

Chapter IV

THE THEORIES OF INTEREST

Etymologically, the word interest is derived from the Medieval Latin word *interesse*,¹ and basically, means "money paid for use of money lent or for not exacting repayment of debt."² The rate of interest is however, defined as "the price of money services".³ Interest forms the pivot on which the modern banking operates, and is conceived as a variable that links the financial market to the real market under its influence on the economic functions of saving and investment. In order to comprehend the role of the institution of interest in the economy, we shall in this chapter outline the major developments that have taken place in the theories of interest. Our approach will be a comparative one and will briefly concentrate on the analysis of the various theories of interest. The purpose is to objectively place the problem of interest and capital in a theoretical perspective.

¹For a synoptic view of the historic aspects of the interest, please see Patinkin's article, "Interest", *International Encyclopaedia of the Social Sciences*, (1979), pp. 471-84.

²Interest as defined in *The Concise Oxford Dictionary*, (1988).

³Please see *The Dictionary of Modern Economics* (1987), p. 357.

REAL MODEL OF INTEREST RATE

In the classical economic theory, saving and investment out of a full employment level of income are regarded as functions of the interest rate alone and interest is the primary force of an economic system. In the real model of interest rate, its determinants are therefore the real forces of investment and saving. In order to study the model which is framed in terms of the market for loanable funds, the demand and supply of new bonds are functions of planned saving and planned investment alone. Since the interest rate on bonds is inversely related to their price, the forces determining are analysed in the bond market.⁴ There are, however, two specific features of the real theory of interest.

- i) The supply of bonds being related to firm's desire to invest. Planned supply of bonds being equal to planned level of investment. As the demand of such bonds is being attributed to the consumer's desire to save, planned demand for bonds is thus equal to planned savings.

⁴Harris, Laurence, (1988), p. 302.

Based on the assumption that a fall in the interest rate increases supply of bonds the supply curve is downward sloping and since it also decreases planned saving, the demand curve is upward sloping, as shown in figure 1, below:

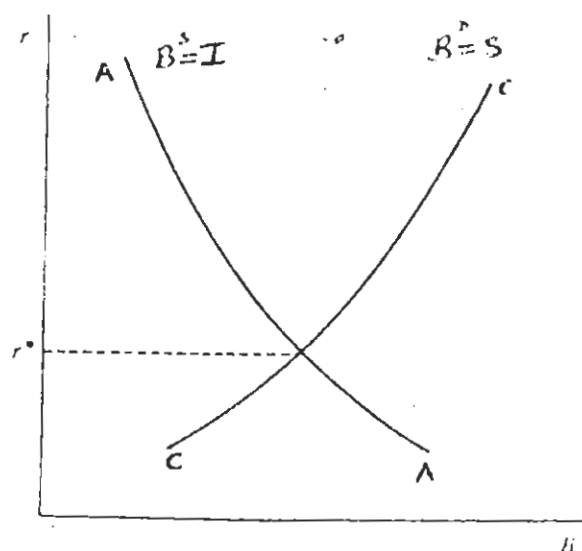


Figure 1

- AA is the supply curve, CC. being the demand curve, r is the equilibrium interest rate.
- B^D is the planned demand for bonds which is equal to planned savings.
- B^S is the planned supply of bonds which is equal to planned investment.

- ii) The second feature of the model is concerned with the demand for and supply of new bonds rather than the existing stock of bonds, implying the fact that we are dealing with flow concept of investment and savings.

In terms of above real model of the bond market, we thus have a demand and supply function, and the equilibrium interest rate being determined by their equality.

The equilibrium being as under:

$$B^D = B^S \quad \text{----- (1)}$$

Further, as demand and supply of bonds are equated to saving and investment, we can write another equation as

$$S = I \quad \text{_____ (2)}$$

It therefore follows that equilibrium interest rate is determined solely by equality of planned saving and planned investment.

It is pertinent to observe that this model ignores two important factors. Firstly, being a partial equilibrium result it ignores the effect of other markets, on the saving and investment.

Secondly, it does not include money as an asset and is based on the assumption that the only assets that consumers can hold are bonds, and similarly the only assets that firms can hold are physical capital.

MONETARY LOANABLE - FUNDS MODEL

Early writers as Thornton (1802), the ones from Swedish school such as Wicksell (1936) and Ohlin (1937), of the English school such as Robertson (1937) considered the role of monetary factors and incorporated the demand for and supply of money in the theory of interest.⁵

The model is formulated in terms of the flow demand for and supply of loanable funds, i.e, new bonds.

The flow demand for bonds constitutes planned saving plus increase in

⁵*Ibid*, p. 304.

the stock of money over time.

$$B^D = S + \Delta M^S \quad \text{----- (3)}$$

B^D denotes flow demand of bonds or the sources of loanable funds.

S signifies saving,

ΔM^S depicts increase in money stock over time.

The demand for loanable funds, or flow supply of bonds is subject to demand for investment in capital goods plus demand for loans from ones wishing to build up stock of money balances.

$$B^S = I + \Delta M^D \quad \text{----- (4)}$$

B^S denotes flow supply of bonds or the demand for loanable funds.

I depicts investment in capital goods.

ΔM^D signifies demand for loans for increasing stock of money balances.

Equating equations (3) and (4) for equilibrium in bond market, we get

$$S + \Delta M^S = I + \Delta M^D \quad \text{----- (5)}$$

In the above equations (5) ΔM^S is exogenously determined, whereas S and I are assumed to be functions of the rate of interest. Furthermore ΔM^D is also treated as a function of the interest rate.

The equilibrium condition as at (5) above can then be rewritten as

$$S(r) + \Delta M^S = I(r) + \Delta M^D(r) \quad \text{----- (6)}$$

Diagrammatic representation of the above is appended below.

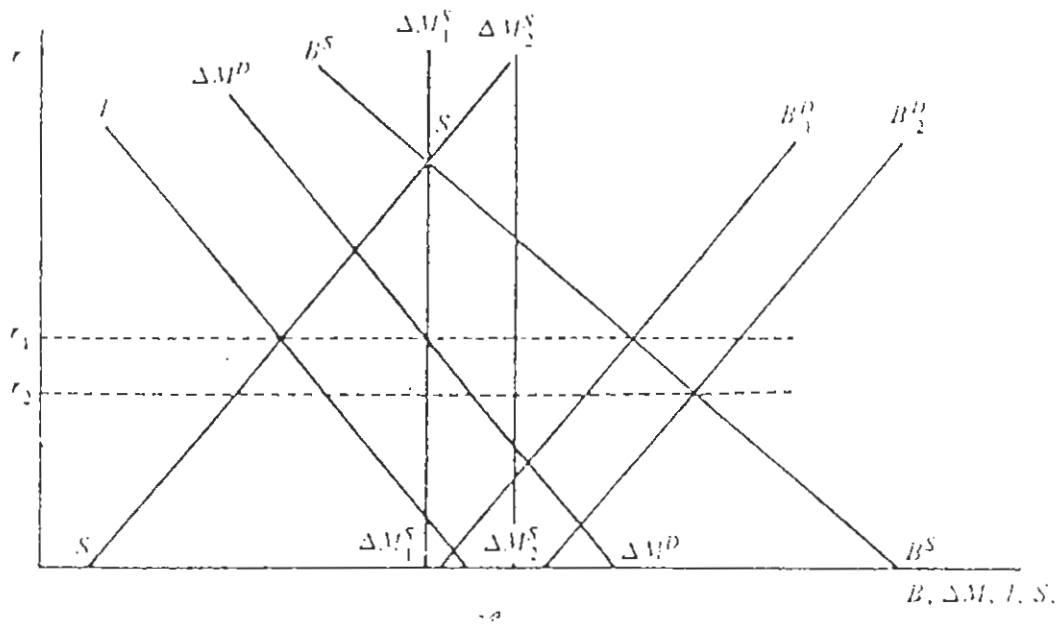


Figure 2

The curve B^S is the horizontal sum of I and ΔM^D .

The curve B^D is the sum of SS and ΔM_1^S .

The equilibrium interest rate is r_1 , where investment and saving are equal.

In this model by employing a partial equilibrium approach if the money supply is increased at the rate ΔM_2^S instead of ΔM_1^S the demand curve for new bonds would shift to B_2^D and the interest rate would consequently fall to r_2 from r_1 , thereby evidencing the fact that the rate of interest is partially a monetary phenomenon which is determined by the real forces of saving and investment and the monetary forces of the demand for and supply of money.

The theory is often questioned by the fact as to why the whole use in the stock of money goes into the purchase of stock. It is however contended that even if part of ΔM^S goes into consumption, the equation (5) stays valid as increase in consumption involves an equal fall in savings.

LIQUIDITY PREFERENCE THEORY:

Keynes analyses the determinant of the interest rate in money market.⁶ This assertion and the contention that the loanable fund theory is

⁶*ibid*, pp.306-07.

expressed in terms of flow and liquidity preference theory in terms of stock forms the basis of the two substantial differences between the two theories.

Figure (3) illustrates the Keynesian money and bond markets with the assumption that the excess demand for money always equals the excess demand for bonds, therefore, envisaging an equilibrium in the money and bond market. Another major assumption in the model refers to supplies of money and of bonds as exogenous.

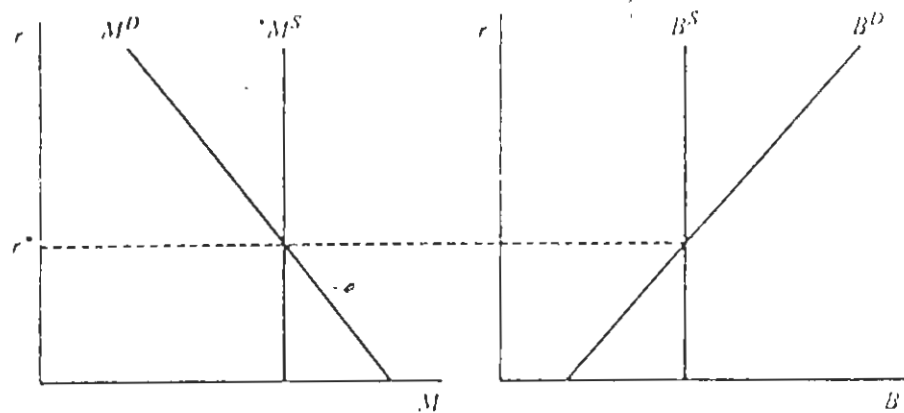
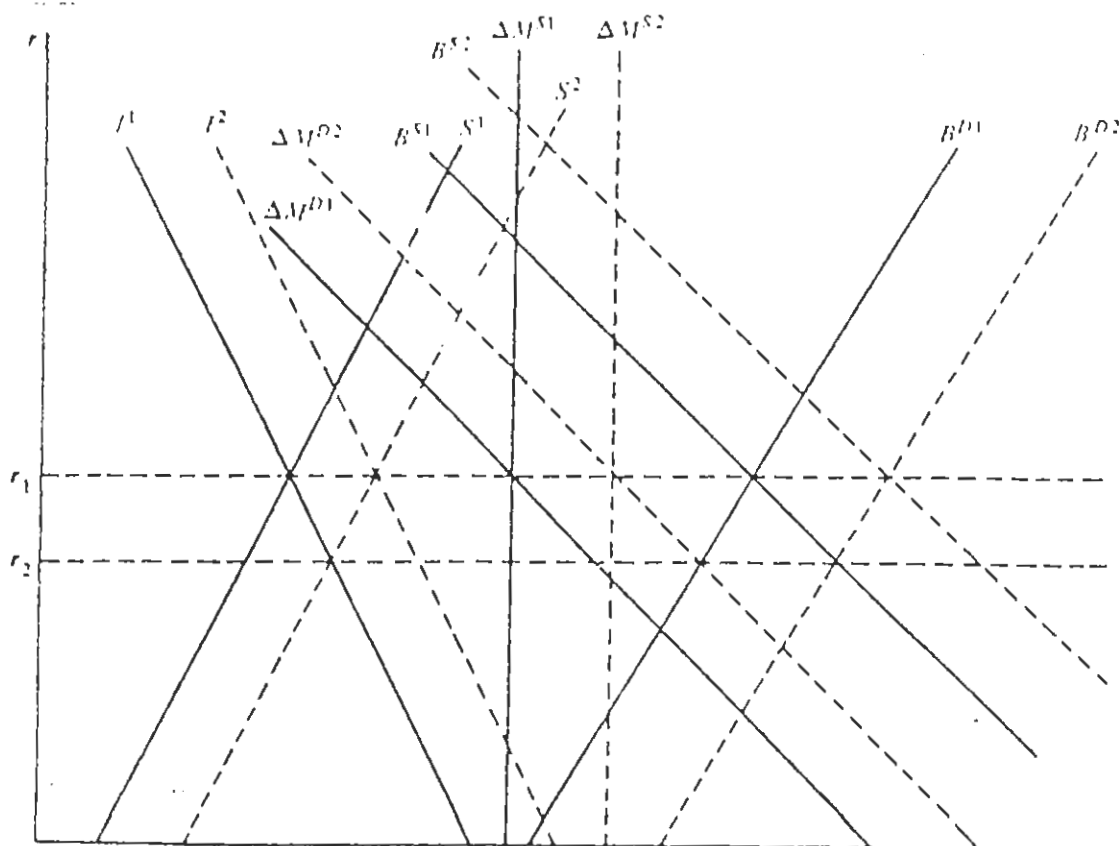


Figure 3

After having considered real and monetary theories of the interest rate from a partial equilibrium point of view, let us now deal with these in terms of general equilibrium model.

GENERAL EQUILIBRIUM VIEW OF REAL AND MONETARY THEORIES

In the general equilibrium analysis of the monetary loanable funds model since the rate of interest is unaffected by changes in the rate of growth of the money supply it is therefore presumed to be determined solely by the positions of the planned saving and investment function. Consider figure 4, below:



Let the curves marked I reflect the equilibrium rate r_1 . Taking only the nominal variables, suppose the rate of change of money supply is M_2^S .

The demand curve of bonds would shift to B_2^D and interest rate would fall to r_2 , thereby creating equilibrium in loanable fund market. However due to excess of planned investment over planned savings, the disequilibrium in the goods market would tend to increase the price level. The rise in price level would cause the nominal savings and investment curve along with nominal demand curve for increased money balances to shift right wards as per curves labelled 2, in the context of the assumption that individuals plan their real saving, real investment and real demand for money as functions of interest rate. Subsequently, the new equilibrium is reached at same interest rate r_1 . Similarly, the same result is obtained in a Keynesian general equilibrium model.

COMPARISON BETWEEN LIQUIDITY PREFERENCE AND LOANABLE FUNDS THEORIES OF INTEREST

Liquidity preference theory postulates that the interest rate changes, if

there is excess demand or supply in the money market irrespective of the situation in the bond market, loanable funds theory however postulates the opposite. In the three market scenarios of general equilibrium, rate of interest which equilibrates the money and goods markets must also equilibrate the bond market under Walras' Law, equation.

$$(I-S) + (B^D - B^S) + (M^D - M^S) = 0 \quad \text{_____} \quad (7)$$

Figure (5) below would diagrammatically illustrate:

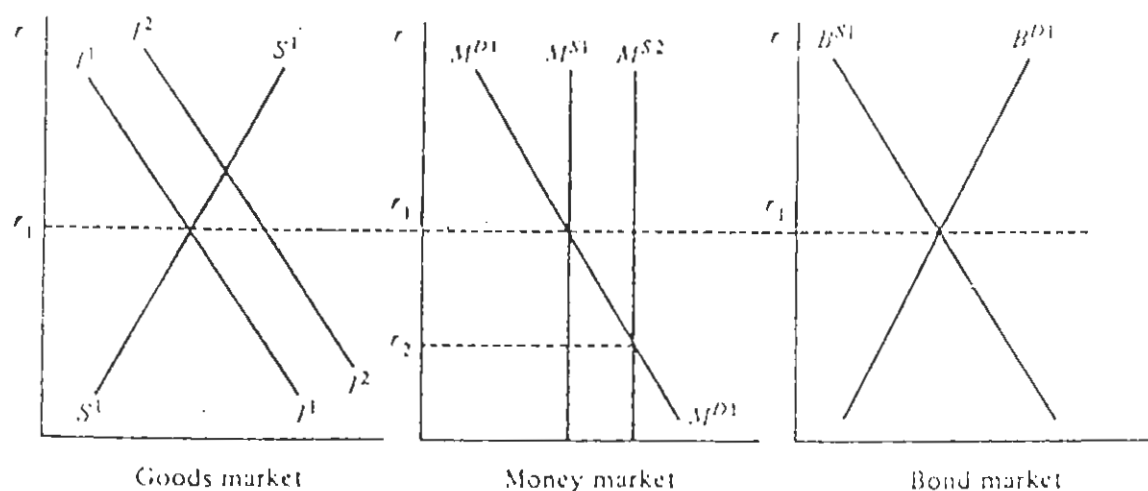


Figure 5

At the equilibrium interest rate r_1 , the curves are marked 1. Suppose the money supply increases to M_2^S in the money market interest rate would fall to r_2 , which will shift the investment curve to I^2 in goods market. We would thus have an excess demand for goods in goods market and excess supply of money in money market, but however there is equilibrium in the bond market. The loanable funds model would show that disequilibrium in goods and money market would not bring any change in the interest rate as the bond market is in equilibrium. However, liquidity preference model would suggest that interest rate adjusts to bring money market in equilibrium. These models therefore differ in behaviour of interest rate in disequilibrium.⁷

In the context of evaluating classical theory as a non-monetary or real theory, and Keynes's theory as a purely monetary theory in terms of interest rate determination by liquidity preference, Metzler (1951)⁸ discusses and emphasises the polar positions the theories occupy in relation to Scitovszky-Pigou-Haberler wherein as per changes the theory of interest is either termed as a real theory if change consists of a direct

⁷*Ibid*, p.315.

⁸For a synoptic view, please see Metzler A. Lloyd, (1951), pp.93-116.

increase or decrease in the money supply without any off-setting change in private holding of other assets, and a monetary theory if the change consists of open market transactions of central bank.

Although the liquidity preference and loanable fund theories differ in the determination of interest rate the other feature is the stock or flow nature of the theories. The liquidity preference theory is formulated in terms of the demand for money as a desired stock of money and the supply of money being the existing stock of money, where as on the other hand the loanable funds theory is concerned with demand for and supply of a flow of loanable funds or bonds over a period of time.

In this context, please refer to equation (6) of the flow loanable funds theory in equilibrium which in terms of summary and period T can be written as:

$$\Delta B_T^D = \Delta B_T^S \quad \text{----- (8)}$$

Let there be a desired stock at (t + 1) period by the savers and investors.

The stock would therefore be B_{t+1}^D and B_{t+1}^S .

Change of stock could then be written as

$$(B_{t+1}^D - B_t) \text{ and } (B_{t+1}^S - B_t) \text{ where } (B_t \text{ is existing stock})$$

Equating in terms of (8) above, we get

$$B_{t+1}^D - B_t = B_{t+1}^S - B_t \quad \text{----- (9)}$$

Flow Equilibrium is, therefore, equal to Stock Equilibrium.

BOHM-BAWERK'S THEORY OF INTEREST

Bohm-Bawerk is the chief exponent of time preference theory which is generally known as Austrian theory of capital and interest. The classification of both land and labour as original factors of production with their supply fixed and capital as a produced factor with its supply a function of economic decision and dependent on land and labour is fundamental to Bohm-Bawerk's theory of interest.⁹

Bohm Bawerk gives three reasons for the under valuation of future goods.

⁹Blaug, Mark, (1985), p. 498. (Reprinted in 1992).

FIRST REASON: In the context of equi-marginal principle the rational individual shall so distribute his expected future income among different years so as to ensure that the marginal unit of currency received in any year makes the same contribution to total utility as any other. The expected flow of income shall be converted into consumption expenditure in a manner so as to equalise the weighted marginal utility of consumption over all future periods, i.e. the consumer equilibrium formula shall read as under:

$$\frac{MU_t}{P_t} = \frac{MU_{t+1}(1+r)}{P_{t+1}} = \frac{MU_{t+2}(1+r)^2}{P_{t+2}} = \dots = \frac{MU_{t+n}(1+r)^n}{P_{t+n}} \quad \text{----- (10)}$$

Assuming prices (P) and rate of interest (r) to be constant, the marginal rate of substitution between consumption in the current year and all future years must be equal to the discount factor (1+r) i.e. from (10) above, we have

$$\frac{MU_t}{MU_{t+1}} = \frac{MU_{t+1}}{MU_{t+2}} = \frac{(1+r)^2}{1+r} = (1+r) \quad \text{----- (11)}$$

The discount factor $(1+r)$ would then indicate the existence of time preference, thereby depicting the fact that an increase in r would cause consumers to postpone consumption so as to raise MU_t and to lower MU_{t+1} . It implies that as long as rise in the rate of interest does not effect the marginal utility of expenditure in general, an increase in r will promote savings.

SECOND REASON The second reason why people, on an average, prefer present to future i.e. having positive time preference relates to the psychological factor, a tendency towards myopia¹⁰ which is attributed to (a) deficiency of imagination (b) limited will power

¹⁰*ibid*, p. 502.

and (c) the shortness and uncertainty of life.

THIRD REASON: The third reason for interest pertains to the fact that as present goods are practically more useful and employable, they carry a higher value and are regarded superior to future goods. The third reason therefore creates an excess demand for production loans in the sense of the technical superiority of present over future goods.

It can then be inferred from the above that the first two reasons operate to create an aggregate excess demand for consumption loans i.e. different circumstances of want and provision in the present and future, underestimation of the future, and the third reason creates excess demand for production loans on the grounds of the technical superiority of present over future goods.

FISHER'S THEORY OF INTEREST:

Fisher, by employing the concept of 'opportunity line' and 'willingness line' reaches on the result of discount factor of $(1 + r)$ which is analogous to equation (11 related to Bohm-Bawerk's three famous causes of interest discussed above. It is, in his theory, the interaction of 'willingness' and 'opportunity' which determines the rate of interest.¹¹

¹¹*ibid*, p. 529.

FISHER'S INTEREST DIAGRAM:

The following diagram is Fisher's model of interest rate determination.¹²

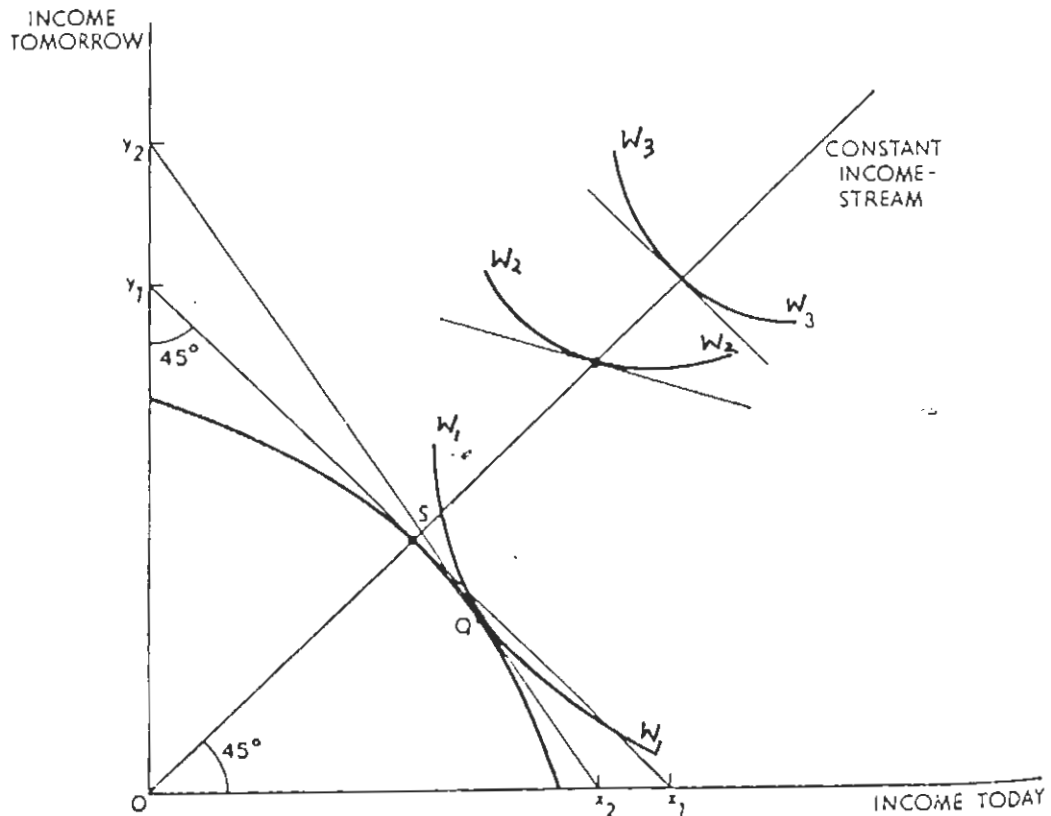


Figure 6

The curve AA depicts production possibility frontier between the present and future consumption goods via production. This opportunity line or technical transformation curve, reveals the net productivity of capital.

¹²For a view on the issue, please refer to Samuelson, A. Paul (1973), p. 611 and Blaug, Mark (1985), pp. 531-34.

Its concavity to the origin is owing to diminishing returns from sacrificing present income to obtain future income. The willingness lines labelled W_1 , W_2 and W_3 on the indifference maps between present and future income are convex to the origin due to the law of diminishing marginal utility of income. The gradient of these curves expresses the time preference. (The positive time preference means that willingness lines have an absolute slope greater than unity at 45° income stream line). The curves, therefore, marked W_3W_3 would depict neutral time preference, W_2W_2 reflects negative time preference and W_1W_1 would represent positive time preference.

The rate of interest is determined by the point of tangency between willingness curve W_1W_1 and the opportunity curve AA at point Q. As per rules of gradient stated above, since the point Q has an absolute slope greater than unity, the rate of interest would be positive. (pt. Q is lying on W_1W_1).

Now suppose, if a is the income this year and $y = f(a)$ is the income next year, the present value (PV) can be written as under:

$$PV = a + \frac{y}{(1+r)} = a + \frac{f(a)}{(1+r)} \quad \text{----- (12)}$$

The condition for maximum would be $\frac{dPV}{da} = 0$ and $\frac{d^2PV}{da} < 0$

For first order condition

$$\frac{dPV}{da} = 1 + \frac{f'(a)}{1+r} = 0$$

$$\rightarrow \frac{dPV}{da} = \frac{(1+r) + f'(a)}{1+r} = 0$$

$$\rightarrow f'(a) = -(1+r)$$

$$\text{OR } -f'(a) = (1+r) \quad \text{-----(13)}$$

For second order condition

$$\frac{d^2PV}{da} = \frac{f''(a)}{(1+r)}$$

since $(1+r) = -f'(a)$

then $\frac{d^2PV}{da} < 0$

Now by equating the marginal rate of substituting between a and y in consumption to $(1+r)$ as per our equation (11), it is evident that $-f'(a)$ from (13) above is the marginal rate of substitution between a and y so

that $\frac{MP_a}{MP_y} = (1+r)$

where MP_a is the marginal product of capital in first year and MP_y is the marginal product of capital in year 2.

Analogy is thus arrived at between this analysis and consumer equilibrium as at (11) in Bohm - Bawerk's model.

CONCLUSION

The objective of this chapter was to briefly look into the major theories of interest and its determination. In this context, we have analysed the loanable funds theory and liquidity preference theory in the perspective of real and monetary phenomena, in relation to flow and stock aspect of the same. Subsequently the general equilibrium was discussed in light of the real balance effect. Bohm Bawerk's and Fisher's views on interest were the concluding aspects with elaboration of their somewhat common derivations. It is pertinent to point out that our description and the analysis of the theories of interest have been limited to avoid digression from our scope of investigation.

In the next chapter we shall present a macro-economic model based upon micro economic foundations in terms of equity based economic system consistent with *Shariah*. Subsequently, validity of such interpretations will be evaluated in relation to policy implications and pragmatic approach.

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