Summary

Because nominal wage is *sticky*, an unexpected change in the price level moves the real wage away from then target real wage, and this change in the real wage fluctuates the amount of labor hired and output produced.

$$\text{SRAS: } Y = \bar{Y} + \alpha(P - P^e); \alpha > 0$$

This is also called the Lucas supply curve, named after Robert Lucas.

Output deviates from its natural level when the price level deviates from the expected price level.