CHAPTER 2

THEORETICAL ISSUES AND EVIDENCES : A REVIEW

This chapter presents the theoretical issues on investment behaviour and a review of studies on investment behaviour both in India and abroad.

2.1 THEORETICAL ISSUES :

In this section, the theoretical developments in the field of investment behaviour are traced and presented.

2.1.1 The Keynesian Approach :

The time honoured approach to the demand for investment following Keynes and Fisher, runs in terms of their conceptual frame - the Marginal Efficiency of Capital (MEC), Marginal Efficiency of Investment (MEI) and the like. MEC is defined as the rate of discount that equates the cost of capital asset to the present value of its expected returns during its life. MEI is the rate of return expected from a given investment on a capital asset after covering all its costs, except the rate of interest. Keynes emphasized the role of interest rate in determining investment demand by incorporating the expectations concept in it. Keynes argued that an increase in the rate of
interest makes investment less attractive by narrowing the gap between MEC and the rate of interest.

2.1.2 The Post-Keynesian Approach:

In the post-Keynesian theories of investment behaviour, the emphasis was given to demand factors as represented by output or sales. The rate of interest, which was earlier given importance was almost ignored in the post-Keynesian era. These theories also incorporate expectations with varying degrees of sophistication.

2.1.2.1 The Naive Accelerator:

Although the naive accelerator was proposed before Keynes (1936) it received attention only after Keynes. Later on it was developed by Clark (1917). The naive accelerator hypothesis rests on the technical relationship between output and capital stock. The naive accelerator assumes that the optimum capital stock is some proportion of output. It specifies the stock of capital necessary to produce a given level of output i.e.

\[ K^*_t = \gamma Y_t, \]  

(2.1)

where \( K^*_t \) is the optimal capital stock and \( Y_t \) is the current output and \( \gamma \) is a positive constant indicating the technical
relationship between $K_t$ and $Y_t$. If there is any change in output, the desired capital stock must also change in fixed relationship to satisfy the equation (2.1) and it results in:

$$K_t^* - K_{t-1}^* = \gamma (Y_t - Y_{t-1}) \quad . (2.2)$$

If it is assumed in (2.2) that capital is instantaneously and optimally adjusted in each period, so that $K_t^* = K_t$ for all $t$ then

$$\text{It} = K_t^* - K_{t-1}^* = K_t - K_{t-1} = \gamma \Delta Y_{t-1} = Y_t - Y_{t-1} \quad (2.3)$$

and It is net investment.

The naive accelerator assumes that there is an instantaneous investment reaction for increases or decreases in output. An underlying assumption is that, firms are always in equilibrium and that the supply of capital goods is infinitely elastic such that adjustment is instantaneous without lags.

The naive accelerator principle does not operate when excess capacity exists, implying instantaneous adjustments of constant capital-output ratio to be unrealistic.
2.1.2.2 The Flexible Accelerator:

The flexible accelerator is a generalization of the naive accelerator. The flexible accelerator models were propounded by Chenery (1952) and Koyck (1954). In this model, the focus is on the time structure of investment process.

The flexible accelerator overcomes one of the major shortcomings of the naive accelerator namely, that capital stock is instantaneously and optimally adjusted. The flexible accelerator considers some optimal relationship between capital stock and output with time lags in the adjustment process. The adjustment mechanism between $K_t$ and $K_{t-1}$ is given by,

$$I_t = K^*_t - K_{t-1} = (1 - \lambda) \left[ K^*_t - K^*_t - K_{t-1} \right], \quad 0 \leq \lambda \leq 1 \ldots (2.4)$$

The actual capital stock may alternatively be represented by a weighted average of all past levels of desired capital plus replacement investment as

$$K_t = \left[ 1 - \lambda \right] \sum_{r=0}^{\infty} \lambda^r K^*_t - r + \delta K_{t-1} \ldots (2.5)$$

In the flexible accelerator model of Chenery (1952) and Koyck (1954), the time structure of the investment process is characterized by a geometric lag distribution. Actual capital is a distributed lag function of desired capital with geometrically
declining weights. This can be interpreted as saying that capital stock depends on expected future output, where the latter is predicted from past levels of output. Equation (2.4) is also known as stock adjustment model, suggested by Chenery.

The accelerator model presents one of the simplified variants of the investment process. According to this model, a firm raises expectations about its future output on the basis of the past output of the firm itself, the industry to which it belongs, or both. In this context, a capital adjustment process is applied because, the firm faces uncertain future demand and there are additional costs that the firm would incur if it tries to make a very rapid adjustment. This necessitates an additional hypothesis that replacement investment is proportional to existing capital stock or to the previous years stock.

2.1.2.3 The Profits Theory and Expectational Profits Hypothesis:

Profits theory, as a theory of investment behaviour was first proposed by Tinbergen (1938, 1939) and later on developed by Klein (1950, 1951). The profits theory of Tinbergen postulates that the optimum capital stock is a function of the level of profits. Klein obtained an investment function which depended on the level of profits. He assumed that entrepreneurs get profits by increasing the size of their establishment. But this version is not consistent with profit maximization, since
the larger the profits, the more the firm expands and accepts lower profits.

Another version of the theory is that the optimal capital stock is some function of the expected profits. But, expected profits in turn are a function of actual profits in the past.

Thus,

$$K_t^* = f(\pi_{t-1}), \quad i = 1, 2, 3, \quad (2.6)$$

and

$$\pi_t = g(Y_t) \text{ where } \pi_t \text{ are actual profits.}$$

Thus

$$K_t - K_{t-1} = (1-\lambda) \left\{ f(\pi_{t-1}) - K_{t-1} \right\} \quad (2.7)$$

2.1.2.4 The Liquidity Theory;

Another version of the profits theory of investment behaviour is the liquidity theory, wherein liquidity is cash flow or retained earnings net of not merely tax provision but also the dividends distributed or to be so distributed to shareholders. Reserves of retained earnings are the internal source of capital financing and such liquidity of the firm reflects stock market value of the firm to push up the share prices and to increase share capital. It assumes that the financial capital market is imperfect and that it is cheaper to use internally generated funds rather than externally borrowed funds. Thus the higher the
profits are, the higher will be the liquidity, consequently the lower is the cost of capital and hence the larger is the optimal capital stock. In this theory, desired capital and liquidity are positively associated in a functional relation between the two.

2.1.2.5 External Finance Theory:

Loanable funds from external sources of financing such as long-term debt, new issues of share capital, sale of debentures and bonds etc., also serve as determinants of investment. The demand for external source of finance arises mainly on account of constraints on the availability of internal finance. Hence, the demand for external finance is positively related with investment needs. The cost of raising funds is also a determinant of the demand for external finance. In econometric investigations, external finance has been made a function of profits and dividends or alternatively retained earnings, investment expenditures, working capital requirements and outstanding debt.

2.1.2.6 The Dividends Theory:

The theory that dividends also determine the level of investment expenditures has been based on Lintner's (1956) hypothesis, which states that dividends represent primary and active decision variable, while retained earnings are largely a by product of dividend action taken in terms of well established
practices and policies. Dividend behaviour of any firm depends upon the outcome of various considerations of management and shareholder's preferences. The Lintner's model is given by,

\[ D_t - D_{t-1} = C (D_t^* - D_{t-1}) + a, \]  

(2.8)

Where \( D_t \) represents desired dividends, \( D_{t-1} \) is the current dividends and \( C \) is a reaction coefficient bound between 0 and 1.

In empirical investigations of dividend behaviour, investment, external finance and liquidity have been incorporated in the Lintner's model.

2.1.3 The Neo-classical Approach:

Dale Jorgenson (1968, 1969) had developed and applied several closely related models of investment behaviour based on his version of the neo-classical theory of optimal capital accumulation. His theory of investment behaviour also includes the theory of user cost of capital. Another version of this theory was developed by Modigliani and Miller (1958). The theory of optimal capital accumulation is based on the idea that optimal factor proportions are determined by the relative prices of factors of production. In the Modigliani and Miller version of the theory, under certain conditions albeit highly restrictive investment decisions are independent of the capital structure.
The appropriate cost of capital for investment decisions is a weighed average of the expected return to equity and return to debt. Return to equity can be measured in two alternative ways. In the first one, capital gains on assets held by the firm may be regarded as transitory, so that return to equity and the price of capital services should be measured excluding capital gains. In the second way, capital gains on assets may be regarded as part of the return to investment, so that return to equity and the price of capital services should include capital gains. Jorgenson named the theory incorporating capital gains as neo-classical - I and the theory excluding capital gains as neo-classical - II.

The neo-classical - I relationship is given by,

$$K_t^* = \alpha p_t Q_t C_t^{-1},$$

(2.9)

Where $C_t$ is the user cost of capital given by,

$$C_t = q_t (1 - U_t)^{-1} \left\{ (1 - U_t W_t) \delta + r_t - (\Delta q_t q_t^{-1}) \right\}$$

(2.10)

Where $a$ is the elasticity of output with respect to capital input, it is the investment goods price index, $p_t$ is the whole sale price index, $Q_t$ is the value of output in constant prices, $\delta$ is the rate of replacement, $r_t$ is the cost of capital, $u_t$ is the rate of taxation of corporate income and $W_t$ is the proportion of
depreciation at replacement cost deductible from income for tax purposes.

In this version of the neo-classical theory, capital gains are assumed to be taken into account in investment decisions and desired capital is proportional to the value of output divided by the price of capital services including capital gains. The neo-classical - II relationship is given by,

\[ K_t^* = \alpha P_t Q_t C_t^{-1} , \]

where

\[ C_t = q_t (1 - U_t)^{-1} \left\{ (1 - U_t W_t ) \delta + r_t \right\} \] (2.11)

The price of capital services and cost of capital are measured with capital gains set to zero.

The neo-classical formulation of the investment function is an improvement over the accelerator model, in that it assumes that the desired capital stock depends not only on planned output, but also on the ratio of output price to the implicit rental price of services of capital goods. This formulation gains importance as it includes the cost of capital, which depends on price of investment goods, influenced by features of the tax system. It enables one to study the effect of changes in corporate tax rates, development rebate and other tax exemptions.
2.1.4 Theory Incorporating Tax Policy Effects:

Tax incentives are known to stimulate capital expenditures by making the entrepreneurs to invest more in capital goods. This is done in two ways; first, by reducing the amount of taxes that must be paid on income from assets, or by changing the timing of the tax payments in favour of the future, tax incentives increase the after-tax rate of return on capital. Second, by reducing tax liabilities, tax incentives increase a firm's cash flow, which is one measure of internal funds available for investment expenditures. The rate of return effect is incorporated in 'user cost of capital' variable, in an implicit rental price of capital, which enters the investment function as a determinant of the demand for capital. The 'internal funds effect' is captured by the inclusion of cash flow as a determinant of the speed at which firms eliminate any gap between their desired and actual stock of capital.

In the literature, two specifications of the investment function are used in investigating the importance of tax incentives. The first specification is a capital stock adjustment model with a constant adjustment speed given by

\[ I_t = \beta (K_t^* - K_{t-1}) + \delta K_{t-1}, \]  

(2.12)

where \( \beta \) is the adjustment rate.
In the second specification, cash flow is included as a determinant of the adjustment speed, and is given by

\[
I_t = \left[ \beta_1 + \beta_2 F_{t-1} \left( K_t^* - (1-\delta) K_{t-1} \right) \right] \left[ K_t^* - (1-\delta) K_{t-1} \right],
\]

where \( F_{t-1} \) is the cash flow during the period \( t-1 \). The expression \( K_t^* - (1-\delta) K_{t-1} \) is the amount of gross investment needed during period \( t \) to attain stock \( K_t^* \).

Similar specifications are needed to trace the implicit and explicit effects of tax rate changes or of subsidiaries or expenditure of goods. One may also note the specification alternatives for tracing the implicit and explicit effects of monetary instruments such as bank rate or loan rate of scheduled banks or of selective credit controls.

2.1.5 Inventory Investment Models:

The naive accelerator model of Metzler (1941) for inventory investment is given by

\[
IN = b_0 + b_1 S_t - b_2 H_{t-1}, \quad \text{(2.14)}
\]

where \( H_{t-1} \) is the inventory stock in the period \( t-1 \), \( S_t \) is the level of sales, \( IN \) is inventory investment.
Here, given the ratio of inventory to sales, inventory investment may be adjusted to the expected sales. This formulation depends on the adjustment relation adopted to explain adjustment of actual inventory sales ratio to the desired level. The adjustment mechanism is given by,

$$\Delta H_t = a \left( H_t^* - H_{t-1} \right), \quad 0 \leq a \leq 1, \quad (2.15)$$

where, $H_t^*$ is the desired level of inventory stock and can be expressed as $H_t = C_t S_t$. Thus $b_1 = ac$ and $b_2 = a$ in the inventory investment equation. If these changes are incorporated into the naive accelerator model, it becomes the flexible accelerator model of inventory investment. A better explanation of the inventory investment behaviour incorporating the uncertainty is to define desired inventory stock as a function of the level of sales and prices. The modified accelerator may be given by,

$$IN_t = b_0 + b_1 S_t + b_2 P_t + b_3 H_{t-1}, \quad (2.16)$$

where $P$ is the current price level. The liquidity and profit variables also influence the inventory investment behaviour. The profit variable affects the inventory investment through cost of capital and the liquidity variable affects the investment level positively.
Hilton (1976) distinguished between intended and unintended inventory investment and obtained the estimating equations for intended investment as

\[
\text{INS}_t^e - \text{INS}_{t-1} = \delta (\text{INS}_t^* - \text{INS}_{t-1}) + \epsilon_t,
\]

(2.17)

where \(\delta\) is the speed of adjustment of existing stock to the desired stock. Eisner (1978) has further dealt with the concept of intended and unintended inventory investment and derives his inventory equations as the aggregate to these two components. His model is given by,

\[
\Delta H_t = \alpha + \beta (K_t S_{t+1}^e - H_{t-1}) + \gamma (S_t - S_t^e) + \epsilon_t,
\]

(2.18)

where \(\Delta H_t = H_t - H_{t-1}\) and \(K\) is the ratio of desired inventory stock to sales, \(S_t^e\) represents sales anticipated for period \(t+1\).

2.2 REVIEW OF PAST STUDIES:

Econometric analysis of the investment behaviour at the levels of firm, industry and the economy as a whole, received wide attention, both in India and abroad. The studies in this field have focussed on the following aspects:

(i) The validity of the acceleration principle in explaining the investment behaviour.
(ii) Identifying the importance of various determinants of investment and
(iii) Analysing the factors affecting the level of capacity utilisation.

The studies have also tested some hypotheses relating to the above aspects viz., the acceleration principle, the profit theory and the liquidity theory (cash flow hypotheses) and the role of other financial variables, particularly dealing with external sources of financing for long term growth of firms. Some have tested the role of tax-policy variables implicitly affecting the user cost of capital and explicitly influencing the net investment.

2.2.1 Review of Studies on Fixed Investment Behaviour:

The survey of literature relating to fixed investment behaviour is attempted below in two sections, Section I containing studies for other countries and Section II containing studies for India.

2.2.1.1 Some Significant Trends in the Literature of Investment Behaviour in USA, UK and Other Developed Countries:

Econometric studies in the field of investment behaviour at the level of firm or industry involve several alternative
theories. For instance (i) profit theories (Tingbergen, 1938; Kalecki, 1937; and Klein, 1951) and (ii) capacity utilisation-accelerator theories (Clark, 1917; Chenery, 1952; Koyck, 1954).

The profit theories propounded by Tingbergen (1938) and later on developed by Kalecki (1937) and Klein (1951) contend that the level of investment is determined by the present profit accruing to the firm or industry. The accelerator theory propounded by Clark argues that the rate of change of capital stock is proportional to the positive change of output. This theory was modified by Chenery and Koyck in two related ways. One of the modifications is towards making investment a function of the level of output rather than rate of change of output. Another is, by introducing the concept of desired capital stock and adjustment of the actual to the desired level with the given speed of adjustment.

The literature relating to the theory of investment behaviour was enriched by Grunfeld (1960), Kuh (1963), Eisner and others (1962, 1963, 1965, 1967), Jorgenson and others (1965, 1968, 1969, 1971), Hall and Jorgenson (1971) and Bischoff (1971) by making detailed comparison of, the different variants of profit and accelerator theories such as cash flow and other internal and external sources of financing concepts in explaining the observed investment behaviour. Dobrovolsky (1951) and Lintner (1956) examined the effect of financial variables like dividend policy,
internal financing etc., on investment. Hall and Jorgenson (1971) studied the fiscal and monetary policy variables influencing investment implicitly, through user cost of capital and through effective rates of return over capital.

Detailed surveys of the works on investment behaviour were carried out by Meyer and Kuh (1957), Eisner and Strotz (1963), Evans (1967), Lund (1971) and Jorgenson (1965, 1971).

The studies on investment behaviour can be grouped under the profit theory and the accelerator theory, for purposes of a review. Another classification is by the type of data used in the analysis viz., time series and cross-section data. The studies may also be classified on the basis of whether the unit of analysis is a single firm or industry as a whole. However, the present review adopts a two-fold categorization, namely investment by individual firms and investment by an industry.

2.2.1.2 Investment by Individual Firms:

2.2.1.2.1 Grunfeld's Study (1960):

Grunfeld rejects the theory that profits are a determinant of desired level of capital. In Grunfeld's analysis, desired capital is proportional to the value of firm's outstanding securities. The determinants of the desired capital are value of the firms, deflated by the implicit price deflator for gross national product and the corporate bond rate. The time structure of investment process is similar to that of Kuh. He assumes that replacement investment is proportional to capital stock or that the mortality distribution for investment goods is geometric. The data are on gross additions to plant and equipment plus maintenance and repairs, deflated by an implicit price for producer's durable equipment, 1935 through 1954. He rejects the hypothesis that profits are a good measure of the expected profits that include investment expenditures.

2.2.1.2.2 Kuh's Study (1963):

Kuh's time series study of investment by individual firms deals with two models of investment behaviour. The first one is the flexible accelerator model of Chenery and Koyck, slightly modified in its version with desired capital proportional to sales. The second model is similar to the flexible accelerator with desired capital proportional to profits. Another model incorporating desired capital as a function of both sales and
profits was compared with the other two. Kuh concludes that the accelerator model with desired capital proportional to sales was superior to the profit model. The important variables included in Kuh's profit model are net income after tax and gross operating profits. In the sales model, weights associated with desired capital decline geometrically. The results suggest that, sales rather than internal funds determine the level of desired capital.

In the model for gross investment, replacement investment is proportional to capital stock. The capital stock is measured as accumulated gross investment less retirement, each deflated by an appropriate investment index. Kuh did not take into effect the decline in efficiency of existing capital goods in measuring capital stock. Adjustments to this factor could not be done for want of prior knowledge and related deflators, which is a serious gap with the use of time series data in these studies.

2.2.1.2.3 Eisner's Study (1967):

Eisner's permanent income model of investment employs the ratio of investment to gross fixed assets as a dependent variable and the rate of growth of sales, the ratio of profits to gross fixed assets, and the ratio of depreciation to gross fixed assets for a single year as independent variables. Time series data covering the years 1955 to 1962 are employed. Results show
that profits and the rate of growth of sales are both significant determinants of the desired level of capital. Eisner constructed an alternative model for the period 1960-1962, which includes two additional independent variables representing the market value of the firms and the rate of return over capital. In this model only profits and the rate of return are the significant determinants. Further, the results of the two alternative models contradict each other.

Eisner employs finite distributed lag function in the time structure of investment process. The distributed lag function consists of weighted average of past rates of growth of sales, profits, rates of return, and market values of the firm. Replacement investment is treated as proportional to gross capital stock and book values of gross capital stock were not corrected for variations in the acquisition cost of investment goods. Eisner inconsistently used the gross capital stock with the geometric mortality distribution for investment goods.

2.2.1.2.4 Jorgenson and Siebert's Study (1968) :

Jorgenson and Siebert construct two models based on the optimal accumulation theory of capital. In this theory, the cost of capital is shown to be independent of the financial structure of the firm or of divided policy. The first model studied by Jorgenson and Siebert known as neo-classical I, includes capital
gains, while the second model referred to as neo-classical II excludes capital gains.

In both the models desired capital is proportional to the ratio of the value of output to the price of capital services. It treats net investment as a distributed lag function of changes in desired capital. Jorgenson and Siebert have compared the models based on optimal capital accumulation with corresponding models based on the acceleration principle and ranked them as (i) Neo-classical I, (ii) Neo-classical II, (iii) Expected Profit model, (iv) Accelerator, (v) Liquidity model with respect to statistical goodness of fit and their performance for predictive purpose.

2.2.1.3 Investment by Industry Groups:

Under this section, the review of earlier studies of investment behaviour of one or more industry groups is attempted. The studies on investment behaviour by industry groups were made by Anderson (1964), Eisner (1962, 1965), Evans (1967), Jorgenson and Stephenson (1967, 1969), Hall and Jorgenson (1971), Meyer and Glauber (1964) and Resek (1966). Studies using annual data were carried out by Bourneuf (1964) and Hickman (1965).
2.2.1.3.1 Anderson's Study (1964):

Anderson's model includes three relatively standard elements of desired level of capital namely, pressure on capacity, profits and interest rates, and two novel ones namely, stocks of government securities held at the beginning of the period, and long term debt capacity as the independent variables. Anderson omits replacement investment from the model. The time structure of the investment process includes four quarterly moving averages of each of the determinants used as independent variables. Time trend is included to represent lag in expectations, and decision lag is taken to be fixed.

\[
Q_{At} A_t = \beta_0 + \beta_1 t + \beta_2 (S - S_{max})_{t-3} + \beta_3 \text{RED}_{t-3} + \beta_4 \bar{q}_{t-3} + \beta_5 T_{a,t-3} + \beta_6 \bar{R}_{DL,t-3} + \beta_7 \bar{I}'_{t-3} + \beta_8 Q_1 + \beta_9 Q_2 + \beta_{10} Q_3 + \epsilon_t, \quad \ldots(2.19)
\]

where

- \( q_{At} \): price of investment goods
- \( A_t \): quantity of investment expenditure
- \( q_{At} A_t \): investment in current prices
- \( S - S_{max} \): pressure on capacity
- \( S \): sales
- \( S_{max} \): previous maximum value of \( S \)
A bar over the variable (ex.RED) indicates a moving average for four quarters beginning with the quarter indicated. The determinants of investment expenditures are tested for significance by means of Scheffe's S-method. The results suggest that, capacity utilization, $S - S_{\text{max}}$ and the interest rate $i'$ are significant determinants of investment. The explanatory variables, viz., debt capacity, government securities, and tax liability are barely significant. None of the results is out of line with the null hypothesis that the corresponding coefficients are equal to zero.

2.2.1.3.2 Meyer and Galuber's Study (1964):

Meyer and Glauber's model includes capacity utilization, profits, interest rates, and the percentage change in the price of common stocks as the main determinants of the stock of desired capital. Replacement investment is omitted in the model. The time structure of the model includes a geometric lag function.
The model of Meyer and Glauber is given by,

\[ A_t = \beta_0 + \beta_t (T - V)_{t-1} + \beta_2 C^M_{t-1} + \beta_3 \gamma_{t-3} + \beta_4 (\Delta SP/SP)_{t-1} \]

\[ + \beta_5 A_{t-2} + \beta_6 Q_1 + \beta_7 Q_2 + \beta_8 Q_3 + \epsilon_t, \quad \ldots (2.20) \]

where

\[ A_t \quad = \text{Investment in constant prices} \]
\[ T - V \quad = \text{Net profit plus depreciation} \]
\[ C^M \quad = \text{Ratio of production capacity} \]
\[ V \quad = \text{Corporate bond rate} \]
\[ SP \quad = \text{Standard and poor's index of the prices of 425 industrials} \]
\[ (\Delta SP/SP) \quad = \text{percentage rate of change of the above price index} \]
\[ Q_1, Q_2, Q_3 \quad = \text{Seasoned dummy variables} \]

The results were tested by Scheffe's S-method for significance. Net profits plus depreciation less dividend variable \((T-V)\) is the only clearly significant determinant of investment. Capacity utilisation and the interest rate are barely significant. These results are contrary to those obtained by Anderson.
2.2.1.3.3 Bourneuf's Model (1964):

Bourneuf's model includes output and capacity as determinants of the investment behaviour. The data includes plant and equipment expenditures, deflated by an implicit price deflator for producer's durable equipment and non-residential construction, and the period of coverage is 1950-61.

The time structure of investment process in the model is taken as arbitrary for the first value of output where as the remaining weights decline geometrically. Here, the replacement investment is proportional to capacity. The specification tested by Bourneuf is given by

$$\Delta K_t = \beta_0 + \beta_3 Y_t - (\beta_1 + \beta_3) Y_{t-1} + \beta_1 \alpha^{-1} K_{t-1}, \cdots (2.21)$$

where

- $\Delta K_t = A_t - \beta_2 C_{bt}$
- $A_t = $ Net Investment
- $Y_t = $ Output
- $K_t = $ Capital stock
- $\alpha = K/C$
- $t = $ time suffix

Here also, Scheffe's S-method is employed to appraise the results. The difference between capacity and output is a highly
significant determinant of investment expenditures. Capacity at the beginning of the period, representing replacement requirement generated by existing capital stock is also significant. The change in output is barely significant. These results substantiate the conclusion of Anderson, Resek, Evans, Eisner and Hickman, and show that capacity utilization is an important determinant of investment expenditures.

2.2.1.3.4 Eisner's Study (1965):

Eisner's model of investment behaviour by industry groups, includes changes in sales, changes in profits, replacement investment and capital stock. The time structure of the investment process includes a modified version of Koyck's distributed lag function, with weights determined arbitrarily for the first lagged values of profits and sales and then declining geometrically. Eisner's model is given by,

\[ A_t = \beta_0 + \beta_1 \Delta S_{t-1} + \beta_2 \Delta S_{t-2} + \beta_3 P_{t-1} + \beta_4 \Delta P_{t-2} \]

\[ + \beta_5 A_{t-1} + \beta_6 K_t + \epsilon_t \]

where

\( K_t \) Gross investment

\( \Delta S \) Change in sales
An overall appraisal can not be made because Eisner fitted the model only for realization of investment expenditures and only for the totals of durable and non-durable manufacturing industries. Coefficients associated with change in profits only exceed their standard error.

2.2.1.3.5 Hickman's Study (1965) :

The determinants of desired capital in Hickman's model include output, capital stock, wage rate, rental price of capital, price of output and time trend. In the time structure of investment behaviour, weights of the first two values of output and price ratio are chosen arbitrarily and the remaining weights decline geometrically. Hickman uses a logarithmic form of the flexible accelerator, similar to that used by Koyck. The model fitted by Hickman is given by,

$$
\Delta \ln K_t = \beta_0 + \beta_1 T + \beta_2 (\ln Y_t - \ln K_{t-1}) + \beta_3 (\ln Y_{t-1} - \ln K_{t-1}) + \beta_4 (\ln Y_{t-2} - \ln K_{t-1})
$$
\[ Y = \beta_5 \ln P_t + \beta_6 \ln P_{t-1} + \beta_7 \ln P_{t-2} + \epsilon_t, \]

where \( Y \) = output, \( K \) = capital stock, \( P \) = Price ratio, \( t \) = Time trend.

The data used by Hickman (1965) relates to plant and equipment expenditures deflated by a suitable construction index for plant, and wholesale price index for producer's finished goods for equipment, and covers the period 1949 to 1960. After comparison of possible alternative specifications, Hickman's model reduces to the flexible accelerator model of Chenery and Koyck.

2.2.1.3.6 Robert Resek's Study (1960):

Robert Resek's model includes the determinants - output, change in output, rate of interest, a measure of debt capacity, and an index of stock prices. Gross investment, which is the dependent variable is deflated by a price index for investment goods divided by capital stock. Output and the change in output are also divided by capital stock, while other variables are directly included. Replacement investment is proportional to capital stock and is incorporated into the constant term. The time structure of investment process employed by Resek, includes
the finite distributed lag function and weights are determined from regression of expenditures on capital appropriations.

The best fitting model of Resek is given by,

\[
\frac{A_t}{K_t} = \beta_0 + \beta_1 Q_1 + \beta_2 Q_2 + \beta_3 Q_3 + \frac{\beta_4 (\Delta O)_L,t}{K_t} + \beta_5 \gamma_L,t + \beta_6 \left( M - \frac{D-F}{A} \right)_{L,t}^{-1} + \beta_7 SP_{L,t} + \epsilon_t \ldots (2.24)
\]

where

- \( A_t \) = gross investment
- \( K_t \) = capital stock
- \( Q_1, Q_2, Q_3 \) = seasoned dummy variables
- \( \Delta O \) = change in output over 4 quarters
- \( \gamma \) = interest rate
- \( (D - F)/A \) = debt capacity
- \( M \) = constant
- \( SP \) = SEC stock price index for the industry and
- \( L \) = Moving average of the corresponding variable with Almon weights

Scheffe's method is used to test the results as in the case of Anderson and Meyer and Glauber's models. The interest rate \( \gamma \) and stock price \( SP \) are the clearly significant determinants of investment. Change in output \( AO \) is less significant, but the
null hypothesis that the corresponding coefficients are equal to zero is rejected. Rate of interest, price of corporate securities, associated with the cost of external funds are also significant determinants of investment.

2.2.1.3.7 Jorgenson and Stephenson's Model (1967):

This model includes gross value added in current prices, price of investment goods, depreciation rate of return and tax structure as independent variables. The data are quarterly and relates to plant and equipment expenditures, deflated by an implicit deflator for producer's durable equipment and non-residential structures, and adjusted for seasonal variations. The data are from 1949:1 to 1960:4. The time structure of the investment process employed by Jorgenson and Stephenson includes rational distributed lag function. Replacement investment is proportional to net capital stock. The model is given by

\[ A_t = \beta_0 + \beta_1 \Delta \left( \frac{PQ}{C} \right)_{t-4} + \beta_2 \Delta \left( \frac{PQ}{C} \right)_{t-5} + \beta_3 \Delta \left( \frac{PQ}{C} \right)_{t-6} + \beta_4 \Delta \left( \frac{PQ}{C} \right)_{t-7} + \beta_5 (A - \delta K)_{t-1} + \beta_6 (A - \delta K)_{t-2} + \beta_7 K_t + c_t' \]  

(2.25)

where

- \( A \) = Gross investment
- \( PQ \) = Gross value added in current prices
\[ C = \text{Price of the capital services} \]
\[ C = q \left\{ (1-uv)(1-u)^{-1} + (1-uw)(1-u)^{-1}r \right\} \]
\[ q = \text{price of investment goods} \]
\[ s = \text{rate of replacement} \]
\[ r = \text{cost of capital} \]
\[ U = \text{tax rate} \]
\[ V = \text{proportion of depreciation deductible from income for tax purposes} \]
\[ w = \text{proportion of the cost of capital deductible from income} \]

and \( K = \text{capital stock} \)

Jorgenson, Hunter and Nadiri (1970) compare the performance of the model of Jorgenson and Siebert with the models of Anderson (1964), Eisner (1965) and Meyer and Glauber (1964). Among the models compared, the best explanation of investment behaviour for individual industry groups is provided by Jorgenson and Stephenson's model.

2.2.1.3.8 Evan's Study (1967) :

The determinants in Evan's model are capacity utilization, capital stock, sales, cash flow, and the interest rate. Capacity utilization is measured as the Wharton School capacity index, where as cash flow is measured as profits after tax plus depreciation less dividends. Replacement investment is taken as
proportional to the average of capital stock, lagged by five and six quarters. The treatment of replacement investment is internally inconsistent. The time structure of investment is a three-parameter rational distributed lag function. Evan’s model is given by,

\[ A_t = \beta_0 + \beta_1 C_{t-1} + \beta_2 S_{56} + \beta_3 K_{56} + \beta_4 L_{56} + i_{56} \]

...(2.26)

where

\[ A_t \] = Gross investment

\[ C_{t-1} \] = Capacity utilization lagged once

\[ S_{56} \] = Sum of sales lagged five and six periods

\[ L_{56} \] = Sum of lagged cash flow

\[ i_{56} \] = Sum of lagged interest rates.

The model is tested using the Scheffe's S-method. The results show that sales and capacity utilization are significant determinants of desired capital. Capital stock is significant for four industries while the cash flow and the interest rate are barely significant.

2.2.1.3.9 Hall and Jorgenson’s Study (1971) :

This study examines the effect of tax policy in altering investment expenditures. For this purpose, they utilize an econometric model of investment behaviour based on the
neo-classical theory of optimal capital accumulation. First, an econometric model is fitted to the data on investment expenditures covering 1935-40 and 1954-65. Estimates of the impact of the adoption of accelerated depreciation in 1954 and of new life times for depreciation of equipment and the investment tax-credit in 1962, the tax cut of 1964 were presented.

The explanatory variables of the model include lagged values of net investment and current and lagged changes in the desired level of capital, tax rate, depreciation formulae, tax credit, and depreciation life time, while net investment is the dependent variable. The numerical estimates of the unknown parameters of the model reflect the alteration in the statistical technique used by the same authors in their earlier studies. The results are in agreement, with evidence on the lag structure from sample surveys and from econometric models of investment fitted to data for industry groups. They conclude that tax policy can be highly effective in changing the level and timing of investment expenditures. Quantitatively, a change in tax policy that reduces the rental price of capital services will increase the desired level of the capital stock.

They conclude, further, that, the investment tax credit, which is essentially a subsidy to the purchase of equipment, had a greater impact than any of the other changes in tax policy during the post-War period.
2.2.1.4 Section II : Studies for India :

There have been some attempts in recent years to study the determinants of investment in the Indian corporate sector. Important studies on Indian industry are those of Bagchi (1962), Krishnamurthy (1964), Krishna and Krishnamurthy (1974), Krishnamurthy and Sastry (1971, 1975, 1976), Divatia and Athawale (1972), Somayajulu (1975, 1977), Dixit (1976), Mathew (1972), Jameson (1975), Swamy and Rao (1975) and Siddharthan (1976).

The main issues that received attention in these studies are:
1. The search for appropriate determinants of investment – both fixed and inventory, with special reference to the verification of the acceleration principle.
2. The role and quantitative significance of tax policy and tax incentives and monetary instruments.

There have been some attempts in recent years to study the determinants of fixed investment for India. Most of the studies relate to private sector. Some studies are based on time series and some are based on cross-section data, whereas some recent studies in this field make use of pooled time series cross-section data.
The investigations that have been carried out are classified into macro or sectoral studies, individual studies, studies incorporating tax policy variables and studies based on utility maximisation approach.

2.2.1.4.1 Macro Studies :

2.2.1.4.1.A Bagchi's Study (1962) :

One of the earliest studies in the field of corporate investment behaviour in India is that of Bagchi. His study has covered 27 diverse industries like tea plantations, electricity supply and shipping. The unit of analysis is industry. The study examines whether the acceleration principle provides a good explanation of the movements in private industrial investment or the level of past profits is a more important determinant of investment. The consolidated balance sheet data of public limited companies published by Reserve Bank of India have been used. Investment equations, one with sales changes and another with profits separately, have been estimated using yearly averages for the two periods, 1952-55 and 1957-59. The broad conclusion of the study is that profits after tax have a more powerful influence on the head of investment than changes in sales.
Bagchi's specifications are:

\[
\begin{align*}
I_t &= \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} \\
I_t &= \beta_1 Z_{t-1} + \beta_2 Z_{t-2}
\end{align*}
\]  \hspace{1cm} (2.27)

where \(I_t\) = investment, \(\Delta Y_{t-1}\) = change in income in period \(t-1\) and \(Z_{t-1}\) = profit in period \(t-1\).

2.2.1.4.1.B Krishnamurthy's Study (1964):

Krishnamurthy made a detailed analysis of the investment behaviour of the entire private sector for the period 1948-1961. The data were taken from the Central Statistical Organisation's study on capital formation. The explanatory variables in investment equation include, index of industrial profits (\(\pi\)), percentage yield on government securities (\(L\)), private disposable income at 1948-49 prices (\(Y^\prime\)), price index number of machinery and other equipment. 1948-49 = 100 (\(P_{1948-49}\)) is used as a deflator for the profit series. Thirteen linear models were estimated to explain private gross investment in machinery and other equipment (\(IP_{me}\)) in terms of index of industrial utilization of capacity (\(U\)) and index of industrial profits (\(\pi\)) or both. The study concluded that neither profits nor the capacity version of the accelerator, if taken separately, can explain investment completely. However, both these variables along with interest rate, explain investment in the private sector.
2.2.1.4.1.C Divatia and Athawale's Study (1972) :

This study examined the basic hypotheses of the theory of investment behaviour viz., 'accelerator principle' and the 'profit principle'. The study covers the private corporate sector over the period 1955-56 to 1969-70. The independent variables in the model are sales deflated by wholesale price index of non-food articles \((S_{t-1})\), sales deflated by investment goods price index \((S_{t-2})\), profits before tax deflated by investment goods price index \((P_{t-1})\), capital stock \((K_{t-1})\) at the end of the year at constant prices. The study concluded that a combination of accelerator and profits can explain gross capital formation adequately. The lagged effect of the accelerator was also taken into consideration.

2.2.1.4.1.D Krishna and Krishnamurthy's Study (1974) :

Krishna and Krishnamurthy made a time series analysis of the corporate fixed capital formation in India for the period 1950-51 to 1965-66. A specific feature of this study is that the impact of government capital outlays on corporate fixed investment was examined. The explanatory variables of the model are gross capital formation in machinery, equipment and construction by the corporate sector \((I_{c})\) and by the government \((I_{g})\); Yield on government bonds \((R^g)\) and corporate debentures \((R)\) used as proxy
variables for rate of interest; profits after tax plus depreciation provision (P), net worth (NW) equalling total assets minus total liabilities; Gross retained earnings (GRE); and capacity utilization index for the manufacturing industries (U).

The results show that government investment and long term interest rate are the important determinants of the corporate fixed investment. I was found to be an important explanatory variable to explain I. This study is an improvement over the earlier studies because it incorporates I instead of disposable income ($Y$) and another set of liquidity variables.

From the foregoing discussion, it can be seen that is almost all the studies on the private corporate sector, accelerator along with the profit variable were found to be important determinants of investment, whereas the liquidity variables revealed little or no importance, except for corporate debentures.

### 2.2.1.4.2 Individual Industry Studies:

#### 2.2.1.4.2 A Krishanmurthy and Sastry's Study (1971):

Krishanmurthy and Sastry in their study examined the investment behaviour of the chemical industry in India. They studied the role of accelerator and other financial factors in
determining the level of investment and also the interaction between the determinants of dividends, external finances and investment. The dependent variable was gross investment deflated by capital stock at the beginning of the period \( \frac{I(t)}{K(t-1)} \), through a linear function of five lagged sales changes, retained earnings and flow of net debt, both deflated by capital stock at the beginning of the period. In the second model, inventory investment also was incorporated along with the other explanatory variables.

The specification of Krishnamurthy and Sastry is given by,

\[
\frac{I_t}{K_{t-1}} = \alpha + \beta_1 \Delta S_t(S_{t-1})^{-1} + \beta_2 \Delta S_{t-1}(S_{t-2})^{-1} + \beta_3 \Delta S_{t-2}(S_{t-3})^{-1} + \beta_4 \Delta S_{t-3}(S_{t-4})^{-1} + \beta_5 \Delta S_{t-4}(S_{t-5})^{-1} + \beta_6 R_t (K_{t-1})^{-1} + \beta_7 \text{FNDE}(NW_{t-1})^{-1}, \quad \ldots (2.28)
\]

Where

- **FNDE** = Flow of net debt
- **NE** = Net Worth
- **\( \Delta S \)** = Sales change
- **\( R_t \)** = Gross Retained earnings
- **\( K_t \)** = Capital stock
- **\( I_t \)** = Gross fixed investment
From results of their model, they concluded that the accelerator influenced the investment, and in the year when it did not influence investment, there were special macro economic reasons. They also concluded that the financial flow variables, internal as well as external, were of importance.

2.2.1.4.2.C Sastry's Study (1975) :

Sastry's study refers to the investment behaviour in the capital goods industry in the private corporate sector in India, and was based on time series data, covering the period 1957-67. The explanatory variables of the model include sales change, retained earnings and net debt while the explained variable was gross investment. The results of the cross-sectional analysis show that the financial variables play an important role in investment decision while that of the time series analysis show that the financial variables are important explanatory variables.

2.2.1.4.2.D Misra's Study (1975) :

Misra's time series study analysed fixed investment and examines the role of financial variables. Misra formulated five equations including two for investment, and one for earnings. The results (both OLS and 2SLS) show that accelerator is a significant determinant of fixed investment and that the financial variables appear to be more important.
2.2.1.4.2.C Krishnamurthy and Sastry's Study (1975):

 Krishnamurthy and Sastry analysed the investment behaviour of seven major industries viz, cotton textiles, jute, chemicals, engineering, paper and paperboards, sugar and cement. The specification of the model is

\[
\frac{I_t}{K_t} = \alpha + \sum_{j=2}^{4} b_j Q_{jt} + \sum_{t=2}^{4} c_t Y_t + \sum_{r=0}^{4} d_r \Delta S_{t-r} (K_{t-1})^{-1} \\
+ e I_N \ (K_{t-1})^{-1} + f R_{E} \ (K_{t-1})^{-1} + g F_N \ (K_{t-1})^{-1} \\
+ h D_{R} \ (K_{t-1})^{-1},
\]

where

- \(I\) = gross fixed investment
- \(K\) = gross fixed assets
- \(Q_{jt}\) = dummy variable for accounts closing quarter
- \(Y_t\) = dummy variable for year \(t\)
- \(\Delta S\) = Sales change
- \(I_N\) = Inventory investment
- \(R_{E}\) = Gross Retained earnings
- \(F_N\) = Flow of net debt
- \(D_{R}\) = Depreciation reserves

Heteroscedasticity is corrected using a uniform deflator. They concluded that accelerator was an important determinant in all the industries considered for analysis, except in sugar and
cement, where extreme forms of price and distribution controls exist.

2.2.1.4.3 Studies Incorporating Tax Policy Variables:

This section surveys some of the important contributions to the study of investment behaviour wherein the role of tax policy variables such as corporation tax rates, and tax incentives is examined. Tax policy variables are incorporated to measure their implicit as well as explicit effects in the single equation models of Mathew (1972), Jameson (1975), Somayajulu (1975), Swamy and Rao (1975) and Dixit (1976).

2.2.1.4.3.A Mathew's Study (1972):

Mathew studied tax policy and investment behaviour by calculating the effect of tax incentives on rental prices of capital and estimated Jorgenson's model in the following form,

\[ G_t = \beta_0 + \beta_1 \Delta K_t^* + \beta_2 \Delta K_{t-1}^* + \delta K_{t-1} + c_t \]

(2.30)

Where \( G_t = N_t + \delta K_{t-1} \)

and \( (K, \alpha, p_t, q_t)/C \) and \( \alpha \) is the exponent of capital input in the Cobb-Douglas form of production function. The results show that tax policy variables are not significant determinants of investment.
2.2.1.4.3.B Jameson's Study (1975) :

Jameson studied the impact of different policy variables such as tax rate, development rebate, rate of interest and the depreciation rate on fixed investment through the user cost of capital. The results show that even a relatively small change in the user cost of capital could have a significant impact on the rate of investment in most of the industries. The author concludes that fiscal policy measures are more important than the interest rate mechanism.

2.2.1.4.3.C Somayajulu's Study (1975) :

Somayajulu examined the role of tax incentives in determining the level of investment. He made pooled cross section study from 1965-66 to 1970-71 of sugar, cotton textiles, paper and paper products and motor vehicles. A distinctive feature of this study is that it incorporates tax policy variables defined as the sum of tax exemptions and development rebate, as one explanatory variable in the specification and estimation of single equation linear model of investment. On the basis of the empirical results, the author ranked the explanatory variables according to their contribution, as follows (i) Profit after tax (ii) Long-term borrowings (iii) All tax incentives (iv) Changes in sales. The author maintained that the
gestation lags are guided by not only market forces but also institutional and other extraneous factors, all simultaneously influencing the investment decisions in a given period of time.

2.2.1.4.3.D Swamy and Rao's Study (1975) :

Swamy and Rao examined the quantitative effects of monetary and fiscal policy variables on fixed investment, internal and external sources of funds etc. The results showed the importance of the accelerator, external finances and that of consumption allowances reflecting the age of equipment, unlike the earlier finding by Krishnamurthy and Sastry.

2.2.1.4.3.E Dixit Study (1976) :

Dixit studied the effect of corporate tax policy on fixed investment behaviour of large private corporations in India. Both neo-classical and financial approaches were adopted in the analysis. The Two versions of the neo-classical theory have been examined. The results showed that direct negative influence of tax policy on the fixed asset investment behaviour is absent. Tax resources like depreciation allowances, and development rebate play a positive role in the fixed asset investment decisions. Fixed asset investment decisions are independent of financial decisions. Hence, tax policy changes do not influence investment decisions via financial decisions.
2.2.1.4.4 Studies Based on Utility Maximisation Approach:

Economists like Baumol (1959, 1962) and Williamson (1970) have objected to the profit maximisation principle and, instead, have propagated maximisation of objective function incorporating market share, non-production expenditure, profit etc., as its determinants. This section surveys the studies in the area of utility maximisation hypothesis relating to the firm's investment behaviour.

2.2.1.4.4.A Siddhardhan's Study (1976):

Siddhardhan studied the investment behaviour of a conglomerate firm. A conglomerate firm is a multi-firm organisation with an apex authority at the centre. For the purpose of estimation, profits are considered as a percentage of total net assets $(\pi)$, and annual average compound rates of growth are considered of, total net assets $(g^{A_i})$, sales revenue $(S_i)$, and non-production expenditure $(g^E_i)$. Four linear models were estimated by considering $TT$ or $n/n$ and $g$ or $g/g$ along with the other variables. The author concluded that profit was not an important determinant of investment in the long run whereas it was significant for non-monopoly firms in the medium run. Siddhardhan’s study differs from the earlier studies in that the selection of the sample of firms does not refer to any particular industry, but to different industries.
2.2.2 REVIEW OF STUDIES ON INVENTORY INVESTMENT:


The important determinants of inventory investment in different studies are stock of inventories, cost of capital, whole sale price index of inventories, degree of capacity utilisation, sales, desired stock-sales ratio, flow of net debt, availability of funds etc. Some of the studies are outlined below.

2.2.2.1 Sen's Study (1964):

A.K.Sen's study is aggregative and covers the entire economy. For the manufacturing sector he has estimated marginal inventory coefficients for the period 1946-59, component wise,
i.e., raw materials, goods-in-process and finished goods inventories. This study suggests the importance of accelerator.

2.2.2.2 Krishnamurthy and Sastry's Study (1970):

Krishnamurthy and Sastry studied the inventory investment behaviour of 21 individual industries for each of the major components for the period 1946-62. The study was based on the data of C.M.I. The role of output/sales, utilization of productive capacity, interest rate, bank finance and price anticipation that have a bearing on inventory holdings were analyzed. Accelerator, bank finance and the interest rate are found to be important determinants.

2.2.2.3 Swamy and Rao's Study (1975):

Swamy and Rao constructed an equation for aggregate inventory investment in their analysis of the flow of funds of public limited companies for the period 1954-70. The preferred equation contains accelerator and bank finance only and these variables were found to be significant.

2.2.2.4 Vinod Prakash's Study' (1970):

Vinod Prakash examined the influence of structural changes in manufacturing activity on the relative size and
composition of inventory holdings in the large scale manufacturing sector in India. The study covered the period from 1946 to 1963. Analysis was carried out both for total inventories and for its components. Three different models for major industry groups and for six important individual industries were tried. Sales, capacity utilization, unit size, short-term rate of interest and price index were the important explanatory variables. The naive accelerator model gave better results than the flexible accelerator.

2.2.2.5 Summary:

Sen (1964), Krishnamurthy (1964), Trivedi (1970), Krishnamurthy and Sastry (1970) and Hilton (1976) found that rate of interest, which was used as a proxy for the opportunity cost of carrying stocks was significant in determining the desired level of inventories.

Sales variable is postulated to have positive relationship with inventory investment. This variable and its variants have been used in several earlier studies and were found to be important determinants. Swamy and Rao (1975) used sales, while change in sales was used as a determinant in the studies of Sastry (1967), Krishnamurthy and Sastry (1970) and Hilton (1976). Most of the studies found that changes in wholesale price index
of stock of inventories have influenced the desired level of inventories.

The studies of Abramovitz (1950), Modigliani (1957), Zarnovitz (1962), Swamy and Rao (1975), Agarwal (1987) highlighted the importance of capacity utilisation as another determinant. These studies obtained a positive coefficient for this variable.

Existing stock of inventories was found to have a negative coefficient in most of the studies cited above. Inventory-turn over ratio was found to be an important determinant in the studies of Metzler (1941), Darling (1959), Vinod Prakash (1970), Lovell (1964) and Hilton (1976).

The studies of Eisner (1978), Dhrymes and Kurz (1967), George (1972), Swamy and Rao (1975), Krishnamurthy and Sastry (1975) and Sarma and Venkatachalam (1977) brought out the importance of financial variables like retained earnings and flow of external finance in determining the desired level of inventories. Eisner found only liquidity and cash flow variables to be important determinants.

Sastry (1966), Swamy and Rao (1975), Krishnamurthy and Sastry (1970), Dhameja (1978) and Agarwal (1987) included fixed investment as another determinant in the model of inventory
investment. They found that this variable had a negative impact on inventory investment expenditures. Vinod Prakash considered the effect of time trend on inventories and obtained a positive coefficient for it.

2.2.3 REVIEW OF STUDIES ON EXTERNAL FINANCE:

The notable studies in this area are Meyer and Kuh (1957), Sastry (1966), Swamy and Rao (1975), Krishnamurthy and Sastry (1975), Sarma and Venkatachalam (1977), Dhrymes and Kurz (1967) etc.

The important determinants of the demand for external funds in most of the studies cited above, were fixed investment, inventory investment, retained earnings, sales, cost of funds and existing stock of funds.

2.2.3.1 Sastry's Study (1966):

Sastry studied the demand for external funds for sample of public limited companies across industries. He used balance sheet data for the years 1955 through 1960. The OLS estimates showed that flow of external finance was negatively related to net debt equity ratio and to gross retained earnings, while there was a positive relationship between investment outlays and flow of net debt.
2.2.3.2 Swamy and Rao's Study (1975) :

Swamy and Rao included the major components of external finance in their model to study the flow of funds. Bank borrowings, long-term loans and accounts payable were the major components of external finance. Macro monetary policy variables like net liquidity ratio were included in the equation for accounts payable. The analysis was done in the framework of partial adjustment model. The OLS estimates showed that both fixed and inventory investment had same influence on external finance.

Summing up the studies in this section, Sastry established a negative relationship between internal and external funds. Swamy and Rao, Krishnamurthy and Sastry, Sarma and Venkatachalam also confirmed the results of Sastry. Meyer and Kuh found that there was dependence between investment and internal funds. Krishnamurthy and Sastry examined that dividends and external finance had a weak relationship between the two. Sastry, Dhrymes and Kurz etc., concluded that fixed investment was a significant variable in determining the demand for external funds.
2.2.4 REVIEW OF STUDIES ON DIVIDEND BEHAVIOUR:


2.2.4.1 Rao and Sarma's Study (1971):

Rao and Sarma carried out a time series analysis based on RBI data for the period 1955-66. They tried three variation of the Lintner's model, one with net profits, another with cash flow and the third with net profits and depreciation separately. The study was done at three levels of aggregation. First for all public and private limited companies, second for all four major industry groups and third, for ten important individual industries. The study concluded that Lintner (1956) model with profit variable explained the corporate dividend behaviour.
2.2.4.2 Purannandam and Hanumantha Rao's Study (1966):

Purannandam and Hanumantha Rao analysed fifty companies in the cotton textile industry for the period 1946-63. They studied the dividend-payout ratios and reaction coefficients in the light of the Lintner model. The Lintner model was found to be explaining the dividend behaviour of the companies.

2.2.4.3 Sastry's Study (1966):

Sastry tried several alternative hypotheses of dividend behaviour for the period 1955-60, for public limited companies. He introduced finite distributed lags in his model. The results showed that current profits were a significant factor affecting disposition of profits between savings and retained earnings. Gross profit after tax showed a significant impact on dividends than net profits.

Summing up all the studies, Darling and Brittain found that depreciation allowance was statistically significant in explaining dividend behaviour. Swamy and Rao and Khurana established that lagged dividend was an important determinant in the model. The importance of sales as a determinant was played down by Krishnamurthy and Sastry in the Indian context. Flow of external funds was found to be an important determinant in the
studies of Sastry, Dhrymes and Kurz, Krishnamurthy and Sastry and Swamy and Rao.

2.3 CONCLUDING REMARKS:

The models of investment behaviour reviewed above differ substantially in the determinants of desired capital, the time structure of investment process and replacement investment. The determinants of desired level of capital in the above studies constitute capacity utilisation, internal finance and external finance. Capacity utilisation was found to be an important determinant of desired capital in most of the studies. The variables associated with internal finance were not found to be significant determinants of desired capital in the studies of Anderson (1964) and Evans (1967), while they were significant in Meyer - Glauber (1964) model. Resek's (1966) measure of debt capacity was also not significant. Of the variables of external finance, interest rate was found to be a significant determinant of desired capital in Anderson (1964) and Resek (1967), while it was barely significant in Meyer - Glauber models (1964).

The time structure of investment process was represented by finite [ Eisner (1965) and Resek (1966) ], geometric [ Grunfeld (1960) and Kuh (1963) ] and rational [ Koyck (1954), Bourneuf (1964) and Hickman (1957) ] distributed lag functions by different authors. All these studies, except those of Anderson
(1964) and Meyer and Glauber (1964) included replacement investment as a determinant of desired capital explicitly in the models.

In the case of Indian studies, sales change variable reflecting the accelerator mechanism was found to be a significant determinant in most of the studies in the case of fixed investment as well as inventory investment. Among the financial variables, profits and flow of net debt were the significant determinants of both fixed and inventory investment. The fiscal policy variables were found to have an impact on investment through rental price of capital. Rate of interest as a monetary policy variable was found to have significant influence on fixed investment.

Most of the studies on external financing activity brought out the significance of investment expenditures - both fixed as well as inventory - as important determinant of the external finance variable. However, all the studies established a negative relationship between internal and external funds.

The studies on dividends behaviour of the firms were carried out in the framework of Lintner's (1956) model. Lagged dividends and profits after tax were the major determinants of dividend behaviour in these studies. Lintner's model was found to be explaining the dividend behaviour in many of the studies.