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Determinants of Investment in Fixed Assets in General Engineering Industry

Lakshmi Tulasi Devi Surapaneni

School of Management, National Institute of Technology, Warangal (NITW), Warangal - 506004, Andhra Pradesh, India.

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ABSTRACT

This paper focuses attention on specific aspects of entrepreneurial decisions relating to investment, both in the total fixed investments and plant & machinery (separately). Demand and financial factors, internal and external, are considered in the investment analysis. Finally the influence of determinants of fixed investment and investment plans are examined in General Engineering industry in India.

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Introduction

The fixed investment decision is an important decision in the valuation of the firm; attempts were made previously to understand the factors that influence the fixed investment decision of the firm. Such studies have identified different factors which play an important role in the determination of the fixed investment of the companies and the studies made by some of the researchers Ashim etal., Bonton (1980), Gompers etal.(1995), Jorgenson (1967), Kuh (1963), Krishna etal.(1974), Kishnamurthy (1975), Meyer (1957), Misra (1984), Prem Kumar,(1985), Prasant Kumar Sahoo (1988), and Ranganadhan etal.(1996) have added significant contributions to this important area of Business Finance.

Though some attempts were made earlier to find out the validity of such contributions in the Indian context, there are very few studies, which tested their applicability at the micro level units on a more comprehensive basis. Hence an attempt is made in this study to understand the different economic variables which influenced the fixed investment of some sample companies in selected industries in India.

Objectives, Methodology & Limitations

Objectives

Being exploratory in character, the present study aims at understanding the fixed investment behaviour of some sample companies in General Engineering Industry. This stundertaken:

To analyze the investment pattern in Gross Fixed Assets of some selected companies in the General Engineering Industry in India.

To analyze the investment pattern in Plant & Machinery separately in the above companies of General Engineering Industry.

To analyze the determinants of investment in Gross Fixed assets i.e., Gross Block and Plant & Machinery in General Engineering Industry.

To analyze the best models, which determine the investment behavior in fixed assets through Stepwise Multiple Regression Analysis.

Methodology

Source of data

The data relating to the different economic variables of companies have been collected from various issues of the Bombay Stock Exchange Official Directory.

The source of data for the fixed investment policy of General Engineering industry is the data relating to the individual sample companies in General Engineering Industry. The industry, for the purpose of the study, means the aggregate of sample units in the industry. Thus the cross section data of micro level economic variables is added to make up the industry data.

Period of study

The present study covers a period of 10 years from 2000 to 2009. Since the fixed investment policy is a long-term policy, a period of 10 years is considered to be long enough to study the Fixed Investment Policy of companies/Industries.

The sample selection

The selection criteria of the companies for inclusion in the sample of the study have been that

a) Companies must have been incorporated on or before 1975, i.e., 25 years before the period for which analysis has been started here so that a minimum period of at least 25 years must have been elapsed for them to establish themselves and invest in fixed assets;

b) Companies must have had a paid-up capital of more than Rs 10 lakhs in 1975 so that only medium and large companies as per the classification of the Reserve Bank of India are included in the sample; and

c) Companies must be continuously profit making companies in all 10 years (which is the study period here) so as to ensure that only which made profits on consistent basis are included.

Based upon the above selection criteria a total of the following 17 firms constitute the size of the sample for the purpose of this study.

1. Ashok Leyland Ltd.
2. BajajAutoLtd.

Tele:

E-mail addresses: sltdevi.nitw@gmail.com

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3. Bimetal Bearing Ltd.
4. Cumins India Ltd.
5. Elecon Engineering Co. Ltd.
6. Escorts Ltd.
7. Exide Industries Ltd.
8. Graver & Well (India) Ltd.
9. Gujarat Machinery Mfgs. Ltd.
10. Honda Siel Power Products Ltd.
11. Kirloskar Brothers Ltd.
12. L.G.Balakrishna & Brothers Ltd.
13. Maharashtra Scooters Ltd.
14. Tata Engineering & Locomotive Co. Ltd.
15. TRF Ltd.
16. Tata-Yodogawa Ltd.
17. ZF Steering Gear (India) Ltd

Variables

A list of the variables – both dependent and independent – that are used in this study is presented

Dependent Variables

1. $GB_{t-(t-1)}$ = Change in Gross Block
2. $Pm_{t-(t-1)}$ = Change in Plant & Machinery

Independent variables

1. $S_{t-(t-1)}$ = Change in sales
2. GIF_t = Gross Internal Funds
3. NL_t = Stock of Net Liquidity
4. D_t =Dividends
5. $EC_{t-(t-1)}$ =Growth of equity capital
6. $DETOUT_t$ =Debt outstanding
7. T_t = Provision for taxes
8. I_t =Interest on borrowed funds

Step wise Regression

The present study is mainly based on stepwise multiple regression analysis. This technique begins with the simple correlation matrix and enters into regression of the independent variables most highly correlated with the dependent variable. Using the partial coefficients generated with respect to the other variables, the computer programme then selects the next variable to enter the model.

Stepwise regression permits the analyst to start with a large number of variables that might have predictive values and then use the model to select the particular variables that appear to provide the prediction.

Statistical analysis

The data used in this study was processed by using computer packages, they are Statistica and Limdep. The multiple linear stepwise regression was run in order of importance in terms of explanatory powers of different variables influencing the dependent variable in the study. In other words, which independent variable has the greatest effect in determination of the dependent variable? How sensitive is dependent variable to fluctuations in independent variables? This technique is adopted in order to obtain a realistic picture of the importance of the various independent variables, which influence financing investment in the General Engineering industry in India.

Models built

This study is conducted on the basis of three models. These three models have been tested in the case of each company. They are

1. Adding Model 2. Constant Model 3. Elimination Model.

The above three models have been tested in each case with the intercept term. Thus altogether 15+ equations are estimated in each case.

Adding Model

It may be noted that in this model, an independent variable has been entered into the model at an earlier step, and then another independent variable is added to the first one and then another variable etc. So ultimately all the independent variables are added and tested under this model.

The following are the equations, which are estimated under this model.

1. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)}$
2. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t$
3. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t$
4. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t + b_4 D_t$
5. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t + b_4 D_t + b_5 EC_{t-(t-1)}$
6. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t + b_4 D_t + b_5 EC_{t-(t-1)} + b_6 DBTOUT_t$
7. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t + b_4 D_t + b_5 EC_{t-(t-1)} + b_6 DBTOUT_t + b_7 T_t$
8. $GBt_{-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t + b_4 D_t + b_5 EC_{t-(t-1)} + b_6 DBTOUT_t + b_7 T_t + b_8 I_t$

Constant Model

In this model the first two independent variables (change in sales and gross internal funds) are kept as constant variables because these two are very closely related to the dependent variables, and the third variable is changed in each model.

The following are the equations, which are estimated under this model.

1. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 NL_t$
2. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 D_t$
3. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 EC_{t-(t-1)}$
4. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 DBTOUT_t$
5. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 T_t$
6. $GB_{t-(t-1)}$ or $PM_{t-(t-1)} = b_0 + b_1 S_{t-(t-1)} + b_2 GIF_t + b_3 I_t$

Elimination Model

In elimination model, the estimated equations are not constant but the number of equations depends on the significance of the variables which proved to be significant.

The following procedure is adopted while estimating the equations. Initially, all the independent variables are included in the model. Based upon the significance of‘t’ values, the variable with the least‘t’ value is dropped and then again the equation is estimated with the remaining independent variables. Again the variable with the least‘t’ value is dropped and the equation is again estimated. This process is continued till all the independent variables in the equation have proved to be significant either at 5% or at 10% level.

So the number of equations varies depending upon the significance of variables in each case of companies.

The above 15+ equations are estimated for all the 17 companies and industry aggregate. The total numbers of estimated equations are as follows:

For 17 companies & industry aggregates in two cases (both gross block and plant & machinery):

In Adding Model ……18×8×2 = 288
In Constant Model ..... 18×6×2 = 216
In Elimination Model ..... = 121

Total 625

Thus altogether 625 equations have been estimated with all the necessary tests, using the data for 10 years in each case.

To find out the effect of different independent economic variables on the fixed investment of the companies during the

period of this study, the Multiple Linear Regression Analysis is used with all its limitations.

Selection of the best model

The following procedure is adopted to select the best model in each case from out of the 15+ estimated equations.

Step - I

Out of the 15+ estimated equations in each case, all those equations, whose Multiple Correlation Coefficients are found to be significant at 5% level based on their calculated 'F' values are picked up for further analysis.

Step – II

The equations thus picked up according to step-I above are further screened in the following way:

The values of intercept term (b_0) and other regression coefficients (b_1, b_2, b_3) are tested at 5% level of significance based on their calculated't' values. If only one equation is found in which all the explanatory variables are significant at 5% level, then that equation is taken as the best model to explain the fixed investment behavior of the company. If, on the other hand, there are two or more equations in which all the explanatory variables are found significant at 5% level, the procedure explained in step III is followed.

But if, in a company, there is not even a single equation in which all the independent variables show significant effect at 5% level, the significance level is relaxed and the impact of the variable is tested at 10% level wherever necessary. That is, the variables, which are not significant at 5% level, are tested at 10% level of significance. However, this has happened in a very few cases in this study. If only one equation is found in which the explanatory variables are significant at 5% level or 10% level, then that model is selected as the best model to describe the fixed investment behavior of the company. On the other hand, if there are two or more than two equations in which the independent variables are significant at 5% or 10% level, the procedure explained that in step III is followed to decide the best model.

Step – III

As stated in step II, if there are two or more equations in which all the explanatory variables are significant that particular equation whose R^2 is the highest is chosen as the best equation to explain the fixed investment behavior of the company.

Limitations of the study

This study has the following limitations.

The accounting years of the sample companies are not common and the closing of the accounting years is spread over all the 12 months of the year. So for the industry aggregate data the accounting year is not uniform.

The Industry data, for the purpose of the study, comprise the aggregate of the data of the micro level sample units that are selected for this study. As there is difference in the classification of industries between Reserve Bank of India and the Bombay Stock Exchange, the RBI data could not be relied upon for the industry aggregate data and the Bombay Stock Exchange Directory does not provide the Industry aggregate data. Since it is highly difficult to collect the data of all the firms which appear on the Bombay Stock Exchange Directory the aggregate data of the sample micro level units is taken to represent the industry data for this study.

a) The data for the study are taken in absolute values as given in the Bombay Stock Exchange Directory and no price deflator is used to adjust for the inflationary trends.

b) This study is only exploratory in its objectives and does not aim at recommending any policy measures either for the companies or for the government.

Analysis of the Regression Results of Firms in General Engineering Industry

This section deals with the study of investment behavior of sample firms taking into consideration two dependent variables namely Gross Block (Y_1) and Plant and Machinery (Y_2) in General Engineering Industry of India.

This study deals with eight explanatory variables, which influence the investment behavior in fixed assets (Y_1 and Y_2). This study is conducted on the basis of three models. They are Adding model, Constant model and Elimination model. In Adding model there are eight estimated equations. In Constant model there are six estimated equations and in Elimination model the estimated equations are not Constant but the number of equations depend on the significance of independent variables.

The following abbreviations are used in the tables (1-8):

NF - The number of firms, where the explanatory variable has shown an impact.

5% - The number of equations in which the explanatory variable is significant at 5% level.

10% - The number of equations in which the explanatory variable is significant at 10% level.

CI - General Engineering Industry (The numbers indicate the number of equations that are estimated)

AM - Adding model

CM - Constant model

E M - Elimination model

Table-1 General engineering (Total No. Of firms: 17)

Explanatory variable : *CHANGE IN SALES (b_1)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	8	7	11	NF	9	8	8
5%	15	6	17	5%	10	13	16
10%	7	10	4	10%	9	11	5
GEI	8	6	4	GEI	8	6	1
5%	8	6	4	5%	8	6	1
10%	--	--	--	10%	--	--	---

Y_1- Gross Block:

From the table (1), it can be seen that in Adding model in nine firms like, Elecon Engineering Co. Ltd., Maharashtra Scooters Ltd. et cetera the explanatory variable that is, Change in Sales shows an impact on investment in Gross Block in 10 estimated equations at 5% level of significance and in nine equations at 10% level of significance. When the aggregate of sample firms is taken as a whole, in Adding model this particular variable is found to be significant at 5% level in all the eight estimated equations.

When the influence of Change in Sales as an independent variable is tested on Gross Block as a dependent variable under Elimination model it is found to be significant in 16 equations at 5% level in eight companies like, Elecon Engineering Co. Ltd., Exide Industries Ltd., L.G. Balakrishna & Brothers Ltd., Maharashtra Scooters Ltd. et cetera. In the above companies, it is found to be significant in five equations at 10% level. Taking the sample firms' aggregate level it is found to be significant at 5% level in only one estimated equation.

In Constant model, this variable is found to be significant at 5% level in 13 equations and at 10% level in 11 equations in eight firms like, Elecon Engineering Co. Ltd., Exide Industries Ltd., L.G. Balakrishna & Brothers Ltd., Maharashtra Scooters Ltd., ZF Steering Gear (India) Ltd., et cetera. When the equations in the Constant model are tested at the aggregate of firms level in General Engineering Industry, this particular variable has shown an impact at 5% level in all the six equations.

In 49 equations of Elecon Engineering Co. Ltd., Exide Industries Ltd., L.G. Balakrishna & Brothers Ltd., Maharashtra Scooters Ltd. and ZF Steering Gear (India) Ltd., Change in Sales is found to be significant at either 5% level or at 10% level under Adding model, Constant model and Elimination models. In Bajaj Auto Ltd., Tata Engineering & Locomotive Co. Ltd. and Tata-Yodogawa Ltd., it appears to be significant in 11 equations under Adding and Elimination models. Change in sales is significant in two equations under Constant model in companies like, Escorts Ltd. and TRF Ltd. In Graver & Well (India) Ltd., in two equations it is found to be significant under Adding and Constant models. This particular variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model in firms like, Ashok Leyland Ltd., Bimetal Bearing Ltd., Cumins India Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd. and Kirloskar Brothers Ltd. In eight out of 17 companies this particular independent variable is significant in most of the equations under Elimination model.

Y_2-Plant and Machinery:

In Elimination model, Change in Sales as a variable is found to be significant at 5% level in seven equations and in four equations, it is found to have a significant impact at 10% level in 11 firms like, Elecon Engineering Co. Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd., L.G. Balakrishna & Brothers Ltd., Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd. et cetera. When the equations in the Elimination model are tested at the aggregate of firms level in General Engineering industry, this particular variable has shown an impact at 5% level in all the estimated four equations.

When the investment in Plant and Machinery as a dependent variable is analysed, the independent variable that is Change in Sales is found to be significant at 5% level in 15 estimated equations under Adding model in eight firms like, Kirloskar Brothers Ltd., Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd. et cetera. In the above companies, this particular variable appears to be significant at 10% level in seven equations. Considering the aggregate of sample firms as a whole, its level of significance is 5% in all the eight estimated equations under Adding model.

Change in Sales shows an impact on investment in Plant and Machinery in six equations at 5% level of significance and in 10 equations at 10% significance level in seven companies like, Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd. et cetera. When sample firms' aggregate level is taken as a whole, in all the six estimated equations it appears to be significant at 5% level under Constant model.

Incase of Graver & Well (India) Ltd., Maharashtra Scooters Ltd. and Tata Engineering & Locomotive Co. Ltd., this independent variable is significant at either 5% level or 10% level in 32 equations under Adding, Constant and Elimination models. In four equations it appears to be significant under Elimination model in companies like, Ashok Leyland Ltd., Bimetal Bearing Ltd. and Elecon Engineering Co. Ltd. In Exide Industries Ltd., Kirloskar Brothers Ltd. and L.G. Balakrishna & Brothers Ltd., it is found to be significant in 12 equations under Adding and Elimination models. Incase of Gujarat Machinery Mfgs. Ltd. and ZF Steering Gear (India) Ltd., it is significant in six equations under Adding and Constant models. Under Constant and Elimination models in five equations it is significant in two firms namely, Honda Siel Power Products Ltd. and TRF Ltd. In Bajaj Auto Ltd., Cumins India Ltd., Escorts Ltd. and Tata-Yodogawa Ltd., this explanatory variable is found to be not significant in any of the equations under Constant model or Adding model or Elimination model. In 11 firms out of 17 firms in General Engineering Industry, this particular variable appears to be significant in most of the equations under Elimination model.

Table 2 General engineering (Total No. Of firms: 17)

Explanatory variable : *GROSS INTERNAL FUNDS (b_2)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	13	14	9	NF	9	10	9
5%	21	25	22	5%	10	14	17
10%	10	10	4	10%	12	8	4
GEI	8	6	1	GEI	8	6	4
5%	6	6	--	5%	6	6	3
10%	1	--	1	10%	1	--	1

Y_1- Gross Block:

From the Table (2) in Constant model, Gross Internal Funds shows an impact on investment in Gross Block. Its level of significance is 5% in 25 estimated equations and 10% in 10 equations under Constant model in 14 firms like, Elecon Engineering Co. Ltd., Exide Industries Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd., Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd. et cetera. When aggregate of sample firms is taken as a whole, this explanatory variable is found to be significant at 5% level in all the six estimated equations under Constant model.

In 13 companies like, Elecon Engineering Co. Ltd., Honda Siel Power Products Ltd., Tata Engineering & Locomotive Co. Ltd. et cetera this independent variable is found to be significant in 21 equations at 5% level and at 10% level in 10 estimated equations under Adding model. Considering the sample firms' aggregate level in six equations this explanatory variable appears to be at 5% level of significance and in one equation at 10% level out of eight estimated equations under Adding model. When the investment in Gross Block as a dependent variable is studied, the independent variable that is, Gross Internal Funds is found to be significant in 22 estimated equations at 5% level and in four equations at 10% level in nine firms like, Bimetal Bearing Ltd., Cumins India Ltd., Graver & Well (India) Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd. et cetera under Elimination model. Considering the aggregate of sample firms in the total General Engineering Industry as a whole, in only one equation it is found to be significant at 10% level under Elimination model.

In the case of Ashok Leyland Ltd., this independent variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model. This variable is significant in 23 equations of firms like, Bajaj Auto Ltd., Exide Industries Ltd., Kirloskar Brothers Ltd. and Maharashtra Scooters Ltd. under Adding and Constant models. But in some firms namely, Bimetal Bearing Ltd., Cumins India Ltd., Elecon Engineering Co. Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., Tata Engineering & Locomotive Co. Ltd. and ZF Steering Gear (India) Ltd., these Gross Internal Funds as an independent variable is found to be significant in 57 equations at either 5% level of significance or 10% significance level under Adding, Constant and Elimination models. Incase of Escorts Ltd., in one equation it appears to be significant at 10% level under Constant model. In Graver & Well (India) Ltd. and TRF Ltd., in eight equations it is significant under Constant and Elimination models. But this independent variable is significant in three equations of firms

like, L.G. Balakrishna & Brothers Ltd. and Tata-Yodogawa Ltd., under Adding model. In nine companies out of 17 companies this particular variable is found to be significant in most of the Equations Under Elimination Model.

Y_2-Plant & Machinery:

In Adding model, Gross Internal Funds as an independent variable has shown an impact in 10 equations at 5% level of significance and in 12 equations at 10% significance level in nine companies namely, Exide Industries Ltd., Tata Engineering & Locomotive Co. Ltd., ZF Steering Gear (India) Ltd. et cetera. When the equation in the Adding model are tested at the aggregate of firms level in General Engineering Industry, this particular variable appears to be significant in six equations at 5% level and in one equation at 10% level out of eight estimated equations.

Gross Internal Funds as an explanatory variable is found to be significant at 5% level in 14 equations and 10% level in eight equations in 10 firms like, Ashok Leyland Ltd., Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd., et cetera. under Constant model. Similarly, in General Engineering Industry as a whole, in all the six estimated equations it is found to be significant at 5% level under Constant model.

When the investment in Plant and Machinery as a dependent variable is studied, the independent variable that is Gross Internal Funds appears to be significant in 17 equations at 5% level and in four equations at 10% level in nine firms like, Cumins India Ltd., Graver & Well (India) Ltd., Gujarat Machinery Mfgs. Ltd., Escorts Ltd. and Kirloskar Brothers Ltd. et cetera under Elimination model. When the aggregate of sample firms is taken as a whole, under Elimination model, this variable is significant in three equations at 5% level and in one equation at 10% level out of four estimated equations.

In Escorts Ltd., Gujarat Machinery Mfgs. Ltd., Kirloskar Brothers Ltd., L.G.Bala Krishna & Brothers Ltd. and ZF Steering Gear (India) Ltd., Gross Internal Funds are found to be significant in 32 equations under all the three models. In two companies namely, Ashok Leyland Ltd. and TRF Ltd., in seven equations it is found to be significant under Constant and Elimination models. Incase of Bimetal Bearing Ltd., in one equation it appears to be significant at 5% level under Adding model only. In two firms like, Cumins India Ltd. and Graver & Well (India) Ltd., in five equations this variable has shown an impact under Elimination model only. In 11 equations of Exide Industries Ltd. and Maharashtra Scooters Ltd., it is significant under Adding and Constant models. Where as in Bajaj Auto Ltd., Elecon Engineering Co. Ltd., Honda Siel Power Products Ltd., Tata Engineering & Locomotive Co. Ltd. and Tata-Yodogawa Ltd., this variable is found to be not significant under Adding model or Constant model or Elimination model. In nine firms out of a total of 17 firms this particular variable is found to be significant in most of the equations under Elimination model.

Table 3

General engineering (Total No. Of firms: 17)

Explanatory variable : *STOCK OF NET LIQUIDITY (b_3)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	10	5	8	NF	10	3	12
5%	18	3	25	5%	15	3	20
10%	9	2	5	10%	9	--	9
GEI	8	6	1	GEI	8	6	4
5%	2	--	1	5%	--	--	--
10%	--	--	--	10%	1	1	--

Y_1- Gross Block:

From the table (3) it can be seen that in Adding model, in 10 companies like, Escorts Ltd., Exide Industries Ltd., Kirloskar Brothers Ltd., Tata Engineering & Locomotive Co. Ltd., ZF Steering Gear (India) Ltd. et cetera. Stock of Net Liquidity as an independent variable, has shown an impact at 5% level of significance in 18 equations and in nine equations at 10% significance level. Considering the aggregate of sample firms in Adding model, this explanatory variable is found to be significant in only two equations at 5% level out of eight estimated equations.

When the influence of Stock of Net Liquidity as an independent variable is tested on Gross Block as a dependent variable under Elimination model, in 25 estimated equations it is found to be significant at 5% level and in five equations at 10% level in eight companies like, Bajaj Auto Ltd., Bimetal Bearing Ltd., Escorts Ltd., Graver & Well (India) Ltd., Kirloskar Brothers Ltd. et cetera. Taking the sample firms aggregate level, it is significant in only one equation at 5% level under Elimination model.

Stock of Net Liquidity shows an impact on investment in Gross Block. Its level of significance is 5% in three equations and in two equations at 10% level in five firms like, Elecon Engineering Co. Ltd., Exide Industries Ltd., Kirloskar Brothers Ltd. et cetera under Constant model. When the equations in the Constant model are tested at the aggregate of firms level in General Engineering Industry, this particular variable appears to be not significant in all the six estimated equations.

In 26 equations of firms like, Elecon Engineering Co. Ltd., Exide Industries Ltd. and Kirloskar Brothers Ltd., this Stock of Net Liquidity is found to be significant under all the three models. In the case of Bajaj Auto Ltd., Bimetal Bearing Ltd., Escorts Ltd., Graver & Well (India) Ltd. and L.G. Balakrishna & Brothers Ltd., it appears to be significant in 29 equations under Adding and Elimination models. But in Tata Engineering & Locomotive Co. Ltd. and ZF Steering Gear (India) Ltd., in seven equations it is found to be significant under Adding and Constant models. This particular variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model in Ashok Leyland Ltd., Cumins India Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., Maharashtra Scooters Ltd., TRF Ltd. and Tata-Yodogawa Ltd. In eight firms out of 17 firms this variable appears to be significant in most of the equations under Elimination model.

Y_2-Plant and Machinery:

When the investment in Plant and Machinery as a dependent variable is studied, Stock of Net Liquidity has shown an impact at 5% level of significance in 20 estimated equations and at 10% significance level in nine equations in 12 companies like, Bajaj Auto Ltd., Bimetal Bearing Ltd., Elecon Engineering Co. Ltd., Graver & Well (India) Ltd., Escorts Ltd., Kirloskar Brothers Ltd. et cetera under Elimination model. Where as in the total General Engineering Industry as a whole, under Elimination model, it appears to be not significant in all the four estimated equations.

In Adding model, this particular variable is found to be significant in 15 equations at 5% level in 9 equations and at 10% level in 10 firms like, Escorts Ltd., Kirloskar Brothers Ltd., Tata Engineering & Locomotive Co. Ltd., ZF Steering Gear (India) Ltd. et cetera. Considering the sample firms' aggregate level in Adding model, it appears to be significant in only one equation at 10% level out of eight estimated equations.

This particular independent variable in Constant model is found to be significant at 5% level in three equations in 10 firms like, Kirloskar Brothers Ltd., Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd., ZF Steering Gear (India) Ltd. et cetera. When the aggregate of sample firms is taken as whole, it is found to be significant at 10% level in only one equation out of six equations under Constant model.

In Kirloskar Brothers Ltd. and Tata Engineering & Locomotive Co. Ltd., in 17 equations Stock of Net Liquidity has shown an impact under Adding, Constant and Elimination models. Incase of Bajaj Auto Ltd., Bimetal Bearing Ltd., Elecon Engineering Co. Ltd., Escorts Ltd., Exide Industries Ltd., Graver & Well (India) Ltd. and L.G. Balakrishna & Brothers Ltd., this variable is found to be significant in 31 equations under Adding and Elimination models. But in Honda Siel Power Products Ltd., TRF Ltd. and Tata-Yodogawa Ltd., it appears to be significant in five equations under Elimination model only. In ZF Steering Gear (India) Ltd., in three equations it is significant under Adding and Constant models. This particular variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model in companies namely, Ashok Leyland Ltd., Cumins India Ltd., Gujarat Machinery Mfgs. Ltd. and Maharashtra Scooters Ltd. This variable is found to be significant in most of the equations under Elimination model in 12 out of 17 firms in General Engineering Industry.

Table 4
General engineering (Total No. Of firms: 17)

Explanatory variable : *DIVIDENDS (b_4)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	8	4	10	NF	9	2	14
5%	11	2	27	5%	10	1	23
10%	7	2	4	10%	9	1	9
GEI	8	6	1	GEI	8	6	4
5%	3	1	1	5%	5	1	4
10%	1	--	--	10%	--	--	--

Y_1- Gross Block:

From the Table (4) when the investment in Gross Block as a dependent variable is studied, the independent variable that is, Dividends appears to be significant in two equations at 5% level and in two equations at 10% level in four companies like, Bimetal Bearing Ltd., Cumins India Ltd., L.G. Balakrishna & Brothers Ltd. et cetera under Constant model. Taking the sample firms aggregate level under Constant model it appears to be significant in only one equation at 5% level out of six estimated equations.

Dividends shows an impact on investment in Gross Block in 11 equations at 5% level of significance and in seven estimated equations at 10% significance level in eight firms like, Bajaj Auto Ltd., Bimetal Bearing Ltd., L.G. Balakrishna & Brothers Ltd. et cetera under Adding model. When the aggregate of sample firms is taken as a whole, it appears to be significant in three equations at 5% level and in one equation at 10% level out of eight estimated equations under Adding model.

When the influence of Dividends as an independent variable is tested on Gross Block as a dependent variable under Elimination model in 27 estimated equations, it is significant at 5% level and in four equations at 10% level in 10 firms like, Ashok Leyland Ltd., Bajaj Auto Ltd., Bimetal Bearing Ltd., Cumins India Ltd., Escorts Ltd., Gujarat Machinery Mfgs. Ltd., Tata Engineering & Locomotive Co. Ltd., Tata-Yodogawa Ltd. et cetera. When the equations in the Elimination model are tested at the aggregate of firms level in General Engineering and Industry, this explanatory variable is found to be significant at 5% level in only one equation.

In 24 equations of Bajaj Auto Ltd., Bimetal Bearing Ltd. and Cumins India Ltd., Dividends as an independent variable is found to be significant under all the three models. Incase of Ashok Leyland Ltd., Exide Industries Ltd., Tata-Yodogawa Ltd. and ZF Steering Gear (India) Ltd., in nine equations this variable is significant under Elimination model only. In Escorts Ltd., Gujarat Machinery Mfgs. Ltd. and Tata Engineering & Locomotive Co. Ltd., it appears to be significant in 15 equations under Adding and Elimination models. But in Graver & Well (India) Ltd., it is significant in only one equation under Adding model. In L.G. Balakrishna & Brothers Ltd., in four equations it is found to be significant under Adding and Constant models. Where as incase of Elecon Engineering Co. Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd. and TRF Ltd., it appears to be not significant at either 5% level or 10% level in any of the equations under Adding model or Constant model or Elimination model. In 10 out of a total of 17 firms in General Engineering Industry Dividends as a variable is found to be significant in most of the equations under Elimination model.

Y_2-Plant & Machinery:

In nine companies like, Bajaj Auto Ltd., Bimetal Bearing Ltd., Kirloskar Brothers Ltd. and L.G. Balakrishna & Brothers Ltd. et cetera, Dividends as an explanatory variable is found to be significant in 10 estimated equations at 5% level and in nine equations at 10% level under Adding model. Taking the aggregate of sample firms as a whole, under Adding model in five equations its level of significance is 5% out of a total of eight estimated equations.

In Constant model, Dividends show an impact on investment in Plant and Machinery in one equation at 5% level of significance and in one equation at 10% significance level in two firms namely, L.G. Balakrishna & Brothers Ltd., Maharashtra Scooters Ltd. When the equations under Constant model are tested at the aggregate of firms level in General Engineering Industry in only one equation this variable is significant out of six estimated equations.

When the investment in Plant and Machinery as a dependent variable is studied, the independent variable that is, Dividends is found to be significant in 23 estimated equations at 5% level and in nine equations at 10% level in 14 companies like, Bajaj Auto Ltd., Gujarat Machinery Mfgs. Ltd., Kirloskar Brothers Ltd., Tata Engineering & Locomotive Co. Ltd., Escorts Ltd. et cetera under Elimination model. When the aggregate of sample firms is taken as a whole, in all the four estimated equations this variable is appears to be significant at 5% level **Under Elimination Model.**

In L.G. Balakrishna & Brothers Ltd., Dividends are found to be significant in six equations under all three models. In the case of Bajaj Auto Ltd., Bimetal Bearing Ltd., Cumins India Ltd., Kirloskar Brothers Ltd., Tata Engineering & Locomotive Co. Ltd. and ZF Steering Gear (India) Ltd., in 31 equations it is significant under Adding and Elimination models. In Ashok Leyland Ltd., Escorts Ltd., Exide Industries Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., TRF Ltd. and Tata-Yodogawa Ltd., it appears to be significant in 13 equations under Elimination model only. This variable is significant in only one equation under Adding model in Graver & Well (India) Ltd. It is significant in two equations under Adding and Constant models in Maharashtra Scooters Ltd. But in Elecon Engineering Co. Ltd., it is not significant in any of the equations under Adding model or Constant model or Elimination model. Where as in 14 out of 17 firms this

particular variable is found to be significant in most of the equations under Elimination model.

Table 5 General engineering (Total No. Of firms: 17)

Explanatory variable : *GROWTH OF EQUITY CAPITAL (b_5)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	4	2	9	NF	4	1	9
5%	10	1	20	5%	9	1	16
10%	2	1	2	10%	4	--	4
GEI	8	6	1	GEI	8	6	4
5%	4	1	1	5%	4	1	4
10%	--	--	--	10%	--	--	--

Y_1- Gross Block:

From the table (5), it can be seen that, in Adding model in four companies like, Bimetal Bearing Ltd., Escorts Ltd., Tata Engineering & Locomotive Co. Ltd., Tata-Yodogawa Ltd. et cetera, Growth of Equity Capital as an independent variable appears to be significant in 10 estimated equations at 5% level and in two equations at 10% level. When the sample firms' aggregate level is taken as a whole, in Adding model, this variable is found to be significant in four equations at 5% level out of eight estimated equations.

When the investment in Gross Block as a dependent variable is studied, the explanatory variable that is, Growth of Equity Capital appears to be significant in one equation at 5% level and in one equation at 10% level in firms like, Escorts Ltd., ZF Steering Gear (India) Ltd. et cetera under Constant model. Similarly at the aggregate of sample firms it is significant at 5% level in only one equation out of six estimated equations under Constant model.

Growth of Equity Capital shows an impact on investment in Gross Block in 20 equations at 5% level of significance and in two equations its significance level is 10% in nine firms like, Bimetal Bearing Ltd., Escorts Ltd., Tata-Yodogawa Ltd., ZF Steering Gear (India) Ltd. et cetera under Elimination model. When the equations under Elimination model are tested at the aggregate of firms level in General Engineering Industry this particular variable appears to be significant in one equation at 5% level only.

This independent variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model in companies namely, Bajaj Auto Ltd., Cumins India Ltd., Elecon Engineering Co. Ltd., Graver & Well (India) Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd. and L.G. Balakrishna & Brothers Ltd. In the case of Ashok Leyland Ltd., Exide Industries Ltd., Maharashtra Scooters Ltd. and TRF Ltd., in eight equations it is found to be significant under Elimination model only. This variable appears to be significant in 17 equations in firms like, Bimetal Bearing Ltd., Tata Engineering & Locomotive Co. Ltd. and Tata-Yodogawa Ltd. under Adding and Elimination models. In Escorts Ltd., in eight equations it is significant under all the three models. In ZF Steering Gear (India) Ltd., in three equations, this variable is significant under constant and Elimination models. In nine firms out of a total of 17 firms this particular variable is found to be significant in most of the equations under Elimination model.

Y_2-Plant and Machinery:

When the investment in Plant and Machinery as a dependent variable is studied, the independent variable that is, Growth of Equity Capital is found to be significant at 5% level in 16 estimated equations and at 10% level in four equations under Elimination model in nine firms like, Elecon Engineering Co. Ltd., Escorts Ltd., Kirloskar Brothers Ltd., Tata-Yodogawa Ltd. and ZF Steering Gear (India) Ltd. et cetera. Taking the aggregate of sample firms as a whole, it appears to be significant in all the four estimated equations at 5% level under Elimination model.

In Adding model, Growth of Equity Capital as a variable is found to be significant in 9 equations at 5% level and in four equations at 10% level in four companies like, Escorts Ltd., Kirloskar Brothers Ltd. et cetera. Considering the aggregate of sample firms, it is significant in four equations at 5% level out of eight estimated equations under Adding model.

When the influence of Growth of Equity Capital as an independent variable is tested on Plant and Machinery as a dependent variable under Constant model, it is significant at 5% level in only one equation in Escorts Ltd. When the sample firms' aggregate level is taken as a whole, this variable is found to be significant in only one estimated equation at 5% level out of six estimated equations under Constant model.

In Escorts Ltd., in nine equations this variable is found to be significant under all the three models. Incase of Bimetal Bearing Ltd., Kirloskar Brothers Ltd. and L.G. Balakrishna & Brothers Ltd., it appears to be significant in 14 equations under Adding and Elimination models. This variable appears to be significant in 11 equations under Elimination model in Elecon Engineering Co. Ltd., Exide Industries Ltd., Maharashtra Scooters Ltd., Tata-Yodogawa Ltd. and ZF Steering Gear (India) Ltd. In the remaining companies like, Ashok Leyland Ltd., Bajaj Auto Ltd., Cumins India Ltd., Graver & Well (India) Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., Tata Engineering & Locomotive Co. Ltd. and TRF Ltd., this variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model. In nine firms out of total of 17 firms it is found to be significant in most of the equations under Elimination model.

Table 6 General engineering (Total No. Of firms: 17)

Explanatory variable : *DEBT OUTSTANDING (b_6)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	8	5	9	NF	8	6	11
5%	9	2	22	5%	4	3	20
10%	5	3	3	10%	6	3	8
GEI	8	6	1	GEI	8	6	4
5%	2	1	1	5%	1	1	--
10%	1	--	--	10%	--	--	--

Y_1- Gross Block:

From the Table (6) Debt Outstanding shows an impact on investment in Gross Block. Its level of significance is 5% in nine estimated equations and 10% in five estimated equations in eight companies like, Escorts Ltd., Exide Industries Ltd., Gujarat Machinery Mfgs. Ltd., Tata Engineering & Locomotive Co. Ltd., Tata-Yodogawa Ltd. et cetera under Adding model. At the aggregate of sample firms in Adding model it is found to be significant in two equations at 5% level and in one equation at 10% level out of eight estimated equations.

In Constant model, Debt Outstanding as a variable is found to be significant in two equations at 5% level and in three estimated equations at 10% level in five firms like, Exide Industries Ltd., Graver & Well (India) Ltd., Tata Engineering & Locomotive Co. Ltd., TRF Ltd. et cetera. When the sample firms' aggregate level is taken as a whole, in Constant model this variable appears to be significant in only one equation at 5% level out of six estimated equations.

When the influence of Debt Outstanding as an independent variable is tested on Gross Block as a dependent variable under Elimination model, it is significant at 5% level in 22 estimated equations and 10% level in three equations in nine companies like, Bimetal Bearing Ltd., Graver & Well (India) Ltd., Tata

Engineering & Locomotive Co. Ltd., TRF Ltd. et cetera. Taking the aggregate of sample firms as whole, it is significant at 5% level in one equation under Elimination model.

In 16 equations of Graver & Well (India) Ltd., Tata Engineering & Locomotive Co. Ltd., and Tata-Yodogawa Ltd., Debt Outstanding appears to be significant under all the three models. In the case of Bajaj Auto Ltd., Escorts Ltd., Gujarat Machinery Mfgs. Ltd. and ZF Steering Gear (India) Ltd., it is significant in 18 equations under Adding and Elimination models. But in Exide Industries Ltd., in three equations it is found to be significant under Adding and Constant models. This variable is significant in six equations under Elimination model in firms like, L.G. Balakrishna & Brothers Ltd. and Maharashtra Scooters Ltd. In TRF Ltd., in one equation it appears to be significant at 10% level under Constant model. Incase of Ashok Leyland Ltd., Bimetal Bearing Ltd., Cumins India Ltd., Elecon Engineering Co. Ltd., Honda Siel Power Products Ltd. and Kirloskar Brothers Ltd., this variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model. In nine firms out of 17 firms, in most of the equations it appears to be significant under Elimination model.

Y_2-Plant and Machinery:

In Elimination model Debt Outstanding as an explanatory variable is found to be significant in 20 estimated equations at 5% level and in eight equations at 10% level in 11 firms like, Escorts Ltd., Graver & Well (India) Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd., Maharashtra Scooters Ltd. et cetera. When the sample firms' aggregate level is taken as a whole, this variable is found to be not significant in any of the equations under Elimination model.

When the investment in Plant and Machinery as a dependent variable is studied, the independent variable that is, Debt Outstanding is found to be significant at 5% level in three equations and 10% level in three equations in six firms like, Bimetal Bearing Ltd., Graver & Well (India) Ltd., Tata Engineering & Locomotive Co. Ltd. TRF Ltd. et cetera under Constant model. At the aggregate of sample firms under Constant model this variable is found to be significant at 5% level in only one equation out of six estimated equations.

This particular independent variable is found to be significant at 5% level in four equations and at 10% level in six equations under Adding model in eight companies like, Bajaj Auto Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd., L.G. Balakrishna & Brothers Ltd., ZF Steering Gear (India) Ltd. et cetera. When the equations under Adding model, are tested at the aggregate of firms level, in General Engineering Industry, this particular variable is significant at 5% level in only one equation out of eight estimated equations.

Debt Outstanding is an explanatory variable appears to be significant in 11 equations under all the three models, in Graver & Well (India) Ltd. and Maharashtra Scooters Ltd. Incase of Bajaj Auto Ltd., Honda Siel Power Products Ltd., Kirloskar Brothers Ltd. and L.G. Balakrishna & Brothers Ltd., in 16 equations it is found to be significant under Adding and Elimination models. In Bimetal Bearing Ltd. and Tata Engineering & Locomotive Co. Ltd., it is significant in six equations under Constant and Elimination models. In the case of Elecon Engineering Co. Ltd., Escorts Ltd. and Tata-Yodogawa Ltd., it is found to be significant in seven equations under Elimination model only. In Exide Industries Ltd., it is significant in two equations under Adding and Constant models. In TRF Ltd., in one equation it is significant at 5% level under Constant model. In ZF Steering Gear (India) Ltd., in one equation it is significant at 10% level under Adding model. It is found to be not significant in any of the equations under Adding model or Constant model or Elimination model in three firms namely, Ashok Leyland Ltd., Cumins India Ltd. and Gujarat Machinery Mfgs. Ltd. In 11 firms out of 17 firms this particular variable appears to be significant in most of the equations under Elimination model.

Table 7 General engineering (Total No. Of firms: 17)

Explanatory variable : *PROVISION FOR TAXES (b_7)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	3	2	12	NF	4	--	9
5%	1	1	17	5%	1	--	12
10%	2	1	10	10%	3	--	6
GEI	8	6	1	GEI	8	6	4
5%	2	1	1	5%	2	1	4
10%	--	--	--	10%	--	--	--

Y_1- Gross Block:

From the table (7), it can be seen that, Provision for Taxes as an independent variable in Constant model is significant in two companies like, Gujarat Machinery Mfgs. Ltd., Cumins India Ltd. In one equation its level of significance is 5% and in one equation its significance level is 10%. When the equations tested at the aggregate of sample firms, under Constant model in only one equation this variable is significant at 5% level out of six estimated equations.

When the investment in Gross Block as a dependent variable is studied, the independent variable that is, Provision for Taxes is found to be significant in 17 estimated equations at 5% level and in 10 equations at 10% level in 12 firms like, Ashok Leyland Ltd., Escorts Ltd., Exide Industries Ltd., Gujarat Machinery Mfgs. Ltd., Tata-Yodogawa Ltd. et cetera under Elimination model. When the sample firms' aggregate level is taken as a whole, this variable appears to be significant at 5% level in only one equation under Elimination model.

Provision for taxes as an explanatory variable is found to be significant at 5% level in one equation and at 10% level in two equations in three companies like, Escorts Ltd., Tata Engineering & Locomotive Co. Ltd., Tata-Yodogawa Ltd., under Adding model. When the aggregate of sample firms is taken as a whole, in Adding model, in two equations it is found to be at 5% level of significance out of eight estimated equations.

In Ashok Leyland Ltd., Bajaj Auto Ltd., Cumins India Ltd., Exide Industries Ltd., Graver & Well (India) Ltd., Honda Siel Power Products Ltd. and ZF Steering Gear (India) Ltd., in 15 equations Provision for Taxes appears to be significant under Elimination model only. This variable is significant in 10 equations under Adding and Elimination models in firms like, Escorts Ltd., Tata Engineering & Locomotive Co. Ltd. and Tata-Yodogawa Ltd. In Gujarat Machinery Mfgs. Ltd. and TRF Ltd., in seven equations it is significant under Constant and Elimination models. Incase of Bimetal Bearing Ltd., Elecon Engineering Co. Ltd., Kirloskar Brothers Ltd., L.G. Balakrishna & Brothers Ltd. and Maharashtra Scooters Ltd., it is not significant in any of the equations under Adding model or Constant model or Elimination model. In 12 out of 17 firms, in most of the equations, this particular variable is significant under Elimination model.

Y_2-Plant and Machinery:

In Adding model, Provision for Taxes as an independent variable has shown an impact in one equation at 5% level of significance and in three equations at 10% significance level in four companies like, Elecon Engineering Co. Ltd., L.G. Balakrishna & Brothers Ltd., Tata Engineering & Locomotive

Co. Ltd., ZF Steering Gear (India) Ltd. et cetera. When the equations under Adding model are tested at the aggregate of firms level in General Engineering Industry this variable is significant at 5% level in two equations out of eight estimated equations.

In Constant model, this particular variable is found to be not significant at either 5% level or 10% level in any of the equations of the individual firms of General Engineering Industry. At the aggregate of sample firms, this variable is found to be significant in only one equation at 5% level out of six estimated equations under Constant model.

In Elimination model, in 12 equations its level of significance is 5% and in six equations its significance level is 10% in nine firms like, Bajaj Auto Ltd., Elecon Engineering Co. Ltd., Gujarat Machinery Mfgs. Ltd., Tata Engineering & Locomotive Co. Ltd., ZF Steering Gear (India) Ltd. et cetera. Taking the sample firms' aggregate level under Elimination model Provision for Taxes appears to be significant at 5% level in all the four estimated equations.

Provision for taxes is found to be significant in 13 equations under Adding and Elimination models in firms namely, Elecon Engineering Co. Ltd., L.G. Balakrishna & Brothers Ltd., Tata Engineering & Locomotive Co. Ltd., ZF Steering Gear (India) Ltd. In the case of Bimetal Bearing Ltd., Cumins India Ltd., Exide Industries Ltd., Gujarat Machinery Mfgs. Ltd. and Honda Siel Power Products Ltd., in nine equations it is significant under Elimination model only. This variable appears to be not significant in any of the equations under Adding model or Constant model or Elimination model in firms like, Ashok Leyland Ltd., Bajaj Auto Ltd., Escorts Ltd., Graver & Well (India) Ltd., Kirloskar Brothers Ltd., Maharashtra Scooters Ltd., TRF Ltd. and Tata-Yodogawa Ltd. In nine out of 17 firms in most of the equations this particular variable is found to be significant under Elimination model.

Table 8

General engineering (Total No. Of firms: 17)

Explanatory variable *: INTEREST ON BORROWED FUNDS (b_7)*							
Gross Block (Y_1)				Plant & Machinery (Y_2)			
	AM	CM	EM		AM	CM	EM
NF	1	3	10	NF	2	2	13
5%	1	3	18	5%	1	2	12
10%	--	--	5	10%	1	--	6
GEI	8	6	1	GEI	8	6	4
5%	1	1	1	5%	--	1	--
10%	--	--	--	10%	--	--	--

Y_1- Gross Block:

From the Table (8) when the investment in Gross Block as a dependent variable is studied, the independent variable that is, Interest on Borrowed Funds is found to be significant in 18 estimated equations at 5% level and in five equations at 10% level in 10 firms like, Elecon Engineering Co. Ltd., Exide Industries Ltd., Escorts Ltd., Graver & Well (India) Ltd., L.G. Balakrishna & Brothers Ltd., TRF Ltd. et cetera under Elimination model. When the equations are tested at the aggregate of sample firms, its level of significance is 5% in only one equation under Elimination model.

Interest on borrowed funds shows an impact on investment in Gross Block under Adding model at 5% level of significance in one equation in Escorts Ltd. Taking the aggregate of firms level in General Engineering Industry, this variable is significant in one equation at 5% level out of eight estimated equations under Adding model.

In three companies like, Gujarat Machinery Mfgs. Ltd., TRF Ltd. and ZF Steering Gear (India) Ltd., Interest on Borrowed Funds is found to be significant in three equations at 5% level, under Constant model. Similarly in General Engineering Industry as a whole, it appears to be significant at 5% level in only one equation out of six estimated equations under Constant model.

In 17 equations of Bajaj Auto Ltd., Elecon Engineering Co. Ltd., Exide Industries Ltd., Graver & Well (India) Ltd., L.G. Balakrishna & Brothers Ltd., Maharashtra Scooters Ltd., Tata Engineering & Locomotive Co. Ltd. and Tata-Yodogawa Ltd., this variable appears to be significant under Elimination model only. Incase of Escorts Ltd., it is significant in four equations under Adding and Elimination models. In Gujarat Machinery Mfgs. Ltd. and ZF Steering Gear (India) Ltd., in two equations it is significant at 5% level under Constant model only. In TRF Ltd., it appears to be significant in four equations under Constant and Elimination models only. But this variable is found to be not significant in any of the equation under Adding model or Constant model or Elimination model in firms like, Ashok Leyland Ltd., Bimetal Bearing Ltd., Cumins India Ltd., Honda Siel Power Products Ltd. and Kirloskar Brothers Ltd. In 10 firms out of 17 firms, this particular variable is significant in most of the equations under Elimination model.

Y_2-Plant and Machinery:

In Adding model, Interest on Borrowed Funds as an explanatory variable, which influences the Plant and Machinery is significant in one equation at 5% level and in one equation at 10% level in two companies like, Elecon Engineering Co. Ltd., and L.G. Balakrishna & Brothers Ltd. When the equations under Adding model are tested at the aggregate of firms level in General Engineering Industry, this variable is not significant in any of the equation.

When the influence of Interest on Borrowed Funds as an independent variable is tested on Plant and Machinery as a dependent variable under Constant model it is found to be significant in two equations at 5% level in two firms namely, TRF Ltd. and ZF Steering Gear (India) Ltd. At the aggregate of sample firms in only one equation it is found to be significant at 5% level out of six estimated equations under Constant model.

Interest on Borrowed Funds as an explanatory variable influences the investment on Plant and Machinery. Its level of significance under Elimination model is 5% in 21 estimated equations and 10% level in six equations in 13 firms like, Bimetal Bearing Ltd., Elecon Engineering Co. Ltd., Escorts Ltd., Honda Siel Power Products Ltd., TRF Ltd., ZF Steering Gear (India) Ltd. et cetera. Considering the aggregate of sample firms, this variable is found to be not significant in any of the equations under Elimination model.

This explanatory variable is found to be significant in 18 equations under Elimination model only in firms like, Ashok Leyland Ltd., Bajaj Auto Ltd., Escorts Ltd., Exide Industries Ltd., Graver & Well (India) Ltd., Gujarat Machinery Mfgs. Ltd., Honda Siel Power Products Ltd., Maharashtra Scooters Ltd., and Tata-Yodogawa Ltd. In the case of Elecon Engineering Co. Ltd., and L.G. Balakrishna & Brothers Ltd., in six equations it appears to be significant under Adding and Elimination models. But in TRF Ltd. and ZF Steering Gear (India) Ltd., it is significant in seven equations under Constant and Elimination models. Where as in Bimetal Bearing Ltd., Cumins India Ltd., Kirloskar Brothers Ltd. and Tata Engineering & Locomotive Co. Ltd., this variable is found to be not significant in any of the equations under Adding model or Constant model or Elimination model. In 13 firms out of 17 firms in most of the

equations this particular variable is significant under Elimination model.

Findings and Conclusions

The Summary of the analysis is presented in the tables the following conclusions are drawn.

1. The major finding of the study is that, the elimination model is the most appropriate model in determining the behavior of investment in total fixed assets & plant and machinery separately.
2. The results of this analysis suggest that gross internal funds (retained earnings + depreciation) are more important for the fixed investment in almost all the companies in the present study.
3. Change in sales (growth rate in sales), stock of net liquidity, debt outstanding dividends are also significant determinants of fixed investment.
4. The study reveals that demand considerations in the long-run are of some importance in the entrepreneurial fixed investment decisions. Financial considerations seem to dominate over demand factors in fixed investment decisions.
5. The implication of the results of the present study is that profitability is an important consideration in entrepreneurial investment decisions. Profits influence dividend policies and hence retained earnings. Retained earnings in turn influence investment. Profits influence dividends and dividends influence the flow of external finance.
6. As retained earnings is an important factor in the determination of investment, it is important to see that higher profitability is not dissipated through dividend disbursals. As self financing is non-inflationary, it may be desirable to encourage asset expansion through internal savings rather than through borrowings.

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