# Chapter 2
# Theory and Literature Review

## 2.1 Economic Theory

### 2.1.1 Interest and Money in Keynesian Approach

Interest is a payment for the use of money. Since this is just what the arithmetic books say it is, it would be unnecessary to make much of the point if traditional economic theory had not viewed interest as something quite different as a payment for "waiting" for "saving" for "abstinence" or for "time preference."

The difference between the traditional theory of interest and Keynes' money theory of interest is a fundamental aspect of the difference between the economics of full employment and the economics of less than full employment. By the economics of full employment is meant analysis which assumes that no resources are involuntarily unemployed so that an increase in the production of one thing necessarily involves the withdrawal of resources from some other employment. Of investment is to be increased, for example, this can only be done if resources are withdrawn from employment in the consumers goods industries. If people can be induces to wait a while for some of their consumption into investment-goods production to an extent corresponding to the reduction in spending for consumers goods. The inducement which is paid to get people to forego present consumption is interest, the payment for waiting. Within the framework of a system of theory built on the assumption of full employment, the notion of interest as a reward for waiting or abstinence is highly plausible. It is the premise that resources are typically fully employed that lacks plausibility in the contemporary world.

If unemployed resources are present on a large scale, there is no obvious necessity for paying people to abstain from consumption in order that more resources may be devoted to the production of capital goods (investment). The obvious way to produce more capital goods is to put the idle resources to work and not to withdraw resources already the point where full or approximately full employment is reached, it would be foolish to try to order to free resources so that more capital assets could be

produced. In fact, a reduction in the demand for consumers goods is likely to lessen the incentive to produce capital goods if the reduction in consumer demand represents a permanent change of habit on the part of the consuming public. Something other than a theory of "waiting" or "time preference" is needed to explain why interest is paid.

Keynes's explanation is that interest is a purely monetary phenomenon, a payment for the use of money. This view of money in the economics system. The main tradition in economic theory since the time of eighteenth century mercantilism has banished money as a significant factor in the main body of principles of economic, but Keynes's monetary theory of interest reintegrates money into the theory of output and employment for the economy as a whole. While technical monetary theory falls into the background, the essential role of money is explained in relation to the theory of interest. The rate of interest is vital in relation to investment, and investment is the strategic determinant of the volume of employment since, according to the principle of effective demand, employment cannot increase unless there is an increase in investment. Thus monetary theory becomes an essential part of general economic theory through its relation to the theory of interest, and monetary policy becomes a vital part of general economic policy.

At every step in the following discussion of the theory of interest, it is helpful to bear in mind the close connection between Keynes's theory and the policy which he advocates. The theory of interest is at the same time part of the theory of money, and control of the rate of interest is to be attained through control of the supply of money. Control of the supply of money is one of the most effective and employment. This is the operational meaning of Keynes's theory of interest and money. The agency of control of the money supply is the monetary authority, in particular the central banking system.



Banking policy in the past has all too frequently resulted in a shortage of money when more money was needed and an oversupply when less money was needed. The former contributes to unemployment and the latter to inflation. Since the long-term trend under private capitalism in its present stage of development is probably toward unemployment rather than inflation, Keynes gives special attention to the necessity of an "easy money" policy. He recognizes at the same time the

dangers of inflation in war and postwar periods and has made outstanding proposals for coping with such situations. Keynes's theory of interest and money has its operational or practical meaning in the thesis that the banking system holds the key to the expansion of employment. With this in mind, the meaning and significance of interest rates will easily be understood. In a period of expanding output, and a bank policy which does not permit a sufficient increase in the supply of money will cause a rise in the rate of interest and in this manner choke off the incipient expansion. An energetic policy by the monetary authority can do much to lower the long-term rate of interest to a level which will stimulate enough investment to fill the ever-threatening gap between income and consumption.

**Statement of the Theory of Interest**

The proposition that interest is a monetary phenomenon does not, of course, in itself constitute a theory of money or of interest. However, it does provide a point of departure for a theory of interest which differs fundamentally from the traditional view of interest as a reward for "waiting". Interest is a monetary phenomenon in the sense that the rate of interest is determined by the demand for and the supply of money. Money is demanded because to is the only perfectly liquid asset. People who need money for personal and business reasons and do not possess it are willing to pay a price for its use. Before a holder of money will surrender the advantages that attach to the ownership of the only perfectly liquid asset, he must be paid a reward. Interest is reward paid for parting with liquidity, or in slightly different terms, the reward for not-hoarding. The rate at which interest will be paid depends on the strength of the preference for liquidity in relation to the total quantity of money available to satisfy the desire for liquidity. The stronger the liquidity preference, the higher is the rate of interest; and the greater the quantity of money, the lower is the greater the quantity of money, the lower is the rate of interest. A decrease in liquidity preference will tend to lower the rate of interest and a decrease in the quantity of money will tend to raise the rate of interest. The rate of interest, like any price in a free market, is established at a level at which the demand will be equilibrated with the supply available to meet the demand. At any time, an increase in the desire of the public to hold cash—that is, an increase in its liquidity preference—may be met either by an increase in the price paid

(interest) or by an increase in the quantity available. Since money cannot be produced by the public, the direct result of an increase in its desire for money will not be to increase the quantity available but to increase the premium paid to those who give up their cash holdings. An increase in the rate of interest means a larger reward is paid for not-hoarding, and people who otherwise would not be satisfied except to increase their cash holdings will be satisfied as a result of the higher premium they receive for not holding cash. If the rate of interest did not rise when liquidity preference increased, the total amount of cash the public would wish to hold at the existing rate of interest would exceed the available supply. If the rate of interest did not fall when liquidity preference decreased, there would be a surplus of cash which no one would be willing to hold. Thus, if the rate of interest tends to be too high or too low, an adjustment takes place whereby the demand is equated to the available supply.

Since the quantity of money is the other factor which, along with the state of liquidity preference, determines the rate of interest, it is possible for the monetary authority to meet an increase in the desire on the part of the public to hold money with an actual increase in the supply of money. If people want to hold more money, the monetary authority, and only the monetary authority, can give them what they want. If the quantity of money is increase in proportion to the increase in liquidity preference, the rate of interest will not rise as it does when the quantity of money remains unchanged and liquidity preference increases. Since the rate of interest is one of the co-determinants of investment, and investment is the main determinant of employment, the importance of monetary policy in determining the volume of employment is easily seen.



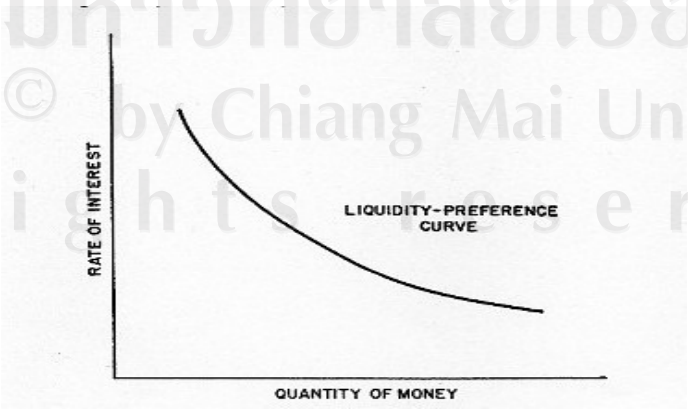


**Figure 2.1** Liquidity-Preference Schedule

The relationship between the rate of interest, the quantity of money, and liquidity preference may be represented by means of a diagram. In Figure 2.1, the quantity of money is shown along the horizontal axis and the rate of interest along the vertical axis. The liquidity-preference schedule will then appear as a smooth curve which decreases toward the right as the quantity of money increases. It is obvious from the diagram that larger quantities of money will be associated with lower rates of interest as long as the liquidity-preference schedule remains unchanged.

Interest appears in the market in form of a reward paid to a wealth-holder who parts with control of money in exchange for a debt, e.g., for a bond or note or mortgage, for a stated period of time. The rate of reward per unit of time differs for debts of varying lengths. Thus, there will be one rate of interest on call loans, another rate on three-day loans, and still other rates on six-month, one- year, five-year, ten-year and longer loans. While these rates differ in amount, they are all of the same specie. If is convenient in discussions of the theory of interest to speak of the rate of interest without reference to debts of any particular maturity. This simplification should not cover the fact that what really exists in the money market is a complex of rates of interest. Sometimes it is convenient to distinguish the short-term rate of interest paid on commercial bank loans from the long-term rate paid on bonds. In Keynes's general theory of employment, the important role played by real investment in durable capital assets makes the ling-term rate of interest on loans used to finance such investments of prime significance. Fluctuations in the long-term rate of interest are reflected in changes in the price of bonds in the securities markets. As the price of bonds already outstanding in the market rises, the effective rate of interest falls; and as the price of bonds falls, the rate of interest rises. Thus, if a bond paying $50 per year sells at $1,000 in the market, the prevailing rate of interest on that type of security is 5 per cent. If the price of the bond in the market rises above $1,000, this means the effective rate of interest falls below 5 per cent because more than $1,000 is now required to purchase an annual income of $50. Thus, references to changes in the rate of interest arising from changes in the state of liquidity preference or from changes in the supply of money may be visualized as taking the form of fluctuations in the price of bonds in the organized securities markets. A decrease in liquidity preference is reflected in an eagerness on the part of the public to purchase bonds at

current prices, thus pushing up the prices of bonds and lowering the rate of interest. An increase in liquidity preference is reflected in an eagerness by the public to sell bonds in order to get cash. On a seller's market, the price of bonds falls and the rate of interest rises. The monetary authority may increase the supply of money and thus prevent the rise in the rate of interest by purchasing securities which the public wishes to sell at the current market price. When the monetary authority pays for its purchases with "new" money, it increases the supply of money and forestalls a rise in the rate of interest.

**Liquidity Preference**

The demand for money is a demand for liquidity. Liquidity may be analyzed in more detail by distinguishing three separate motives which lead to liquidity preference: (1) the transactions motive, (2) the precautionary motive, and (3) the speculative motive. Although interest is peculiarly related to the speculative motive, the other two motives cannot be ignored because money held for one purposes. A cash balance is, as a rule, held for other purposes. A cash balance is, as a rule, held in a single pool the size of which is determined by a combination of the motives for liquidity preference. Part of the total may be held primarily for one purpose and secondarily for another purpose so that even the possessor does not have clearly in mind how much he holds for each separate in the total economy, an increase in the demand for money, e.g., for transactions, may be met by drawing upon the amount held for the speculative motive, in which case the rate of interest would tend to rise even thought there were no change in the strength of the speculative motive and no change in the aggregate supply of money. Therefore, consideration is given to the transactions and the precautionary as well as to the speculative motive. But it is the last named which calls for the most attention in connection with the theory of interest.



**Transactions Motive**

The quantity of money required to satisfy liquidity preference for the transactions motive is closely related to the volume of income and employment, that is to the general level of business activity. As total output and employment rise and as

prices and wages rise, the transactions demand for money also rises. A cash balance is required to bridge the interval between the receipt of income and its outlay for expenditures. The size of the cash balance will be related to the size of the income received and also to the frequency of income payment and the frequency of expenditure. Of everyone received income in cash and simultaneously paid their expenses in cash, there would be little necessity for holding money balances for transactions purposes. There would be no interval to bridge. In the case of personal accounts, the cash balance actually held will be greater in proportion to the length of interval between paydays. A person who is paid monthly will have need for a larger average cash balance than an individual who is paid daily, assuming that there is some similarity in their expenditure habits. For example a man who receives his entire income of $300 per month in a single payment and spends it in constant outlays of $10 per day will have a $300 balance the first day and a balance which decreasesy $10 per day until at the end of the month he has a zero balance. The average cash balance for the month would be $150. but if this same individual were to be paid weekly, he would require an average balance of only $37.50, or one-half of his weekly $75 pay check.

Business firms, like individuals, find it necessary to hold bank balances to bridge the gap between outlays for expenses and the receipt of cash from sales of finished products. Again as with individuals, the size of the balance will vary indirectly with the length of the interval. The business motive for holding cash will rise as businesses activity increases. Payments from one entrepreneur to another will vary with the number of stages through which goods pass on their way to final completion, that is with the degree of integration in the economy as a whole. Increasing integration will, other things being equal, diminish the demand for money. However, factors like the degree of business integration change relatively slowly and except for fluctuations in the level of business activity. There is no major factor causing changes into the demand for cash for transactions in the short run.



**Precautionary Motive**

The second motive for liquidity preference—the precautionary motive—arises because individuals and business firms find it good practice to hold a reserve of

cash in addition to what is needed for transactions. An individual who goes shopping will normally take more money than just the amount he thinks he will need for planned purchases. Plans may change or opportunities may arise to make especially advantageous purchases if they are transacted on the spot without delay. In business the need for immediate cash may arise in order to meet contingent liabilities or unforeseen opportunities to make advantageous purchases. The quantity of money held to satisfy the precautionary motive will vary widely with individuals and businesses, according to their degree of financial conservatism, the nature of their enterprise, their access to the credit market, and the stage of development of organized markets for quick conversion of earning assets such as stocks and bonds into cash. Danger of being cut off from the credit market, say as a result of business losses, will be an especially important factor tending to increase the size of pre cautionary holdings by business firms. As long as individuals and businesses feel assured of ready access to extra cash by temporary borrowing, the precautionary motive to hold money will be relatively weak.

Although organized markets in which securities can be converted quickly and cheaply into cash tend to reduce the size of precautionary holdings, the possibility of forced liquidation under highly unfavorable conditions serves. Precautionary balances may be held in savings deposits, where they will earn a low rate of return but where there is no danger, apart from failure of the bank, that the money value of the investment will depreciate. However, a notice of thirty days or so is required before funds may be withdrawn, the savings account lacks the advantages of perfect liquidity. Savings deposits are useful as a form of assent with a value fixed in terms of money which can be used to meet a subsequent liability fixed in terms of money. The cash reserves of a bank are themselves money held by the bank to protect itself against outstanding liabilities, the payment date of which cannot be predicted with certainty.



**Speculative Motive**

Despite some important differences between the demand for money for transactions and that for precautionary motives, Keynes lumps these two together in discussing the relation of money to the rate of interest. While cash for transactions

will be kept to a minimum, there is an obvious point where the convenience of holding cash to pay for regular expenditures will not be much affected by changes in the rate of interest. Likewise precautionary holdings, which depend mainly on the nature of the contingencies that are envisaged, are unlikely to be much affected by small changes in the rate of interest. Thus the significant type of liquidity preference in relation to the rate of interest is that arising from the so-called speculative motive, because speculative holdings are especially sensitive to changes in the rate of interest. Of the total supply of money is designated by M, we may refer to that part of M held for transactions and precautionary motives as M1, and to that part held for the speculative motive as M2. Thus, M=M1+M2. The rate of interest is primarily determined by the propensity of the public to hold money for the speculative motive in relation to the quantity of money available for that purpose, i.e. M2. The quantity of money which will be held to satisfy the speculative (M2) is a function (L2) of the rate of interest (r) or reward paid for giving up temporary control over money. A convenient shorthand expression for this relationship between money held for the speculative motive and the rate of interest is M3=L2 (r). Since the amount of money held for the transactions and precautionary motive (M1) depends primarily upon the general level of business activity which may be measured by income (Y). Then the equation M=M1+M2 may be expressed, M=L1(Y)+L2(r).

In connection with liquidity preference for the speculative motive (the desire for money as a store of wealth), the fundamental issues of modern monetary theory are raised. Why should anyone with a surplus of wealth choose to store it in the form of money and thus sacrifice the interest income which could be earned by exchanging money for a debt in the form of a bond or mortgage, et cetera? According to Keynes, the one essential condition in the absence of which liquidity preference for money as a store of value could not exist is the uncertainty as to the future of the rate of interest, by which is meant uncertainty as to the future of the complex of interest rates on debts of varying lengths which will prevail in the future. A wealth-holder who does not know on what terms he may be able to convert debts into money in the future has reason to believe that a postponed purchase may be preferable to a present purchase of a debt. For example, a man who contemplates paying $1000 for a bond yielding $30 per year when the rate of interest on this type of bond is 3 per cent will

hesitate to do so if he thinks the rate of interest on this same type of security may later rise, say to 4 per cent. At 4 per cent it is necessary to invest only $750 to get a return of $30 per year. Therefore, the price of the security will fall to approximately $750, which will mean a virtual loss of $250, less whatever interest is received in the interval, to anyone who paid $2000 for such a bond.

At any moment of time, the current rates of interest on debts of different maturities are known with certainty because there are actual quotations in the market. The rates of interest that will prevail in the future are not known with certainty. The current rates of interest do, however, take into account estimates or guesses concerning what the future rates will be. Market quotations represent the predominant, but not the universal, opinion as to what the future rates of interest will be. An individual who thinks he knows better than the market, i.e. better than the predominant opinion what the future will bring, is in a position to profit of his guesses actually turn out to be better than the predominant opinion. In the absence of uncertainty about the future rates of interest, the rates at which debts of varying maturities could be converted into money at any future date would also be known with certainty now because present rates would be perfectly adjusted to future prices. Under these circumstances, this would exist if there were no uncertainty, there would always be clear economic advantage in owning interest-bearing securities as compared with holding non-income-earning cash. There would exist no basis for liquidity preference for the speculative motive. This helps to explain why in the classical theory, which rests upon generally static assumptions, no significance is attached to the speculative motive and therefore M2 is equal to zero. Under static theory there may be change, but since the direction and extent of the change is assumed to be known now, the future changes are subject to rational discounting which incorporates them into current calculations. Hence, uncertainty in any significant sense is ruled out of the theory. It is precisely at this point that Keynes's theory differs fundamentally from the classical theory of interest. Wealth-holders lull their disquietude about the future by storing wealth in the form of money just because the actual world is highly dynamic and the future is above all uncertain. The degree of disquietude is measured by the rate of interest. Of course the mature of the real world is not changed by making assumptions which differ from reality. The upshot of

oversimplified assumptions is to render theory irrelevant for many types of problems. By assuming a kind of knowledge about the future which we do not and cannot possess, the classical theory rules out liquidity preference for the speculative motive, and with this, out goes the basis for a theory of interest. " 'interest' has really no business to turn up at all in *Marshall's Principles of Economics* " says Keynes, " it belongs to another branch of the subject."

The speculative motive for liquidity preference is thus defined as attempting to secure a profit from knowing better than the market what the future will bring. Purchases of bonds will be postponed if the rate of interest is expected to rise. If and when the rate of interest does rise, the price of bonds will fall, the person who has speculated by holding money can now buy at the lower price and realize a profit. An individual who expects the price of bonds to rise (the rate of interest to fall) more than predominant opinion, as expressed in market quotations, expects them to rise, is in a position to profit by borrowing money on short term in order to buy securities now and then sell them at a profit later when and if the price does in fact rise. In the language of the market, a "bear" position leads to a holding of cash in anticipation of a fall in the price of bonds (a rise in interest rates) and a "bull" position leads to the purchase of securities in anticipation of a rise in bond prices (a fall in interest rate). As either the "bear" or the "bull" position predominates in the market, there is an alternate rise and fall in the desire to hold cash. In the absence of changes in the total quantity of money (M), these speculative fluctuations impinge on output and employment by changing the rate of interest and thus reacting upon the volume of current real investment.

The difference of opinion among "bears" and "bulls" is in itself a stabilizing influence and contributes to the feasibility of monetary control of the economic system. Differences of opinion prevent, or at least reduce, the extent of shifts in the rate of interest. An increase in the desire on the part of some wealth-holders to hold money is offset by a decrease in the desires of others so that changing events often result in a redistribution of cash holdings rather than a mass rush into cash or out of cash. Of the banking authority, through open market operations, is able to purchase bonds by bidding up the price by slight amounts, it does so by causing some "bull" (a person holding securities) to exchange his bonds for the new cash and

thus become a “bear.” The rise in the price of bonds represents a fall in the rate of interest which, other things being the same, stimulates real investment and employment. If everyone reacted in the same way to changing events, the fluctuations in the rate of interest would be much more violent and the stability of the system would be lessened. As Keynes say: “It is interesting that the stability of the system and its sensitiveness to changes in the quantity of money should be so dependent on the existence of a variety of opinion about what is uncertain. Best of all that we should know the future. But if not, we are to control the activity of the economic system by changing the quantity of money, it is important that opinions should differ.” Since the transactions and the precautionary motives are both relatively insensitive to changes in the rate of interest, the effect of changes in the quantity of money upon the speculative motive is the substantial basis upon which monetary management rests its case for control of interest rates.

Although monetary management by the central monetary authority offers distinct possibilities for social control of employment, it is subject to important limitations which arise from the nature of the speculative motive. For while an increase in the quantity of money will, other things remaining unchanged, lower the rate of interest. It will not do so if liquidity preference is increasing more than the quantity of money. In this connection, it is important to distinguish between two points on the same liquidity-preference curve and two different liquidity-preference curves. Figures 2.2a and 2.2b are similar to Figure 2.1 except that the horizontal axis measures only the quantity of money available to satisfy the speculative motive. This is represented by M2. Corresponding to M2, the liquidity function for the speculative motive is L2. This function may be written M2 = L2 (r) which mean the quantity of money held for the speculative motive is a function of the rate of interest. In Figure 4a, A and B represent two points on the same liquidity-preference curve, and in 4b, A and C represent points on two different liquidity-preference curves. This distinction is analogous to that between two points on the same demand curve and a shift in an entire demand curve.

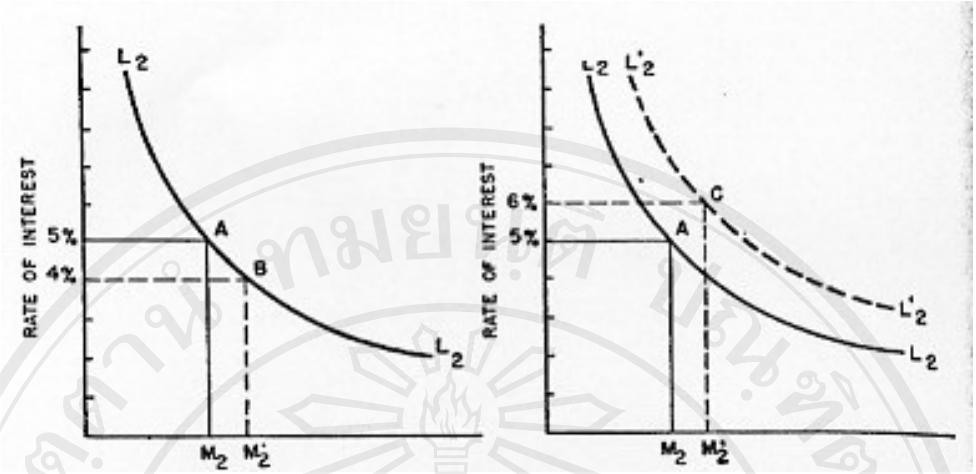


**Figure 2.2a** Two Point on the same Liquidity-Preference Schedule

**Figure 2.2b** A Change in Liquidity-Preference Schedule

In Figure 2.2a, an increase in the quantity of money from M2 to M2´ is accompanied by a fall in the interest rate from 5 per cent to 4 per cent. The assumption behind this lowering of the interest rate is that the action of the monetary authority in increasing the supply of money did not affect the expectations of wealth-holders. The additional supply of money was absorbed by the sale of securities to the banking authority with a resultant rise in security prices and a fall in the interest rate.

In Figure 2.2b, the increase in the quantity of money from M2 to M2´ is accompanied by a revision of expectations in the market such that the entire liquidity-preference schedule shifts upward to an extent that more than offsets the effect of the increase in the quantity of money for satisfying the speculative motive. Hence, instead of falling as in 2.2a, the interest rate rises from 5 per cent to 6 per cent. This means that central bank policy or some event accompanying it has led wealth-holders to increase their preference for holding money. Such an upward shift could be caused by many factors and might take place independently of a change in bank policy. When such shifts in liquidity preference occur, a considerable fluctuation in the rate of interest, i.e. in the prices of bonds, may take place with very little activity in the bond market. Shifts in the liquidity function may be either downward or upward depending on the way in which the public interprets a change in events. In so far as different individuals react differently to the new situation, movements will be less marked. On the other hand, if everyone interprets the new situation in the same way, the change in

interest rate may take place without any buying or selling of bonds and therefore without any redistribution of cash holdings.

As previously indicated, the total quantity of money (M) consists of two parts, money held to satisfy the transactions and precautionary motives (M1) and money held to satisfy the speculative motive (M2). Demand for the former varies primarily with changes in income (Y) or in terms of the equation M1=L1 (r). Demand for the latter (M2) varies primarily with changes in the rate of interest, such that M2=L2(r). However, income (Y) depend partly on the rate of interest (r) and therefore changes in either r or M1 will affect the other indirectly. This relationship becomes important for monetary policy in periods of expanding output. If income (Y) is rising, the demand for M1 is also rising. If there is no increase in the total quantity of money (M), the increase in M1 will take place by a transfer of funds from M2. The decrease in funds available to satisfy the speculative motive will tend to increase the rate of interest, which in turn will react adversely on investment, and hence upon income. This rise in the rate of interest, which will tend to place a brake on expansion, can be offset by increasing the total quantity of money (M) so that the increase in funds needed to satisfy the growing transactions demand will not be met at the expense of money needed to satisfy the speculative motive (M2). Here the banking authority is called upon to act in a way which will not allow a shortage of money to lead to a premature brake on expanding output and employment.

Now, see the practical implications of Keynes's theory of money and interest. The banking authority may be called upon to stimulate employment by increasing the supply of money. The theory behind the idea that an easy-money policy can stimulate expansion is as follow: An increase in the total supply of money (M) operates by increasing the amount of money available for the speculative motive (M2), which will cause the rate of interest to fall. A fall in the rate of interest to fall. A fall in the rate of interest will increase investment, and an increase in investment will lead to a multiple increase in income. As income rises, the amount of money required for transactions (M1) will increase so that the total increase in money (M) will divided in some fashion between M1 and M2. How effective monetary stimulation will be depends on how much the rate of interest falls in response to an increase in M2 (upon the elasticity of the L2 function); how responsive investment is to a fall in the rate of

interest (the elasticity of the schedule of the marginal efficiency of capital) ; and how much a given increase in investment will increase income (the size of the investment multiplier).

The pitfalls which may beset monetary policy will be recognized as very great. We have already noted that an increase in the quantity of money will not lower the rate of interest if liquidity preference is increasing more than the quantity of money. Although a fall in the rate of interest will, other things being equal, increase investment and employment, it will not do so if the marginal efficiency of capital is falling more rapidly than the rate of interest. In a bad depression when the preference for liquidity is high and the expectations of entrepreneurs for profitable investment are low, monetary policy may be helpless to break 5the economic deadlock.

It is much easier to bring down short-term than long –term interest rates. The reason for this is obvious. The chief barrier to a fall in interest rates is the expectation that they may rise later to an extent that makes it worth while to hold cash in anticipation of buying on better terms at a later date. If the banking authority launches a large-scale open-market policy to lower the interest rates, it is logical to assume that this policy will probably be pursued for some time. There will be little reason to expect a rise in the rate of interest in the near future and therefore little incentive to remain liquid in order to buy on better terms later. Furthermore, commitments to debts on short-term cannot involve very great losses even if expectations prove wrong. Securities may be held a short while until maturity when they will be redeemed at face value. It is well known that short-term interest rates have been extremely low in the United States and Britain in recent years.

The long-term rate of interest is more difficult to lower and it becomes increasingly resistant to further reductions at every step on its downward path; at some level, say about 2 per cent, no further reductions may be attainable. To illustrate, let us compare the consequences of a rise from 5 to 6 per cent with the consequences of a rise of from 2 to 3 per cent. To simplify the example, let us assume that the securities bought are perpetual bonds, that is, have no maturity date, like British consols or French rentes. When the rate of interest is 5 per cent, a bond paying $50 per year is purchased at $1000. three years later the rate of interest on this type of security rises to 6 per cent as a result of which the price of the bond falls to $833 (at 6

per cent $833 will purchase an income of $50 per year). The capital loss is $ 167 but, during the three-year period, interest income amounting to $150 has been collected. Hence the net loss is negligible. In contrast, when the rate of interest is 2 per cent, a bond paying $20 can be purchased for $1000. Three years later the rate of interest rises to 3 per cent, as a result of which the price of the bond falls to $667 (at 3 per cent $677 will purchase an income of $20 per year). The capital loss of $333 is offset only to the extent of $60 in interest income received in the three-year period. Thus the loss from a rise in the interest rate from 2 to 3 per cent is much greater than from 5 to 6 per cent, first, because the loss in capital value is greater and, second, because the interest income is less at the lower level.

The increasing risk of loss at lower rates of interest will be reflected in the liquidity-preference schedule by a flattening out of the liquidity curve. This flattening of the curve indicates a growing elasticity of the liquidity-preference function. Translated into monetary policy, this means a point will be reached below which it is extremely difficult to lower the interest rate any further. At about 2 per cent, Keynes suggests the liquidity curve may become horizontal, indication perfect elasticity, and meaning that no further reduction in the rate can be attained merely by increasing the quantity of money. When this point is reached, the demand for money has become absolute in the sense that everyone prefers to hold money rather than long-term securities yielding a return of 2 per cent or less.

When Keynes wrote the *General Theory*, he no longer believed in the adequacy of mere monetary policy, but nevertheless he thought the full possibilities of interest rate control had never been tested. Central bank purchases in the open market had been too limited in amount and confined mainly to short-term securities to the neglect of long-term securities beating directly upon the much more important long-term rate of interest. The interest rate is a highly psychological or conventional phenomenon and investors who have become accustomed to high rates as “normal” will continue to harbor the hope of a return to “normalcy” unless and until bold monetary policy by the banking authorities breaks through conventional beliefs to convince the public that low long-term rates are both sound and certain to continue. Any monetary policy that appears experimental is self-defeating. The chief hope of lowering the ling-term interest rate to a point consistent with full employment rests

upon the ability of the monetary authority to convince the community that it should accept as a permanent fact lower rates of return on long-term debts. Such a policy should not be neglected just because it will ultimately reach a limit where it will no longer be effective because of the flattening out of the liquidity curve. (Dillard, 1948)

### 2.1.2 Efficient Market Hypothesis

In finance, the efficient market hypothesis (EMH) asserts that financial markets are "informationally efficient", or that prices on traded assets, e.g., stocks, bonds, or property, already reflect all known information and therefore are unbiased in the sense that they reflect the collective beliefs of all investors about future prospects. Professor Eugene Fama at the University of Chicago Graduate School of Business developed EMH as an academic concept of study through his published Ph.D. thesis in the early 1960s at the same school.

The efficient market hypothesis states that it is not possible to consistently outperform the market by using any information that the market already knows, except through luck. Information or news in the EMH is defined as anything that may affect prices that is unknowable in the present and thus appears randomly in the future.

The efficient market hypothesis was first expressed by Louis Bachelier, a French mathematician, in his 1900 dissertation, "The Theory of Speculation". His work was largely ignored until the 1950s; however beginning in the 30s scattered, independent work corroborated his thesis. A small number of studies indicated that US stock prices and related financial series followed a random walk model. Also, work by Alfred Cowles in the 30s and 40s showed that professional investors were in general unable to out perform the market.

The efficient market hypothesis emerged as a prominent theoretic position in the mid-1960s. Paul Samuelson had begun to circulate Bachelier's work among economists. In 1964, Bachelier's dissertation along with the empirical studies mentioned above were published in an anthology edited by Paul Coonter. In 1965, Eugene Fama published his dissertation arguing for the random walk hypothesis and Samuelson published a proof for a version of the efficient market hypothesis. In 1970 Fama published a review of both the theory and the evidence for the hypothesis. The

paper extended and refined the theory, included the definitions for three forms of market efficiency: weak, semi-strong and strong.

**Weak-form efficiency**

- No excess returns can be earned by using investment strategies based on historical share prices or other financial data.
- Weak-form efficiency implies that Technical analysis techniques will not be able to consistently produce excess returns, though some forms of fundamental analysis may still provide excess returns.
- In a weak-form efficient market current share prices are the best, unbiased, estimate of the value of the security. Theoretical in nature, weak form efficiency advocates assert that fundamental analysis can be used to identify stocks that are undervalued and overvalued. Therefore, keen investors looking for profitable companies can earn profits by researching financial statements.

**Semi-strong form efficiency**

- Share prices adjust within an arbitrarily small but finite amount of time and in an unbiased fashion to publicly available new information, so that no excess returns can be earned by trading on that information.
- Semi-strong form efficiency implies that Fundamental analysis techniques will not be able to reliably produce excess return.
- To test for semi-strong form efficiency, the adjustments to previously unknown news must be of a reasonable size and must be instantaneous. To test for this, consistent upward or downward adjustments after the initial change must be looked for. If there are any such adjustments it would suggest that investors had interpreted the information in a biased fashion and hence in an inefficient manner.

**Strong-form efficiency**

- Share prices reflect all information and no one can earn excess returns.

- If there are legal barriers to private information becoming public, as with insider trading laws, strong-form efficiency is impossible, except in the case where the laws are universally ignored. Studies on the U.S. stock market have shown that people do trade on inside information.
- To test for strong form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time. Even if some money managers are consistently observed to beat the market, no refutation even of strong-form efficiency follows: with tens of thousands of fund managers worldwide, even a normal distribution of returns (as efficiency predicts) should be expected to produce a few dozen "star" performers.

## 2.2 Econometric Theory

### 2.2.1 Structural Changes and Unit Root Tests

***Unit root tests no structural change: Augmented Dickey-Fuller tests***

Augmented Dickey-Fuller tests (ADF tests) are conducted with no structural change:

$$y_t = \mu_1 + \varphi_1 t + \rho y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta y_{t-i} + \varepsilon_t \qquad (1)$$

where $y_t$ is time series data, $\varepsilon_t$ is a white noise series with mean zero and variance $\sigma^2$ and $\Delta$ is difference operator in the null hypothesis ($H_0$), $\rho = 1$ and $\varphi_1 = 0$, and a stationary variable in the alternative hypothesis ($H_a$), $\rho < 1$,. If the calculated statistic is higher than ADF's critical value then we do not reject $H_0$ and the considered variable is non-stationary, if not it is stationary.

***Unit root tests with structural change: Perron tests***

Perron (1989) devised a unit root test that incorporates a change in a drift term and a kink of a time trend in a linear model exogenously, and proved Theorem 1

that the ADF test is not able to reject a null hypothesis of unit root, and creates a "spurious unit root" when a true model is trend stationary and there is a structural change. With the same data as Nelson and Plosser (1982), he examined a null hypothesis of unit root in a model that accompanies a structural change to obtain the result that a null hypothesis was rejected for 11 out of 13 sets of time series data. He concluded that most American major economic time series data were subject to a trend stationary process that accompanies a structural change.

Perron's method suffers from arbitrariness in the sense that it introduced a structural break exogenously not endogenously. Christiano (1992) criticized Perron's exogenous treatment of a structural change, and devised a method, which structural changes in a drift term and a trend can be detected endogenously, and proposed a test whose null hypothesis is a unit root process without a structural change, and whose opposing hypothesis is a stationary process with a structural change. Zivot and Andrews (1992) proposed a test whose null hypothesis is a unit root process without any change in a drift term, and whose opposing hypothesis is a trend stationary process with a structural break. Their test can detect a time point of a structural change endogenously, and its asymptotic distribution is constant regardless of the time points of structural changes. In order to conduct a unit root test which is able to find endogenously an unknown time point of structural change, Banerjee, et al. (1992) proposed three kinds of unit root tests: firstly a recursive test that is extended on the basis of a structural stability test of Brown, et al. (1975) which uses recursive residuals; secondly a rolling test that shifts a partial testing period successively among the whole sample period; and thirdly a sequential test that conducts *t* tests or Quandt likelihood ratio tests while shifting a time point of a structural change among the whole sample. Kunitomo (1996) studied unit root and cointegration hypotheses in cases where a structural change exists, and proposed the classes of such test statistics as likelihood ratio test, Wald test, and Lagrangian test. These tests have the merit of being able to conduct a structural test and a unit root test at the same time, and of being able to yield more rigorous and correct results than simple ADF or PP test. However, most of them except Banerjee, et al. test have the problem that they can not necessarily fully detect true structural changes, because they consider only a temporal

structural change in a drift term and a time trend. Unit root test with structural change model:

$$y_t = \mu_1+\mu_2 DU_t+\mu_3 D(TB)_t+\sum_{i=1}^{k}\delta_i SD_{it}+\varphi_1 t+\varphi_2 DT_t+\rho y_{t-1}+\sum_{i=1}^{k}\gamma_i \Delta y_{t-i}+\varepsilon_t \qquad (2)$$

Where $y_t$ is time series data, $SD_{it}$ are centred seasonal dummies which sum to zero over a full year, $DU_t = 1$ if $t > T_B$ and 0 otherwise, $D(TB)_t = 1$ if $t = T_B + 1$ and 0 otherwise, $DT_t = 1$ if $t > T_B$ and 0 otherwise. This model allow a sudden change in the level followed by a shift in the slope of the trend function at a time TB ($1 < T_B < T$). The null hypothesis of unit root ($H_0$), $\rho = 1$ and $\varphi_1 = \varphi_2 = 0$, and the alternative of trend stationarity ($H_a$), $\rho < 1$, are nested in (2).

### 2.2.2 Cointegration Tests

The tests of cointegration based on a VAR approach initiated by Johanson (1988). Suppose for that, that we have a general VAR model with k lags:

$$X_t = A_1 X_{t-1} + A_2 X_{t-2} + \ldots + A_k X_{t-k} + BY_t + \varepsilon_t \qquad (3)$$

Where $X_t$ is a non-stationary vector I (1), the $A_k$ are different matrices of coefficients, $Y_t$ is a vector of deterministic terms and finally $\varepsilon_t$ is the vector of innovations. This VAR specification can be rewritten in first differences as follows:

$$\Delta X_t = \Pi X_{t-1} + \Delta\sum_{i=1}^{k-1}\Gamma_i X_{t-i} + BY_t + \varepsilon_t \qquad (4)$$

Where $\Pi = \sum_{i=1}^{p} A_i - I$, and $\Gamma_i = -\sum_{j=i+1}^{k} A_j$

In Granger representation theorem, the matrix $\prod$ has a reduced rank $r < k$, it can be expressed then as CB′ ($\prod$= CB′), where C and B are n x r matrices and r is the distinct cointegrating vectors or the number of cointegrating relations. Also, each column of B gives an estimate of the cointegrating vector. The elements of C are the adjustment parameters in the error correction model. The determination of the

cointegrating vectors and their number, for a general VAR with n variables and k lags, is described by Johanson (1988).

The number of cointegrating relations, in a VAR with k endogenous variables, varies between 0 and k-1. If there are no cointegrating relations, standard time series analyses such as the (unrestricted) VAR may be applied to the first differences of the data. When there is one cointegrating equation, the resulting equation $B'Y_{t-1}$ will form the base of the error correction term $CB'Y_{t-1}$.

In the case of a bivariate VAR (two-variable case), the cointegration coefficient, if it exists, it is uniquely determined. The matrix $\Pi$ is composed only by $A_i$ - I with a rank equal to unity (r = 1) and a unique stationary combination of the endogenous variables (i.e. a unique co-integrating equation).

The Johanson procedure for testing co-integration focuses then on the rank of matrix $\Pi$. Johanson and Juselius (1990) developed two likelihood ratio tests. The first one is the Maximum Eigenvalue (ME) test and is given by $JME = -T \ln (1 - \lambda_r)$, where T is the number of observations and $\lambda_r$ is the maximal eigenvalue. The object of this test is to see whether the rank ($\Pi$) = r ($H_0$ hypothesis) against the alternative hypothesis $H_a$ (rank ($\Pi$) = r+1). The second test is the Likelihood Ratio (LR) test is based on the trace of the stochastic matrix and given by $J_r = -T \Sigma \ln (1-\lambda_i)$ The tests in the current work are carried out using the Likelihood Ratio (LR).

In the case of a bivariate VAR, the null hypothesis is that there is no cointegration between the variables and the alternative one is the existence of only one cointegrating vector.

### 2.2.3 Granger Causality Tests

In the case of two variables X and Y, the Granger causality approach that developed by C.W.J. Granger in 1969 is different from the common use of the term since it measures precedence and information provided by X in explaining current value of Y. According to this view, Y is said to be granger caused by X if X helps in the prediction of Y or equivalently lagged values of X are statistically significant.

The time series representation of a bivariate VAR for two variables X and Y has the following form :

$$\begin{bmatrix} Y_t \\ X_t \end{bmatrix} = \begin{bmatrix} C_1 \\ C_2 \end{bmatrix} + \begin{bmatrix} a_{11}^1 & a_{12}^1 \\ a_{21}^1 & a_{22}^1 \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ X_{t-1} \end{bmatrix} + \cdots + \begin{bmatrix} a_{11}^k & a_{12}^k \\ a_{21}^k & a_{22}^k \end{bmatrix} \begin{bmatrix} Y_{t-k} \\ X_{t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (5)$$

Where t is time subscript, $a_{ij}$ are the coefficients of the matrices associated to the VAR, the superscripts denote the order of that matrices, $\Sigma_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ is a vector of uncorrelated disturbances and finally $c_1$ and $c_2$ are constants.

Within a system of two equations, equation (6) becomes:

$$\begin{cases} Y_t = C_1 + \sum_{i=1}^{k} a_{11}^i Y_{t-i} + \sum_{i=1}^{k} a_{12}^i X_{t-i} + \varepsilon_{1t} \\ X_t = C_2 + \sum_{i=1}^{k} a_{21}^i X_{t-i} + \sum_{i=1}^{k} a_{22}^i Y_{t-i} + \varepsilon_{2t} \end{cases} \quad (6)$$

Testing for Granger causality between X and Y consists to check the significance of $a_{12}$ and $a_{22}$ coefficients. In other words, X does not Granger-cause Y if the vector $(X_{t-1}, X_{t-2}, ..., X_{t-k})$ has no power in forecasting X. Each equation represented by (4) is estimated separately in testing for Granger causality and the null hypothesis tested is X does not Granger-cause Y and Y does not Granger-cause X.

## 2.3 Literature Review

**Tsukuda and Miyakoshi (1988)** studied about "Granger causality between money and income for the Japanese economy in the presence of a structural change". Their research examined Granger causality between money and income in the Japanese economy based upon a bivariate VAR model with a structural change in the trend function. They employ a stratified testing strategy incorporation preliminary tests for a unit root and for the order of cointegration rank. Their study revealed that the choice of either trend stationarity or difference stationarity, as well as the order of cointegration rank, crucially affects the test results for Granger causality. It was found that the causality from money to income was strong before 1980 but weakened or virtually disappeared result confirms the claim by the Bank of Japan (1992) and

Honda et al. (1995) among others that the role of money as a leading indicator for prediction movements in income has weakened or even disappeared in the 1980s.

**Hashemzadeh and Taylor (1988)** studied the statistical relationship between the supply of money and stock price levels and between the level of interest rates and stock prices. Their research addresses a significant aspect of this debate by examining the direction of causality between the money supply, stock prices and interest rates. Using Granger-Sims's test for determining unidirectional causality, they found that the relationship between the money supply and stock prices is characterized by a feedback system, with money supply causing some of the observed variations in the stock price levels and vice versa. With respect to the relationship between stock prices and interest rates, the results were not as conclusive. In this instance, the causality seems to be mostly running from interest rates to stock prices, and not the other way around.

**Boulila and Trabelsi (2002)** studied about causal relationship between financial development and economic growth using unit root and co-integration techniques within bi-variate vector auto-regressive (*BVAR*), based on Tunisian data during the periods 1962-1998 and 1963-1987. The main results of the study are: *(i)* Causality direction is running from growth to financial development during the sub-period of financial control 1963-1987. *(ii)* The evidence shows, however, a be-variate directional causality for the whole period only when credit and investment ratio are used to measure financial and economic development. *(iii)* The results seem to give a weak support to the hypothesis that financial system is a leading sector in the growth process.



**Mcmillan (2005)** studied about "Time variation in the cointegrating relationship between stock prices and economic activity". Their research examined whether there exists a long-run cointegrating relationship between a stock market index and output and interest rates. Moreover, estimation is conducted over the full sample and both a recursive and rolling sample to examine any time variation in the nature of the relationship. The results support evidence of a single cointegrating

vector, where stock prices typically exhibit a positive relationship with industrial production and a negative relationship with interest rates. However, there is significant time variation and periods of time where contrary results are observed. As such any model of stock prices needs to account for such time variation.

**Surya Bahadur (2006)** examine the existence of causality relationship between stock market and economic growth based on the time series data for the year 1988 to 2005 using Granger causality test. The study finds the empirical evidence of long-run integration and causality of macroeconomic variables and stock market indicators even in a small capital market of Nepal. The causality has been observed only in real terms but not in nominal variables. In econometric sense, it depicts that the stock market plays significant role in determining economic growth and vice versa Interestingly, the causation is evident with a lag of 3 to 4 years.