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Foreword

by

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This is the fourth paper to be published in the series that are being prepared under the auspices of the RBI Endowment Chair at the Centre for Studies in Social Sciences, Calcutta. The aim of the series has been to understand both the movements of important variables in the Indian stock market and their relation to changes in the real economy. In this particular case, the author has sought to illuminate the changes and trends in the structure of electronics firms in the wake of the liberalisation measures adopted in 1990-91. The paper also throws light on the relative importance of scale and other relevant variables in determining capital market strategies adopted by the firms.

Electronics Industry in India : Profitability and Growth, 1990-94

Abstract

In this paper* we have examined the trends in growth and profitability of firms in the electronics industry in India. Initially an attempt has been made to analyse inter-firm variation in profitability of firms by looking into various firm-specific structural variables and also some elements of market structure. Finally an attempt has been made to analyse growth and profitability by classifying the firms in different ways so as to identify varying elements of growth and profitability in different groups. For this purpose Marris' hypothesis about linkages and trade-offs between growth and profitability has been used. In this connection strategies of firms with regard to declaration of dividend raising capital in the primary market and borrowings from commercial banks and other financial institutions have also been scrutinised.

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1. Introduction.

One of the major issues in industrial economics is what explains inter-firm differences in performance. Traditional theories of farm behaviour have tried to explain the performance of firms as indicated by profitability in terms of the elements of market structure. There is an abundance of hypotheses about what actually constitutes the market structure. One tradition assumes market share of different firms to be the crucial factor of market structure. This was pioneered by Chamberlin's (1931) concept of group behaviour.It was then followed by Bain's theory of barriers to new competition in the 1950s and theories of firm size and advertising of the 1960s. The importance of the size structure of firms and the market in which they operate has been analysed by many researchers such as Marcus(1969), Hay & Morris (1979) Shepherd (1972), Ravenscraft (1983), Baumol (1967) and so on.

It has been argued by critics of structure-function approach that the relative importance of the various factors and their interrelationships has not been clearly specified in that approach while explaining profitability. Early empirical analysis of the structure-profitability relationships has mainly relied on partial tests relating one or two structural variables, say, size of the firm or advertising to performance as we find in Baumol's (1967) analysis of size and profitability. However, in our analysis of profitability we have emphasized the interrelationships among various firm-specific structural variables, and a few elements of market structure so as to determine the main determinants of

growth and profitability.

We have chosen the electronics industry for this study because it has emerged as a modern, growth-oriented and well-diversified industry in our country as in many other countries in the world. With wider application of electronics in different spheres of activities mainly in industrial activities the development of various segments of the economy has gradually become dependent on the development of the electronics industry. It has introduced sophisticated technologies (product as well as process) in other industries and contributed to their productivity and growth.

Since the electronics industry has diversified in various lines of production ranging from consumer electronics to defence equipments it is likely that there would be a wide variety of firms operating in the industry. Depending on the scale of operation there are large as well as small firms with varying characteristics. Also we have labour-intensive as well as capital-intensive firms. All these facts are likely to be reflected in the performance of the firms. From early days domestic firms have had to compete with foreign firms. The last six years have witnessed major changes in industrial and fiscal policies. A highly regulated regime of industrial licensing, phased manufacturing program me of approvals and capacity constraints has been replaced by a more liberal and supposedly more competitive environment. Has there taken place any significant change in the performance of the firms in post-liberalisation period ? If so, what are those changes? We have tried to answer these questions also. We have initially carried out some analysis on

the profitability of the firms and its interactions with other variables by taking the entire sample of firms.

Secondly,The macro level study of the growth performance of the electronics industry in India by many researchers such as Joseph (1995) has shown that in the early 1980s it has registered impressive growth with the highest growth being recorded in consumer electronics (around 40%) . However, since late 1980s there was deceleration in growth of electronics industry and this continued upto the first two years of the early 1990s with a very low rate of growth in certain major product groups. These studies have focused on production performance of the different segments of the industry.

However, we will try to analyse the growth and profitability of industrial firms keeping in mind the heterogeneous characteristics of the firms in the electronics industry. In our study we have tried to explore whether the firms in any particular segment performed better in terms of profitability and growth than any other segments and at the same time ,whether there exists any interdependence across different segments through linkage effects. With this objective we have classified the firms on the basis of some suitable size measure (Net fixed asset) and also on the basis of the major products that the firms produced during the five year period from 1990-91 to 1994-95. We have looked into the pattern of growth and profitability in different groups in order to identify the varying elements of growth and profitability in different groups.

Thirdly, we would expect that in the post-liberalisation period there would be increasing

competition among the firms to raise their market share. Here,we have used Marris (1963) theory for providing the hypothesis to be tested. In this theory concepts of demand for growth and supply of growth play an important role in influencing growth and profitability of the firms.

2. Description of Data.

The basic data that have been used in our study relate to a panel of 61 companies of the electronics industry in India which are listed at the Bombay stock exchange. All the relevant financial data relating to the functioning of the companies have been compiled from the CIMM package supplied by the Centre for Monitoring Indian Economy which in turn compiles data from the Bombay Stock Exchange official directories. For the purposes of our study we have considered five consecutive years starting from 1990-91 to 1994-95 and the financial data for the 61 companies in the panel are available for all the five years under consideration In the appendix we have listed the names of the companies under consideration.

Since this is a cross-sectional study of the Indian firms in the manufacturing sector, there is an inherent problem of heterogeneity in the data. First, the sizes of the firms differ with respect to sales and assets. Some firms are very small while some others are large in terms of sales or assets. Secondly, the electronics industry is characterized by strong diversification in respect of products. So the usual problem of heteroscedasticity is likely to cause problems while estimating the regression

equations.In order to guard against this problem we have normalized all the relevant financial variables by deflating them by measures of size (mainly sales or net fixed assets, or total assets) before carrying out the regression analysis. In order to minimize problems arising out of product heterogeneity we have classified the firms under different headings according to their lines of production e.g. consumer electronics, industrial electronics etc. and carried out the performance analysis of the firms separately for different groups.

In accordance with the methodology used in the previous studies we have made use of the the following indices for converting the variables at constant prices(1980-81=100):

(i) The wholesale price index of electronics goods for deflating sales.

(ii) The consumer price index for deflating net profit, dividend, etc.

(iii) The price index for gross fixed capital formation for deflating gross fixed asset, net fixed asset, the change of these assets.

(iv) The deflator for inventories for deflating working capital, change in inventories etc.

The above mentioned deflators have been collected from the following sources.

(a) Report on Currency and Finance published by the Reserve Bank of India.

(b) National Accounts Statistics published by Central Statistical Organisation(CSO).

(c) Economic Intelligence Service published by Centre For Monitoring Indian Economy.

(d) Economic Survey published by the Government of India.

This paper has been broadly divided into two sections. In the next section we have analysed, the profitability performance of the electronics industry in India. Within this section we have three sub-sections .In subsection 3a we have presented a summary of average values of some important financial variables as well as important financial ratios relating to the working of the electronics industry in India. In sub-section 3b we have analysed the degree of association between the key financial variables and the important financial ratios by using non-parametric methods. In sub-section 3c we have presented an analysis of the interrelationships among the relevant variables explaining profitability of firms, by using regression methods.

In section 4 we have carried out an analysis of relation between growth and profitability of firms, by classifying the firms in different ways. In this connection we have employed Marris (1963) managerial framework for this disaggregated analysis. In last section we have summed up the previous sections.

3.a **Movements of averages of important financial variables in the electronics industry.**

In this section we have presented a brief summary of the movement of the average values of some important financial variables and some important financial ratios during the five year period starting from 1990-91 to 1994-95. The variables considered are

sales, net profit, interest paid, dividend declared, gross value added (GVA), total borrowing, borrowing from financial institutions, taxes, values of gross fixed assets (GFA) and net fixed assets (NFA), advertising expenditures, value of all assets, value of inventories, short- term borrowing, net worth, equity capital, debentures and retained profit, working capital, excise tax paid , value of inventories of raw materials, and of finished goods. Table 1.1 in the appendix reveals that most of the variables have an increasing tendency over the years. Sales, equity and dividend on an average increased over the five year period. But the rate of growth is not very high. The maximum year-to-year growth in sales was recorded during the period from 1992-93 to 1993-94 (13.89%). Net profit increased smoothly in the first three years (1990-91 to 1992-93). However it decreased slightly in 1993-94 to increase again in 1994-95. In fact net profit increased fastest (at 63.64 %) between 1993-94 and 1994-95. There has been a moderate increase in advertisement expenditure during the period from 1990-91 to 1993-94, the maximum rate of annual growth in advertisement expenditure occured in the year 1994-95 (around 80%) compared to the year 1993-94.

The importance of borrowed capital, particularly the long-term fund obtained from financial institutions and also funds raised through debentures, decreased over the period. We have found that during the period 1990-91 to 1992-93 debenture has substantially decreased followed by an an increase in 1993-94. However, in 1994-95 it has again decreased from (3.25 to 2.72). Institutional borrowing on the other hand has been found to increase moderately in the first four years. However,

it has decreased in 1994-95.

Table 1.2 shows the average of some important financial ratios relating to the operations of firms in the electronics industry in India. The share of institutional borrowing in total borrowing decreased from .2407 to .2093 between the period 1993-94 and 1994-95. In case of debentures we observe a similar trend. On the other hand the proportion of equity capital in total assets has shown a smooth increasing tendency during the entire five year period.It has increased from .14670 to .27186 between 1990-91 and 1994-95.This implies that firms increasingly resorted to the stock market rather than to banks and other financial institutions, for raising capital.

Rate of return on sales has been found to be negative in 1990-91 followed by an increase in 1991-92.Then it decreases in the following two years.However,in 1994-95 it again increases.Return on total assets was poor in 1990-91.It increased in the next two years but in 1993-94 it drastically declined. Thus during the period 1992-93 to 1993-94 we observe a sluggishness in profitability performance both in absolute terms as well as in relation to total assets. Looking at the excise-tax burden borne by the firms we find that maximum increase has been during the first three years (1990-91 to 1992-93). It was around 36 % during 1990-91 and 1991-92 and around 20 % during 1991-92 and 1992-93. However, in the following years the excise burden came down substantially Further looking at the excise burden on the different segments of the electronics industry (e.g. consumer electronics, industrial electronics, components and communications) we find that except in the

components segment of the electronics industry all other segments are subject to an increasing tendency of the excise burden. Only in the components segment we find that since 1992-93 there is a declining tendency of the excise following period. This has its reflection on the profitability performance in the following periods.We, however, find that the Government of India in its Budget 1993-94 announced relief in customs and excise duties which greatly assisted the various segments of the electronics industry particularly the consumer electronics sector producing television, vcr, vcps etc (ECONOMIC SURVEY,1994-95) This has its reflection in the performance of the following year 1994-95. We also find a decrease in tax burden in 1994-95.

3b.Testing for association between key financial variables.

In this part of our analysis we have examined the degree of association between different financial variables as well as financial ratios with the objective of finding out the main determinants of company performance. We have also tried to assess whether the degree of association between the variables has changed over the years We have carried this exercise for each of the five year separately in a non-parametric environment.We have used Spearman's rank correlation coefficient between the two variables for each year. Here our null hypothesis is that two variables are independent.We want to test H0: $r=0$ against H1: $r \neq 0$, where r is the Spearman's rank correlation coefficient between two variables. The statistic used for this purpose can be written as $t= r\sqrt{n-2}/\sqrt{1-r2}$ where n =sample size. In our case, in

each year n = 61. We are interested in those cases in which the null hypothesis of zero correlation is rejected. Tables 2.1- 2.5 shows the rank correlations between different variables for each of the five year We observe from the tables that rank correlation between net profit and dividend is strongly positive and hence the null hypothesis rejected in all the years under consideration. Thus higher profits encourage the firms to declare more dividends.The rank correlation values between net profit and gross fixed assets(GFA), total assets, working capital and net worth are also high. Noticeably we have increasing values of rank correlation between net profit and net worth This partly explains the robust rank correlation between net profit and dividend. As expected short term bank-borrowing is found to have a moderately high rank correlation with working capital.Except in the years 1990-91 and 1991-92, the rank correlation between net profit and short term bank borrowing and also that between net profit and institutional borrowing are moderately high. The null hypothesis is rejected in all the years except in 1990-91 and 1991-92. In the first two years rank correlation between net profit and short-term borrowing is found to be very low and institutional borrowing is found to have negative rank correlation.

The GFA is found to have high rank correlation with institutional borrowing and null hypothesis is rejected in all the years.Institutional credit, thus appears to be an important determinant of fixed capital formation as well as working capital. Thus we find that despite the growth of the capital market, firms are still dependent on external borrowing from either banks or financial institutions for raising their necessary

funds for working capital and capital formation However, we also find high values of rank correlation between GFA and net worth in all the years. In all the years the rank correlation between net worth and total assets is found to very high (around 0.85) As expected, values of rank correlation between dividend and net worth are positive and we have already found robust rank correlation between net profit and dividend as also net profit and net worth. With an active stock market in a world of asymmetric information the dividend rate acts as signaling device between the manager of a company and its shareholders and conveys significant information regarding the current state and the future prospects of the company.

Thus we observe that most of the values of rank correlation between different financial variables have signs predicted by economic theory, and that most of the rank correlations between different financial variables are mutually consistent.

We observe from Tables 2.1a to 2.5e that a moderately high rank correlation obtained between rate of return on total assets on the one hand and return on net fixed assets on the other in all the years. The rate of return on total assets is also found to have moderately high correlation with the ratio of net worth to total assets. The ratio of institutional borrowing to total assets has, however, a weak and negative correlation with either return on total assets or return on net fixed assets. This implies that a high share of external borrowing adversely affects the profitability of the firms.We have robust rank correlation between current ratio on the one hand and rate of return on total assets which implies that current assets forms an important

fraction of total assets. However, in 1994-95 the rank correlation decreases to 35 from around .58 in 1993-94. We have also found that the debt-equity ratio has a negative rank correlation with both the return on total asset and return on net fixed assets.

3c. Methodology and models of regression.

In the previous section we analysed the interrelationships between different financial variables by using non-parametric methods with the objective of finding out the factors determining or being determined by a company's performance. In order to explore the appropriate exact functional relationships between or among the variables we have carried out a regression analysis following the ordinary least squares (OLS). Checks have been made to guard against the possibilities of various problems such as multicollinearity and heteroscedasticity.The problem of multicollinearity has been sought to be minimized by leaving some of the relevant variables out of any single regression equation where it is suspected that the said variables are correlated with one another. Thus the number of equations used for estimating the models is large. In order to minimize errors out of the problem of heteroscedasticity, we have deflated all the relevant variables by some size measures. We have used sales, NFA and total assets as the deflators.

We have specified the following regression equations for the purposes of analysing the performance of the firms. The relationships posited are generally consistent with the findings of

previous theoretical and empirical structure-profitability relationships.The analysis is based on simple linear models.Profitability as measured by net profit has been considered as the endogenous variable which is determined by several other factors.We have also considered some other variables as endogenously determined such as dividend, NFA etc. We have considered the following regression equations :-

(i) $P = a_0 + a_1$ size $+a_2$ vi $+ a_3 (p_1/p_2) + a_4$ ms $+a_5$adv$+a_6$sb$+a_7$ib$+a_8$nw$+a_9$wc$+u_1$

(ii) NFA $= b_0 + b_1$ size $+b_3$ sb $+b_4$ lb $+ b_5 P + u_2$

(iii) DVD $= c_0 + c_1$ size $+ c_2 (p_1/p_2)\ c_3 P + u_3$

(iv) SALES $= d_0 + d_1$ size $+ d_2$ sb $+ d_3 P + d_4 (p_1/p_2) + u_4$

(v) WC $= e_0 + e_1$ size $+ e_2$ sb $+ e_3 P + e_3$ sales $+ u_5$

where P =net profit ; NFA =Net fixed asset ; sb = short-term borrowing ; ms = market share ; lb =long-term borrowing ; p_1/p_2 = ratio of whole sale price index of electronics to GDP deflator ; size =sales /NFA /total asset ; vi =vertical integration as measured by ratio of value added to sales ; adv =advertising expenditure ; DVD =dividend ; wc =working capital

Regression results

Regression tables reveal that the variation in net profit is suitably explained by the size of the firm as measured by the value of sales, relative price, and value added (Table 3.1 in appendix).Size is found to be significant in all the regressions.

Results indicate that 1 % increase in sales result in increase in profitability to the extent of 0.35 to .0.79 %. So alternatively if profit is to be increased by 1 % sales are required to increased by more than 2%. This implies that firms with small sales are not particularly profitable. The role of size in explaining profitability is a complex one. Baumol (1967) hypothesized a positive relationship between firm size and profitability providing the argument that large firms in terms of their sales have an advantage over smaller firms in the sense that the large firms can enter into all the product lines that the smaller firms enter but not the other way round.These hypothesis is also supported by Hall and Weiss (1967), Shepherd (1972) and Marcus (1967). This is in conformity with the results we obtain with respect to the firms in the electronics industry in India. However, in the following section where we have carried out the profitability analysis in a disaggregated fashion by classifying the firms, we have found that that size in terms of sales is negatively correlated with profit. This paradoxical result is explained by economies of scale, and economies of scope in finance, marketing etc. There are economies of scale when per unit cost of production can be reduced by increasing the size of the firm irrespective of whether the firm diversifies or not. Economies of scope, on the other hand , arises when it is less costly to produce two or more products in one firm than to produce them separetely .The above definition of economies of scope precisely characterizes the condition which leads to the formation of multi-product firms (Panzar and Willig, 1981). Positive effect of size on profitability when electronics industry is taken as

whole is obviously due to the presence of economies of scope arising from heterogeneous characteristics of the firms. It is suggested in literature that origin of multi-product firms is the opportunity to exploit some type of excess capacity and it is the large firms which can exploit this advantage. However, negative size-effect in individual product groups (e.g. consumer electronics, industrial electronics etc.) is neither due to economies of scope nor economies of scale. It only implies diseconomies of scale.

Results indicate that firms which are more vertically integrated are able to exploit internalization advantages and thus earn more profits. We obtain very high and significant,positive coefficient of vertical integration as regressed on profitability. As some segments of the electronics industry particularly consumer electronics are very much dependent on outside supply for components, this might be the case that firms producing consumer electronics goods are arranging the production of those components which were otherwise purchased from outside market. In the next section we have found that vertical integration is positively correlated with profitability in all the different segments of the electronics industry in India. In this context we have also tried to find out the relation between size of the firms and vertical. On the whole it is found that size of the firms measured in terms of sales is highly correlated with vertical integration It is around 0.91. However, we have also tried this exercise separetely for different segments of the electronics industry and we have found that the correlation between size and vertical integration is above 0.90 in all the cases. Graphically this also

supports this phenomenon as we have found that over the years there is a clear increasing tendency of vertical integration. So what can be argued is that large size of the firms in general,motivates them to exploit the advantages of vertical integration.

Advertising expenditure in relation to sales is found to have a significant but negative coefficient in explaining profitability. Firms allocated much less under advertising in 1990-91 as compared to that in other years and in that year there was virtually no relation between advertising and profitability. Except in 1990-91 in all the remaining years the coefficient of advertisement expenditure is found to be significant but negative. In this connection we also found that in 1990-91 the coefficient of market share is negative as well as insignificant in the same regression where we also include advertising expenditure. This clearly implies that efforts of the firms to grab the market in pursuit of higher profitability did not turnout to be fruitful always. However,considering the entire sample we find that market share has a significant and positive coefficient This has the implication that the dominant firms in the industry through their higher market share in terms of sales earn more profits than firms with lower market share.

Looking at the correlations between different variables, we find that change in net fixed asset is significantly correlated with change in institutional borrowing. A positive link between ANFA and change in institutional borrowing implies that the flow of term loans significantly supports the level of fixed capital formation which in turn significantly affects profitability. As per expectation we find a positive

and significant coefficient of net profit while regressed on NFA. Dividends are found to be positively associated with sales.

In table 3.2 we have presented the regression results when the variables are deflated by NFA. We found that size of the firm as measured by sales is inversely related to relative price as measured by the ratio of wholesale price index of electronics goods to price index of GDP. Sales are also found to be correlated significantly with short-term borrowing ;the firms finance at least a part of their working capital requirements through short-term loans.Large size of the firms in terms of higher sales enable them to get easy access to bank credit. Working capital is again found to be significantly related to short term borrowing.

For the dividend series the value of sales turned out to be positive and significant as before but net profit is found to have positive but insignificant coefficient in explaining dividend. This may be due to the fact that firms retain a large part of their profit rather than distribute it to its share-holders in the form of dividend. Retained profit is an important source source of internal finance particularly when external funds are costly. Moreover, we have evidence that firms in our sample are vertically integrated and in that case it serves useful purposes. Positive and significant coefficient of sales in explaining dividend has the possible implication that firms are more interested in increasing their productive capacity and give dividend only when sales increases.

When variables are deflated by total assets (table 3.3), net worth is found to have significant coefficient when regressed on profitability. Size as

before has a significant and positive coefficient. However,in all the regressions the values of R2 as well as$\bar{R}$2 are low. Short term borrowing is found to be significant in two regressions. Institutional borrowing is also found to have a significant and positive coefficient. Thus funds from stock market act as complements rather than strong substitutes for institutional borrowing.

Clubbing together the results from different deflated series we find that the effect of size is significant and positive in all the regressions. Dividends series seem to be mainly related to sales.The coefficient of net profit on dividend is positive but insignificant. In case where variables are deflated by sales dividend is found to be positively and significantly related to relative price. Higher commodity prices relative to prices of raw materials leads to higher profit margin to the firms. Turning to the different components of borrowed capital we have found that only in case where variables are deflated by total assets, short- term bank borrowing and institutional borrowing have significant and positive coefficients in relation to profitability. This has the possible implication that borrowed capital are productively used by the firms in order to increase the profit margin. However, results with the NFA as size deflator indicate that it is the sales which is significantly related to short -term borrowing. Using sales as deflator it is found that NFA is significantly related to institutional borrowing. Working capital in all these cases are significantly related to short -term borrowing. Thus using different size

deflators we have different effects of borrowed capital

We have also carried out the regression analysis of profitability of the firms without deflating the relevant variables. Table 3.4 shows the regression results when the variables are not deflated. Except in some cases we have more or less the similar results. Size effect or market share effect is found to have same positive and significant coefficient explaining profitability. However, coefficients are found to have relatively greater values in this case than that in the deflated series.

4. Growth and profitability analysis of different segments of electronics industry in India.

In this section we have considered both growth and profitability as performance indicators of the firms. By growth, we mean growth in sales of the firms over the five year period starting from 1990-91 to 1994-95. We have classified the firms into groups in two different ways. First, the firms have been classified on the basis of major products produced. By computing and comparing the proportions of sales of each product in total sales of a firm we have decided whether a particular firm belongs to the segment of (a) consumer electronics (b) industrial electronics, (c) components, (d) computers or (e) communication equipments - five groups in all. We have 12 firms in the consumer electronics sector, 16 firms in the industrial electronics, 17 firms in the components sector, 9 firms in the computer sector and 6 firms in the communication & equipment sector. Secondly, we have classified the firms into size groups by using NFA as a size measure. We have 4 groups in this respect - (i) very small, (ii) small,

(iii) medium and (iv) large. The following table gives the clear description of the number of firms in each category in each year.

	90	91	92	93	94	95
X[1] < Rs.3 crs.	16	15	11	11	11	12
3 ≤ X<20 crs	31	30	33	32	32	27
20≤ X<100crs	10	13	11	11	11	5
X≥ 100crs	4	3	6	7	7	7
	61	61	61	61	61	61

We have considered for our analysis only those firms for which we have data in all the years. Thus we have 11 firms in the very small category, 22 firms in the small category and 7 firms in the medium category. We have only 2 firms in the large category as defined. However, we have observed that number of firms in a particular category does not remain the same over the years because the firms change their ranks from say, being very small category to becoming small as defined by us.

We have found that 6 firms in the very small category have changed their rank and have been graduated to small category. Eight firms have changed their status from small category to the medium and only three firms have attained the status of the large firms over the years from medium category. Most of these changes in ranks took place during the period from 1992-93 to 1994-9. In order

[1] X denotes net fixed assets of firms in crores

to assess that whether graduation from the very small to small or from small to medium indicates the result of successful competitive struggles in the market, we calculated the changing market shares of firms. Increasing market shares of firms along with the increase in size implies that there is the potential for further expansion. It is found that in the case of both very small firms which have graduated to small category and small firms which have graduated to medium category, market share increases in most of the cases. We also found that during the period 1992-93 to 1994-95 the market share of the large firms declined. The purpose of all such classifications, is to carry out the growth and profitability analysis of each group separately in order to pinpoint differential factors responsible for growth and profitability. In previous section we have carried out the profitability analysis of firms in general but did not consider the growth factors. In this section we have considered growth and profitability as two performance indicators. Consideration of growth along with profitability becomes more relevant when we look at the performance of individual groups of firms. Electronics industry is characterized by a wide variety of firms and this kind of disaggregated analysis is likely to give further insight regarding the performance of firms.

For the purposes of this disaggregated analysis we have employed Marris' (1963) theory. In this theory an equilibrium between growth and profitability was supposed to result from an equalisation of factors determining the demand for growth (DG) and supply of growth (SG).(for details

see appendix) In Marris demand for growth is largely affected by successful diversification However, we have not directly measured diversification by standard Herfindahl-Hirschman type diversification index. Rather we have identified those factors which affect diversification and thus cause the firms to go to a higher DG curve. Hay & Morris (1991) suggest that the following variables could shift DG curve:

(i) Size of the firm. (ii)Industry where the firms operate. (iii) the level of innovative activity. (iv) Marketing skill. Sidharthan & Lall (1994) found R & D expenditures and advertising expenditures as important in explaining growth of large US manufacturing firms. We have considered some of these factors in our analysis. Initially Marris considered the supply rate of growth to be fixed and allowed shifts in demand for growth curve But given the facts that the government and financial institutions play a vital role in the credit market, the supply rate of growth (SG) function cannot be the same for all firms. Moreover, the financial ratios differ across the firms. So we have considered the shifts in SG curve along with the shift in DG curve. Sidharthan (1994) considers those factors which causes shift in supply of growth along with the demand for growth factors.

We have linearised the original Marris model for purposes of empirical testing . We want to examine whether there exist inter-firm differences in growth and profitability performance of firms belonging to different groups, the reasons for these difference when they are significant. To put it differently, why do some firms belonging to a particular group grow faster and enjoy higher profits to those in other size-groups ?.

Inter-firm variation in profit is supposed to be affected by those variables which causes shift in DG and SG curves. The factors causing such shifts except growth have been treated as predetermined variables. Inter- firm variation in growth rate would depend on some factors in addition to those discussed above. such as fixed investment, inventory investment and profit. Fixed investment is supposed to depend on age of the firm, investment of the previous period profit and external fund. Inventory investment would depend on profit, inventory -sales ratio, vertical integration and external fund. External fund again is supposed to be depend on size of the firm, age of the firm, vertical integration etc. Finally dividend is assumed to depend on dividend of the previous period, profit and growth in sales. By considering fixed investment, inventory investment, external fund and dividend as endogenously determined along with profit and growth in sales we have tried to separate out the factors which affect demand rate of growth and supply rate of growth which contribute to differential growth and profitability.

Models of regression

Here we have estimated the following regression nquations separetely for different groups :-

(i) $PR = a_0 + a_1 \log size + a_2 G + a_3 VI + a_4 age + a_5 AD + u_1$

(ii) $G = b_0 + b_1 \log size + b_3 VI + b_4 PR + b_5 AD\ b_6 age + u_2$

(iii) $IF = c_0 + c_1 IF_{-1} + c_2 PR + c_3 age + c_4 EF + u_3$

(iv) $INV = d_0 + d_1 PR + d_2 INS + d_3 VI + d_4 EF + U_4$

(v) $EF = e_0 + e_1 \log size\ e_2 age + e_3 VI + e_4 PR + u_5$

(vi) $DVD = m_0 + m_1 PR + m_2 DVD_{-1} + m_3 G + u_6$

PR = gross profit as % of total assets
G = % rate of growth of sales
Size = size in terms of sales
AD = Advertising expenditure as a % of sales
VI = vertical integration as measured by value added /sales
DVD = dividend paid to the shareholders as a % of sales.
EF = external funds from all types of borrowing as a ratio of sales
Age = age of the firm expressed as a ratio of depreciation reserves to gross fixed assets
INS = inventory - sales ratio.
IF = investment in fixed asset
INV = investment in inventory

Results.

Tables (see tables 4.1-4.8 in appendix)indicate that size of the firm is negatively related to profit but have a significant coefficient in all the sub-sectors except in computer (as far as product classification is concerned). However, in the previous section size has a positive and significant coefficient in explaining profitability. where all the firms are taken together. This negative coefficient of size might be due to diseconomies of scale in individual groups. The rate of growth is

found to have a positive and significant coefficient when regressed on profitability in all the individual product groups. The positive and significant coefficient of growth in consumer electronics sector and components sector rellect the fact that the firms producing consumer electronics goods are dependent on components sector through their linkages. The graph of actual and fitted values of profit rate in consumer electronics reveal that during the period from 1990-91 to 1994-95 there were wide variations in profit rate and even touched to negative value. This is explained by the fact that there was a recession in demand for consumer electronics goods particularly TV sets which continued til 1992. High prices of TV sets due to high excise duties, sales tax and other taxes followed by devaluation in 1991-92 resulted in a deceleration in demand for TV sets. However,the revival started from 1993-94 both in terms of production as well as sales which has its reflection in clear increasing trend of profit. This was the result of lowering of prices of all categories of Tv with the slashing of import duties on TV components, excise tax and sales tax. It was in 1993-94 that the government announced the reduction of various taxes. Moreover, there was a considerable rise in the purchasing power both in rural and urban areas and also there was a significant diversification in marketing products. All these factors led to better performance of consumer electronics in post 1993 period. Vertical integration gives positive and very significant coefficient in all the product groups while explaining profitability.This implies that even if growth and profitability in different groups are interrelated firms in individual product groups still exploit internalization advantages though vertical integration.

As far as growth is concerned size is not found significant in any of the product groups. Profit is found to be significant in some groups while explaining growth which implies that growth oriented firms in some groups are profitable as compared to others. In both consumer electronics and components sector profit appears to be positive and significant in explaining growth. Although we have not directly linked the performance of these two sectors in our regression framework, it is known that there is a high inter-relation between these two sectors.In fact it is the component sector which supplies all components of TV and audio industry of the consumer electronics sector. Commitment towards complete backward integration between these two sectors can also be observed with large investments in the manufacturing of glass for picture tubes. In recent years components segment has attracted huge investments which led to the setting up of a fairly diversified production base. This production base continues to centre around consumer electronics.(Exim Bank Study, 1995, 1996). Over the years manufacturing capability in consumer electronics sector has strengthened which has been supported by components. Vertical integration is found not to be significant in explaining growth in all the groups although the coefficients have positive sign as expected. However, in communication and equipments segment of the electronics industry vertical integration gives negative coefficient in explaining growth. Investment in fixed asset of the previous period, significantly and positively explains growth in communications segment. It is expected because communication segment requires large-scale investment in fixed assets and these investments require some time before it starts generating production in full

swing. So, growth in this segment expectedly depend on investment in fixed asset of the previous period.

Age as measured by depreciation /GFA[2] is found to be significant in some product group e. g. components sector while explaining profit. However, age is found to have a negative but significant coefficient while explaining growth in some group (e. g. computers). In other product groups we get negative coefficient of age while explaining growth. This essentially reveals that older firms in some groups are no doubt profitable but are not always growth oriented.

So far we have talked about those factors which demand for growth and causes shift in DG curves. Now let us pass on to those factors which influence growth of supply of productive resources. In Marris (1963) model growth of supply is affected by those factors which affect the rate of investment. We are interested in differential investment behaviour of the firms that might take care of inter -firm differences in growth and profit. Results indicate that investment in fixed assets is explained in some cases by the profit margin (PR) and investment of the previous period. This is particularly the case with the firms in industrial electronics sector, components and computers Significant coefficient of profit in explaining investment in fixed asset imply that profit margin act as a market signal in the case of the firms in the above groups to expand their their productive capacity. Growth in sales is not found to be significant in any

[2] Higher depreciation as a percentage of gross fixed assets implies that a firm is older in the sense that it had to keep a large share of profit in order to maintain or replace the existing worn-out capital.

of the regressions.

As far as inventory investment is concerned, it is significantly explained by profit margin in the case of consumer electronics, industrial electronics, and components. Inventory-sales ratio turned out to be significant in explaining inventory investment in the case of the firms in components and computers sector. Vertical integration is found to give negative coefficient in explaining investment in inventory.This is consistent with the expectation that greater the vertical integration the firms are required to maintain smaller levels of unsold stocks of goods and raw materials.

As far as dividend is concerned growth in sales, profit margin, and dividend of the previous period turned out to be significant in the case of consumer electronics.In the case of industrial electronics growth in sales is found to have a negative and insignificant coefficient while explaining dividend.In components sector only dividend of the previous period turned out to be significant.Profit is not found to be significant in explaining dividend in this sector.This is possibly because of the fact that firms producing components are mostly small firms which are not much profitable so as to declare more dividends to their shareholders. In computers sector growth in sales gives insignificant coefficient Profit margin and dividend of the previous period gives, however, significant coefficients in this product group.

As far as classification of firms according to different sizes are concerned we have considered 11 firms in very small group, 22 firms in the small group and 7 firms in the medium-sized group. As

before we have carried out the regression analysis separetely for different size-classes.

As far as firms in medium group is concerned we have found that profit is significantly explained by growth in sales and vertical integration. Age is found to have a significant but negative coefficient. Size has significant but negative coefficient. In the case of small group of firms growth did not turn out to be significant in explaining profitability. However, for the very small group it turned out to be significant. Advertising expenditure gives negative coefficient in all the cases. However, in some cases we have significant coefficients.

As far as the growth of the firms is concerned size has a positive coefficient only in the case of very small firms. Profit explains growth significantly in case of medium-sized firms and very small firms. Advertising expenditure has a significant coefficient only in the case medium-sized firms. What can be argued is that small firms in the industry are growth oriented. Regarding the medium-sized firms, we can make the same argument.

Turning to the investment by the firms we have noticed that in the case of medium-sized firms growth in sales significantly influences investment in fixed asset. Investment in fixed asset in this group is also significantly explained by investment in previous period, borrowing and age of firms. However, in small or very small group of firms we do not satisfactory explanation of investment in fixed assets.

As far as dividend is concerned it is mostly explained in all the cases by the dividend of the previous period. Only in the case of small firms profit to some extent explains current significantly.

Demand for external funds as denoted by EF in

the tables is significantly explained by the size of the firms in the case of medium-sized and small group of firms. In the case of medium-sized firms we have found that age gives positive and significant coefficient. Older firms in this group require larger replacement of worn-out capital so that depreciation reserves will be higher and in order to fill that gap created by the leakage from flow of investment firms are required to borrow from external sources. However, in the case of small and very small groups of firms we have negative coefficient of age.

We know that demand for external fund arises when internal sources fall short of what is required to meet the demand for additional investment. This is because of the fact that internally generated fund are less risky and also less costly than borrowed funds. So, the demand for external funds should, in general, be negatively related to internal funds or profit. Results show that in all the cases except in the very small group we have negative coefficient of profit in explaining demand for external funds. In the very small group we have positive and significant coefficient of profit. The argument is that smaller firms can meet all their investment needs out of the internally generated funds and naturally they try for external funds.

One possible explanation of relatively better performance of medium-sized firms can be their managerial attitudes and a host of other factors. Earlier research findings point to the fact that medium-sized firms have certain behavioural characteristics which are manifested in their higher growth and profitability compared to smaller firms. It is generally argued that smaller firms are less likely to be ambitious and their performance is more likely to be handicapped by factors of

capital paucity, lack of managerial capability and so on. However, we have found that smaller firms have the tendency to grow.

Concluding remarks.

In this paper we have tried to analyse the profitability and growth performance in the Indian corporate sector with special reference to the firms in the electronics industry in India. Initially we have made an attempt to analyse overall profitability performance of the firms in the electronics industry in India by looking at various firm-specific structural variables as well as some elements of market structure which seemed to influence profitability of the firms. However, before going into the rigorous econometric analysis (based on parametric tests of hypothesis) we have employed some non-parametric tests to find out the degree of association between the different financial variables For this purpose we have used Spearmans's rank correlation coefficient between two variables. In most cases we obtain the expected values and signs of rank correlation between the different variables. We have found that the stock market has played a crucial role in all the years under consideration. But the firms are still dependent on formal institutional credit from banks and financial institutions. Profitability as measured by net profit has desired rank correlation with variables such as sales, dividend etc. Absolute levels of net profit as well net profit in relation to total assets were low in the years 1990-91 and 1993-94. In 1990-91 Indian economy faced severe crisis both in the domestic as well as in the external front which has its effect on the industrial performance.

Then we have carried out regression analysis in an interrelated framework. Most of the regression results are consistent with the what we have found through non-parametric tests. Then we have grouped the 61 firms in our panel in several different ways so as to permit us to carry out a disaggregated analysis of growth and profitability of the firms. Our objective is to examine the variability in growth and profitability performance in different categories and also to see whether the growth (and profitability) performance of firms in one category are affected by that in other category. This is of importance for the firms of our study where various segments of the industry viz. consumer electronics, components etc. are highly interdependent. For this purpose we have employed Marris' (1963) theoretical framework. We have found that consumer electronics and component segments are highly interdependent through backward linkages. As far as the performance of the firms in different size classes are concerned we have found that medium-sized firms performed better than very small or small firms as we have defined in respect of growth, profitability and investment demand. We have found that small firms are more prone to borrowing from external sources than medium sized firms.

Regarding the future prospects of the electronics industry it can be argued that there is an urgent need to stimulate investments particularly in the components sector if the objective of meeting domestic demand has to be fulfilled substantially from indigenous sources. Lack of such investments would require in more and more imports which will affect competitiveness among Indian firms.

Appendix A

Marris' theory postulated dichotomy between a traditional firm, where management and ownership are combined in the hands of one individual, and a managerila firm. The traditional firm faces two constraints ; a) managerial constraint and b) financial constraint. Managerial constraint sets limit on absolute size of the firm so that important economies may remain unexploited and financial constraint limits the rate of growth which forces firms to rely mainly on internal sources of finance for financing investments. These two constraints in models of traditional proprietary or partnership firms which are motivated by profit maximization principle are overcome, according to Marris, through gradual invention of modern managerial firms where the basic objective is the expansion or growth. In managerially-controlled firms the management problems are overcome through collective ownership and delegated control. Financial constraints are overcome by issuing marketable shares (Marris 1964). Baumol had pointed out earlier that the main preoccupation of management of modern managerial firms is the growth. Initially, Baumol(1959) had assumed that firms are motivated by sales-maximization. This was subsequently modified by him into as growth equilibrium analysis (1962) where maximization of rate of growth of sales, not absolute level of sales, was taken to be the main objective of modern managerial firms.

Like Baumol, Marris also viewed the modern managerial firms as the engine of continuous growth. Growth itself was likely to be the major objective of managers of firms but the threat of take-over or the commitment to save the interests of the shareholders may prevent the firms from pursuing the objective of

maximization of growth. However, as a requirement to fulfill the objective of continuous growth, Marris assumed a steady-state model in which all the variables such as sales, profit, dividend etc.would grow at a constant rate. Unlike Baumol's (1962) model where managers are interested in maximization of only their own utility, in Marris (1964) model under conditions of steady-state growth managers are interested in both the maximization of their own utility and the utility of owner-shareholders. The separation of management from ownership in modern firms allows the managers to set goals which do not necessarily coincide with those of owners. Marris argued that by jointly maximizing the rate of growth of demand for products of firms (i.e demand rate of growth) and rate of growth of supply of capital (i.e supply rate of growth) the manager of a modern firm can maximize his own utility and utility of owner-shareholder. The demand rate of growth is measured by rate of growth of sales revenue and supply rate of growth is measured by rate of growth of productive assets. According to Marris utility of managers is a function of such variables like salary, status job security etc. and these are directly related to the rate of growth of demand for products (Gd).On the other hand utility of owner-shareholders is a function of supply rate of growth (Gs) which is actually the rate of growth of capital. So the firm is in equilibrium when the maximum balanced growth rate is attained i.e.GD = GS= G* (Max) In fact it is difficult to test the basic model developed by Marris as the actual values of profit rate and growth rate are determined by the intersection points of DG and SG curves and it is difficult to locate those points. So we have developed some hypotheses and built a simplified model which is based on Marris'

theoretical insight. Here we first present original Marris model as follows :-

$$G_D = f(d) \qquad (1)$$

$$G_S = I/K = P/k = p \qquad (2)$$

$$d = f(1/p) = f_1(p^*) \qquad (3),\ p^* = 1/p$$

$$G_D = G_S \qquad (4)$$ where,

GD= demand rate of growth, GS= supply rate of growth, I = rate of growth of new assets which is assumed to cover all new assets including current and fixed assets, K = existing assets, I/K = rate of growth of assets, p = rate of return on capital employed, = amount of new investments financed per unit of profit earned.

The demand rate of growth is a function of successful diversification because according to Marris' firms are usually multi-product units and diversification helps to sustain demand rate of growth. Diversification appears to be a decreasing function of rate of return on capital employed because a faster growth of demand by a firm for its products via rapid diversification either leads to lower profit margin and a lower rate of return on capital employed or leads to higher capital-output ratio which also lowers the rate of return on capital. Thus there are significant costs attached to diversification and these costs reduces rate of profit.

By supply rate of growth we mean the rate of growth of productive resources. or new investments. This crucially depends on the finance available from various sources. Taking into account both internal and external sources of finance the rate of growth of supply of funds has been postulated by Marris to be

an increasing function of rate of return on capital employed.The growth of supply of funds is denoted by GS. We have, taken investments in fixed assets, external funds and dividend to represent the supply rate of growth of funds in an indirect way. Thus higher the profits of the firms , the more funds that the firms can raise from external sources such as banks and financial institutions. The stock market also plays a crucial role to the firms in raising funds. Shareholders will desire a higher return and banks and financial institutions will upgrade the credit rating of the firm. The dividend paid to the shareholders is of considerable importance while raising funds from outside investors. Again dividend is affected by various factors such as growth profit, dividend of the previous period etc. In particular the relationship between dividend and growth is derived from the idea that modern firms usually have considerable influence over its own growth destiny. It can not grow indefinitely by reducing prices of existing products because it reduces profitability,cuts off finance. It can, however,search for new markets by developing new products or by entering the market of existing products where profit possibilities are high or higher than in its own existing markets. It may also promote the growth of demand for its existing products by advertising. However,given the profitability of existing activities, the faster the growth rate of a firm the less is the amount of cash available for dividend.

Appendix-B

Table 1.1

Electronics industry : Average of some important financial variables at constant prices (1980-81 =100) for 1990-91 to 1994-95. (Rs.in crores)

	1990	1991	1992	1993	1994
Sales	41.84	45.79	48.66	55.42	59.63
	(84.58)	(87.85)	(91.45)	(110.72)	(116.43)
NP	0.94	1.29	1.67	1.54	2.52
	(3.31)	(3.82)	(5.41)	(5.24)	(5.69)
Inte-	2.59	2.57	2.94	2.88	3.19
rest	(7.30)	(5.80)	(5.71)	(5.84)	(7.49)
Divi-	0.29	0.80	0.93	1.32	1.37
dend	(0.78)	(2.93)	(3.17)	(5.46)	(4.76)
GVA	8.87	9.51	10.94	12.97	13.80
	(23.97)	(23.95)	(23.28)	(34.08)	(32.70)
TB	15.99	16.54	17.38	18.36	17.93
(1)	(46.31)	(38.56)	(36.87)	(43.96)	(44.48)
IB	1.72	2.20	2.65	3.66	3.41
	(3.47)	(4.94)	(5.07)	(7.67)	(7.96)
Adv	0.32	0.35	0.38	0.43	0.75
	(0.82)	(0.97)	(1.03)	(1.13)	(2.50)
NFA	8.65	8.65	9.42	9.70	10.03
	(18.69)	(17.17)	(17.59)	(16.70)	(17.53)
TA	45.23	45.97	48.09	47.26	53.68
(1)	(123.30)	(113.81)	(115.20)	(110.97)	(117.09)
Inven-	17.38	15.20	14.83	14.03	1.44
tory	(54.87)	(42.09)	(37.50)	(37.79)	(36.80)

Table 1.1 contd...

	1990	1991	1992	1993	1994
SB	3.97	3.82	3.28	6.37	6.50
	(11.12)	(7.79)	(6.48)	(18.72)	(17.91)
NW	8.08	8.13	9.23	11.39	14.77
	(20.00)	(19.36)	(21.29)	(25.08)	(34.85)
EC	4.40	4.06	4.20	4.63	4.83
	(8.96)	(7.82)	(7.95)	(7.62)	(7.21)
RP	0.65	1.11	1.51	1.43	2.28
	(2.76)	(3.18)	(4.82)	(4.58)	(4.72)
WC	16.87	18.12	19.62	21.49	25.98
	(50.36)	(46.50)	(47.42)	(58.44)	(71.98)
Excise	5.49	7.21	8.62	8.70	9.68
	(10.23)	(12.87)	(10.82)	(14.45)	(17.77)

NOTE: figures in parentheses denote standard deviations

(1) Deflated by simple average of deflators for fixed capital and for raw materials

EC- Equity capital,
RP- Retained profit,
WC- Working capital
NW- Net worth, SB- Short-term borrowing,
IB- Institutional borrowing,
GVA- Gross value added,
NFA- Net fixed assets.

Table 1.2

Electronics industry : some important financial ratios for 1990-91 to 1994-95.

	1990	1991	1992	1993	1994
RP/TA	0.02	0.08	0.12	0.14	0.17
	(0.10)	(0.26)	(0.47)	(0.73)	(0.81)
TB/TA	0.47	0.47	0.45	0.43	0.36
	(0.29)	(0.24)	(0.23)	(0.22)	(0.19)
CA/TA	1.56	1.80	0.98	2.28	2.33
	(0.34)	(0.37)	(0.42)	(0.49)	(0.50)
NP/Sales	-0.03	0.11	0.05	0.03	1.46
	(0.33)	(0.74)	(0.19)	(0.15)	(0.81)
WC/TA	76.72	89.35	102.99	115.85	134.53
	(223.60)	(238.22)	(272.00)	(303.88)	(322.14)
NP/TA	0.03	0.04	0.04	0.03	0.06
	(0.11)	(0.10)	(0.08)	(0.11)	(0.08)
AD/ Sales	0.01	0.06	0.05	-0.03	-0.03
	(0.01)	(0.36)	(0.25)	(0.42)	(0.37)
IB/TB	0.18	0.20	0.22	0.24	0.21
	(0.20)	(0.21)	(0.21)	(0.24)	(0.21)
Debt/ TA	18.12	8.54	19.24	20.20	9.71
	(45.74)	(37.90)	(36.19)	(43.35)	(44.31)
SB/TB	1.05	1.20	1.24	1.44	1.46
	(0.58)	(0.65)	(0.67)	(0.77)	(0.81)
NW/TA	0.15	0.16	0.17	0.23	0.27
	(0.25)	(0.24)	(0.27)	(0.30)	(0.27)

RP - Retained profit; NP - Net profit;
WC - Working capital
CL - Current liabilities;
CA - Current asset; TA - Total asset
TB - Total borrowing; IB -Institutional borrowing;
NW - Net worth; SB - Short term borrowing;

Table 2.1

Rank correlation between different financial variables : 1990-91

	NP	Dvd	SB	IB	TA	NW
Dvd	0.66 (6.73)	-	-	-	-	-
SB	0.05 (0.37)	-0.04 (-0.29)	-	-	-	-
IB	-0.05 (-0.42)	-0.09 (-0.67)	0.57 (5.03)	-	-	-
TA	0.34 (2.74)	0.10 (0.79)	0.25 (1.99)	0.21 (1.64)	-	-
GFA	0.28 (2.22)	0.07 (0.54)	0.24 (1.86)	0.34 (2.79)	0.92 (18.42)	0.76 (8.86)
WC	0.54 (4.92)	0.28 (2.27)	0.24 (1.93)	0.04 (0.29)	0.86 (13.10)	0.94 (22.13)
NW	0.60 (5.71)	0.36 (2.99)	0.18 (1.43)	-0.002 (-0.02)	0.86 (12.91)	-

Note :Figure in parentheses denote the respective t-value computed for testing the association between two different variables.

Table 2.2
Rank correlation between different financial variables : 1991-92

	NP	Dvd	SB	IB	TA	NW
Dvd	0.50	-	-	-	-	-
	(4.39)					
SB	0.38	0.11	-	-	-	-
	(3.17)	(0.86)				
IB	0.12	-0.12	0.48	-	-	-
	(0.96)	(-0.94)	(4.23)			
TA	0.44	0.05	0.31	0.28	-	-
	(3.72)	(0.36)	(2.53)	(2.30)		
GFA	0.32	-0.03	0.28	0.39	0.92	0.75
	(2.60)	(-0.22)	(2.24)	(3.27)	(18.40)	(8.82)
WC	0.55	0.22	0.31	0.13	0.90	0.94
	(5.08)	(1.73)	(2.50)	(0.99)	(15.44)	(21.8)
NW	0.62	0.31	0.28	0.12	0.85	-
	(6.01)	(2.48)	(2.24)	(0.92)	(12.65)	

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.

Table 2.3

Rank correlation between different financial variables : 1992-93

	NP	Dvd	SB	IB	TA	NW
Dvd	0.42	-	-	-	-	-
	(3.60)					
SB	0.19	0.11	-	-	-	-
	(1.49)	(0.82)				
IB	0.25	-0.08	0.66	-	-	-
	(2.01)	(-0.60)	(6.76)			
TA	0.57	0.13	0.35	0.41	-	-
	(5.39)	(1.01)	(2.84)	(3.47)		
GFA	0.53	0.08	0.31	0.49	0.92	0.78
	(4.80)	(0.63)	(2.54)	(4.37)	(18.11)	(9.67)
WC	0.65	0.26	0.29	0.27	0.92	0.93
	(6.50)	(2.04)	(2.31)	(2.18)	(18.11)	(19.73)
NW	0.71	0.36	0.25	0.25	0.86	-
	(7.75)	(2.98)	(2.02)	(2.01)	(13.12)	

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.

Table 2.4
Rank correlation between different financial variables : 1993-94

	NP	Dvd	SB	IB	TA	NW
Dvd	0.55 (5.06)	-	-	-	-	-
SB	0.26 (2.06)	0.26 (2.05)	-	-	-	-
IB	0.33 (2.67)	0.19 (1.47)	0.69 (7.37)	-	-	-
TA	0.46 (3.95)	0.15 (1.15)	0.56 (5.17)	0.56 (5.59)	-	-
GFA	0.44 (3.78)	0.10 (0.70)	0.52 (4.62)	0.65 (19.40)	0.93 (10.47)	0.81 (10.47)
WC	0.55 (4.99)	0.31 (2.54)	0.49 (4.23)	0.41 (3.48)	0.91 (16.83)	0.91 (16.49)
NW	0.60 (5.80)	0.35 (2.89)	0.45 (3.91)	0.41 (3.43)	0.85 (12.62)	-

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.

Table ...

Rank correlation between different financial variables : 1994-95

	NP	Dvd	SB	IB	TA	NW
Dvd	0.54 (4.90)	-	-	-	-	-
SB	0.30 (2.38)	0.21 (1.62)	-	-	-	-
IB	0.37 (3.06)	0.22 (1.71)	0.61 (5.95)	-	-	-
TA	0.58 (5.51)	0.29 (2.33)	0.61 (5.98)	0.58 (3.16)	-	-
GFA	0.53 (4.77)	0.24 (1.91)	0.56 (5.13)	0.61 (5.95)	0.93 (18.85)	0.81 (10.69)
WC	0.65 (6.54)	0.38 (3.14)	0.56 (5.20)	0.44 (3.82)	0.92 (18.20)	0.86 (13.15)
NW	0.77 (9.38)	0.47 (4.13)	0.40 (3.33)	0.43 (3.63)	0.85 (12.48)	-

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.

Table 2.1a
Rank Correlation between different financial ratios : 1990-91

	NW/TA	IB/TA	CA/CL	NP/TA	NP/NFA	NP/NW
NW/TA	-	-	-	-	-	-
IB/TA	-0.40 (-3.35)	-	-	-	-	-
CA/CL	0.38 (3.15)	0.05 (0.38)	-	-	-	-
NP/TA	0.42 (3.23)	-0.11 (-0.87)	0.49 (4.30)	-	-	-
NP/NFA	0.36 (2.96)	-0.24 (-1.89)	0.40 (3.39)	0.95 (22.76)	-	-
NP/NW	0.25 (2.02)	-0.06 (-0.50)	-0.06 (-0.48)	0.49 (3.22)	0.47 (4.14)	-
D/E	-0.26 (-2.07)	0.14 (1.09)	-0.26 (-2.10)	-0.54 (-4.93)	-0.55 (-5.11)	-0.34 (-2.77)
CA/NW	-0.26 (-2.07)	-0.31 (-2.47)	-0.35 (-2.83)	-0.24 (-1.91)	-0.12 (-0.92)	0.03 (0.20)

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.
CA -Current Assets,; CL - Current Liabilities;
TA - Total Assets; NFA - Net Fixed Asset.
D/E - Debt/Equity; NP - Net profit

Table 4.2b

Rank Correlation between different financial ratios : 1991-92

	NW/TA	IB/TA	CA/CL	NP/TA	NP/NFA	NP/NW
NW/TA	-	-	-	-	-	-
IB/TA.	-0.39 (-3.22)	-	-	-	-	-
CA/CL	0.52 (4.73)	0.05 (0.38)	-	-	-	-
NP/TA	0.43 (3.62)	0.02 (0.13)	0.41 (3.76)	-	-	-
NP/NFA	0.36 (3.00)	-0.13 (-1.02)	0.27 (2.11)	0.92 (17.55)	-	-
NP/NW	0.10 (0.81)	0.10 (0.78)	-0.001 (-0.10)	0.52 (4.66)	0.46 (3.98)	-
D/E	-0.33 (-2.70)	0.15 (1.19)	-0.27 (-2.14)	-0.26 (-2.08)	-0.31 (-2.50)	-0.13 (-1.04)
CA/NW	-0.24 (-1.86)	-0.27 (-2.17)	-0.31 (-2.51)	-0.07 (-0.53)	0.06 (0.47)	-0.09 (-0.71)

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.
CA -Current Assets,; CL - Current Liabilities;
TA - Total Assets; NFA - Net Fixed Asset.
D/E - Debt/Equity; NP - Net profit.

Table 2.5C

Rank Correlation between different financial ratios : 1992-93

	NW/TA	IB/TA	CA/CL	NP/TA	NP/NFA	NP/NW
NW/TA	-	-	-	-	-	-
IB/TA	-0.34	-	-	-	-	-
	(-2.79)					
CA/CL	0.48	0.07	-	-	-	-
	(4.24)	(0.57)				
NP/TA	0.47	0.11	0.49	-	-	-
	(4.10)	(0.83)	(4.34)			
NP/NFA	0.40	-0.08	0.34	0.88	-	-
	(3.38)	(-0.59)	(2.82)	(14.05)		
NP/NW	0.20	0.27	0.09	0.62	0.54	-
	(1.54)	(2.19)	(0.70)	(6.07)	(4.91)	
D/E	-0.39	0.19	-0.29	-0.20	-0.24	0.06
	(-3.22)	(1.50)	(-2.33)	(-1.56)	(-1.88)	(0.44)
CA/NW	-0.28	-0.34	-0.21	-0.22	-0.03	-0.11
	(-2.21)	(-2.75)	(-1.67)	(-1.75)	(-0.20)	(-0.88)

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.
CA -Current Assets, ;CL -Current Liabilities;
TA - Total Assets; NFA - Net Fixed Asset.
D/E - Debt/Equity; NP - Net profit

Rank correlation between different financial ratios : 1993-94

	NW/TA	IB/TA	CA/CL	NP/TA	NP/NFA	NP/NW
NW/TA	-	-	-	-	-	-
IB/TA.	-0.29 (-2.33)	-	-	-	-	-
CA/CL	0.56 (5.22)	0.12 (0.93)	-	-	-	-
NP/TA	0.50 (4.46)	0.03 (0.21)	0.59 (5.59)	-	-	-
NP/NFA	0.42 (3.51)	-0.13 (1.04)	0.50 (4.94)	0.91 (16.79)	-	-
NP/NW	-0.01 (-0.11)	0.30 (2.42)	0.23 (1.85)	0.61 (6.15)	0.59 (5.55)	-
D/E	-0.32 (-2.56)	0.26 (2.04)	-0.27 (-2.16)	-0.17 (-1.29)	-0.14 (-1.09)	-0.10 (-0.77)
CA/NW	-0.43 (-3.63)	-0.28 (2.26)	-0.21 (-1.65)	-0.13 (1.06)	0.08 (0.60)	-0.21 (-1.62)

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.
CA - Current Assets,; CL - Current Liabilities;
TA - Total Assets; NFA - Net Fixed Asset.
D/E - Debt/Equity; NP - Net profit

Table 2.5a

Rank Correlation between different financial ratios : 1994-95

	NW/TA	IB/TA	CA/CL	NP/TA	NP/NFA	NP/NW
NW/TA	-	-	-	-	-	-
IB/TA	-0.12	-	-	-	-	-
	(-0.93)					
CA/CL	0.62	0.03	-	-	-	-
	(6.03)	(0.20)				
NP/TA	0.45	0.11	0.35	-	-	-
	(3.87)	(0.85)	(2.83)			
NP/NFA	0.27	-0.02	0.25	0.87	-	-
	(2.15)	(-0.18)	(1.96)	(13.72)		
NP/NW	0.02	0.25	0.02	0.80	0.76	-
	(0.16)	(2.24)	(0.14)	(10.16)	(8.87)	
D/E	-0.36	0.30	-0.35	-0.16	-0.15	-0.04
	(-2.95)	(2.41)	(-2.96)	(-1.28)	(-1.17)	(-0.33)
CA/NW	-0.73	-0.25	-0.33	-0.26	0.02	-0.10
	(-8.25)	(-1.94)	(-2.73)	(-2.10)	(0.13)	(-0.82)

Note: Figure in parentheses denote the respective t-value computed for testing the association between two different variables.
CA - Current Assets,; CL - Current Liabilities;
TA - Total Assets; NFA - Net Fixed Asset.
D/E - Debt/Equity; NP - Net profit

Regression results when variables are deflated by NFA

	Dependent variable										
	Cons.	Price ratio	1/NFA	SB	1B	Sales	NP	R^2	$\bar{R}^2$	SD of D.V.	
Sales	19.74	-19.15	*2.47	*1.46	-	-	-	0.24	0.23	11.41	
	(1.96)	(-1.58)	(5.57)	(2.43)							
WC	1.39	-	*0.42	*0.82	-	-	-	0.48	0.48	2.28	
	(11.35)		(5.82)	(8.30)							
"	1.41	-	-	1.19	-	-	-	0.42	0.42	"	
	(10.94)			*(14.92)							
Dvd	0.11	-	-	-	-	*0.31	0.39	0.02	0.02	0.50	
	(0.06)					(2.51)	(0.14)				
"	-2.32	-	*5.45	-		-		0.14	0.14	"	
	(-1.56)		(7.06)								

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 3.2

Regression results when variables are not deflated

	Dependent variable								
	Cons.	Price ratio	1/NFA	SB	IB	Sales	Adv	R^2	$\bar{R}^2$	SD of D.V
NP	5.99	*0.20	**-7.95					0.56	0.55	4.78
	(1.86)	(19.27)	(-1.95)							
"	-0.01			*0.20	*0.09	*1.23		0.57	0.57	"
	(-0.04)			(12.93)	(2.78)	(9.45)				
Sales	79.16	*4.57	-90.21					0.66	0.65	0.61
	(1.36)	(23.97)	(-1.23)							
"	51.59	*3.65		*2.84	*-1.82			0.75	0.75	"
	(1.02)	(16.40)		(10.54)	(-3.16)					
DvD	0.01					0.01		0.03	0.02	0.04
	(2.64)					(2.79)				
"	0.01		*0.14					0.03	0.03	"
	(3.19)		(3.10)							
NFA	4.89				*1.16			0.32	0.31	17.4
	(5.39)				(11.81)					
WC	0.55			*0.15				0.46	0.46	0.98
	(4.09)			(16.05)						

* Significant at 1% level

** Significant at 5% level

Figures in parenthesis denote t values

Table 3.3
Regression results when variables are deflated by "Total Assets"

	Dependent variable								
	Cons.	NW	1/TA	SB	IB	WC	R^2	$\bar{R}^2$	SD of D.V.
NP	0.01	*0.10	*0.17				0.25	0.24	0.10
	(-1.26)	(3.58)	(9.53)						
	- 0.01	*0.19			*0.16		0.23	0.23	"
	(0.93)	(9.35)			(2.69)				
"	-0.02	*0.18		*0.12			0.24	0.23	"
	(-1.54)	(8.69)		(3.04)					

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 3.4

Regression results when variable are deflated by sales

	Dependent variable								
	Cons.	Price ratio	VA	1/Sales	Market share	AD	R^2	$\bar{R}^2$	SD of D.V.
NP	0.02			*0.35			0.25	0.24	0.60
	(0.38)			(9.96)					
"	-0.04		*0.39				0.71	0.71	"
	(-2.38)		(27.43)						
"	0.10	*0.45					0.24	0.24	"
	(0.33)	(9.88)							
"	0.07			*0.80	*1.24	*-1.58	0.55	0.54	"
	(-2.50)			(19.11)	(1.68)	(-14.19)			

NNote : Significant at 1% level.
Significant at 5% level.
Figures in the parenthesis denote t-values.

Table 3.4 cont'd.

	Dependent variable								
	Cons	1/Sales	SB	IB	NP	NFA	Price ratio	R^2	$\bar{R}^2$	SD of D.V
NFA	0.11	*1.47						0.67	0.66	1.53
	(2.21)	(24.57)								
"	-0.01			*2.83				0.42	0.42	"
	(-0.08)			(14.85)						
"	0.23				*1.71			0.45	0.45	"
	(3.54)				(15.77)					
Dvd	-1.00					*2.78		0.39	0.38	6.87
	(-0.32					(13.80)				
"	-1.00	*6.11						0.57	0.57	"
	(-3.84)	(20.22)								
"	-1.55						*6.12	0.62	0.61	"
	(-5.44)						(14.19)			
WC	0.23		*1.39					0.86	0.84	2.01
	(5.35)		(44.06)							

Note : Significant at 1% level.
Significant at 5% level.
Figures in the parenthesis denote t-valwes.

Table 4.1

Regression results of medium-sized firms

I.V.	PR	G	IF	DVD	EF
Dependent variable					
cons.	-0.01	-11.45	6.38	0.11	9.20
	(-0.25)	(-1.28)	(2.89)	(0.87)	(0.79)
logsize					6.85
					(2.83)
VI	0.43				
	(3.69)				
AD		32.92			
		(2.40)			
G	0.0013		0.22		
	(3.3536)		(2.81)		
DVD_{-1}				1.09	
				(15.00)	
PR		186.05			
		(2.72)			
R^2	0.50	0.22	0.23	0.90	0.20
$\bar{R}^2$	0.45	0.19	0.20	0.89	0.17
S.D. of D.V.	0.07	26.51	12.29	1.85	17.76

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 4.1 contd.

I.V.	PR	IF	EF
cons.	0.34	13.06	5.87
	(11.16)	(2.44)	(0.78)
logsize	-0.05		
	(-7.52)		
AGE	-1.65	-163.66	58.27
	(-4.81)	(-2.06)	(2.41)
G	0.0013		
	(3.04)		
IF_{-1}		0.62	
		(4.20)	
PR			-111.72
			(-2.73)
R^2	0.42	0.48	0.18
$\bar{R}^2$	0.41	0.44	0.16
S.D. of D.V	0.06	12.52	0.17

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 4.2

Regression results of small firms
Dependent variable

I.V.	PR	IF	INV	DVD
cons	-0.58	3.02	0.0019	0.19
	(-3.56)	(2.17)	(0.4929)	(4.60)
VI	0.72		-0.03	
	(14.87)		(-2.02)	
AGE	0.36			
	(1.99)			
		0.34		
		(3.10)		
DVD_{-1}				0.95
				(12.56)
PR			-0.05	0.39
			(-3.28)	(2.23)
R^2	0.72	0.13	0.12	0.67
$\bar{R}^2$	0.71	0.12	0.11	0.65
S.D.of D.V.	0.12	11.73	0.02	0.37

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 4.3

Dependent variable

Regression results of very small firms

I.V.	PR	G	DVD	EF
Const.	0.19	-105.06	0.0017	0.22
	(7.27)	(-4.88)	(1.7415)	(1.62)
logsize		39.20		
		(4.05)		
VI		110.75		
		(3.07)		
AGE	-0.94			-10.42
	(-2.36)			(-3.18)
G	0.0011			
	(3.2142)			
DVD_{-1}			0.66	
			(6.36)	
PR				6.18
				(7.37)
R^2	0.31	0.40	0.49	0.58
$\bar{R}^2$	0.28	0.37	0.48	0.55
S.D.of D.V.	0.08	29.97	0.01	0.62

* Significant at 1% level

** Significant at 5% level

Figures in parenthesis denote t values

Table 4.3 contd.

I.V.	PR	G	EF
Cons	-0.04	-22.02	0.34
	(-0.92)	(-2.52)	(1.37)
logsize	0.02		
	(1.09)		
VI	0.52		2.95
	(7.34)		(3.47)
AD	-3.01		
	(-2.30)		
PR		185.29	
		(3.39)	
R^2	0.52	0.21	0.19
$\bar{R}^2$	0.51	0.18	0.17
S.D. of D.V	0.08	29.97	0.71

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 4.4

Dependent variable

Regression results of consumer electronics

I.V.	PR	G	IF	INV	EF	DVD
Cons	0.08	-3.37	1.06	-0.05	0.08	0.01
	(3.38)	(0.34)	(0.07)	(-2.05)	(1.31)	(2.66)
logsize	-0.01					
	(-1.64)					
VI	0.21					
	(2.95)					
AGE					*8.96	
					(3.59)	
G	.0048					
	(2.9380)					
DVD_{-1}						*0.62
						(4.67)
PR		*224.08	219.00	*0.68	***0.92	
		(2.15)	(1.31)	(2.49)	(1.63)	
R^2	0.31	0.18	0.04	0.11	0.23	0.40
$\bar{R}^2$	0.26	0.14	0.02	0.09	0.20	0.37
S.D.of D.V	0.03	26.08	39.76	0.06	0.15	0.30

* Significant at 1% level

** Significant at 5% level

Figures in parenthesis denote t values

Table 4.4 contd.

Regression results (Consumer electronics)

I.V.	Dependent variable PR	EF	DVD
Cons	0.0364	0.05	
	(2.6289)	(1.31)	
logsize		*-0.0049	
		(-4.16)	
VI	0.21	*1.69	
	(3.02)	(7.96)	
AD	0.55		
	(1.65)		
G	0.0044		
	(2.67)		
PR			*0.13
			(4.97)
R^2	0.31	0.57	0.30
$\bar{R}^2$	0.27	0.56	0.29
S.D.of D.V	0.03	0.16	0.09

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 4.5

Regression results (Industrial electronics)

	Dependent variable				
I.V.	PR	IF	INV	EF	DVD
Cons	0.02	-8.13	-0.05	-0.01	0.01
	(1.63)	(-1.37)	(-1.67)	(-0.13)	(0.20)
Logsize	*-0.01				
	(-2.46)				
VI	*0.22			*0.98	
	(6.59)			(3.42)	
AD	*-0.21				
	(-2.58)				
AGE	*** 0.01				
	(1.95)				
G	*0.0034				
	(2.5082)				
PR		*181.10	0.65***		*0.17
		(2.30)	(1.50)		(4.14)
R^2	0.59	0.08	0.03	0.17	0.22
$\bar{R}^2$	0.56	0.06	0.01	0.15	0.20
S.D.of D.V	0.09	19.03	0.10	0.24	0.01

* Significant at 1% level
** Significant at 5% level
*** Significant at 10% level
Figures in parenthesis denote t values

Table 4.6

Regression results (Components)

I.V.	Dependent variable PR	G	IF	INV	EF	DVD
cons	0.16	1.69	1.48	-0.03	1.20	0.02
	(3.64)	(0.21)	(0.21)	(-1.83)	(6.90)	(0.66)
logsize					-0.22	
					(-0.31)	
AGE	*1.46					
	(2.99)					
G	*0.01					
	(2.61)					
IF_{-1}			*0.55			
			(5.41)			
DVD_{-1}						*1.41
						(12.65)
EF				*-0.04		
				(-3.34)		
INS				*0.12		
				(2.77)		
PR		*77.57		*0.11		
		(2.21)		(2.01)		
R^2	0.25	0.07	0.37	0.16	0.10	0.71
$\bar{R}^2$	0.20	0.05	0.33	0.12	0.09	0.70
S.D.of D.V	0.11	33.41	27.60	0.04	0.70	0.39

*.Significant at 1% level

** Significant at 5% level

Figures in parenthesis denote t values

Table 4.6 contd.
Regression results (Components)

I.V.	PR	G	IF	DVD	EF
cons	-0.06				
	(-3.08)				
VI	*0.80				
	(13.97)				
G	*.0047				
	(2.2903)				
R^2	0.77				
$\bar{R}^2$	0.76				
S.D.of D.V	0.11				

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

Table 4.7

Regression results (Computers)

I.V.	Dependent variable PR	G	IF	INV	DVD
Cons	-0.07	0.15	6.88	-0.06	0.02
	(-1.85)	(1.15)	(1.66)	(-2.38)	(0.72)
logsize		**0.05			
		(1.72)			
VI	*0.56				
	(6.60)				
AGE	***1.29	*-5.49			
	(1.41)	(-2.08)			
IF_{-1}			*0.48		
			(2.46)		
DVD_{-1}					*1.10
					(16.60)
PR				*1.28	
				(2.23)	
R^2	0.59	0.16	0.20	0.13	0.89
$\bar{R}^2$	0.56	0.12	0.16	0.08	0.89
S.D.of D.V	0.08	0.24	14.89	0.05	0.49

* Significant at 1% level
** Significant at 5% level
*** Significant at 10% level
Figures in parenthesis denote t values

Table 4.7 Contd.

Regression results (Computers)

I.V.	IF	INV	DVD
Cons	5.78	-0.02	-0.14
	(1.18)	(-0.94)	(-1.13)
PR	*60.52	*0.42	2.99
	(2.33)	(2.96)	(3.71)
R^2	0.16	0.23	0.30
$\bar{R}^2$	0.16	0.16	0.26
S.D.of D.V.	14.20	0.05	0.49

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values.

Table 4.8
Regression results (Communication)

	Dependent variable					
	PR	G	IF	INV	EF	DV
Cons	-0.05	7.57	8.88	4.73	-55.04	0.49
	(-1.32)	(0.94)	(2.80)	(2.30)	(-3.80)	(1.75
logsize	*0.02				*17.77	
	(2.31)				(5.72)	
VI	0.43			-6.32		
	(4.25)			(-1.51)		
AD		*19.64				
		(2.13)				
IF		**1.15				
		(1.89)				
INS				*-12.77		
				(-2.69)		
PR			**-28.42			*3.50
			(-1.42)			(2.00)
R^2	0.63	0.15	0.08	0.28	0.57	0.12
$\bar{R}^2$	0.57	0.11	0.04	0.21	0.54	0.09
S.D.of D.V	0.10	30.10	9.77	3.12	40.59	0.90

* Significant at 1% level
** Significant at 5% level
Figures in parenthesis denote t values

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