7.1 Introduction

The aim of this chapter is to make an econometric study of the determinants of external funds and the pattern of financing in the fixed investments and inventories of the Joint Stock Companies in India during 1997-98 to 2006-07. The financial variables of 1397 sample manufacturing companies are aggregated under ten important industries viz., Sugar, Cotton, Paper, Engineering, Electrical, Chemical, Pharmaceutical, Cement, Construction and Computer. The technique of multiple regression analysis has been used to find out the significant determinants of external funds and financing pattern of gross fixed assets and inventories. The various financial variables, included for the analysis are Long-Term Debts (LTD), Bank Borrowings (BB), Trade Credit (TC), Share Capital (SC), Retained Earnings (RE), Gross Fixed Assets (GFA) and Inventories (INV). The analysis has been done through a standard electronic computer programming. For the purpose of analysis, the following functional relationships have been set up:

(i) Change in gross fixed asset is assumed to be related to change in long-term debt, share capital and internally generated fund.
(ii) Variation in inventory is assumed to be related to variation in bank borrowings, trade credit and internally generated fund.

The study made by A. K. Bagchi\textsuperscript{1} is one of the earliest cross section analysis across twenty seven industries. V. K. Sastry's\textsuperscript{2} study is a major attempt to analyse investments, dividends and external finance of individual public limited companies during the period 1955-60, Krushnamurty and Sastry\textsuperscript{3} have made a comprehensive study on inventories of twenty one manufacturing industries.

\textit{Multiple Regression}

This technique begins with the simple correlation matrix and enters into regression the independent variable most highly correlated with the dependent variable. This analysis can conceived as a refined and powerful technique of "controlling" variance by estimating the magnitude of different sources of influence on 'Y', through analysis of the interrelations of all the variables\textsuperscript{4}. It suggests how much 'Y' is presumably due to $X_1$, $X_2$, $X_n$ (Independent Variables). It gives an idea of the relative amounts of influence of the 'X's. It also furnishes test, of the statistical significance of combined influence of each 'X'. Thus, it helps in scientific study with relative precision, complex interrelations between independent variables and dependent
variables by explaining the presumed phenomenon represented by the dependent variables.⁵

A multiple regression equation express the average relationship of the variables and on the basis of the average relationship an estimate of the dependent variable is made. If the ordinary product moment co-efficient of correlation between the predicted values ‘Y’¹ and the observed value of ‘Y’ are calculated we obtain an index of the magnitude of the relation, between, on the one hand a least squares composite of X₁, X₂ ..... Xₙ and the other hand, YC. This index is called the multiple correlations co-efficient. The theory of multiple regressions seems to be especially elegant when we consider the multiple correlations co-efficient.

It is one of the links that bind together the various aspects of multiple regression and analysis of variance.³ The equation is :

\[ YC = a + b₁x₁ + b₂x₂ + b₃x₃ + .... + bₙxₙ \]

When, YC = computed value of dependent variable
a = Constant
b₁, b₂, b₃, ......, bₙ = Regression Coefficient
x₁, x₂, x₃, ......, xₙ = Independent variables

The value of \( R^2 \) is calculated as
\[
R^2 = \frac{\sum Y Y_1}{\sum Y_2 Y_1^2}
\]

When \( R^2 \) = Square of co-efficient of correlation of \( X \) and \( Y \) series.

\( Y \) = Computed value of dependent variable

\( Y_1 \) = Predicted value of dependent variable

\( R^2 \) is an estimate of proportion of the variance of the dependent variable \( Y_C \), accounted for the independent variables \( x_1, x_2, x_3 \ldots x_n \ldots R \), the multiple correlations co-efficient is the product moment correlation between dependent variable and another variable produced by a least squares combination of the independent variables.

The 'F' ratio and 't' value have been calculated to find out the significance of regression coefficients of independent variables while the calculated 'F' ratio has compared with the table value to judge the combined effect, the calculated 't' has compared with 'T' table for given degrees of freedom at certain level of significance to find out the individual significance of regression co-efficient of each independent variable.

The multiple regression equations formulated in this study have been worked out from the established theory and related research on the determinants of financial variables. In order to obtain functional relationships in determining the external finance, investment in fixed assets and
inventories, several alternative specifications and the grouping of independent variables were estimated. In some cases, it was found that the sign of regression co-efficient were not confirming the established theory and in some other cases, the problem of multi-co linearity was noticed among some of the explanatory variables in the regression equation. This resulted in an unreliable estimate of regression co-efficient. So, to avoid such problems the multi-linear regression equation has been formed after studying the appropriate functional relationships among explanatory variables with the help of computer programming using the software SPSS13.0.

**External Fund**

An external fund constitutes two thirds of the total capital employed in case of total samples of the industry. The external funds comprise of borrowings (bank borrowings and long-term debts) trade credit and new issues of capital. Though the trend of composition of external fund has been changing over years, the borrowings accounted for about 60 per cent credits around 25 per cent and new issues of capital less than 20 per cent.

The regression output of different sample industries from 1997-98 to 2006-07 (Time Series Analysis) as shown by computer programming has been analysed here. In the equation, the external funds (EF) is taken as dependent variable and four independent variables are Gross Fixed Assets
(GFA), Inventories (INV), Retained Earnings (RE) and Time factor. The period of time is taken as one of the independent variables to find out whether time trend has significant effect on dependent variable. The equation is:

\[ \text{External Fund} = a + b_1 \text{GFA} + b_2 \text{INV} + b_3 \text{RE} + b_4 \text{Time} \]

Where \( a \) = Constant

\( b_1, b_2, b_3, b_4 \ldots \ldots \) Regression co-efficient

\[ \text{GFA} = \text{Gross Fixed Asset} \]

\[ \text{INV} = \text{Inventory} \]

\[ \text{RE} = \text{Retained Earnings} \]

It is indicative of fairly high degree of correlation in case of Construction industry 0.856 (i.e. 86 per cent) and Electrical industry 0.898 (i.e. 89.8 per cent). The Paper Industry, Cement Industry, Engineering Industry, Chemical Industry, Pharmaceutical Industry registered as moderate degree of correlation.

(F) Ratio 'F' Test Technique

\[ \frac{\sum d_1^2}{\sum d_2^2} \]

\( N_{1-1} = 91 \) (Small)

\[ \frac{S_1^2}{S_2^2} = \frac{133}{91} \]

\( F = \frac{S_1^2}{S_2^2} = 1.46 \)

\( V_1 = n_2 - 1 = 10 - 9 = 9 \)
\[ V_2 = x_2 - 1 = 8 - 1 = 7 \]

As per the Pearson Coefficient of correlation the 5% level critical / tabulated value is 3.68.

### 7.2 Component-wise

#### 7.2.1 External Funds

<table>
<thead>
<tr>
<th>Industry</th>
<th>Constant</th>
<th>‘X’ Co-efficient</th>
<th>( R^2 )</th>
<th>‘F’ Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>-28.315</td>
<td>-7E-02 0.922   1.719</td>
<td>6.564</td>
<td>0.768</td>
</tr>
<tr>
<td>Cotton</td>
<td>-9.497</td>
<td>-2E-02 1.415 1.3E-02</td>
<td>2.086</td>
<td>9.967</td>
</tr>
<tr>
<td>Paper</td>
<td>-6.292</td>
<td>-8E-02 -2.153 0.698</td>
<td>9.309</td>
<td>0.582</td>
</tr>
<tr>
<td>Cement</td>
<td>-11.824</td>
<td>-4E-03 2.165 0.510</td>
<td>2.319</td>
<td>0.746</td>
</tr>
<tr>
<td>Construction</td>
<td>-9.879</td>
<td>0.145 0.021 0.608</td>
<td>7.187</td>
<td>0.856</td>
</tr>
<tr>
<td>Engineering</td>
<td>3.728</td>
<td>-0.024 0.333 -0.110</td>
<td>4.416</td>
<td>0.702</td>
</tr>
<tr>
<td>Chemical</td>
<td>1.001</td>
<td>2E-02 1.231 0.841</td>
<td>-0.139</td>
<td>0.734</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>26.394</td>
<td>0.071 2.693 -0.059</td>
<td>-5.084</td>
<td>0.748</td>
</tr>
<tr>
<td>Electrical</td>
<td>-16.118</td>
<td>0.008 1.943 0.812</td>
<td>3.240</td>
<td>0.898</td>
</tr>
<tr>
<td>Computer</td>
<td>80.195</td>
<td>0.073 -0.795 0.104</td>
<td>2.177</td>
<td>0.239</td>
</tr>
</tbody>
</table>

*Source: Appendix-V*

The multiple regression resulted external funds (Time Series Analysis) from 1997-98 to 2006-07 shows the effect of the factors like GFA, INV, RE, Time. The value of \( R^2 \) has the highest in the Cotton industry at 9.967 which indicates a very high degree of correlation while the computer industry has the lowest value 0.239 which indicates a very low degree of correlation. In case of Sugar and construction (0.76 & 0.85) recoded as a fairly high degree of correlation. But in case of paper industry (0.58%), Cement (0.74%),...
Engineering (0.70%), Chemical 0.73%, Pharmaceutical 0.74% treated as moderate degree of correlation. The computed ‘F’ ratio is also shown as highly significant in Sugar, Cotton, Cement, Construction, Pharmaceutical and Electrical Industry, because the calculated value of ‘F’ value is more than tabulated ‘F’ value at 5% level and 1% level of significant. The result suggests that functional relationship between the dependent and independent variable are quite good and the equation is a best fit.

The regression co-efficient of each independent variable and computed ‘T’ indicates that the gross fixed asset (GFA) has positive (‘X’ coefficient) and significant (at 1 per cent level) impact on the variation of external funds for all industries except Paper and Computer industry. In Paper and Computer industry it implies negative influence (negative ‘X’ coefficient) on flow of external funds. So, the output suggested that in Sugar industry the contribution of fixed assets in total flow of external fund is noteworthy. The contribution is not only positive but also highly significant (at 1 per cent level) which signify the industry requires more funds from external sources for its rapid expansion and modernization.

On the other hand, the inventory has positive contributory in the variation of external funds for the entire sample except Engineering and Pharmaceutical industry. There is highly significant contributory (at 1 per cent
level) in case of Sugar, Cotton, Cement, Pharmaceutical Paper, Construction and Chemical industry.

The retained earnings (RE) has positive contributory (X coefficient negative) as the flow of external funds for 40 per cent sample industries which also low significant in Construction, Pharmaceutical, Electrical and Computer industry. Whereas the balance 60% samples as negative coefficient on flow of external funds which indicate that it is a real substitute for financing the corporate sector.

The factor has positive contributing on the external funds in Sugar, Cotton, Paper, Construction, Engineering, Electrical and Computer industries, except Cement, Chemical & Pharmaceutical. The contribution of time factor in case of Paper industry is highly significant and positive at (1 per cent level) on the variation of external funds. This is significant with the effect of changing pattern of consumption and designs.

In overall this result suggests that the functional relationship between the dependent (long term debt and net worth) and independent variable such as Gross Fixed Asset, Inventory, Retain Earnings and Time Factors are quite good and highly significant.
The cross section result suggested that have Gross Fixed Assets (GFA) and Inventory positive contribution and significantly influenced (at 1 per cent level) the flow of external funds during the period 1997-98 to 2006-07. Thus, the patterns remains the same where the investment expenditures (Gross Fixed Assets and Inventory except greater influence of external fund. However, the RE (retained earnings) continued to have negative influence in both the period and also have insignificant impact of the flow of external fund.

The result further suggest that between the two components of investment, inventory appears to influence more on external funds which is not supported by time series analysis. However, both time series and cross section analysis result agree that the investment policies seems to influence more the external funds rather than earning capacity of the companies.

7.2.2 Fixed Investment

<table>
<thead>
<tr>
<th>Industry</th>
<th>Constant</th>
<th>'X' Co-efficient</th>
<th>R²</th>
<th>'F' Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GRE</td>
<td>SC</td>
<td>B.B.</td>
<td>LTD</td>
</tr>
<tr>
<td>Sugar</td>
<td>7.364</td>
<td>-0.01876</td>
<td>0.213</td>
<td>0.650</td>
</tr>
<tr>
<td>Cotton</td>
<td>5.687</td>
<td>-0.002775</td>
<td>0.535</td>
<td>0.145</td>
</tr>
<tr>
<td>Paper</td>
<td>4.366</td>
<td>0.04615</td>
<td>0.561</td>
<td>-0.118</td>
</tr>
<tr>
<td>Cement</td>
<td>3.944</td>
<td>-3.521E-03</td>
<td>0.610</td>
<td>8.693E-02</td>
</tr>
<tr>
<td>Construction</td>
<td>6.921</td>
<td>-3.335E-02</td>
<td>0.265</td>
<td>0.271</td>
</tr>
<tr>
<td>Engineering</td>
<td>9.441</td>
<td>-2.795E-02</td>
<td>0.228</td>
<td>-3.521E-02</td>
</tr>
<tr>
<td>Chemical</td>
<td>7.491</td>
<td>-2.781E-02</td>
<td>4.283E-02</td>
<td>8.514E-02</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>2.833</td>
<td>-6.879E-02</td>
<td>0.378</td>
<td>8.917E-02</td>
</tr>
<tr>
<td>Electrical</td>
<td>7.434</td>
<td>-9.485E-03</td>
<td>0.250</td>
<td>-2.951E-02</td>
</tr>
<tr>
<td>Computer</td>
<td>32.601</td>
<td>1.492E-02</td>
<td>0.388</td>
<td>-0.472</td>
</tr>
</tbody>
</table>

Source : Appendix-V
In the cross section analysis an attempt has been made to find out the pattern of financing the investment in Gross Fixed Assets. Usually, long term sources of finance are utilized for fixed investment expenditures. But here, four financial variables, such as, bank borrowings, retained earnings, share capital, bank borrowings and long-term debt (LTD) have been taken into consideration for the purpose of study. Bank borrowing has taken because a long with short term loans commercial banks also provide long-term finance.

Retained earnings are an important factor influencing the investment in gross fixed assets. This source is comparatively less costly and less risky to meet the financial requirements. It obvious that the other three sources like share capital, bank borrowing and long-term debts are meant to finance the long-term requirements of the companies. Although companies may have preference for internal sources of finance, very often, they seek external funds for financing their investment plans. It is argued that the companies resort to long-term debt finance when the desired rate of return is higher than the return permitted by the internal funds.

The cross section result suggests that these four independent variables together contributed 75% of the variation in the investment of gross fixed assets as determined by the value of $R^2$ during 1997-98 to 2006-07. The computed 'T' value also indicate the long-term debt, share capital and
retained earnings have significant contribution (at 1 per cent and 5 per cent level) in financing the gross fixed asset 1997-98 to 2006-07 (for 10 years).

The share capital continued to have significant effect of all Industries except Chemical industry. But long term debt positive significant is in Pharmaceutical industry. Bank borrowings in Sugar, Cotton, Cement, and Construction have significant effect on financing the fixed assets. Thus, the effect of internally generated fund in the above three industries financing the fixed investment has been increasing in over all it has been declining.

### 7.2.3 Inventory Investment

<table>
<thead>
<tr>
<th>Industry</th>
<th>Constant</th>
<th>'X' Co-efficient</th>
<th>R²</th>
<th>'F' Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GRE</td>
<td>B. B.</td>
<td>T. C.</td>
</tr>
<tr>
<td>Sugar</td>
<td>2.152</td>
<td>6.3E-02</td>
<td>0.112</td>
<td>-0.149</td>
</tr>
<tr>
<td>Cotton</td>
<td>8.705</td>
<td>-2.123E-02</td>
<td>0.548</td>
<td>-0.508</td>
</tr>
<tr>
<td>Paper</td>
<td>3.265</td>
<td>-3.717E-02</td>
<td>9.787E-02</td>
<td>0.465</td>
</tr>
<tr>
<td>Cement</td>
<td>1.215</td>
<td>1.517E-02</td>
<td>0.554</td>
<td>0.136</td>
</tr>
<tr>
<td>Construction</td>
<td>-8.669</td>
<td>-3.390E-02</td>
<td>0.397</td>
<td>-0.784</td>
</tr>
<tr>
<td>Engineering</td>
<td>11.649</td>
<td>4.191E-03</td>
<td>0.557</td>
<td>-9.053E-02</td>
</tr>
<tr>
<td>Chemical</td>
<td>-4.971</td>
<td>0.100</td>
<td>0.364</td>
<td>0.878</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>-0.301</td>
<td>8.827E-02</td>
<td>0.263</td>
<td>0.512</td>
</tr>
<tr>
<td>Electrical</td>
<td>-4.434</td>
<td>7.005E-03</td>
<td>6.318E-02</td>
<td>1.099</td>
</tr>
<tr>
<td>Computer</td>
<td>30.240</td>
<td>-7.575E-05</td>
<td>0.802</td>
<td>-1.219</td>
</tr>
</tbody>
</table>

Source: Appendix - V

The cross section analysis shows the performance of financing the inventories investment during 1997-98 and 2006-07. The study is made for the aggregate inventory investment of sample industries consisting of raw
materials work in progress and finished produce. The result suggests that the significant discriminant influencing the investment in inventories. So, the roles of bank borrowings, trade credit and retained earnings which have important bearings on inventory investment have been analysed.

The multiple regression output suggests that from 1997-98 to 2006-07, three factors namely bank borrowings, trade credit and retained earnings have positive contributions of inventory investment is financed by the combination of three factors. On the analysis of total samples, Construction, Electrical industry has a fairly high degree of correlation. Sugar, Pharmaceutical has good correlation. But Cotton, Paper, Cement, Engineering & Computer have moderate correlation.

### 7.2.4 Gross Profits

In order to know the effect of different factors, viz. (i) Sales (ii) Total Gross Assets (iii) Net worth, a time series analysis has been carried out with the use of a multiple linear regression model. The analysis consider the relevant secondary data being collected from Joint Stock Companies in India viz. Sugar, Cotton, Paper, Cement, Construction, Motor Vehicle, Chemicals & Chemical Products, Medicine & Pharmaceutical Preparations, Electrical Machinery Apparatus & Appliances etc., Computer and Related Activity
Industries for a period of 10 years i.e. from 1997-98 to 2005-07. The analysis has been made for industries over a period of 10 years taking variable like Dependable variable GP i.e. Gross Profit and Independent variables like Sales, TGA i.e. Total Gross Assets and N. W. i.e. Net Worth.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Constant</th>
<th>'X' Co-efficient</th>
<th>R²</th>
<th>'F' Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>-38.916</td>
<td>1.447</td>
<td>0.490</td>
<td>-1.973</td>
</tr>
<tr>
<td>Cotton</td>
<td>5.619</td>
<td>4.225</td>
<td>3.258</td>
<td>-7.685</td>
</tr>
<tr>
<td>Paper</td>
<td>-40.931</td>
<td>15.543</td>
<td>-1.375</td>
<td>-16.000</td>
</tr>
<tr>
<td>Cement</td>
<td>31.875</td>
<td>3.686</td>
<td>2.122</td>
<td>-5.305</td>
</tr>
<tr>
<td>Construction</td>
<td>-128.475</td>
<td>0.479</td>
<td>-4.326</td>
<td>8.371</td>
</tr>
<tr>
<td>Engineering</td>
<td>7.547</td>
<td>4.086</td>
<td>1.964</td>
<td>-6.062</td>
</tr>
<tr>
<td>Chemical</td>
<td>-19.261</td>
<td>-7.144</td>
<td>-1.737</td>
<td>8.824</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>-11.783</td>
<td>-0.120</td>
<td>-0.122</td>
<td>-0.495</td>
</tr>
<tr>
<td>Electrical</td>
<td>-19.713</td>
<td>2.023</td>
<td>-0.514</td>
<td>-0.101</td>
</tr>
<tr>
<td>Computer</td>
<td>-2.924</td>
<td>1.836</td>
<td>-0.161</td>
<td>-8.449E02</td>
</tr>
</tbody>
</table>

Source: Appendix - V

On total analysis of all Industries from 1997-98 to 2006-07, it is found that the $R^2$ of Construction industries is highest i.e. 0.897 this shows 90% of the total variance of external fund (Gross Profit) is associated with the independent factor like Sale, Net worth, Total Gross Asset and Time. It indicates strong correlation between the dependent and independent variables. On contrary, $R^2 = 0.413$ is lowest which indicate moderate correlation. So in between them other industries keeps goods correlation among dependent and independent variables 'F' ratios of Construction and Engineering also high it is highly significant at 1% level of significance.
Chemical industry keeps significant at 5% level of significance. Coefficient of sales records good correlation except Chemical and Pharmaceutical industry coefficient of Net worth of Cotton and Engineering records positive correlation. Total Gross Asset keeps maximum negative coefficient correlation except chemical industry 8.824 and note worthy records maximum time factor support to the correlation.

On analysis of total industries ‘F’ test ratios of Construction, Chemical and Electrical industry have critical value has more than the tabulated value. It implied highly significant. In all the above case bank borrowings have played the significant role (at 1 per cent level) during the period 1997-98 to 2006.07.

### 7.3 Industry-wise Analysis

**Sugar Industry**

On total selected sample of Sugar industry the analysis has been made over a period of 10 years taking variables like dependable (fixed asset) and independent value (RE, SC, BB and LTD).

In case of Sugar industry $R^2$ is 0.916 which shows 92% of the total variance of fixed assets (Independent Factor). Here the calculated value ‘F’ ratio is 13.632. Further, it is seen that intercept values constant = 7.364,
regression coefficient of RE = -0.01876, coefficient of share capital = 0.213, coefficient of bank borrowing = 0.650 and co-efficient of long-term debt = -0.122.

Tabulated value of ‘F’ test at 5% level of significance for (4.10) degree of freedom = 3.6331 and tabulated value of F-test at 1% level of significance for (4,10) degree of freedom = 6.4221.

From the we analysis, it is found that F-statistics is insignificant both at 5% and 1% level of significance, where tabulated value is more than calculated value. Here $R^2$ is more than 0.5 for the Sugar industry, it indicates good relationship between dependant and independent variables.

From the analysis it is found that $R^2 = 0.646$, this shows 65% of the total variance of the external fund (Inventory) is associated with the independent factors. Here, calculated ‘F’ ratio is 3.658. Further, it has seen intercept value constant is 2.152, regression coefficient of RE = 6.3 E-02, Bank Borrowing = 0.112 and Trade Credit = -0.149.

On the above analysis, it is found that ‘F’ statistics is significant at 5% level of significance, where calculated value is more than tabulated value. Here $R^2$ is more than 50% for Sugar industry, it indicate good relationship between dependent and independent.
From the analysis of Sugar industry it is found that $R^2 = 0.768$, this shows 77% of the total variance of external fund (i.e. Long-term loan and share capital) associated with the independent factor. Here the calculated ‘F’ ratio is 4.146. Further it is seen that intercept value constant = -28.315, Regression coefficient of RE = -7E-02, GFA = 0.922, INV = 1.719 and Time = 6.564.

On the above analysis, it is found that ‘F’ statistics is 4.146 which is highly significant at 5% level of significance, where calculated value is more than tabulated value. Here $R^2$ is more than 75% for the Sugar industry, it indicates strong relationship between dependent and independent variables.

From the analysis it is found that $R^2 = 0.516$, this shows 52% of the total variance of external fund is associated with the independent factors. Here the calculated ‘F’ ratio is 1.332. Further, it is seen that intercept value Constant = -38.916, regression co-efficient of Sale = 1.447, co-efficient of Net worth = 0.490, co-efficient of Total Gross Asset = -1.973 and co-efficient of time = 9.523.

Tabulated value of F-test at 5% level of significance for (4,10) degree of freedom = 3.6331 and tabulated value of F-test at 1% level of significance for (4,10) degree of freedom = 6.4221.
From the analysis it is found that F-statistics is insignificant both at 5% and 1% level of significance, where tabulated value is more than calculated value. Here $R^2$ is more than 0.5 for the Sugar industry. It indicates good relationship between dependant and independent variables.

**Cotton Industry**

From analysis of Cotton industry it is found that $R^2=0.919$ this shows of the external fund (FA) associated with the independent factors (RE, SC, BB & LTD). Here the calculated ‘F’ Ratio is 14.222. Further, it is seen that intercept value constant = 5.687, coefficient of RE = -0.01876, SC = 0.213, BB.=0.650 and LTD = -0.122. The tabulated value of ‘F’ Test at 5% level of significance for (4, 10) degree of freedom is 3.6331 and the tabulated value of ‘F’ test at 1% level of significance for (4, 10) degree of freedom is 6.4222.1.

From the analysis, it is found that ‘F’ statistics is highly significant both at 5% and 1% level of significance, where calculated value is more than tabulated value. Here, $R^2$ is more than 91% for the Cotton industry it indicates strong relationship between dependence and independent variables.

From the analysis it is found that $R^2 = 0.338$ which shows 34% of the total variance of external fund (inventory) is associated with the independent
factors (RE, BB, TC). Here, the calculated ‘F’ Ratio is 1.023. Further, it is seen that interest value constant = 8.705. Regression coefficient of GRE = -2.123E-02, Bank borrowing = 0.548 and Trade Credit = -0.508.

On the above analysis, it is found that ‘F’ statistics is insignificant both at 5% & 1% level of significance, where tabulated value is more than calculated value. Here $R^2$ is more than 25% for the Cotton industry which indicates a moderate correlation.

From the analysis of Cotton industry, it is found that $R^2 = 0.996$, this shows 99% of the total variance of external fund associated with the independent factor (RE, FA, INV, Time) which shows strong relationship between them. Here, the calculated value of ‘F’ ratio is 36.799 which is highly significance at 1% level of significance where the calculated value is more than the tabulated value.

From the analysis of Cotton industry it is found that $R^2 = 0.507$, this shows 51% of the total variance of external fund is associated with the independent factors. Here the calculated ‘F’ ratio is 1.284. Further, it is seen that intercept value constant = -40.931, regression coefficient of sale = 4.225, co-efficient of net worth = 3.258, co-efficient of Total gross asset = -1973 and co-efficient of time = 6.444.
Tabulated value of ‘F’ test at 5% level of significance for (4,10) degree of freedom is 3.63331 and tabulated value of ‘F’ test at 1% level of significance for (4,10) degree of freedom is 6.4221.

From the analysis, it is found that ‘F’ statistics is insignificant both at 5% and 1% level of significant, where tabulated value is more than calculated value. Here $R^2$ is more than 0.5 for the cotton industry, it indicate good relationship between dependent and independent variable.

**Paper Industry**

From the analysis of Paper industry it is found that $R^2 = 0.919$ which shows 92% of the total variance of external fund is associated with the independent variable (i.e. fixed asset) such as RE, SC, BB, LTD. Here, the calculated ‘F’ ratio is 4.541. Further it is seen that intercept value constant = 4.3666, regression coefficient of RE = 0.561, coefficient of share capital = 561, bank borrowing = 0.118 and long-term debt = -0.0008632.

On the above analysis, it is found concluded that ‘F’ statistics 14.209 is highly significant where calculated value is more than tabulated value. Here $R^2$ is more than 90% for the paper industry it indicates very high degree of correlation.
From the analysis, it is found that $R^2 = 0.306$, this shows 31% of the total variance of external fund (inventory) is associated with the independent factors. Here the calculated 'F' ratio is 0.884. Further, it is seen that intercept value constant = 3.265, regression co-efficient of $RE = -3.717 \times 10^{-2}$, $BB = 9.787 \times 10^{-2}$ and $TC = 0.465$.

From the analysis, it is found that 'F' statistic is insignificant both at 5% and 1% level of significant, where tabulated value is more than calculated value. Here $R^2$ is more than 25% for the paper industry, it indicates moderate correlation between dependent and independent variables.

On analysis of Paper industry it is found that $R^2 = 0.582$ this shows 58% of the total variance of external fund (LTD & SC) associated with the independent factors i.e. $RE$, $GFA$, $INV$, Time. It is more than 50%, it indicates good relationship between dependent and independent variable. It is also found that the 'F' statistics is insignificant.

On analysis of Paper industry from the companies samples over a period of 10 years taking variable like dependant variable (Gross Profit) and independent variables (Sales, Total Gross Asset and Net worth), it has observed that $R^2 = 0.413$, this shows 41% of the total variance of external fund is associated with the independent factors. Here, the calculate 'F' ratio is 0.880. Further, it is seen that intercept value constant = -40.931, coefficient of
sale = 15.543, coefficient of net worth = -1375, coefficient of TGA = -16000 and coefficient of time = 20.577. Here, $R^2$ is 41% (i.e. more than 25% and less than 50%), it indicates moderate correlation between dependent and independent variables.

Cement Industry

In order to know the effect of different factors of cement industry, it is found that $R^2 = 0.784$, which is 78% of the total variance of external fund is associated with the independent factors. Here the calculated ‘F’ ratio is 4.541. Further, it is seen that intercept value constant = 3.944, regression coefficient of RE = -3.521 E-03, share capital = 0.610 and bank borrowings = 8.693 E-02.

From the above analysis, it is analysed that ‘F’ statistics is significant at 5% level of significance where calculated value is more than tabulated value. Here $R^2$ is more than 75% for the cement industry, it indicates good relationship between dependent and independent variables.

From the analysis it is found that $R^2 = 0.346$, this shows fund (inventory) is associated with the independent factors. Here, the calculated ‘F’ ratio is 1.059, regression coefficient of RE = 1.517E-02, BB = 0.554 and TC = 0.136.
On the above analysis, it is found that ‘F’ statistics is insignificant both at 5% and 1% level of significance, where tabulated value is more than calculated value. Here $R^2$ is more than 25% for the cement industry, it indicate moderate correlation between dependent and independent variables.

On analysis of Cement industry it is found that $R^2 = 746$, this shows 75% of total variance of external fund (i.e. share capital and long-term debt) is associated with the independent factors (i.e. RE, GFA, INV & Time). Here, the calculated ‘F’ ratio is 3.669 which is highly significant at 5% level of significance. And $R^2$ is 75%, it indicates strong correlation.

The analysis has been made for industries over a period of 10 years taking variables like dependent variables $GP = \text{Gross Profit}$ and independent variables like $Sales$, $TGA=\text{Total Gross Asset}$ and $NW = \text{Net worth}$.

From the analysis of the table, it is found that $R^2 = 0.657$. This shows 65% of the total variance of external fund is associated with the independent factors. Here, the calculated ‘F’ ratio is 2.394. Further, it has seen that intercept value constant = 31,875, regression coefficient of sale 3.686, coefficient of Net worth = 2.122, coefficient of total gross asset = -5.305 and coefficient of time = -4.139.
From the above analysis, it is found that $R^2$ is more than 0.5 or 50% for Cement industry, it indicate good relationship between dependent and independent variables.

**Construction Industry**

From the analysis of Construction industry that $R^2 = 0.194$, this shows 19% of the total variance of external fund (i.e. Fixed Asset) is associated with the independent variable i.e. RE, SC, BB, LTD. Here, the calculated 'F' ratio is 0.301. Further, it is seen that intercept value constant is 6.921, regression coefficient of RE = -3.335E-02, SC = 0.265, BB =0.271 and LTD = -0.157.

From the above analysis, it is found that F-statistics is insignificant both at 5% and 1% level of significance where tabulated value is more than calculated value. Here $R^2$ is less than 25% for the Construction industry, it indicate week correlation between dependent and independent variable.

From the analysis of Construction industry it is found that $R^2 = 0.922$, this shows 92% of the total variance of external fund (Inventory) is associated with the independent factor i.e. RE, BB, TC. Here the calculated 'F' ratio 23.515. Further it is seen that intercept value constant is -8.669, regression
coefficient of RE = -3.390E-02, Bank borrowings = 0.397 and trade credit = -0.784.

On the above analysis, it is found that ‘F’ statistics is highly significant at 1% level of significant, where calculated value is more than tabulated value. Here $R^2$ is more than 90% for the construction industry, it indicates strong relationship between dependent and independent variables.

On analysis of Construction industry it is found that $R^2 = 0.856$, this shows 86% of the total variance of external fund (SC & LTD) is associated with the independent factors (RE, GFA, INV & Time). Here, the calculated ‘F’ ratio is 7.454, which is significant at 1% level of significance, where calculated value is more than tabulated value. Here $R^2$ is more than 75% from the Construction industry, it indicates good relationship between dependent and independent variables.

On total analysis from the selected sample companies of Construction industry it has observed that, the industry over a period of 10 years i.e. from 1997-98 to 2006-07 taking variables like Gross Profit as dependent variable and independent variables like Sales, of GA, Net worth.

From the analysis of the Construction industry it is found that $R^2 = 0.897$ this shows 89% of the total variance of dependent external fund is
associated with the independent factors. Here the calculated 'F' ratio 10.866.
Further it has been seen that intercept values of constant = -128.475, regression
coefficient of sales = 0.479, coefficient of net worth = -4.326, coefficient of total
gross asset = 8.371 and coefficient of time = 13.250.

From the above analysis, it is observed that F-statistics (i.e. 10.866) is
highly significant at 1% as the calculated value to more than tabulated value.
Here $R^2$ (i.e. 0.892) is more than 75% for the Construction industry, it
indicates strong relationship between dependent and independent variables.

**Engineering Industry**

On analysis of Engineering industry it is observed that $R^2 = 0.593$, this
shows 59% of the total variance of external fund (i.e. Fixed Asset) is
associated with the independent variable (i.e. RE, SC, BB, LTD). Here the
calculated 'F' ratio is 1.819, regression coefficient of GRE = -2.795E-02, SC
= 0.228, BB = -3521E-02 and LTD = -3.289E-02.

From the above analysis, it is found that 'F' statistic is insignificant both
at 5% and 1% level of significance, where tabulated value is more than
calculated value. Here $R^2$ is more than 0.5 for the Engineering industry it
indicates good relationship between dependent and independent variables.
From the analysis, it is found that $R^2 = 0.260$, this shows 26% of the total variance of external fund (Inventory) is associated with the independent factors. Here $R^2$ is more than 0.25% for the Engineering industry; it indicates good relationship between dependent and independent variable. Here the constant = 11.649, regression of coefficient of RE = 4.191E-03, BB = 0.557 and TC = -9.053E-02. Here the calculated ‘F’ ratio is 0.701 which is insignificant, where the tabulated value is more than calculated value.

From the analysis of the Engineering industry it is found that $R^2 = 0.702$, this shows 70% of the total variance of external fund (SC & LTD) is associated with the independent factors (i.e. RE, GFA, INV & Time). Here, the calculated ‘F’ ratio is 2.943 which is insignificant. Here, $R^2$ is more than 0.5 for Engineering industry; in indicates good relationship between dependent and independent variable.

On the selected samples of Engineering industry over a period of 10 taking variables of dependent variables GP i.e. Gross Profit and independent variable like Sales, TGA, Net worth, it is found that $R^2 = 0.874$, this shows 87% of the total variance of the dependent factor is associated with the independent factors. Here, the calculated ‘F’ ratio is 6.914. Further, it is seen that intercept value constant = 7.547, regression coefficient of sale = 4.086,
From the analysis table it is found that 'F' test is highly significant at 1% level of significance. Here the calculated value is more than the tabulated value. Here, $R^2$ is more 25% for the Engineering industry, it indicates strong relationship between depend and independent variable.

**Chemical Industry**

From the analysis of Chemical industry it is found that $R^2 = 0.259$ which shows 26% of total variance of internal fund is associated with the independent factors. Here the calculated 'F' ratio is 0.438. Further it is seen that intercept value constant = 7.491, regression coefficient of GRE = -2.781E-02, SC = 4.283E-02, BB=8.514E-02 and LTD = -4.023E-03.

On the above analysis it is observed that 'F' statistic is insignificant both at 5% and 1%. Here $R^2$ is more than 25% for the chemical industry, it indicates moderate correlation.

From the analysis, it is found that $R^2 = 0.742$ this shows 74% of the total variance of external fund (Inventory) is associated with the independent factors. Here the calculated 'F' ratio = 5.738, which is highly significant at 1%
level of significance, where the calculated value is more than tabulated value. Further it is seen that intercept value constant = -4.971, regression coefficient of RE = 0.100, BB = 0.364 and TC = 0.978. Here $R^2$ is more than 50% for Chemical industry, it indicates good relationship between dependent and independent variables.

From the analysis it is found that $R^2 = 736$, this shows 73% of the total variance of external fund (SC & LTD) is associated with independent factors (i.e. RE, GFA, INV & Time). Here, the calculated 'F' ratio is 2.043 which are insignificant. But $R^2$ is more than 50% for the sugar industry it indicates good relationship between dependent and independent variables.

From the time series analysis of Chemical industry it is found that $R^2 = 0.742$, this shows 74% of the total variance of dependent external fund (i.e. Gross Profit) is associated with the independent factors (i.e. Sales, Net worth, total tangible asset and time). Here, the calculated 'F' ratio is 3.596. Further, it is seen that intercept value constant = -19.261, regression coefficient of sale = -7.144, coefficient of net worth = -1.737, coefficient of total gross asset = 8.824 and coefficient of time = 4.833.

From above analysis, it is found that 'F' statistics (3.596) is insignificant both at 5% and 1% level of significant, where the tabulated value is more than calculated value. Here $R^2 = 0.742$ which is more than 50% for the chemical
industry, it indicate good relationship between dependant and independent variables.

**Pharmaceutical Industry**

From the analysis of Pharmaceutical industry it is found that $R^2 = 0.856$ which shows 86% of the total variance of external fund (F.A.) is associated with the independent factors. Here, the calculated 'F' ratio is 7.452. Further it is seen that intercept value constant = 2.833, regression coefficient of RE = -6.879E-02, SC = 0.378, BB = 8917E-02 and LTD = 0.536.

From the analysis it is observed that 'F' statistics is highly significance at 1% level of significance, where calculated value is more than tabulated value. Here $R^2$ is more than 75% for the Pharmaceutical industry, it indicates good relationship between dependent and independent variables.

From the analysis of this table, it is found that $R^2 = 0.774$, this shows 77% of the total variance of external fund (Inventory) is associated with the independent factors i.e. RE, BB, TC. Here the calculated 'F' ratio is 3.599. Further it is seen that intercept value constant = -0.301, regression coefficient of GRE = 8.827E-02, Bank Borrowing 0.263 and Trade Credit = 0.512.
From the analysis we find that ‘F’ statistics is insignificant. Here $R^2$ is more than 75% for the Pharmaceutical industry, it is indicates good relationship between dependent and independent.

On analysis of Pharmaceutical industry it is found that $R^2 = 0.748$ which is 75% of total variance of external fund (i.e. SC & LTD) is associated with the independent factors (i.e. RE, GFA, INV & Time). Here, the calculated ‘F’ ratio is 3.704, which is significant at 5% level of significance. $R^2$ is 75% for the Pharmaceutical industry; it indicates strong relationship between dependent and independent variables.

From the analysis of Pharmaceutical industry, it is found that $R^2 = 0.774$, this shows 77% of the total variance of dependent variable i.e. Gross Profit with the independent factors i.e. Sales, Total Gross Assets, Net worth and Time. Here the calculated ‘F’ ratio is 3.420. Further, it is seen that intercept value constant = -11.783, regression coefficient of sale is -7.144, coefficient of net worth is -1.737, coefficient of total gross asset is 8.824, and coefficient of time is 4.833.

From the analysis on the table it is found that ‘F’ statistics is insignificant both at 5% and 1% level, where tabulated value is more than calculated value. Here $R^2$ is more than 75% for the Pharmaceutical Industry, it indicates good relationship between dependent and independent variables.
Electrical Industry

From the analysis of the table, it is found that $R^2 = 0.800$, this shows 80% of the total variance of the external fund (F.A.) is associated with the independent factors. Here the calculated 'F' is 5.014. Further it has seen that intercept value constant = 7.434, regression co-efficient of RE = -9.485E-03, SC = 0.250, BB = -2.951E-02 and LTD = 1.768E-02.

From the analysis it is found that 'F' statistic is highly significant at 5% level of significant, where calculated value is more than tabulated value. Here $R^2$ is more than 75% for the Electrical industry, it indicates good relationship between dependent and independent variables.

From the analysis it is found that $R^2 = 0.821$ this shows 82% of the total variance of external fund is associated with the independent factors. Here, the calculated 'F' ratio is 9.169. Further, it is seen that intercept value constant = -4.434, regression coefficient of RE = 7.005E-03, BB = 6.318E-02 and TC = 1.099.

On the above analysis it is observed that $F$=statistics is highly significant at 1% level of significance. Here $R^2$ is more than 75% for the
Electrical industry, it indicates good relationship between dependent and independent variables.

On analysis of Electrical industry it is found that $R^2 = 0.898$, this shows 90% of the total variance of external fund (SC & LTD) is associated with the independent factors (RE, GFA, INV & Time). The calculated value of ‘F’ ratio is 10.967 which is more than tabulated value so it indicates highly significant at 1% level. Here, $R^2$ is more 90% which also indicate strong relationship between dependent and independent variables.

From the analysis of Electrical industry it is found that $R^2 = 0.582$, this shows 58% of the total variance of dependent external fund i.e. G.P. is associated with the independent factors i.e. Sales, TGA, Net wroth and Time. Here, the calculated ‘F’ ratio is 1.740. Further it is seen that intercept value constant = -19.717, regression coefficient sale = 2.023, coefficient of net worth = -0.514, coefficient of TGA = -0.101 and coefficient of time = 1.693.

From the analysis it is concluded that ‘F’ statistics is insignificant both at 5% and 1% level of significance, where tabulated value is more than calculated value. Here, $R^2$ is more than 50% for the Electrical industry, it indicate that good relationship between dependent and independent variables.
From the analysis we found that $R^2 = 0.483$, this shows 48% of the total variance of external fund (FA) is associated with the independent factors. Here, the calculated ‘F’ = 1.169. Further it has seen that the intercept value constant = 32.601, regression coefficient of $RE = 1.492E-02$, $SC = 0.388$, $BB = 0.472$ and $LTD = -0.143$.

From the analysis it is found that ‘F’ statistics is insignificant both at 5% and 1% level of significance, where tabulated value is more than calculated value. Here $R^2$ is more than 25% for the Computer industry, it indicates moderate correlation between dependent and independent variables.

From the analysis of Computer industry it is found that $R^2 = 0.374$, this shows 37% of the total variance of external fund is associated with the independent factors. Here, the calculated ‘F’ ratio is 1.195. Further it is seen that intercept value constant = 30.240, $RE = -7.575E-05$, $BB = 0.802$ and $TC = -1.219$.

From the analysis it is observed that ‘F’ statistics is insignificant. But $R^2$ is more than 25% for the Computer industry, it indicate moderate correlation between dependent and independent variables.
On analysis of Computer industry it is found that $R^2 = 0.239$. This shows 24% of the total variance of external fund is associated with the independent factors. Here, the calculated ‘F’ ratio is 0.392 which insignificant in both 5% and 1% level of significance where the tabulated value is more than the calculated value. Here $R^2$ is less than 25% of Computer industry which also indicates week correlation.

On analysis of the total samples of computer industry it is found that $R^2 = 0.489$ which is 49% of the total variance of dependent fund i.e. Gross Profit associated with the independent factors such as sales, total gross assets, net worth, time etc. Here the calculated ‘F’ is 1.197. Further, it is seen that intercept value constant = -2.924, regression coefficient of sale = 1.836, coefficient of net worth = 0.161, coefficient of total gross assets = 8.449E-02 and coefficient of time = -1.640.

From the above analysis it is observed that ‘F’ statistics is insignificant both at 5% and 1% level of significance, where the tabulated value is more than the calculated value. Here $R^2$ (49%) is more than 0.25 for the computer industry, it indicates moderate relationship between dependent and independent variables.
References:


