

**S.S.B.COM II**  
**MACRO ECONOMIC ISSUES AND POLICIES**  
**UNIT 1**  
**THE QUANTITY THEORY OF MONEY: THE**  
**CLASSICAL AND NEO CLASSICAL VIEW**

**DEPARTMENT OF BUSINESS ECONOMICS**  
**FACULTY OF COMMERCE, MSU**

# Theories of Money and Prices

- Classical Quantity Theory of Money– Different Versions
- Keynes's Critique and Keynesian Theory of Money & Prices
- Friedman's Restatement of Quantity Theory



# The Quantity Theory of Money



- Transactions and the Quantity Equation-- Fisher's Transactions Approach and Equation of Exchange—Income Version of Quantity Theory —Keynes's Critique of Quantity Theory of Money— Effect of Factors Other than Money



# The Quantity Theory of Money

- Transactions and the Quantity Equation
- People hold money to buy goods and services.
- The more money they need for such transactions, the more money they hold.
- The link between transactions and money is expressed in the following equation, called the quantity equation:

$$\text{Money} \times \text{Velocity} = \text{Price} \times \text{Transactions}$$

$$\text{or, } M \times V = P \times T.$$

- Examining each of the four variables in this equation:
- The right-hand side of the quantity equation tells us about transactions.
- **T** represents the total number of transactions during some period of time, say, a year.
- In other words, T is the number of times in a year that goods or services are exchanged for money.
- **P** is the price of a typical transaction – the number of rupee notes exchanged.
- The product of the price of a transaction and the number of transactions, **PT**, equals the number of rupee notes exchanged in a year.

$$(MV = PT)$$

- The left-hand side of the quantity equation tells us about the money used to make the transactions.
- **M** is the quantity of money. **V** is called the *transactions velocity of money* and measures the rate at which money circulates in the economy.
- In other words, *velocity tells us the number of times a rupee note changes hands in a given period of time.*
- For example, suppose that in an economy only biscuits are produced, and 60 packets of biscuit are sold in a given year at Rs. 20 per packet.
- Then **T** equals *60 packets per year*, and **P** equals *Rs. 20 per packet*.
- The total rupee notes exchanged is
- $PT = (\text{Rs. 20/packet}) \times (60 \text{ packets/year}) = \text{Rs. 1200/year}.$
- The right-hand side of the quantity equation equals Rs. 1200 per year, which is the rupee value of all transactions.

# Calculating Velocity

- Suppose further that the quantity of money in the economy is Rs. 600.
- By rearranging the quantity equation, we can compute velocity as

$$V = PT/M$$

- = (Rs. 1200/year)/(Rs. 600)
- = 2 times per year.
- That is, for Rs. 1200 of transactions per year to take place with Rs. 600 of money, each rupee note must change hands 2 times per year.



# The Quantity Theory of Money

The theory that increase in the quantity of money leads to the rise in the general price level was first put forward by Irving Fisher.

**Premise:**        The greater the quantity of money, the higher the level of prices and vice versa.

Therefore, the theory which linked prices with the quantity of money came to be known as quantity theory of money.

Stated in its simplest form, the quantity theory of money says that the level of prices varies directly with quantity of money.

*The price level rises proportionately with a given increase in the quantity of money, other things remaining the same.*



- The general price level in a community is influenced by the following factors:

*(a) The volume of trade or transactions;*

*(b) The quantity of money;*

*(c) Velocity of circulation of money.*

- The volume of trade or transactions depends upon the amount of goods and services to be exchanged.
- This was assumed to be constant as the classical and neoclassical economists subscribing to the quantity theory of money assumed *full employment* of all resources in the economy.
- Hence the total (real) volume of trade or transactions would remain the same.
- The quantity of money would be given by the Central monetary authority.
- The velocity of circulation of money, i.e., the *number of times* a unit of money changes hands during exchanges in a year, was assumed to be given by institutional factors.

# Fisher's Equation of Exchange

- American economist, statistician and polymath Irving Fisher expressed the relationship between the quantity of money and the price level in the form of 'the equation of exchange'. This is:

$$PT = MV \quad \dots(1)$$

or

$$P = MV/T \quad \dots(2)$$



Where, **P** stands for the average price level:

- T** stands for total amount of transactions (or total trade of amount of goods and services), which may include raw materials, resale old goods etc.
- M** stands for the quantity of money; and
- V** stands for the transactions velocity of circulation of money.
- The equation (1) or (2) is an accounting identity and true by definition. This is, because MV, which represents money spent on transactions must be equal to PT which represents money received from transactions.*

# From Accounting Identity to A Theory of the Price Level

- However, the equation of exchange as given in equations (1) and (2) has been converted into a theory of determination of general level of prices by making the following **assumptions**.
- 1) *The physical volume of transactions ( $T$ ) is constant.*
- 2) *The transactions velocity of circulation ( $V$ ) is also constant* in the short run.
- *The quantity theorists believed that the volume of transactions ( $T$ ) and the changes in it were largely independent of the quantity of money.*
- They also believed that changes in velocity of circulation ( **$V$** ) and price level ( **$P$** ) do not cause any change in volume of transactions except temporarily.
- Thus the Classical proponents of the quantity theory of money believed that the number of transactions (which ultimately depends on aggregate real output) does not depend on other variables ( **$M$ ,  $V$  and  $P$** ) in the equation of exchange.
- *Thus the assumption of constant  $V$  and  $T$  converts the equation of exchange ( $MV = PT$ ), which is an accounting identity, into a theory of the determination of general price level.*

# Prices and the Quantity of Money: Example

- The quantity of money is fixed by the Government and the Central Bank of a country, and is assumed to be autonomous of the real forces which determine the volume of transactions or national output.
- Now, with the assumptions that  $M$  and  $V$  remain constant, the price level  $P$  depends upon the quantity of money  $M$ ; the greater the quantity of  $M$ , the higher the level of prices.
- **Numerical Example:** Suppose the quantity of money is ` 5,00,000 in an economy, the velocity of circulation of money ( $V$ ) is 5; and the total output to be transacted ( $T$ ) is 2,50,000 units. What will be the average price level ( $P$ )?

Now suppose the quantity of money increases to 10,00,000. What will be the new price level other things remaining the same?

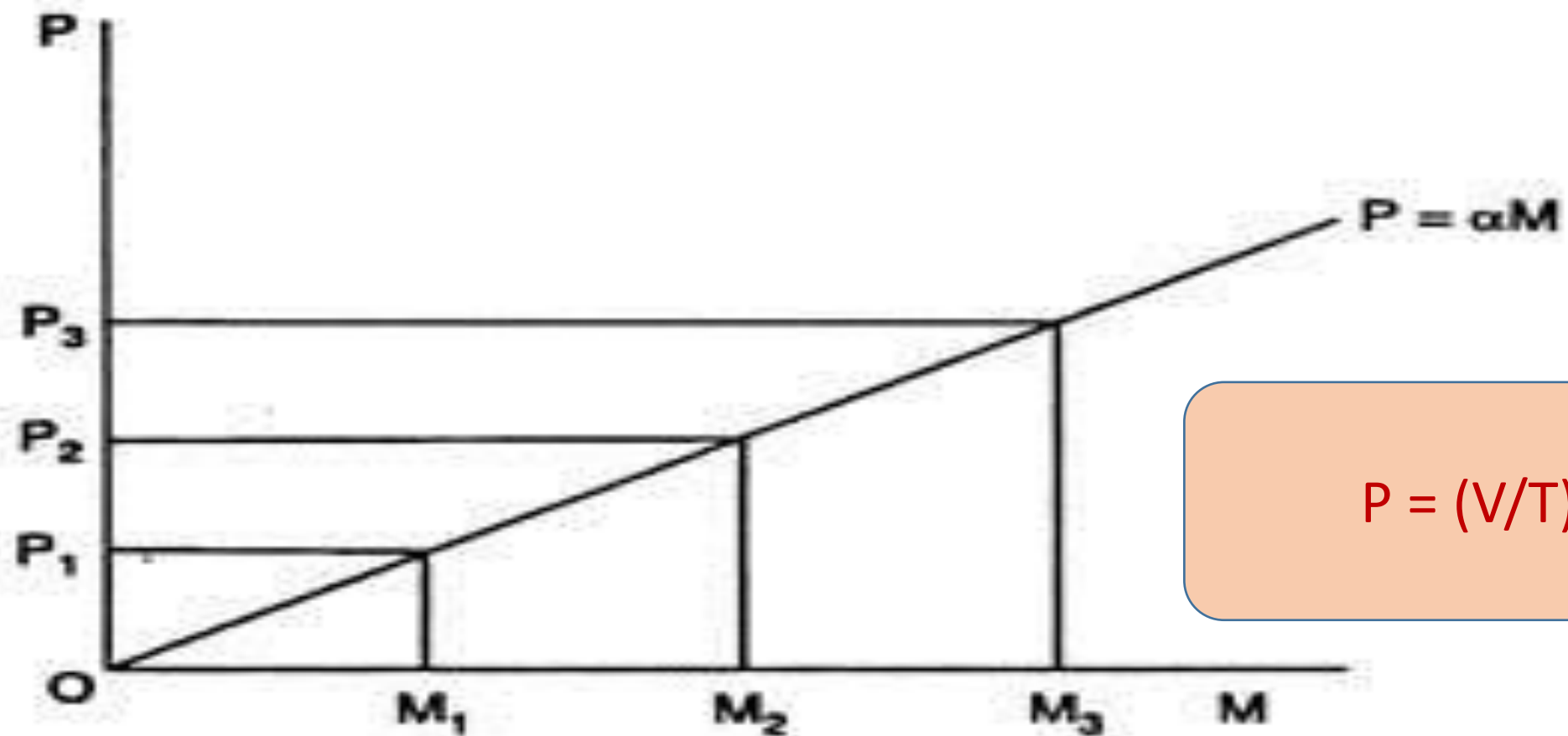
-

# The Money-Price Proportionality Relation

The Quantity Theory thus implies that *the price level varies in direct proportion to the quantity of money.*

A doubling of the quantity of money ( $M$ ) will lead to the doubling of the price level.

*Further, since changes in the quantity of money are assumed to be independent or autonomous of the price level, the changes in the quantity of money become the cause of the changes in the price level.*



$$P = (V/T) \cdot M$$

Fig. 1 : Relation between money supply and the price level

# Quantity Theory of Money: Income Version

- The volume of transactions and its average price level referred to in Fisher's transactions approach to quantity theory of money are conceptually difficult to measure.
- Therefore, in later approaches the quantity theory was formulated in the income form which considers real income or GDP (i.e., transactions of final goods only) rather than all transactions.
- Data regarding national income or output is readily available.
- Also, the average price level of output is a more meaningful and useful concept.
- The general price level in a country is measured taking into account only the prices of final goods and services which constitute national product.
- Note that even in this income version of the quantity theory of money, the function of money is considered to be a means of exchange as in the transactions approach of Fisher.
- The concept of *income velocity of money* has been used instead of transactions velocity of circulation.
- *By income velocity we mean the average number of times per period a unit of money is used in making payments involving final goods and services, that is, national product or national income.*



# The Income Version of the Quantity Theory

- The income version of quantity theory of money is written as below:

$$MV = PY \dots \dots (3)$$

Or,  $P = MV/Y \dots \dots \dots (4)$

Where

- $M$  = Quantity of money
- $V$  = Income velocity of money
- $P$  = Average price level of final goods and services
- $Y$  = Real national income (or aggregate output)
- *Like in the transactions approach, in this income version of the quantity theory also, the different variables are assumed to be independent of each other.*
- *Further, income velocity of money ( $V$ ) and real income or aggregate output ( $Y$ ) are assumed to be given and constant during a short period. They do not vary in response to the changes in  $M$ .*

- Real income or output ( $Y$ ) is assumed to be determined by the real sector forces such as capital stock, the amount and skills of labour, technology etc.
- These factors are taken to be given in the short run.
- Further, the assumptions of Say's law and wage-price flexibility ensure full employment of resources.

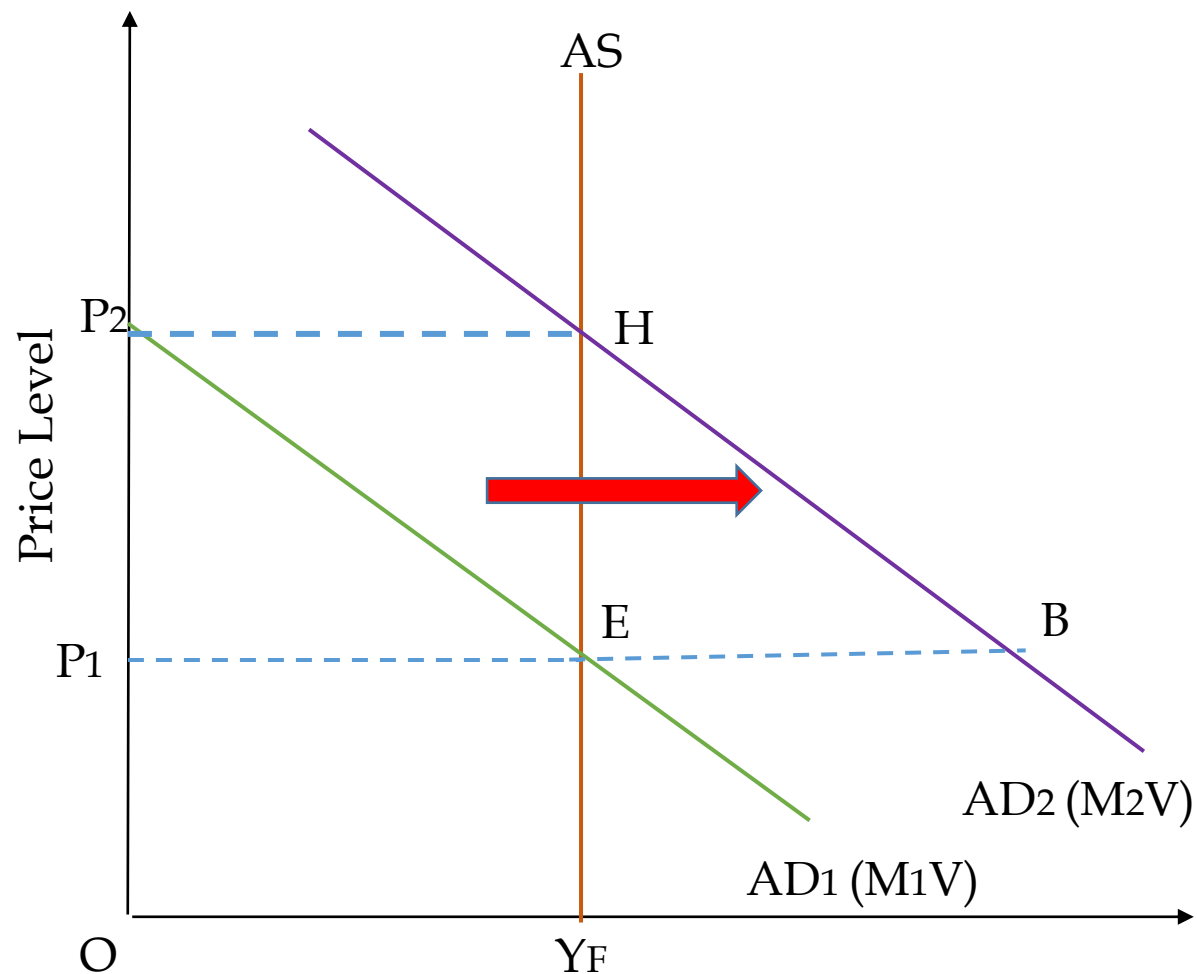


Supply of output is inelastic and constant at full-employment level.

- *It follows from equations (3) and (4) above that with income velocity ( $V$ ) and national output ( $Y$ ) remaining constant, price level ( $P$ ) is determined by the quantity of money ( $M$ ).*

# Classical Quantity Theory of Money in the Aggregate Demand -Aggregate Supply Framework

- The quantity of money ( $M$ ) multiplied by the income velocity of circulation ( $V$ ), that is,  $MV$  gives us aggregate expenditure in the quantity theory of money.
- Now, with a given quantity of money, say  $M_1$  and constant velocity of money  $V$ , we have a given amount of monetary expenditure ( $M_1V$ ).
- Given this aggregate expenditure, at a lower (higher) price level more (less) quantities of goods can be purchased and at a higher price level, less quantities of goods can be purchased.
- Therefore, in accordance with classical quantity theory of money aggregate demand, representing  $M_1V$  slopes downward.
- This is shown by the aggregate demand curve  $AD_1$  in Fig. 1 below.



Aggregate Demand, Aggregate Supply

Fig. 1: Quantity Theory:  
Depiction in Aggregate  
Demand-Supply Framework

The downward sloping schedule  $AD_1$  represents the aggregate demand corresponding to money supply  $M_1$ . If the quantity of money is increased to  $M_2$ , the aggregate demand curve, representing new aggregate monetary expenditure  $M_2V$  will shift to the right.

The aggregate supply curve  $AS$  is completely inelastic given the assumptions of perfect wage-price flexibility and full-employment.

The aggregate demand curve  $AD_1$  cuts the aggregate supply curve  $AS$  at point  $E$  and determines price level  $OP_1$ .

Now, if the quantity of money is increased to  $M_2$ , the aggregate demand curve shifts upward to  $AD_2$ . With the increase in aggregate demand to  $AD_2$ , excess demand ( $=EB$ ) emerges at the current price level  $OP_1$ .

*As output cannot be increased, the excess demand will lead the price level increase to  $OP_2$  at which again aggregate quantity demanded equals the aggregate supply which remains unchanged at  $OY_F$*

# Quantity Theory of Money: the Cambridge Cash-balance

## Approach

- Cambridge economists Marshall and Pigou have stated the equation of exchange in a form different from Irving Fisher. According to the Cambridge economists, the value of money (*i.e.*, its purchasing power) is determined by the demand for and supply of money.
- *In cash-balance approach to demand for money Cambridge economists laid stress on the store of value function of money in contrast to the medium of exchange function depicted by Fisher.*
- According to cash balance approach, the public likes to hold a proportion of nominal income ( $k$ , say) in the form of money (*i.e.*, cash balances).
- Then cash balance approach can be written as:
- $$Md = kPY \dots \quad (1)$$
- where  $Y$  = *real* national income (*i.e.*, aggregate output),  $P$  = the price level
- $PY$  = *nominal* national income,
- $k$  = the proportion of nominal income that people want to hold in money
- $Md$  = the amount of money which public want to hold

- For equilibrium in the money market, demand for money must equal with the supply of money,  $M$ .
- The supply of money  $M$  is exogenously given and is determined by the monetary policies of the central bank of a country. Thus, for equilibrium in the money market,

$$M = M^d$$

Or,

$$M = kPY \dots \quad (2)$$

$k$  in the equations (1) and (2) is related to velocity of circulation of money  $V$  in Fisher's transactions approach. Thus, when a greater proportion of nominal income is held in the form of money (*i.e.*, when  $k$  is higher),  $V$  falls.

- *“The higher the proportion of their real incomes that people decide to keep in money, the lower will be the velocity of circulation, and vice versa.”*
- It follows from above that  $k = 1/V$ .

# Price Determination

Rearranging equation (2), we have the cash balance equation giving price as the dependent variable, as

$$P = (1/k).M/Y \quad \dots(3)$$

Like Fisher's equation, cash balance equation is also an accounting identity because  $k$  is defined as:

$$\text{Quantity of Money} / \text{National Income, or,} = M/PY$$

Now, the Cambridge economists also assumed that  $k$  remains constant.

Further, due to their belief that wage-price flexibility would ensure full employment of resources, the level of real national income was also fixed.

Thus, from equation (3) it follows that with  $k$  and  $Y$  remaining constant , *price level (P) is determined by the quantity of money (M);*

*Changes in the quantity of money will cause proportionate changes in the price level.*



## The Cash balance & the Transactions Approach Compared

There are some **similarities** between the Cambridge cash-balance approach and Fisher's transactions approach.

- **k is reciprocal of V.** That is,  $k = 1/V$  or  $V = 1/k$
- Thus in equation (2) above, if we replace k by  $1/V$ , we have,

$$M = (1/V) \cdot PY$$

or  $MV = PY$ , which is the income version of Fisher's quantity theory of money.

- However, the similarity in form notwithstanding, there are important conceptual **differences** between the two which makes cash-balance approach superior to the transactions approach. In very brief,
- Fisher's transactions approach lays stress on the medium of exchange function of money, while the cash balance approach emphasises the store-of-value function of money.
- Further, the Cambridge explanation of the factors which determine velocity of circulation, k in the cash balance approach, is **behavioural** in nature, unlike the **mechanistical** approach of the transactions version in explaining V.

# Criticism of the Quantity Theory by Keynes and his Associates:

1. The theory has been alleged to be a “**Useless truism**”. With the qualification that velocity of money (V) and the total output (T) remain the same, the equation of exchange ( $MV = PT$ ) is a useless truism.

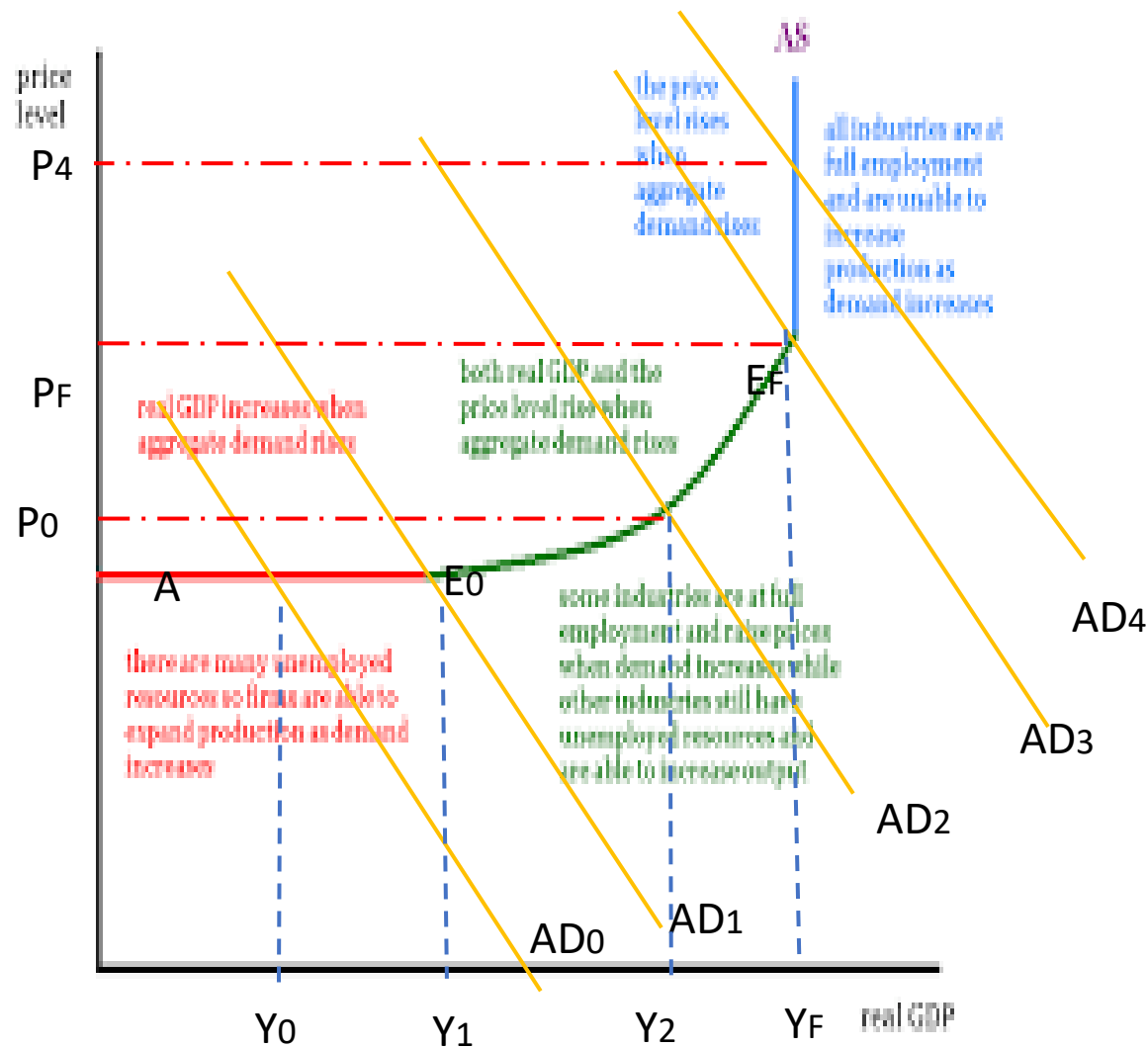
Fisher’s equation of exchange simply tells us that expenditure made on goods (MV) is equal to the value of output of goods and services sold (PT).

**2. Velocity of money is not stable.** Keynesian economists have challenged the Quantity Theory assumption that velocity of money remains stable.

They argue that velocity changes inversely with the change in money supply. Increase in money supply, with constant demand for money, leads to the fall in the rate of interest which will cause people to hold more money as idle cash balances (under speculative motive). This means velocity of circulation of money will be reduced.

3. The third criticism is that increase in quantity of money may not always lead to the increase in aggregate expenditure or aggregate demand.

Note that changes in the quantity of money DO often induce changes in the volume of aggregate spending. **What Keynes and his followers deny is the assertion that there exists a direct, simple, and more or less a proportional relation between variation in money supply and variation in the level of total spending.**



Over the horizontal range AE0 on the aggregate supply curve AS, the economy is in recession, there is unemployment and excess productive capacity. Supply of output is perfectly elastic over this range.

Suppose now that the government seeks to cure this recession by increasing spending on infrastructure, and finances this by printing new money, i.e., by augmenting money supply.

As aggregate demand AD increases to AD1, output can be expanded to Y1 without any increase in costs and therefore, prices, by putting into use the excess capacity in the economy. In the short-run, thus, it is output, *not price*, that adjusts to an increase in aggregate demand.

Over the upwardly sloped range E0E1EF on AS, both price and output adjust upwards as aggregate demand increases, until the full employment output YF is reached.

It is *only when* output reaches full-employment level YF, that further increase in money supply will lead to increase in the price level in full proportion.

Thus, according to Keynes, it is only when the economy is operating at full-employment or potential output level that increase in money supply leads to the proportionate rise in price level. However, full employment cannot be assumed to be a normal state of affairs in a free-market economy.

## Criticisms: (*contd.*)

4. Perhaps the most serious criticism levelled by Keynes against the Quantity Theory is its envisaged role of money solely as a medium of exchange. That people may hold money for reasons other than transactions purposes, particularly for speculative motives, was to be later elegantly formalized in Keynes's own theory of the demand for money.

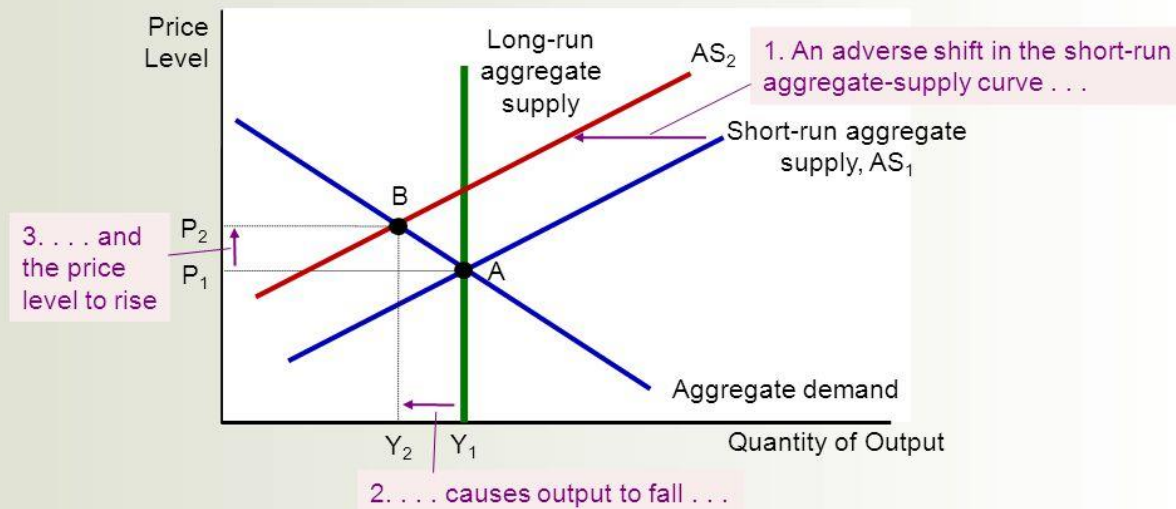
Crowther comments, "The modern tendency in economic thinking, in fact, is to discard the old notion of the quantity of money as a causative factor in the state of business and a determinant of the value of money and to regard it as a consequence".

# Factors Other than Quantity of Money Also Affect the Price Level.

- The quantity theory does not consider other factors than the quantity of money that cause changes in aggregate demand and influence changes in price level.
- Some of these factors are:                      increase in government expenditure.    with quantity of money remaining unchanged--- increased investment by optimistic investors, or increase in demand for exports of a country, all of which cause aggregate expenditure to increase.
- If the increase in aggregate demand is not matched by sufficient increase in supply of output, imbalance between demand and supply causes price level to rise
- Below, we consider just one such instance in economic history when prices rose exorbitantly in a sustained manner without any change in money supply.

Figure 3

### An adverse shift in aggregate supply



When some event increases firms' costs, the short-run aggregate-supply curve shifts to the left from  $AS_1$  to  $AS_2$ . The economy moves from point A to point B. The result is stagflation: Output falls from  $Y_1$  to  $Y_2$ , and the price level rises from  $P_1$  to  $P_2$ .

- Prices may rise due to *supply-side factors*, even when the quantity of money remains the same.
- The stagflation of 1970s is a remarkable case in point.
- It was caused by the hiking of price of crude oil by the OPEC countries, raising cost of production in many industries and shifting the short-run aggregate supply curve to the left (Fig. 3).
- Thus, prices increased steeply even without increase in the quantity of money.

54

"The quantity theory of money thus rests, ultimately, upon the fundamental peculiarity which money alone of all human goods possesses - the fact that it has no power to satisfy human wants except a power *to purchase* things which do have such power."

Irving Fisher, *Purchasing Power of Money*, 1911: p.32

It is precisely THIS characterization of money that later economists were to contest and develop more fuller, realistic theories of money.





*References:*

1. *Macroeconomics* (2003): N. Gregory Mankiw
2. *Macroeconomics: Theory & Policy* (20<sup>th</sup> Ed.): H. L. Ahuja