CHAPTER IV
CORPORATE FINANCIAL STRUCTURE: AN ECONOMETRIC ANALYSIS

In the previous chapter we had looked at the rates of growth of certain key items in corporate finances for the 1720 companies. We had also examined the movement of certain important ratios and attempted to trace a relationship between size and these variables. It has been observed, that in quite a few cases, the movements of the variables for certain size groups has been contrary to the expected trend. How significant are these exceptions? Is there any statistically valid relationship between the size of the firm, expressed either in terms of assets or sales and the movement of the variables. Unless it can be statistically established that even after taking into account these deviations from normal behaviour, for the entire sample considered, there is a significant and definitive relationship between size and corporate behaviour, the true nature of the relationship remains hazy.

The first problem that has been encountered is that the number of size groups is limited for any particular year. Suppose any statistical relationship that is sought to be drawn between size of the firm and growth of profits, more than one explanatory variable will have to be considered in order to give consistent results given the nature of the problem. For example, if we are understand what are the factors affecting the volume of profits, if only sales is considered as the explanatory variable, the model does not give a good fit. It has been found that total net assets and time also influence the volume of profits. Obviously, if all these are taken into account, we are left with a degree of
freedom of 6 (the number of groups being 10).

Further, given the erratic behaviour of certain size groups, it is not necessary that there will be some uniformity in the findings for all the years. If for example, out of five years, in two, the results are not statistically valid, little firm conclusions can be drawn on the basis of such an exercise.

Hence, what is being attempted in this chapter is to test the hypothesis that profits and profitability (which may be defined in a number of ways) depend on (a). size of assets; and (b). volume of sales; by pooling the cross-section and time-series data. A regression analysis is then run on the basis of this pooled data after taking care of certain problems that emerge as a result of pooling.

First, the pooling technique is not a commonly used one. There are quite a few notable instances in which it has been used. David J Smyth, et al (1975) have used the technique in their analysis of size and profitability of large corporations in the United Kingdom and the United States.\(^1\) However, the methodology that they have followed is slightly different from ours. Peter S. Heller used pooled data from a cross-section of less-developed countries to study their fiscal behaviour. A total of 11 countries were considered for which data was available for 6 years.\(^2\) Heller used the two-stage least square method because of a structural difference between the countries.

Balestra and Nerlove used the pooling technique to estimate the

\begin{itemize}
\end{itemize}
demand for natural gas in the United States. \(^3\)

The problem is that in the process of pooling, there are likely to be some problems that arise over and above that encountered in cross-section or time series data. First, there might be structural changes over a period of time which will not be reflected in the pooled data. Second, there is the problem of heteroskedasticity, which is mainly derived from the cross-section nature of the data though the movements of variables over time also has some impact. Third, in certain kinds of data, there is a problem in the interpretation of the function estimated from the application of the pooling technique.

The advantage of pooling, apart from getting over the problem of paucity of sufficient number of observations is that it is possible to arrive at common interpretations for a dispersed set of data. Thus, despite the problem of some of the observations in the cross-section or the time-series data not obeying the expected trend, if it can be demonstrated that statistically these deviations do not matter.

We examine different models in both the assets and sales classifications to find out what are the factors that influence the level of profits and profitability. Profitability is defined as the level of profits in relation to the level of assets, sales and own funds.

But before we come to the actual model, it is necessary to explain how some of the econometric problems encountered have

been taken care of. As has been explained earlier, the difference in the magnitudes between the smaller size groups and the large groups is enormous, and can lead to the problem of heteroskedasticity. To make the model more manageable, we transformed the gross profits, sales and assets into their natural logarithmic form and ran the regressions.

The use of the derived rate of interest, $r$, as an independent variable and the logarithmic value of profits as a dependent variable brings forth the possibility of an exponential relationship between the rate of interest and profits. This we have found to be true in this case since the use of the logarithmic form of the interest rate led to poorer levels of significance.

Another problem that was encountered in the exercise was that of accounting for the possibility of a shift in the levels of profits and profitability over time. Ideally, it is possible to do so by first of all running separate regressions for time on profits and profitability for each individual group, using the co-efficients thus obtained to correct for parametric changes in the levels of profits and profitability over time. These corrected levels of profits and profitability can then be inserted in the original equation and the regression run for the entire pooled data. However, as mentioned earlier, since we had only 5 years of data, it was not possible to obtain reliable estimates for such a magnitudinal shift in profits and profitability, as distinct from the impact of higher sales or assets on their level.

We could have used time as an independent variable to take
care of such shifts. However, this would have been arbitrary and could have led to some degree of multicollinearity between the different independent variables. Further, since interest rate and sales have tended to increase with time, the structural factors are subsumed in the movement of these two variables. The reasoning that we followed is that if the interest rates move up, it is quite natural to expect the rates of profits to also go up. While the movement of interest rates in the reverse direction may not result in the rates of profit too declining, in the upward direction, in normal circumstances, it should go up. The reason being that interest rates represent an opportunity cost of capital and every firm would like to ensure that its rate of return is above the opportunity cost of capital. Since we are examining the behaviour of gross profits, which includes interest that remains to be paid, it is to be expected that the gross profits in relation to sales, assets or own funds should go up with an upward movement in the rate of interest. While this may not hold in a particular year, the response to higher levels of interest will usually be with a lag, the latter depending on how the firm can raise its prices to compensate for higher costs.

**Total Net Assets**

First, we take up the various models that have been run using data on corporate size groups that have been classified according to size of total net assets. The basic model is:

**Model 1**

$$\ln \text{Prof} = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S$$

Here, \(\ln \text{Prof}\) is the natural logarithmic value of gross profits, \(r\)
is the rate of interest, \( \ln A \) and \( \ln S \) the natural logarithmic value of total net assets and sales respectively. \( \alpha_1 \) is the constant term. The results of the regression and the variants of this model are presented below with t-values in parentheses.

Model 1.1:

\[
\ln \text{Prof} = -3.257 - 2.528r - 0.973\ln A + 2.041\ln S \\
(-11.653) (-1.749) (-2.976) (6.124)
\]

\[ R^2 = 0.995 \quad DW = 1.53 \quad F = 3294 \]

We notice that in the above model, the \( R^2 \) value is high. However, the t-values, specially for the rate of interest coefficient is significant at only 5 per cent. The model indicates that while sales and assets are good explanatory variables for determining the level of profits, both of them being significant at one per cent level of confidence, interest rate is significant at 5 per cent only.

What is indeed surprising in the results is that the level of gross profits is negatively related to the rate of interest. This goes contrary to intuition of firms trying to keep their returns above the opportunity cost of capital as represented by the rate of interest. But as mentioned earlier, this may be because we have not considered lags in our model.

One significant relationship is that of a negative association between the level of profits and the size of assets of the firms. Apparently, contrary to popular perception, the larger firms do not have much of an advantage in terms of their assets size when it comes to increasing the volume of profits. In fact, the size of assets may be a disadvantage as reflected in the model. However, there are several alternative reasons, which
cannot be substantiated by data, but is reflective of actual practice as to why this relationship between profits and assets is negative. This we shall take up at the end of this chapter.

And finally, there is a strong positive association between volume of sales and profits. This is quite logical and needs no explanation. What is significant about the relationship between volume of sales and profits is the fact that the value of the co-efficient exceeds unity. This is possible since after the firm has recovered its capital-related costs beyond a certain level of capacity utilisation, the only cost for an additional unit of sales is merely the variable cost, the rest is gross profits.

The problem of multicollinearity due to the presence of both assets and sales as explanatory variables has to be recognised. This may cause the estimated co-efficients not being very efficient. One simple criterion to judge when multicollinearity becomes harmful is when the value of the F-statistic is significantly different from zero at the 5% level of significance, but none of the t statistics for the regression coefficients is.4 However, the results above suggest that the degree of multicollinearity is not harmful since the t-statistics for several explanatory variables are significant while the F-statistic is significantly different from zero. The Durbin-Watson statistic also does not prove the existence of autocorrelation - positive or negative.

We now come to the second model in the assets classification. Here, instead of the volume of profits, we are

looking at the ratio of gross profits to own funds (equity plus reserves). In this model, we introduce another explanatory variable, OA, which captures the composition of assets of the firm, i.e., the ratio of own funds to total net assets. The purpose was to see whether asset composition, or in other words, whether higher proportion of own funds had any impact on the profitability of the firm. The basic model in this case is:

Model 2

\[ \pi_0 = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S + \alpha_5 OA \]

We shall take up the variants in this model.

Model 2.1

\[ \pi_0 = 0.4751 - 1.2700A - 1.223r - 0.702\ln A + 0.721\ln S \]
\[ (3.0069) (-8.982) (-1.628) (-4.444) (4.495) \]

\[ R^2 = 0.756 \quad DW = 1.355 \quad F = 34.76 \]

Model 2.3

\[ \pi_0 = 0.307 - 1.2150A - 0.625\ln A + 0.645\ln S \]
\[ (2.521) (-8.693) (-4.074) (4.130) \]

\[ R^2 = 0.741. \quad DW = 1.399 \quad F = 43.88 \]

The results indicate that the composition of assets, volume of assets and sales are strong determinants of the profitability with respect to own funds. The ratio of own funds to total net assets has a negative relationship with the profitability of the firms. This means that the higher the volume of own funds, the less the rate of return on such funds. That might be a simple relationship between the numerator and the denominator since if the denominator goes up and the numerator remains constant, the net impact is bound to be negative. However, this demonstrates another aspect of corporate finances, mainly that there is little purpose served by maintaining a high volume of internal
resources - it does not improve profitability.

The rate of interest has a negative relationship with the profitability of the firm. But the relationship is not statistically significant. Hence, the term was dropped and this led to improved t-values for the other explanatory variables.

The volume of assets also do not help improve profitability of firms, in fact, they have an adverse impact. Finally, the volume of sales have a positive impact on profitability with respect to own funds.

The only worrying aspect is that the DW value in model 2.1 is below the lower level which means that there is a possibility of positive autocorrelation at the 5 per cent level of significance. However, when we dropped r from the equation and ran the regression for the remaining variables, the DW value got back into the inconclusive range for determination of autocorrelation.

The other forms of measuring profitability of firms is with respect to its total net assets (or capital employed) and sales. The former gives an indication of how profitably the firms are utilising their total resources and the latter indicates the mark-up per unit of sales.

We shall first take up the profitability with respect to assets. The basic model for this is as follows:

Model 3

\[ \pi_a = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S + \alpha_5 OA \]

The variants in this model are:
Model 3.1
\[ \pi_a = -0.005 - 0.0010A - 0.297r - 0.225\ln A + 0.232\ln S \]
\[ (-0.126) \quad (-0.016) \quad (-1.648) \quad (-5.93) \quad (6.044) \]
\[ R^2 = 0.510 \quad DW = 1.532 \quad F = 11.71 \]

Model 3.2
\[ \pi_a = -0.005 - 0.296r - 0.225\ln A + 0.232\ln S \]
\[ (-0.166) \quad (-1.711) \quad (-6.183) \quad (6.282) \]
\[ R^2 = 0.510 \quad DW = 1.532 \quad F = 15.95 \]

From the above results we notice that assets composition do not significantly influence the profitability of firms measured with respect to their total net assets. The t-value was quite low and hence we dropped the term. We took up the rate of interest as another explanatory variable but this was significant at only the 10 per cent level.

Another factor is that the \( R^2 \) values were slightly over 0.5 for all the regressions. This points to the possibility of a problem in the specification of the model. Despite trying out a combination of what are likely to be explanatory variables, there is no significant improvement in the \( R^2 \) values. The signs of the assets and sales co-efficients for both time and rate of interest are negative and positive respectively and broadly correspond to the findings in the previous models.

Finally, we come to the question of profitability with respect to the volume of sales. This relationship indicates the mark-up per unit value of sales. It should be interesting to see if there is any broad correspondence between the degree of mark-up and the size of the firms as indicated by the magnitude of
total net assets. The basic model for this is similar to the one with respect to assets.

Model 4

\[ \pi_s = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S + \alpha_5 OA \]

The variants in this model are:

Model 4.1

\[ \pi_s = 0.029 + 0.00020A - 0.215r - 0.074\ln A + 0.074\ln S \]

\[ \begin{align*}
(1.139) & & (0.0075) & & (-1.795) & & (-2.945) & & (3.086) \\
\end{align*} \]

\[ R^2 = 0.429 \quad DW = 1.516 \quad F = 8.438 \]

Model 4.2

\[ \pi_s = 0.029 - 0.215r - 0.074\ln A + 0.079\ln S \]

\[ \begin{align*}
(1.412) & & (-1.870) & & (-3.056) & & (3.204) \\
\end{align*} \]

\[ R^2 = 0.429 \quad DW = 1.516 \quad F = 11.50 \]

In the variants of this model, the \( R^2 \) values are quite low and in quite a few instances so are the \( t \)-values. The composition of assets, OA, is a poor explanatory variable of profitability with respect to sales. The best fit model is the one with interest rate, assets and sales. Here, the \( t \)-values are satisfactory but the \( R^2 \) value is low.

Despite the limitations imposed by the low \( R^2 \) and \( t \)-values, what the model indicates is that there is a positive association between the volume of sales and the level of profitability. The level of interest rates and the size of total net assets are related negatively to the level of profitability.

The regression coefficients may be inefficient due to the presence of heteroskedasticity. This arises primarily because of the presence of cross-section data which may cause larger variance of variables relating to the larger firms in the sample.
relative to that of the smaller firms. This may be one of the reasons why the regression coefficients are not very efficient and significant. To take care of this problem we applied a standard corrective for heteroskedasticity by running a regression of the residual from the above model (model 4.2) as the dependent variable and the independent variables being \( r, \ln A \) and \( \ln S \).

Or, \( \hat{e}_i^2 = \hat{f}_1 + \hat{f}_2 r + \hat{f}_3 \ln A + \hat{f}_4 \ln S \)

Where \( \hat{e}_i^2 \) is the residual in the model 4.2, \( \hat{f}_1 \) is the the constant parameter and \( \hat{f}_2, \hat{f}_3 \) and \( \hat{f}_4 \) are the coefficients of \( r, \ln A \) and \( \ln S \) respectively. We ran the above regression and found the t-values of the coefficients as well as the \( R^2 \) value quite low. After eliminating \( r \) in the first round and \( \ln A \) also in the second round, we found that the only coefficient that gives a reasonable t-value is that for \( \ln S \). However, the \( R^2 \) value was only 0.24.

\[
\hat{e}^2 = 0.0003 - 0.00024 \ln S \\
(4.707)(-3.898)
\]

Nevertheless, we decided to proceed to the next step in the correction for heteroskedasticity by using these residuals. Let, \( z_i = \hat{e}_i^2 \). We now divide all the terms on the left and right hand sides of the equation in model 4.2 by \( \sqrt{z_i} \). Or,

\[
\frac{\alpha_s}{\sqrt{z_i}} = \frac{\beta_0}{\sqrt{z_i}} + \frac{\beta_1 r_i}{\sqrt{z_i}} + \frac{\beta_2 \ln A_i}{\sqrt{z_i}} + \frac{\beta_3 \ln S_i}{\sqrt{z_i}}
\]

The above regression gave very interesting results as we see below.

\[
\frac{\alpha_s}{\sqrt{z_i}} = 0.501 - 0.279 r_i - 0.119 \ln A_i + 0.126 \ln S_i \\
(2.193)(-5.857)(-11.889)(12.266)
\]

\( R^2 = 0.999 \quad DW = 1.72 \quad F = 998946 \)
In the above variant of model 4.2, the subscript \( z \) stands for the corrected value of the respective variable. As discussed above, the results are interesting because it reiterates the earlier relationship between the different explanatory variables and the dependent variable and the tests of significance indicate acceptance of the results at one per cent level. Hence, the correction for heteroskedasticity improves the efficiency of the model. As regards autocorrelation, the value of the Durbin-Watson statistic lies above the upper value at the 5 per cent level of significance, or, \( DW > D_u \). This means that there is no autocorrelation.

**Total Sales**

We now come to the classification according to sales. In this section, we shall try and examine how the level of profits and profitability of the different size groups are dependent on various factors like the composition and size of assets, rate of interest, volume of sales and whether there is an increase in profitability over time. Since similar models as the ones considered for the classification according to total net assets are being taken up, we shall retain the identification of the different models in terms of their numbering, only adding the letter 'S' to the numbers so as to help distinguish that it pertains to the sales classification.

**Model 18**

\[
\ln Prof = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S
\]

The results of the regression and the variants of this model are presented below with t-values in parentheses.
Model 1S.1:

\[ \ln Prof = -0.569 - 3.270r - 0.904\ln A + 1.758\ln S \]
\[ (-0.861) (-1.130) (-3.931) (8.979) \]

\[ R^2 = 0.985 \]

We notice that in the above model, the \( R^2 \) value is high and the t-values for \( \ln A \) and \( \ln S \) are significant at one per cent. However, for \( r \) it is not significant at even 10 per cent. To test whether this was due to heteroskedasticity, we decided to correct the data for the same and run the regressions for the corrected variables. The procedure that we followed is similar to that followed in the earlier model 4.2 above.

\[ z = \hat{e}^2 = -0.681 + 2.946r + 0.387\ln A - 0.352\ln S \]
\[ (-4.223) (4.171) (6.903) (-7.336) \]

\[ R^2 = 0.620 \quad DW = 1.191 \quad F = 24.99 \]

Since the \( R^2 \) value was satisfactory and the t-values were high, we decided to proceed to the next step in the correction for heteroskedasticity by using the residuals. Dividing all the terms on the left and right hand sides of the equation in model 1S.1 by \( \sqrt{z_i} \), we get:

\[
\frac{\ln Prof}{\sqrt{z_i}} = \frac{\beta_0}{\sqrt{z_i}} + \frac{\beta_1r_i}{\sqrt{z_i}} + \frac{\beta_2\ln A_i}{\sqrt{z_i}} + \frac{\beta_3\ln S_i}{\sqrt{z_i}}
\]

The results of the regression is given below.

\[ \frac{\ln Prof}{\sqrt{z_i}} = 0.123 - 5.222r - 1.112\ln A + 1.939\ln S \]
\[ (0.527) (-16.753) (-18.831) (34.707) \]

\[ R^2 = 0.999 \quad DW = 1.23 \quad F = 1059408. \]

As we can see, after correcting for heteroskedasticity, the \( R^2 \) values increase but more important, the t-values increase for all the coefficients except the constant. The interpretation of the
results are first of a strong negative relationship between the volume of profits on the one hand and the rate of interest and assets on the other. The positive relationship between volume of profits and sales is similar to that indicated in the assets classification. In the model corrected for heteroskedasticity, the rate of interest, sales and assets are all good explanatory variables for determining the level of profits, all of them being significant at 5 per cent level of confidence.

We now come to the second model in the sales classification. Here, instead of the volume of profits, we are looking at the ratio of gross profits to own funds (equity plus reserves). The basic model is:

Model 2S

\[ \pi_o = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S + \alpha_5 O.A \]

The variants in this model are:

Model 2S.1

\[ \begin{array}{c}
\pi_o = 0.677 - 1.106 OA - 0.310 r - 0.129 \ln A + 0.133 \ln S \\
(3.593) (-4.177) (-0.320) (-1.315) (1.627)
\end{array} \]

\[ R^2 = 0.783 \quad DW = 1.467 \quad F = 40.60 \]

Model 2S.2

\[ \begin{array}{c}
\pi_o = 0.632 - 1.061 OA - 0.130 \ln A + 0.133 \ln S \\
(5.077) (-4.770) (1.339) (1.627)
\end{array} \]

\[ R^2 = 0.783 \quad DW = 1.465 \quad F = 55.18 \]

The results indicate that the composition of own funds is a good explanatory variable for profitability with respect to own funds, the coefficient being significant at one per cent. However, the volume of sales and total net assets are significant at 5 per cent and 10 per cent respectively. The Durbin-Watson statistic assumes a value in the inconclusive intermediate
region between the upper and lower values at 5 per cent level of significance.

We tried to correct for heteroskedasticity, but the residual did not have any relationship with the variables. Both the $R^2$ value and the t-values were too low for acceptance. Hence we abandoned the attempt to correct for heteroskedasticity.

The negative co-efficient for the assets variable reiterate the fact that the volume of assets also do not help improve profitability of firms. Finally, the volume of sales have a positive impact on profitability with respect to own funds.

We now take up the question of profitability with respect to assets. The basic model for this is as follows:

Model 3S

$$\pi_a = \alpha_1 + \alpha_2 r + \alpha_3 \ln A + \alpha_4 \ln S + \alpha_5 OA$$

The variants in this model are:

Model 3S.1

$$\pi_a = -0.005 - 0.0005OA - 0.297r - 0.0225\ln A + 0.232\ln S$$
\[-0.126\] \(0.016\) \[-1.648\] \(-5.953\) \(6.044\)

$$R^2 = 0.510 \quad DW = 1.532 \quad F = 11.71$$

Model 3S.2

$$\pi_a = -0.005 - 0.296r - 0.225\ln A + 0.232\ln S$$
\[-0.160\] \(1.711\) \[-6.183\] \(6.282\)

$$R^2 = 0.510 \quad DW = 1.532 \quad F = 15.95$$

From the above results we notice that assets composition does not significantly influence the profitability of firms measured with respect to their total net assets. The t-value was quite low and hence we dropped the term. Assets and sales' co-efficients had negative and positive signs respectively and were
significant at 5 per cent level in all the variants.

The rate of interest was significant at only 10 per cent in the first variant. But after dropping OA, its significance improved to 5 per cent. This caused a very insignificant fall in the $R^2$ value. Our investigation into heteroskedasticity did not lead to conclusive results as the residuals were not related to the explanatory variables even after dropping each of the explanatory variables by turn. Hence we abandoned the correction exercise for heteroskedasticity.

Finally, we take up the question of profitability with respect to the volume of sales. The basic model for this is:

Model 4S

$$\pi_S = a_1 + a_2 r + a_3 \ln A + a_4 \ln S + a_5 OA$$

The variants in this model are:

Model 4S.1

$$\pi_S = 0.029 - 0.214 r + 0.00020 A - 0.074 \ln A + 0.079 \ln S$$

$$R^2 = 0.429 \quad DW = 1.516 \quad F = 8.438.$$  

Model 4S.2

$$\pi_S = 0.029 - 0.215 r - 0.074 \ln A + 0.079 \ln S$$

$$R^2 = 0.429 \quad DW = 1.516 \quad F = 11.50.$$  

In model 4S, we notice that the profitability with respect to sales is negatively related to the level of assets, and the volume of sales helps improve profitability with respect to sales. The composition of assets does not help improve profitability with respect to sales, the t-value being insignificant. Hence, we dropped the term and ran the regression for the remaining variables. This helped improve t-values with a
very insignificant fall in the $R^2$ value.

However, the $R^2$ value remains low. This means that the specification of the model is not complete or there are other factors influencing the regression model. Hence we decided to test for heteroskedasticity. The exercise is similar to the one done in Model 4.1 and 1S.2 the only difference being that both rate of interest and assets had to be dropped from the regression equation with the residual as the dependent variable.

$$
2 = e^2 = 0.0003 - 0.00021\ln S
$$

$(-4.707) (3.898)$

$R^2 = 0.240 \quad DW = 2.451 \quad F = 15.20$

The $R^2$ value was not satisfactory but the t-values were high and we decided to proceed to the next step in the correction for heteroskedasticity by using the residuals. Dividing all the terms on the left and right hand sides of the equation in model 4S.2 by $\sqrt{z_i}$, we get:

$$
\frac{\alpha_s}{\sqrt{z_i}} = \frac{\beta_0}{\sqrt{z_i}} + \frac{\beta_1 r_i}{\sqrt{z_i}} + \frac{\beta_2 \ln A_i}{\sqrt{z_i}} + \frac{\beta_3 \ln S_i}{\sqrt{z_i}}
$$

The results of the regression is given below.

$$
\frac{\alpha_s}{\sqrt{z_i}} = 0.501 - 0.279r_i - 0.119\ln A_i + 0.126\ln S_i
$$

$(2.173) (-5.858) (-11.889) (12.226)$

$R^2 = 0.999 \quad DW = 1.723 \quad F = 998976.$

As we can see, after correcting for heteroskedasticity, the $R^2$ values increase but more important, the t-values increase for all the coefficients including the constant. The interpretation of the results are first of a strong negative relationship between the profitability with respect to sales on the one hand and the
rate of interest and assets on the other. The positive relationship between volume of profits and sales is similar to that indicated in the assets classification. In the model corrected for heteroskedasticity, the rate of interest, sales and assets are all good explanatory variables for determining the level of profits, all of them being significant at 5 per cent level of confidence.

The one aspect that has been more or less clearly established in the above exercise is that there is a certain element of consistency as to the behaviour of the variables. Specially, the impact of explanatory variables like assets, sales and rate of interest are quite consistent in all the variants of the models. However, the behaviour of the composition of assets is not. It has been observed that the composition of assets has a negative coefficient in some models and a positive coefficient in others. The other problem with this variable is that it has not been significant in a substantial number of models and had to be dropped from the equations.

An analysis of the results

What are the findings in both the assets and sales' classifications? In more general terms, it can be said that the common findings are that of the negative influence of the level of total net assets on the level of profits and profitability of the firm, the positive impact of the level of sales on the same and the negative relationship that the rate of interest bears with the levels of profits and profitability. In a substantial majority of the models and variants, the t-values for all these variables were significant. The composition of assets has been
significant only in the case of profitability with respect to own funds, the coefficient being negative. Which means that the higher the proportion of own funds in total net assets, the lower will be the returns on own funds.

Taking up total net assets first, we notice that this is negatively associated with both the level of profits and also profitability, with respect to own funds, assets and sales. If true, this has an important bearing on policy prescriptions. Monopolies, as generally understood in India, refer to those companies whose total net assets exceed a certain threshold limit or those which belong to a larger group through inter-corporate linkages. Public policy has been directed towards controlling the expansion of these companies since it is perceived that these companies will be in a position to squeeze the market through unfair pricing and marketing tactics since they are large and are able to influence the market. The other objective of public policy is apparently based on egalitarianism, by way of which, economic agents who control a large part of the resource base of the economy, are in a position to divert resources to non-priority areas which yield higher rates of return but which do not fit in with the desirable socio-economic requirements for rapid development of the economy. However, our results show that as the size of total net assets increase, it has a negative influence on the level of profits and profitability. It also emerges from the regression results that the level of total net assets has a negative impact on the level of mark-up in sales, as defined by the gross profits to sales ratio. In that sense, it
may be said that the larger firms, as defined by the size of total net assets, have not used their size and monopoly position to obtain an unfair advantage in terms of pricing by way of higher mark-ups.

However, this is only a part of the reasoning. The more pertinent question is how come big firms do not use their clout and position in the market to maximise their gains through an appropriate pricing strategy. This appears to be counterintuitive. The more likely reason for this negative relationship between the level of total net assets and the level of profits and profitability lies in the financial and accounting practices of firms. The database does not provide an answer but it is possible to advance some hypotheses.

First, it is quite conceivable that with the asset base growing, a larger proportion of the assets are oriented towards non-productive purposes rather than for enhancing the productive requirements of the firm. Second, it is plausible that some pricing and quantity restrictions operate on the larger firms, which fall under the purview of the Monopoly and Restrictive Trading Practices Act (MRTP Act), and which may have inhibited higher mark-ups. Finally, there is also a possibility that since many of these large firms are likely to be much older than the smaller firms, the book value of a substantial portion of their capital assets must have been fully written off. Thus, a larger portion of the mark-up may be going towards net profits rather than on depreciation. Since we have also not considered the age factor, several older and large firms, whose assets must have been fully depreciated, are not represented in the larger firm.
category, which they should be, if the current market value of their assets is considered.

Consider also the profitability profile of the firms. A firm which is highly profitable will tend to take full advantage of the depreciation provisions allowed under tax laws. Firms which are not so profitable will tend to stagger their depreciation provisions over a larger number of years. This means that the book value of the assets of highly profitable firms are far lower than their actual worth vis-a-vis the book value of not-so-profitable firms.

Another factor that may have brought about a negative relationship between profits, including profitability, and assets is that most large companies have substantial inter-corporate linkages in the form of holding companies, subsidiaries and so on. In order to minimise the tax burden, not for the individual company but for the entire corporate group as such, companies do resort to practices like transferring profits to the lesser profitable companies within the group through a system of transfer pricing. This practice is likely to be more rampant in the older companies who have substantial inter-corporate holdings. Since the database we have is companywise, this practice of transferring profits is not reflected in the information at hand. These are hypothetical reasons and not substantiated by data. It may be useful to go into the nature of the assets of each firm, but that is in itself a gigantic task and beyond the scope of this study.

As to the reason why the level of sales has a positive
impact on the level of profits and profitability, this may be related to the pricing policy of the firms. Since, the firms that constitute the database for this study are medium and large public limited companies, it is most likely that a majority of them are price makers. And their profitability is related to their pricing policy. That is, it is quite likely that in a majority of the cases, pricing decisions are based on a break-even point for profits at a certain level of capacity utilisation. Once, the capacity utilisation goes beyond this limit, the level of profits and profitability tend to go up quite sharply. In Model 1 and Model 1S, we notice that the co-efficient of sales is above unity. Which means that if there is a one per cent improvement in the level of sales, the level of profitability goes up by a factor more than one. Or in other words, the marginal rate of profitability with respect to sales is quite high.

There are some questions, which we do not propose to answer, but they, nevertheless, need to be raised. First, there is a general perception that in India, given the restrictive policy on industrial licensing that operated in this period, especially capacity licensing, the profitability of firms has suffered over time. It is not possible to determine whether there has been any restriction on capacity expansion of the firms in the data base considered, but as regards profitability, our analysis shows that there has been no perceptible adverse impact on corporate profitability. In fact, corporate profitability has improved in this time period. This again may be due to a multiplicity of factors, none of which can be substantiated by our data. First,
it is quite conceivable that many of the firms have effectively not been under capacity restrictions. This is not to suggest that the scope of capacity licensing has been very narrow, but that the actual implementation of the policy may have been rather weak. Various studies on the behaviour of Indian monopolies suggest that breaking capacity restrictions and having the same ratified later has been a standard practice of most large firms.

Second, in the case of those firms, which were unable to break capacity restrictions, the pricing mechanism may have been used to achieve the same results, i.e., higher levels of turnover or sales. Prices are hiked ostensibly to cover higher costs of production, but more so, to generate higher levels of profits in a protected market. This was possible even in a situation where there were more than one firm in the market, by creation of cartels. The case of the automobile industry in this period is an oft-cited one, with the dominant car producer, Hindustan Motors, assuming the role of price leader and the others following suit. The tyre industry is another, but here the principle is not that of price leaders but informal cartel arrangements, whereby the dominant producers get together and determine market sharing and pricing strategy for the industry. Therefore, even if capacity restrictions did exist, which it did in the case of the automobile industry, there were few pricing restrictions. Hence, with prices going up, it is possible that the total value of sales too will rise, even if no physical addition to production and sales takes place.

In the earlier chapter, we had seen how the larger firms
had larger levels of own funds relative to total net assets. While this helps in insulating the firms from reduced access to borrowed funds, our analysis shows that it does not help in improving profitability. With a larger proportion of own funds in total net assets, its profitability with respect to own funds declines. This is perhaps due to the fact that the firms do not have adequate investment opportunities and use accumulated reserves as a substitute for borrowed funds. This leads to firms building up larger amounts of reserves which they can then use for investment purposes (buying securities or equity in other companies). While from the aggregate data it is not possible to draw inferences as to the reasons for such a behaviour, this is probably due to capacity licensing or restrictive industrial licensing policy. Under such a policy regime, it is not possible for firms to expand capacity automatically, and a whole host of approvals are required. While, as noted in earlier chapters, this has not prevented bigger firms from expanding, there are delays and lags between the need to expand or diversify and the time when the government actually approves it. In the meanwhile, the reserves keep accumulating, for which they have few profitable outlets. As a result the profitability of those firms which have accumulated a vast amount of reserves have suffered, especially when measured with respect to own funds.

In the next chapter, we use the corporate data and simulate for changes in access to bank credit and the rate of interest. We shall try and see how corporate behaviour gets affected because of such changes. The objective is to isolate factors responsible for differential rates of growth in the corporate sector.