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FUNDAMENTALS AND SHARE PRICES IN THE DRUGS AND MEDICINES INDUSTRY

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FOREWORD

This is the second paper in the series of the studies on the stock market that have been carried out under the R. B. I. Endowment Scheme. The current paper is interesting not only because it attempts systematically to relate the fundamentals of company behaviour to their prices in the stock market and comes out with some interesting findings but also because, in however elementary a fashion, it tests the effectiveness of the economic liberalisation in promoting dynamic efficiency in particular industries. It is expected that further studies in the series will be carried out and they will throw fresh light on the relation between capital markets and firm behaviour in the current phase of liberalisation.

(Amiya Kumar Bagchi)

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FUNDAMENTALS AND SHARE PRICES IN THE DRUGS AND MEDICINES INDUSTRY

ABSTRACT

This study tries to capture the interactions between different economic variables relating to the drugs and medicines industry in India and the share prices of companies operating in the industry. It has a two tier strucure. In the first part, we consider the behaviour of the company fundamentals such as sales, profit, cash flow, fixed capital and their interactions with one another and also with exogenous variables such as bank and non-banking credit facilities which are very often affected by Government policies. In the second part we study the behaviour of share prices and relate them to the movement of company fundamentals.

1. Empirical relations and theoretical modelling for stock exchanges.

This study is an attempt to advance the understanding of the working of Indian firms, specifically in the drugs and medicines industry. We have tried to find out the most significant factors influencing different economic variables, of importance, at the firm level, such as sales, profit, dividends, gross (or net) fixed assets etc. and their interactions with one another as also with different exogenous variables which are policy parameters. In addition, we also explore some aspects of the relationship between movements of share prices and those of company fundamentals. In an earlier paper [see Bandyopadhyay and Das(1993)] we found the efficient market hypothesis to be acceptable for the price movements for a few scrips as also for two indices of share prices. But that test was narrowly based on prices. However, in view of the commonsense expectation that the growth of stock markets and industrial development are closely related, the study of share price movements vis-a-vis firm performance appears to be a meaningful exercise. Such studies are, however, very few in number in the Indian context. One notable exception is Singh (1994) where he has carefully studied the efficacy of stock markets for long term industrial investment in the Indian context. For this purpose, he analysed the role of the equity market in financing the growth of the hundred largest

Indian manufacturing corporations. His study shows that the policy induced liberalisation of the financial sector and the vast expansion of stock market in India has had a major impact on corporate finance. The new issues of ordinary shares or debentures have made significant contributions to corporate growth. But there is as yet no evidence that this greater reliance of large firms on the stock market has led to, or will in future promote faster industrialisations and long term dynamic efficiency.

In this paper we have not gone for any theoretical modelling and its empirical validation. Instead we have tried for best empirical fits for a set of proximate regressors. In that sense, the present study is an exercise in ad hoc econometrics. Theoretical modelling may be premature as yet. The neoclassical literature of the theory of firms or its modern variant, industrial organization, has grown up with developed capitalist economies as their background and may or may not be relevant for Indian firms. The institutional setting or the general economic environment, including Goernment policies, are quite different in India and in the Western economies. We have to look at the empirical relations, existing among the relevant variables, before plumping for one particular theoretical model.

Because of the very nature of the study, we have to work with firm level data. But firms are quite different from one another not only among different industries but even in the same industry. Thus the problem of heterogeneity is all along there in respect of product profiles, raw material profiles etc. A firm may be considered to belong to a particular industry though it might be producing goods of other industries also. That is, in case of diversification in product profile the problem of heterogeneity is enhanced. In this respect drugs and medicines industry is quite suitable for our purpose since most of the companies in this industry do not have product profiles which extend beyond the confines of the industry. Their raw materials profile is also less heterogeneous than in the case of many other industries.

2. Data sources.

The companies are drawn from those engaged in the drugs and medicines industry and listed at the Bombay Stock Exchange. We have considered only those companies which have few product overlaps with other industries. Our data

source is CIMM (version 3.00) package of the Centre for Monitoring Indian Economy which in turn compiles the data from Bombay Stock Exchange official Directory. For our study, we have considered 42 companies for four consecutive years (1989-'90 to 1992-'93). However, we do not have data for all these 42 companies for all the years from the CIMM. In 1989-'90 we have data for 34 companies, in 1990-'91 we have data for 40 companies and there are 41 and 39 companies in the data bases for 1991-'92 and 1992-'93 respectively. The names of the companies have been given in the Appendix. For share prices we depended upon the Bombay Stock Exchange lists. As there are wide variations in the price movement for a particular scrip in a year, we computed an average price for each scrip for each year. The representative price chosen was the average of the highs and lows of each scrip for each month in a year averaged over the twelve-month period.

Since this is a cross sectional study, there is built in heterogeneity in the data and so the usual heteroscedasticity problems are there. However, since the companies' product profiles were reasonably homogeneous, the problem of heterogeneity is somewhat reduced. But the problem of size in terms of sales or fixed assets still remains. So we also tried the same exercises with the companies' financial variables normalized by net fixed assets and sales.

While explaining share price movements, we do not encounter this type of problem. In these cases, our explanatory variables are sales per share, profit per share (or earnings per share), dividend per share, cash flow per share etc., so that normalization is built into the data.

We also used the following four price indices for converting the variables at constant prices (1980-'81=100)–(1) WPI for drugs and medicines for deflating sales, (2) price index for gross fixed capital formation for deflating gross or net fixed assets or their changes, (3) deflator for inventories for deflating working capital or change in inventories and (4) CPI for deflating net profit, dividends etc. The source of deflators is the *National Accounts Statistics* published by the CSO.

In section 3 we provide a descriptive account of the behaviour of some of the important financial variables at the level of industry aggregates. In section 4 we test for persistence of ranks of companies from 1989-'90 to 1992-'93; in section 5 we test for degree of closeness between different financial variables. Both of these two types of test are based on non-parametric methods. In section 6 we provide regression results relating various financial variables of the companies. In section 7 we tried to relate movement of share prices of different companies with the respective fundamentals. In the final section we provide the concluding remarks.

3. A brief account of industry averages of financial variables from 1989-'90 to 1992-'93.

First we give a brief account of industry averages of some of the important financial variables (at 1980-'81 prices) for the four consecutive years, viz. 1989-'90 to 1992-'93. As Table 1 reveals, there is no sharp change in the average of any of the financial variables in these years. However, most of the figures for 1992-93 show somewhat higher values for all the items, as compared with the previous year or previous three years. In respect of sales, net profit and equity dividends there is negative growth in 1990-'91 over 1989-'90. Between 1991-'92 and 1992-'93, average sales registered a growth rate of 15.59%. But rate of growth in net profit was still negative though the absolute value had gone down. However, the cash flow was rising in consecutive years at a low rate. The average equity dividend fell between 1989-'90 and 1991-'92. In 1992-'93 it improved compared to previous year but its level was still lower (Rs. 0.53 Cr.) than in 1989-'90 (Rs. 0.54 Cr.). Gross (or net) fixed assets,[1] remained quite stable with a slightly rising tendency. In net profit, dividend on equity share and retained profit there was a decline in the first three years followed by an upturn in 1992-'93.

Table 2 presents some important average ratios relating to the operations of the firms in the drugs and medicines industry in the money and capital markets. By and large, these ratios also do not show any marked change. However, the ratio of bank borrowing to total borrowing showed a marginal decline from 0.49684 in 1989-'90 to 0.42551 in

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[1] Henceforth we will use GFA or NFA for gross fixed asset and net fixed asset respectively.

1992-1993. For the other such borrowing ratios similar behaviour is observed. During the same period debt-equity ratio declined from 1.6 in 1989-'90 to 1.15 in 1992-'93. This shows that the industry as a whole was coming to rely more on the share market than the banks or non-banking financial institutions for its incremental financing needs. However, the proportions of fixed deposits and debentures in total borrowings have also declined in the same period. Thus equities were becoming more important in the capital market operation of the firms. The years from 1989-'90 to 1992-'93 included those of economic liberalisation and financial deregulation. Firms took more advantage of the stock market as a source of finance than they used to do earlier. Moreover, because of liberalisation of imports and the beginning of the end of the Indian patent system (which the drugs and pharmaceuticals industry had used to its advantage), competitive pressures became more fierce. It is interesting to see whether such competitive pressures led to radical changes in the relative positions of the firms in the drugs and medicines industry. From a statistical point of view also, it is important to find whether some firms pulled so far ahead of the field or lagged so badly behind that the assumption of a low degree of heteroscedasticity would become invalid. Since the sample period is small, we decided to deploy some non-parametric tests in order to find out whether firms had changed ranks in some important respects.

TABLE 1

Drugs and medicines industry : Average of some important financial variables at constant prices (1980-'81 = 100) for 1989-'90 to 1992-'93.

Rs. in Crore

	1989-'90	1990-'91	1991-'92	1992-'93
Sales	51.95	50.68	58.58	70.21
	(54.11)	(56.56)	(59.93)	(71.74)
Interest	1.51	1.56	1.83	2.26
	(1.78)	(1.88)	(1.98)	(2.38)
Tax	0.64	0.56	0.55	0.70
	(0.86)	(0.80)	(0.88)	(1.04)
Net Profit	1.58	1.44	1.38	1.93
	(1.84)	(1.54)	(1.67)	(2.73)
Equity Dividend	0.54	0.45	0.42	0.53
	(0.64)	(0.56)	(0.46)	(0.61)
Retained Profit	1.04	1.00	0.97	1.40
	(1.31)	(1.16)	(1.37)	(2.30)
Cash Flow	2.21	2.28	2.48	3.38
	(2.54)	(2.43)	(2.79)	(4.33)
Equity Capital	2.58	2.37	2.38	2.53
	(2.25)	(1.96)	(1.88)	(1.97)
Reserves	5.87	5.96	6.24	8.09
	(7.05)	(7.42)	(7.33)	(9.34)
Net Worth	8.75	8.33	8.62	10.62
	(9.06)	(8.92)	(8.80)	(11.02)
GFA	11.89	13.16	14.70	15.41
	(14.34)	(16.05)	(18.42)	(17.93)
NFA	7.19	8.46	9.18	9.74
	(9.14)	(11.0)	(11.9)	(12.99)
Working Capital	1138.81	1089.90	1230.90	1415.70
	(1076.20)	(1070.20)	(1216.90)	(1409.00)
Total Assets (1)	45.60	49.78	62.52	77.18
	(46.73)	(49.64)	(62.77)	(72.86)
Total Borrowings (1)	10.33	19.85	26.00	31.41
	(11.31)	(22.79)	(31.23)	(35.39)
Bank Borrowings	5.06	5.00	5.15	5.70
	(5.17)	(5.32)	(5.69)	(6.76)
Institutional Borrowings	1.10	1.41	2.07	2.30
	(1.39)	(1.71)	(3.28)	(3.49)

(Table 1 contd.)

Rs. in Crore

	1989-90	1990-'91	1991-'92	1992-'93
Debentures	2.13	2.34	3.02	2.34
	(4.12)	(1.85)	(6.63)	(5.45)
Fixed Deposits	1.23	1.24	1.25	1.12
	(1.80)	(2.24)	(1.31)	(2.24)
Inventory of Raw Materials (2)	4.32	3.76	4.05	4.51
	(4.96)	(3.65)	(4.01)	(4.53)
Inventory of Finished Goods (3)	5.92	5.23	5.75	6.36
	(5.82)	(6.06)	(6.40)	(6.85)
Total Inventory	10.24	8.99	9.80	10.87
	(10.78)	(9.71)	(10.41)	(11.38)
Change in Inventory of Raw Materials (4)	-----	-0.56	0.29	0.46
Change in Inventory of Finished Goods (4)	-----	-0.69	0.52	0.61
Change in Total Inventory (4)	-----	-1.25	0.81	1.07
% Rate of Growth in Net Sales (4)	-----	-2.44	15.59	19.85
% Rate of Growth in Net Profit (4)	-----	-9.72	-4.16	39.86
% Rate of Growth in GFA (4)	-----	10.68	11.70	4.83

Notes : Figures in parentheses are the respective standard deviations.

(1) Deflated by simple average of deflators for fixed capital and for raw materials.
(2) Deflated by price index for raw materials.
(3) Deflated by price index for drugs and medicines.
(4) These were calculated from the industry average figure. Hence standard deviation could not be calculated.

TABLE 2

Drugs and medicines industry : some important ratios for 1989-90 to 1992-93.

	1989-'90	1990-'91	1991-'92	1992-93
Debt /Equity Ratio	1.5997	1.5515	1.8088	1.1497
	(0.9576)	(1.0195)	(1.6594)	(2.5697)
Interest / Debt	14.2365	14.7528	16.7932	16.7874
	(5.1140)	(4.9307)	(5.8982)	(5.2322)
Current Ratio	2.6909	2.7030	2.7780	2.9231
	(0.9701)	(0.9183)	(0.9696)	(1.3192)
Net Worth / Total Assets	31.4512	32.5913	33.8271	31.9218
	(14.5716)	(13.8642)	(13.0470)	(14.9699)
Current Assets / Total Assets	73.3144	70.2402	71.7441	70.9472
	(9.3988)	(12.9538)	(11.2982)	(14.8974)
Retained Profit / Total Assets	4.0850	4.2535	3.2956	3.8087
	(3.9663)	(4.0101)	(5.0857)	(4.5065)
Working Capital / Total Assets	43.5894	42.0550	43.2763	43.1115
	(12.3060)	(13.4233)	(13.6702)	(15.4879)
Total Borrowings / Total Assets	38.8235	39.2308	40.1434	40.2456
	(12.7059)	(13.3367)	(12.9635)	(13.1588)

(Table 2 contd.)

	1989-'90	1990-91	1991-'92	1992-93
PBIDT / Sales	11.3235	12.5225	11.8173	12.5636
	(3.8177)	(6.5690)	(7.3039)	(7.9179)
PBT / Sales	5.2841	5.7333	4.8734	5.1200
	(3.7662)	(4.5982)	(5.0953)	(5.1970)
NPT / Sales	3.8779	4.4430	3.6685	3.8449
	(2.6630)	(3.9873)	(4.4745)	(4.6078)
Tax / PBT	22.9376	20.8890	22.6924	21.1485
	(14.5658)	(17.8817)	(22.6022)	(21.6362)
Bank Borrowings / Total Borrowings	0.49684	0.46461	0.45321	0.42551
	(0.1997)	(0.2104)	(0.1707)	(0.1985)
Institutional Borrowings / Total Borrowings	0.13967	0.15825	0.17353	0.17556
	(0.1674)	(0.1801)	(0.1778)	(0.1678)
Fixed Deposits / Total Borrowings	0.14443	0.13935	0.13216	0.12466
	(0.1357)	(0.1407)	(0.1375)	(0.1286)
Debentures / Total Borrowings	0.10600	0.11788	0.11178	0.11234
	(0.1078)	(0.1603)	(0.1568)	(0.1718)

Note : Figures in the parentheses are the respective standard deviations of the ratios.

4. Testing for persistence of ranks of financial results of the 42 companies from 1989-'90 to 1992-'93.

In order to find out whether rankings of companies in terms of some financial variables of importance have changed over the years, we employed the U-test of Mann-Whitney and Wilcoxon. This is suitable to test for location parameters of two independent populations, $H_0 : Q_1 = Q_2$. The appropriate null hypothesis in this case is that the two independent samples come from identical populations against the alternative that the population is shifted to the left (or right) or that the populations differ only in location. If the two populations are identical, then one would expect that they will get mixed in a regular fashion. If, however, there is any sizeable difference between the location parameters, then most of the lower ranks will be occupied by the observations from one sample, while most of the higher ranks will be occupied by the observations from the other sample.

Let us consider two independent samples of sizes n_1 and n_2 from two populations and rank the combined sample of size $n=n_1+n_2$. Let R_1 be the sum of the ranks of the observation of size n_1 in the joint ranking. The statistic used for testing the hypothesis is

$$u = n_1 n_2 + n_1 (n_1+1) /2 - R_1$$

Under the null hypothesis that both the samples come from the same population it can be shown that

$$E (U) = n_1 n_2 / 2$$

and $$Var (u) = n_1 n_2 (n+1) / 12.$$

For values of moderately large (say, 9 or more) n_1 and n_2, under H_0, U is approximately normal with mean and variance as above. That is $[U-E(u)]/sd(u)$ is approximately a standard normal variate. In tables 3,4 and 5 we have given the computed values of the statistic for each variable when the samples are from two years mentioned at the top. All the variables, except the ratios, have been deflated by sales and NFA so as to make them free of any size factor. Table 3 corresponds to the case of variables deflated by sales and table 4 of variables deflated by NFA. Table 5 gives the same for some important ratios.

TABLE 3

Values of the standard normal variate for Mann-Whitney and Wilcoxon test for equality of location parameters (variables deflated by sales).

	Between					
	1989-90& 1990-'91	1990-'91& 1991-92	1991-'92& 1992-'93	1989-'90& 1991-'92	1989-'90& 1992-'93	1990-'91& 1992-'93
Net Profit	-0.0325	-1.5115	0.3754	-1.2133	-1.2275	-1.3924
Dividend	-1.0792	-0.6376	-0.1059	-1.9743**	-2.2891**	-0.8139
Profit Retained	0.6942	-1.4831	0.3561	-0.7663	-0.5529	-0.8139
Cash Flow	0.3254	2.7348****	0.5775	-0.6173	-0.3318	-0.8139
GFA	0.9870	-1.0297	-1.0877	-0.2235	-1.3270	-2.0102**
NFA	1.0304	-1.0202	-1.1358	-0.2022	-1.2607	-1.9808**
Total Assets	0.6291	-1.8704 *	-0.7989	-1.4794	-2.0569**	-2.4220***
Bank Borrowings	-0.1573	-0.7982	-0.7315	-0.9419	-1.3713	-1.3434

(Table 3 contd.)

(Table 3 contd.)

	Between					
	1989-'90& 1990-'91	1990-'91& 1991-'92	1991-'92& 1992-'93	1989-'90& 1991-'92	1989-'90& 1992-'93	1990-'91& 1992-'93
Institutional Borrowings	0.4284	-0.0189	-0.0481	0.4044	0.3926	-0.0735
Working Capital	-0.1519	-0.8502	-0.1733	-0.7557	-1.0285	-1.0688
Equity Captial	0.0217	-1.1525	-1.2513	-1.2559	-2.3776***	-2.2357
Reserves	0.5098	-0.9541	0.7797	-0.5534	0.2212	-0.0686
Net Worth	0.8894	-1.7193 *	0.0481	-0.9579	-1.0285	-1.5299

Note : * : H_o is rejected at 10% level of significance.
** : H_o is rejected at 5% level of significance.
*** : H_o is rejected at 2% level of significance.
**** : H_o is rejected at 1% level of significance.

TABLE 4

Values of the standard normal variate for Mann-Whitney and Wilcoxon test for equality of location parameters (variables deflated by NFA).

	Between					
	1989-'90& 1990-'91	1990-'91& 1991-92	1991-92& 1992-'93	1989-'90& 1991-'92	1989-'90& 1992-'93	1990-'91& 1992-'93
Sales	-1.0304	1.0202	1.1454	0.0217	1.2607	1.9808**
Net Profit	-0.2386	-0.8502	1.1551	-1.1606	0.2433	0.5589
Dividend	-0.0868	-0.9919	1.2417	-1.0847	0.2433	0.1863
Profit Retained	-1.1985	-0.0520	0.9529	-1.5239	-0.4645	0.7060
Cash Flow	-0.2278	0.3023	1.7230*	-0.3362	1.3270	1.8239 *
Bank Borrowings	-0.7864	-0.0047	-0.0481	-0.8081	-0.6082	0.1373
Working Capital	-0.8569	0.3968	1.0781	-0.5857	0.5861	1.4709
Equity Capital	-0.5966	0.0850	0.1348	-0.7376	-0.5198	0.1373
Reserves	-0.6833	0.2834	1.8962 *	-0.5857	1.4045	2.0690**
Net Worth	-0.5857	-0.0094	1.5112	-0.9870	0.6856	1.2944

Note : * : H_o is rejected at 10% level of significance.

** : H_o is rejected at 5% level of significance.

TABLE 5

Values of the standard normal variate for Mann-Whitney and Wilcoxon test for equality of location parameters (ratios).

	Between					
	1989-'90& 1990-'91	1990-'91& 1991-'92	1991-'92& 1992-'93	1989-'90& 1991-'92	1989-'90& 1992-'93	1990-'91& 1992-'93
EPS	0.3742	-0.7227	0.9866	-0.2767	0.6248	0.4658
P/E Ratio	1.0847	3.5047 *	-0.4717	3.6719 *	4.0364 *	3.8145 *
Net Worth to Total Assets Ratio	0.4556	-0.3826	0.2503	0.2767	0.9898	-0.2010
Total Borrowings to Total Assets Ratio	0.0434	0.6093	-0.0529	0.5694	0.5032	0.3971
Current Ratio	0.2874	0.3731	0.2840	0.6279	0.9898	0.7109
Debt-equity Ratio	-0.3037	0.5196	-0.4091	0.0585	-0.4313	-0.0637
Rate of Return on NFA	-0.2386	-0.8502	0.6738	-0.9579	0.2433	0.5598
Rate of Return on Total Assets	-0.1844	-1.2281	1.0588	-0.1171	-0.3539	-0.2844
Rate of Return on Net Worth	-0.0976	-1.1241	0.9529	-1.1814	-0.4423	-0.3628

Note : * : H_o is rejected at 1% level of significance.

The computed values of the statistic in tables 3, 4 and 5 show that the null hypothesis of equality of location parameters between different years is accepted for most of the variables. This shows that relative position of the companies in terms of their rankings based on the financial variables in statistical sense have remained stable. For table 3 the null hypothesis is rejected for dividend series of 1989-'90 and 1991-'92 (at 5% level of significance) and 1989-'90 and 1992-'93 (at 5% level of significance), for cash flow series of 1990-'91 and 1992-'93 (at 1% level of significance), for GFA and NFA series of 1990-'91 and 1992-'93 (at 5% level of significance), for total assets series of 1990-'91 and 1991-'92 (at 10% level of significance), of 1989-'90 and 1992-'93 (at 5% level of significance) and of 1990-'91 and 1992-'93 (at 2% level of significance), for equity capital series of 1989-'90 and 1992-'93 (at 2% level of significance) and for net worth series of 1990-'91 and 1991-'92 (at 10% level of significance). Table 4 shows that the null hypothesis is rejected for sales series of 1990-'91 and 1992-'93 (at 5% level of significance), for cash flow series of 1991-'92 and 1992-'93 (at 10% level of significance) and for reserves series of 1991-'92 and 1992-'93 (at 10% level of significance) and of 1990-'91 and 1992-'93 (at 5% level of significance).

Table 5 shows that the null hypothesis is rejected only for P/E ratio in all the cases excepting 1989-'90 and 1990-'91.

A comparison between tables 3 and 4 reveals that rejection of null hypothesis is not necessarily the same for a particular variable between any two given years e.g. for the dividend series of table 3 the null hypothesis is rejected for two cases while it is not rejected in any of the cases for table 4.

In general we can say that the null hypothesis of equality of location parameters is not rejected. This implies that relative position of the companies has not changed significantly across the years. This has another implication for regression analysis, viz. there is no structural shift for the companies across years, and hence one can very well pool cross-section and time series data.

5. Testing for association between the key financial variables.

In the earlier section we have shown that the relative position of the companies in terms of the rankings based on their financial performance has remained by and large stable. Now in this section we intend to find out the degree of asso-

ciation between different variables for each year employing a non-parametric method. This will give us a first hand knowledge to find out what are the determinants of a company's performance reflected in its sales, profit etc. For this purpose we have used Spearman's rank correlation coefficient between two variables for each of the four years. To test association between two variables our null hypothesis is that they are independent. We want to test H_o: r = o against H_1: r # o, where r is Spearman's rank correlation coefficient. The statistic employed for this purpose is

$$t = r \sqrt{(n-2)} \; / \; \sqrt{(1-r^2)}$$

Kendall has shown that the above statistic is distributed as a student's t with n-2 d.f. where n is the sample size.

Table 6A to 9C give the values of rank correlation cofficient for the four years. For each year we have three tables distinguished by A, B or C – A for rank correlation coefficient between variables deflated by sales, B for variables deflated by NFA and C mainly for some ratios. We will consider only those cases where the null hypothesis of correlation is rejected.

TABLE 6B

Rank correlations between different variables (variables deflated by NFA) : 1989-'90.

	Sales	Net profit	Dividend	Bank borrowings
Sales		0.5041		
		(3.3014)		
Dividend	0.4999	0.7909		
	(3.2653)	(7.3116)		
Cash Flow	0.4915	0.9233	0.2322	0.0643
	(3.1927)	(13.5987)	(1.3502)	(0.3646)
Bank Borrowings	0.4839	-0.0741	-0.0347	
	(3.1278)	(-0.4203)	(-0.1964)	
Working Capital	0.8738	0.4616	0.4382	0.6431
	(10.1647)	(2.9433)	(2.7575)	(4.7505)
Net Worth		0.7711	0.7166	
		(6.8512)	(5.8126)	

Note : Figures in parentheses are the respective t-ratios for testing H_o:r=0. between different variables.

TABLE 6C

Rank correlations between different ratios : 1989-'90.

	Debt / Equity	EPS	Net Worth/ Total Assets	Total Borrowings/ Total Assets	Current Ratio
EPS	-0.4651		0.3845	-0.3909	0.0819
	(-2.9722)		(2.356)	(-2.4023)	(0.4649)
P/E	-0.1507	-0.4844	0.2303	-0.0998	0.2905
	(-0.8624)	(-3.1323)	(1.3389)	(-0.5674)	(1.1579)
Rate of Return	-0.3482	0.7051	0.2990	-0.3366	-0.0284
on Net Worth	(-2.1014)	(5.6244)	(1.7736)	(-2.022)	(-0.1608)
Rate of Return on	-0.6359	0.6787	0.5991	-0.5664	0.3120
Fixed Assets	(-4.6616)	(5.229)	(4.2325)	(-3.8877)	(1.8578)
Rate of Return on	-0.7362	0.7211	0.7097	-0.6330	0.2034
Total Assets	(-6.1535)	(5.888)	(5.6986)	(-4.6254)	(1.175)
Net Profit (deflated	-0.6233		0.6254	-0.4967	0.1695
by sales)	(-4.5086)		(4.5334)	(-3.2375)	(0.9717)
Net Profit (deflated	-0.6360		0.5991	-0.5664	0.3120
by NFA)	(-4.6616)		(4.2325)	(-3.8877)	(1.8578)

Note : Figures in parentheses are the respective t-ratios for testing H_o : r = 0 between different variables.

TABLE 7A

Rank correlations between different variables (variables deflated by NFA) : 1990-'91.

	Net Profit	Dividend	Bank Borrowings	Institutional Borrowings
Dividend	0.7414		-0.2263	0.0367
	(6.8111)		(-1.4322)	(0.2266)
Cash Flow	0.7993	0.3593	0.1079	0.4712
	(8.1979)	(2.3733)	(0.6689)	(3.2928)
GFA	0.1608	0.0412	0.4769	0.7680
	(1.0042)	(0.2542)	(3.3448)	(7.3926)
NFA	0.2116	0.0361	0.5634	0.7271
	(1.3348)	(0.2228)	(4.2048)	(6.5293)
Total Assets	0.1039	-0.0109	0.6989	0.7122
	(0.6442)	(-0.0673)	(6.0233)	(6.2549)
Bank Borrowings	-0.0572			0.3696
	(-0.3533)			(2.4521)
Working Capital	0.2135	0.2365	0.5287	0.2567
	(1.3472)	(1.5002)	(3.8397)	(1.6375)
Net Worth	0.5510			
	(4.0705)			

Note : Figures in parentheses are the respective t-ratios for testing H_0 : r = 0. between different variables.

TABLE 7B

Rank correlations between different variables (variables deflated by NFA): 1990-'91.

	Sales	Net Profit	Dividend	Bank Borrowings
Sales		0.5440		
		(3.9965)		
Dividend	0.5484	0.8042		
	(4.0422)	(8.3402)		
Cash Flow	0.5311	0.8700	0.5491	0.0296
	(3.8643)	(10.8762)	(4.0504)	(0.1828)
Bank Borrowings	0.3375	-0.0208	-0.0527	
	(2.2103)	(-0.1284)	(-0.325)	
Working Capital	0.8263	0.4696	0.4990	0.5289
	(9.0426)	(3.2789)	(3.5496)	(3.8416)
Net Worth		0.6567	0.6511	
		(5.3673)	(5.2876)	

Note : Figures in parentheses are the respective t-ratios for testing H_0 : r = 0 between different variables.

TABLE 7C

Rank correlations between different ratios : 1990-'91.

	Debt / Equity	EPS	Net Worth/ Total Assets	Total Borrowings/ Total Assets	Current Ratio
EPS	-0.0987		0.4231	-0.1519	0.0425
	(-0.6114)		(2.8785)	(-0.7473)	(0.2623)
P/E	-0.3607	-0.3487	0.3428	-0.2772	0.0853
	(-2.3841)	(-2.2935)	(2.2493)	(-1.7786)	(0.5277)
Rate of Return	-0.0304	0.6949	0.0161	-0.0470	0.0330
on Net Worth	(-0.1877)	(5.9564)	(0.0995)	(-0.290)	(0.2037)
Rate of Return	-0.5614	0.5073	0.4933	-0.5488	0.2825
on Fixed Assets	(-4.1817)	(3.6292)	(3.4954)	(-4.047)	(1.8155)
Rate of Return	-0.4913	0.6673	0.5041	-0.4049	0.2440
on Total Assets	(-3.4772)	(5.5229)	(3.5984)	(-2.7297)	(1.5513)
Net Profit	-0.2914		0.3696	-0.1751	0.2138
(deflated by sales)	(-1.8777)		(2.4521)	(-1.0961)	(1.3423)
Net Profit	-0.5614		0.4933	-0.5488	0.2825
(deflated by NFA)	(-4.1817)		(3.4954)	(-4.0470)	(1.8155)

Note : Figures in parentheses are the respective t-ratios for testing H_o : r = 0 between different variables.

TABLE 8A

Rank correlations between different variables (variables deflated by sales): 1991-'92.

	Net Profit	Dividend	Bank Borrowings	Institutional Borrowings
Dividend	0.7433		-0.0171	0.0689
	(6.9386)		(-0.1069)	(0.4317)
Cash Flow	0.8894	0.5576	0.1946	0.3461
	(12.1484)	(4.1952)	(1.239)	(2.3034)
GFA	0.1153	0.0620	0.2899	0.8058
	(0.7251)	(0.3879)	(1.8917)	(8.4980)
NFA	0.2270	0.1097	0.3885	0.7999
	(1.4556)	(0.6891)	(2.6330)	(8.3426)
Total Assets	0.2779	0.1762	0.5920	0.6918
	(1.8064)	(1.1179)	(4.5871)	(5.9837)
Bank Borrowings	0.0897			0.3040
	(0.5626)			(1.9929)
Working Capital	0.5443	0.4544	0.5664	0.2245
	(4.0514)	(3.1858)	(4.2918)	(1.4389)
Net Worth	0.6420	0.5915		
	(5.2291)	(4.5814)		

Note : Figures in parentheses are the respective t-ratios for testing H_o: r = 0 between different variables.

TABLE 8B

Rank correlations between different variables (variables deflated by NFA): 1991-'92.

	Sales	Net Profit	Dividend	Bank borrowings
Sales		0.4514		
		(3.1591)		
Dividend	0.5162	0.7536		
	(3.7643)	(7.1591)		
Cash Flow	0.5037	0.8500	0.6231	0.2582
	(3.6409)	(10.0767)	(4.9754)	(1.6690)
Bank Borrowings	0.5415	0.0983	0.1762	
	(4.0220)	(0.6166)	(1.1179)	
Working Capital	0.8488	0.5244	0.5826	0.6627
	(10.0249)	(3.8460)	(4.4766)	(5.5266)
Net Worth		0.6612	0.6834	
		(5.5033)	(5.8458)	

Note : Figures in parentheses are the respective t-ratios for testing H_0: r = 0 between different variables.

TABLE 8C

Rank correlations between different ratios : 1991-'92.

	Debt / Equity	EPS	Net Worth/ Total Assets	Total Borrowings/ Total Assets	Current Ratio
EPS	0.2647		-0.2434	0.1873	-0.0386
	(1.7327)		(-1.5670)	(1.1906)	(-0.2412)
P/E	-0.2541	-0.3815	0.1838	-0.2293	0.0416
	(-1.5408)	(-2.5776)	(1.1677)	(-1.4710)	(0.2603)
Rate of Return	-0.1442	0.1718	0.1859	-0.1511	0.2214
on Net Worth	(-0.9098)	(1.0890)	(1.1757)	(-0.9543)	(1.4176)
Rate of Return	-0.5225	-0.0460	0.5011	-0.4430	0.3783
on Fixed Assets	(-3.3270)	(-0.2857)	(3.6157)	(-3.0861)	(2.5519)
Rate of Return	-0.5063	0.0084	0.5737	-0.3143	0.4154
on Total Assets	(-3.5664)	(0.0522)	(4.3741)	(-2.0675)	(2.8518)
Net Profit	-0.3092		0.3911	-0.2317	0.3258
(deflated by sales)	(-2.0302)		(2.6539)	(-1.4875)	(2.1523)
Net Profit	-0.5225		0.5011	-0.4430	0.3783
(deflated by NFA)	(-3.3270)		(3.6157)	(-3.0861)	(2.5519)

Note : Figures in parentheses are the respective t-ratios for testing H_o : r = 0 between different variables.

TABLE 9A

Rank correlations between different variables (variables deflated by sales): 1992-'93.

	Net profit	Dividend	Bank Borrowings	Institutional Borrowings
Dividend	0.7820		-0.1966	0.0895
	(7.6310)		(-1.2195)	(0.5464)
Cash Flow	0.7723	0.4757	0.1961	
	(7.3946)	(3.2892)	(1.2162)	
GFA	-0.0089	-0.0290	0.4049	0.8621
	(-0.0542)	(-0.1762)	(2.6934)	(10.3503)
NFA	0.1253	0.0146	0.4371	0.8567
	(0.7682)	(0.0887)	(2.9559)	(10.1013)
Total Assets	0.1543	-0.0176	0.6190	0.7739
	(0.9496)	(-0.1072)	(4.7936)	(7.4326)
Bank Borrowings	-0.0143			0.4879
	(-0.0871)			(3.3995)
Working Capital	0.2063		-0.1444	
	(1.2823)		(-0.8879)	
Net Worth	0.6579	0.5963		
	(5.3137)	(4.5178)		

Note : Figures in parentheses are the respective t-ratios for testing H_o : r = 0 between different variables.

TABLE 9B

Rank correlations between different variables (variables deflated by NFA): 1992-'93.

	Sales	Net Profit	Dividend	Bank Borrowings
Sales		0.6729		
		(5.5327)		
Dividend	0.7745	0.8378		
	(7.4470)	(9.3329)		
Cash Flow	0.6705	0.9678	0.6341	
	(5.4965)	(23.3905)	(4.9850)	
Bank Borrowings	0.4377	0.1495	0.1692	
	(2.9609)	(0.9197)	(1.0451)	
Workings Capital	0.8464	0.7192	0.7519	0.5413
	(9.6660)	(6.2969)	(6.9373)	(3.9158)
Net Worth		0.7192	0.8912	
		(6.2969)	(11.9533)	

Note : Figures in parentheses are the respective t-ratios for testing H_o: r = 0 between different variables.

TABLE 9C

Rank correlations between different ratios : 1992-'93.

	Debt / Equity	EPS	Net Worth /Total Assets	Total Borrowings /Total Assets	Current Ratio
EPS	-0.1154		0.2808	-0.2374	0.2093
	(-0.7068)		(1.7794)	(-1.4862)	(1.3017)
P/E	0.0360	-0.3233	0.0630	-0.0727	-0.0959
	(0.2194)	(-2.0780)	(0.3837)	(-0.4432)	(-0.5860)
Rate of Return	-0.2244	0.6235	0.1136	-0.0338	0.0931
on Net Worth	(-1.4004)	(4.8507)	(0.6953)	(-0.2058)	(0.5686)
Rate of Return	-0.4573	0.5170	0.4739	-0.5489	0.2984
on Fixed Assets	(-3.1281)	(3.6739)	(3.2735)	(-3.9942)	(1.9019)
Rate of Return	-0.4266	0.6458	0.6340	-0.3555	0.4341
on Total Assets	(-2.8617)	(5.1443)	(4.9869)	(-2.3132)	(2.9308)
Net Profit	-0.2702		0.5664	-0.1511	0.4658
(deflated by sales)	(-1.7072)		(4.1805)	(-0.9298)	(3.2023)
Net Profit	-0.4573		0.4739	-0.5489	0.2984
(deflated by NFA)	(-3.1281)		(3.2735)	(-3.9942)	(1.9019)

Note : Figures in parentheses are the respective t-ratios for testing H_0 : r = 0 between different variables.

The tables in general reveal that some of the results are quite robust in terms of values of the rank correlation coefficient as well as the rejection of the null hypothesis of zero correlation in all the four years. In the other cases even if the null hypothesis is not rejected or rejected in some of the years. the correlation coefficient is properly signed that one would expect from the standpoint of economic theory. However, we will consider only those cases in which the null hypothesis is rejected.

The robust result (i.e. rank correlation is quite high as well as the null hypothesis of zero correlation is rejected in all the four years) is obtained for net profit with dividend, cash flow and net worth, bank borrowing with total assets, institutional borrowing with GFA, NFA and total assets, cash flow with dividend for tables of category A. For the tables of category B, the robust result is obtained for net profit with dividend, cash flow, working capital and net worth, sales with net profit, dividend, cash flow, bank borrowings and working capital and bank borrowing with working capital. In this case rank correlation of any of the fixed assets (gross or net) with other variables cannot be obtained as in this case our deflator for size is NFA. For the tables of category C, the same result is obtained for debt-equity ratio with rates of return on fixed and total assets and profit deflated by NFA, earning per share (EPS) with price earning ratio (P/E), net worth to total assets ratio with rates of return on fixed and total assets and profits deflated both by sales and NFA and total borrowings to total assets ratio with rates of return on fixed and total assets and profit deflated by net fixed assets. The rate of return on net worth does not give any robust result in respect of its correlation with other variables.

We also find that the rank correlation between net profit and bank borrowing is low except in 1989-'90 and the null hypothesis is rejected only in this year. Bank borrowing is correlated with GFA in 1990-'91 and 1992-'93 and with NFA in all the years excepting 1989-'90. Also GFA and NFA are highly correlated with institutional credit and in this case the result is robust. This shows that in an important determinant of fixed capital stock is amount of outstanding credit from the financial institutions and partially from banks. To put it differently the level of new investment depends upon the flow of additional credit from the financial institutions and banks. On the other hand the major determinant of working capital

is bank borrowing. For the tables of the category B the correlation of bank borrowing with working capital is robust while for category A it is quite high (around 0.6) except in 1992-'93. The conclusion about the role of the bank borrowing is again strengthened by the observation from tables of category B. For tables of A category the correlation between bank borrowings and institutional borrowings is positive and all the three years except in 1989-'90 and it shows a rising tendency. Net profit is not correlated with any of the fixed assets (gross or net) and total assets in all the years. The tables of A and B category show that dividend and cash flow are positively correlated in all the three years excepting 1989-'90.

As far as the rank correlation between ratios are concerned (i.e. table of category C), we mentioned earlier that the debt-equity ratio shows robust relation with rates of return on fixed and total assets but not with the rate of return on net worth. Similar is the case for correlation of these two rates of return with net worth to total assets and total borrowings to total assets ratio. However, all the three rates of return show similar results with EPS, viz. the null is rejected in 1989-'90, 1991-'92 and 1992-'93. Current ratio has no robust relationship with any other ratio.

6. Relations between the financial variables and the key role of institutional credit

In the above section we have shown in a non-parametric setting the degree of association between the different variables for each of the four years. The result shows some positive achievements in this respect. But to find out the exact functional relationship (or at least some linear approximation) between different variables non-parametric methods are inadequate. This can be done with the help of rigorous econometric methods. In this section we try to explore the econometric evidence of functional relations between different variables. The group of 42 selected companies includes large as well as small units. Thus the problem of heteroscedasticity might arise in this knd of cross-section studies. The influence of the mere 'size' of the units should then be eliminated to get more efficient estimates of the parameter. The most common procedure is to deflate all the variables by some kind of measures of the size variable (Maddala, 1977). For example, suppose the relationship under consideration is of the form

$$Y_i = a + bZ_i + cX_i + u_i \quad \ldots\ldots\ldots\ldots \quad (1)$$

where i varies across cross-sectional units and the residuals u_i are found to be heteroscedastic with variance roughly proportional to z_i^2. in this case, we should divide (1) throughout by z_i to obtain

$$y_i/z_i = b + a/z_i + cx_i/z_i + v_i \quad \ldots\ldots \quad (2)$$

where $v_i = u_i / z_i$ will have a constant variance σ^2. It is suggested that the parameters a, b, c and σ^2 should be estimated from the regression equation (2). But once these estimates have been found out, all types of inferences - prediction of future values, calculation of elasticities at the means etc. should be obtained from the original form (1). It may be noted that if the variance of u_i in (1) is proportional not to z_i^2 but to z_i or some other function of z_i, regression equation (1) should be divided throughout by the square root of z_i or some other suitable divisor so that the variance of the modified error has a constant variance.

We have chosen two commonly used deflators viz. the total value of sales and of NFA both at the 1980-'81 prices. Thus for each of the companies we have divided all the relevant variables by the value of the corresponding sales and NFA. We also worked with the variables deflated by square roots of sales and NFA. This is appropriate if the variance of disturbance term is proportional to sales or NFA. But the regression results corresponding to this deflated data set are poor compared with the one obtained when we deflate the variables by sales and NFA. We have also divided the sample of 42 companies in two broad categories. The first group includes those companies for which all the data are available in at least one of the four years covered by the study and this set contains 154 observations in total. However, the second group contains only those companies for which the relevant data are available in all the four years and this set contains 132 observations in total. All the regressions are carried out, using each of these two deflators and also for each of the two groups mentioned above. The most important results are reported in the following tables followed by the graphs of the actual and fitted values, each of which corresponds to some major regressions in each table as mentioned in the respective graphs.

TABLE 10

Dependent Variables | **Independent Variables**

	Constant	Reciprocal of Sales	Price Ratio	Net Fixed Assets	Net Profit	Bank Borrowings	Institutional Borrowings	Rate of Return on Invested Capital	R^2	$\bar{R}^2$	S.D of Dependent Variable
(a)Dividend	0.0059*	-1.071*	1.404*	0.0067*	-----	-----	-----	-----	0.275	0.26	0.00828
	(0.0008)	(0.208)	(0.265)	(0.0034)	-----	-----	-----	-----			
(b)Dividend	0.0022*	0.048*	-----	-----	0.1678*	-----	-----	-----	0.462	0.45	0.00828
	(0.00079)	(0.008)	-----	-----	(0.01653)						
(c) Net Fixed Assets	0.0863*	0.1715	-----	-----	0.17636	-----	1.5262*	-----	0.623	0.62	0.1821
	(0.0147)	(0.1612)	-----	-----	(0.3610)	-----	(0.1258)				
(d) Net Fixed Assets	0.0954*	-----	-----	-----	-----	-----	1.5907*	-----	0.621	0.61	0.1821
	(0.0104)	-----	-----	-----	-----	-----	(0.1009)				

(Table 10 contd.)

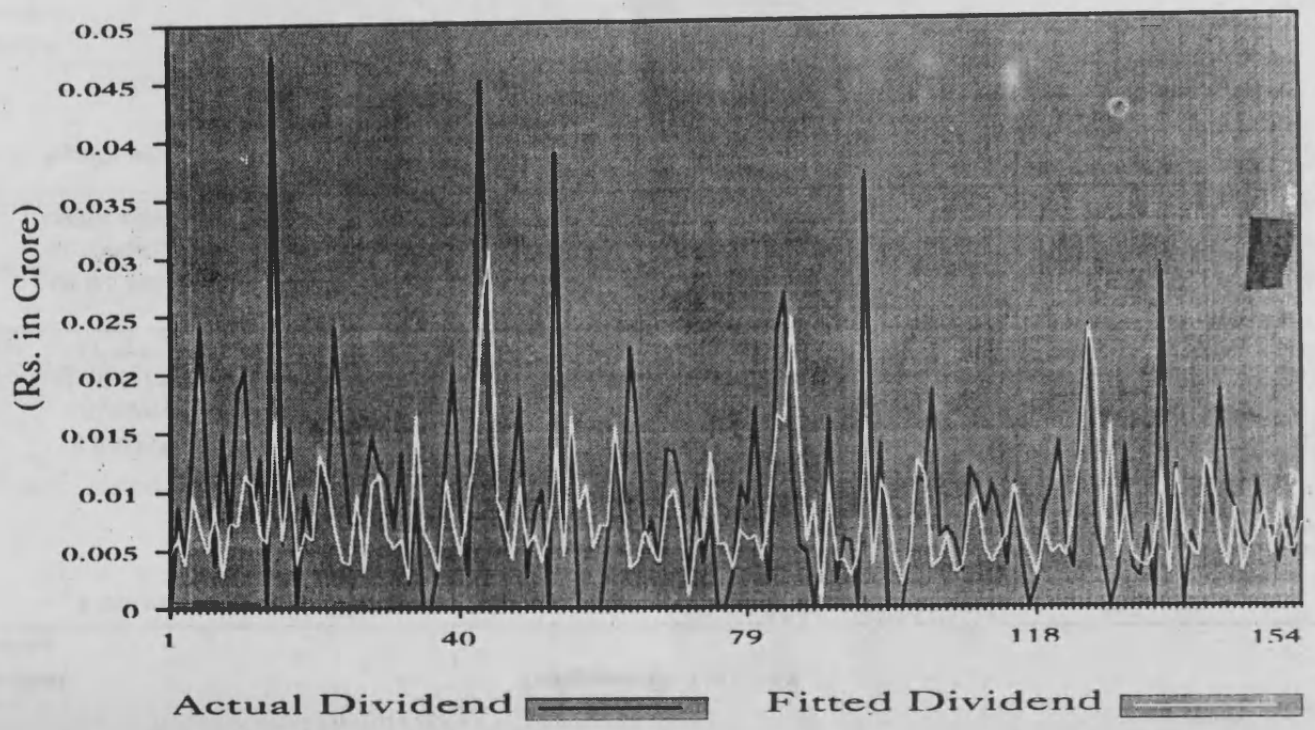
(Table 10 contd.)

Dependent Variables	Independent Variables										
	Constant	Reciprocal of Sales	Price Ratio	Net Fixed Assets	Net Profit	Bank Borrowings	Institutional Borrowings	Rate of Return on Invested Capital	R^2	$\bar{R}^2$	S.D of Dependent Variable
(e)Net Fixed Assets	0.07435* (0.0099)	0.6105* (0.1454)	-----	-----	-----	-----	1.4443* (0.0908)	64.47* (8.216)	0.733	0.73	0.1821
(f) Working Capital	16.546* (1.2932)	-----	-----	-----	-----	61.802* (8.8061)	-----	-----	0.245	0.24	11.037

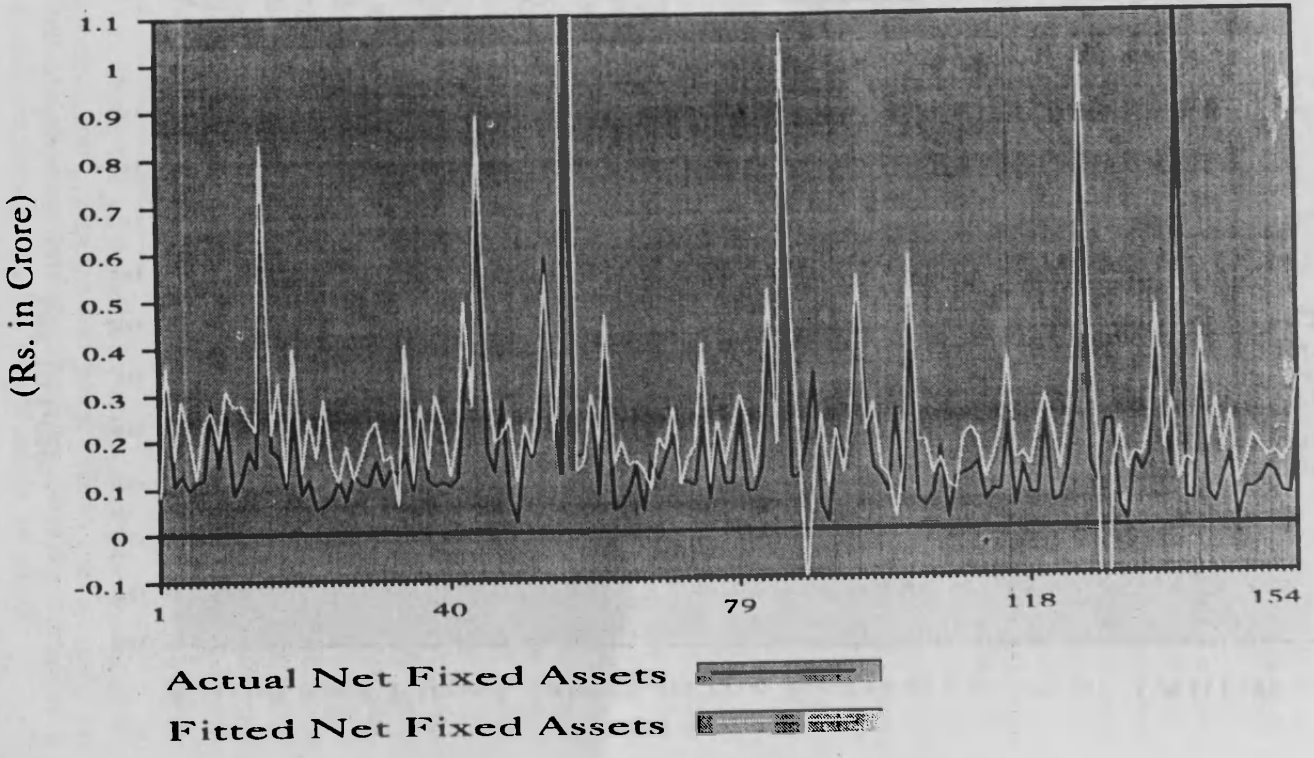
Note : All the variables (at 1980-'81 prices) are deflated by the corresponding value of the total sales at 1980-'81prices. The data set contains 154 observations. The figures within the perentheses are the standard errors of the corresponding regression coefficients.

* Significant at 5% level.

Actual and Fitted values in the Regression (b) of TABLE - 10



Actuai and Fitted values in the Regression (e) of TABLE - 10



Actual and Fitted values in the Regression (f) of TABLE - 10

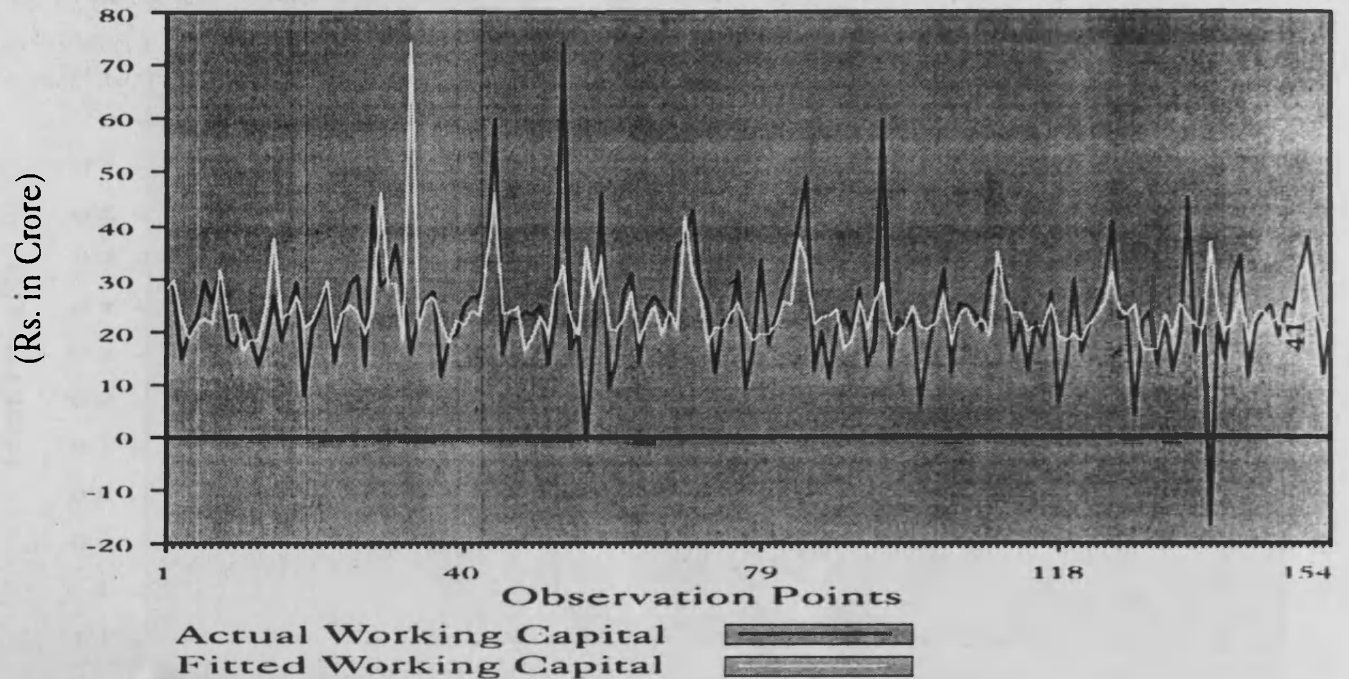


Table 10 evidently shows that variations in the dividend series is mostly explained by net profit and the sales value. For NFA, institutional borrowings turn out to be significant in all the three cases while the rate of return on invested capital also bears a positive relation with the value of NFA. This shows that flow of term loans (or its increment) which in the Indian case, is provided by the financial institutions, significantly influences the level of capital stock (or additional investment). This result is similar to that of Fazzari, Hubbard and Peterson (1988) though their methodology is quite different. Our methodology is very simple and hence subject to several criticisms, but as a first exercise the result is suggestive. For working capital, bank borrowing is the most significant explanatory variable. In a regime of administered interest rate it is the allocation of credit that links real with the financial variables. In an LDC with underdeveloped capital market the flow of credit not only strongly influences the level of investment, but also provides the working capital needs (which is short term in nature and in the Indian case is provided by the commercial banks) of the industry.

The corresponding results for the same set of observations but using the NFA as the deflator are reported in table 11. The inverse relation between sales and the price ratio[2] which in fact is the ratio of WPI for drugs and medicines to the price index for working capital, is evident in first two equations presented in table 11. The coefficients are statistically significant as well. This is an expected relation between drug prices & drug sales. For these two relations, bank borrowings also bears a positive relation with sales and the coefficients are accepted at 95% level of significance as shown in table 11. These regression results are in conformity with the non-parametric tests of the earlier section. The emphasis of bank (or non banking financial institution) credit in the production and or investment process as a cheap source of credit dates back its origin as early as to the writtings of Keynes [see Bagchi (1994)]. The important role of institutional credit has also been advocated by many development economists [see for example McKinnon (1973), Rakshit (1982), (1989),

[2] Using the price index for drugs and medicines industry for each company's product price implies that we have an implicit assumption that the company products comprise a composite commodity basket in the sense of Hicks.

Shaw (1973), Taylor (1983), Wijnbergen (1[illegible]) e[illegible], that [illegible] may act as a constraining factor on curre[illegible] production as well as on capital formation in a regime of [illegible]ministered interest rates.

Even if the interest rates are not admi[illegible]red by the banking authority, [see e.g. Bencivenga and Smith (1993), Bernanl[illegible] and Gertler (1987), Jaffee and Russell (1976), de Meza and Webb (1992), Stiglitz and Weiss (1981), Williamson (1987)] banks may fix up the loan rate and [illegible]ration credit. As a result some borrowers may be rationed in the credit market and rationed out of it altogether. In case of LDCs the problem is particularly acute, because in LDCs firms depend greatly on short term credit (in the Inidan case it is provided by the commercial banks) to meet its working capital needs. Thus production gets constrained by the availability of bank loans. By implication one should expect a negative relation between price ratio and bank borrowing. The third equation of the table confirms this expected relation. Also the value of NFA appears to be significant in both the equations for the price ratio. As before, for the dividend series, net profit and the sales value turn out to be the two most significant explanatory variables.

TABLE 11

Independent Variables

Dependent Variables	Constant	Price ratio	Price (not deflated)	Reciprocal of NFA	Bank borrowings	Sales	Net profit	R^2		S.Dof u dependent variable
(a) Sales	0.93797 (0.9776)	-321.787* (35.159)	-----	268.298* (45.223)	6.037* (0.595)	-----	-----	0.816	0.812	21.2703
(b) Sales	54.0746* (23.0678)	-----	-69.407* (28.831)	18.038* (2.256)	0.564* (0.671)	-----	-----	0.763	0.758	21.2703
(c) Price Ratio	0.00617* (0.0014)	-----	-----	0.776* (0.0036)	-0.002* (0.0011)	-----	-----	0.99819	0.99816	0.3869
(d) Price Ratio	0.00704* (0.0015)	-----	-----	0.792* (0.0037)	-----	-0.001* (0.0001)	-----	0.999	0.998	0.3869
(e) Dividend	-0.0189 (0.009)	-----	-----	0.095 (0.0138)	-----	-----	0.294* (0.026)	0.62	0.615	0.1307

(Table 11 cotnd.)

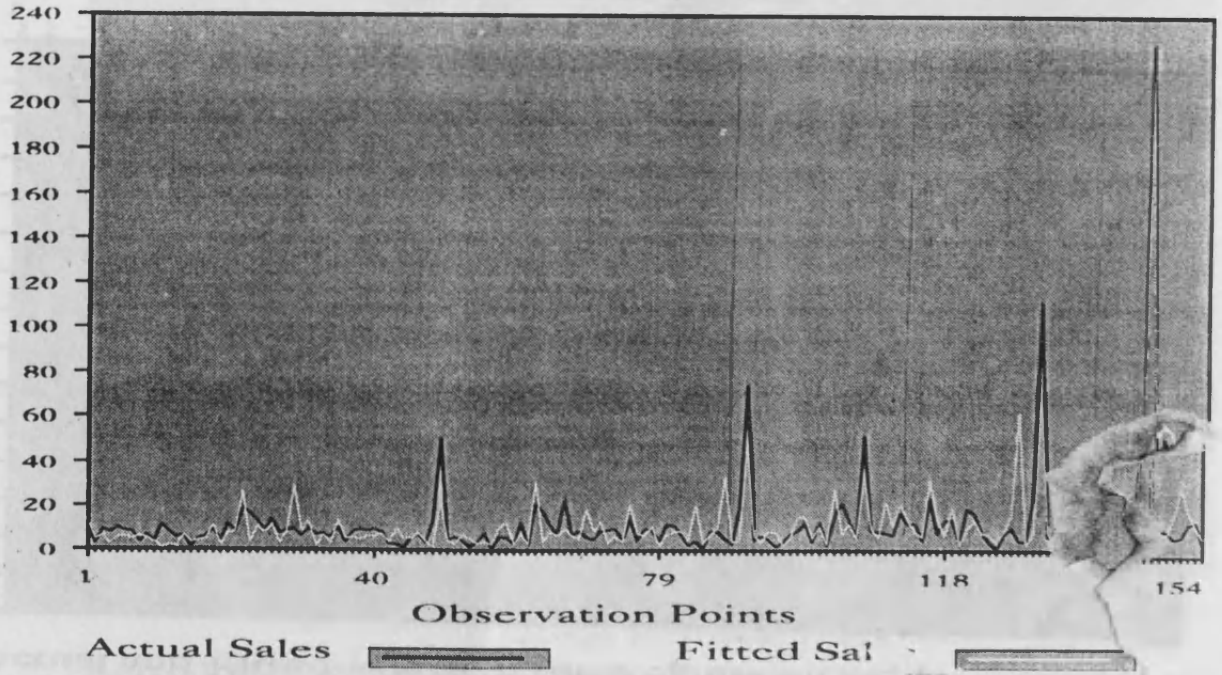
(Table 11 contd.)

Dependent Variables	Independent Variables									
Dependent variable	Constant	Price ratio	Price (not deflated)	Reciprocal of NFA	Bank borrowings	Sales	Net profit	R^2		of the dependent variables.
(f) Dividend	0.0012 (0.0073)	-----	-----	-0.0369* (0.0154)	-----	0.01* (0.001)	0.187* (0.022)	0.794	0.79	0.1307
(g) Working Capital	-49.636 (19.897)	-----	-----	265.04* (42.8)	212.278* (12.769)	-----	-----	0.841	0.838	495.697

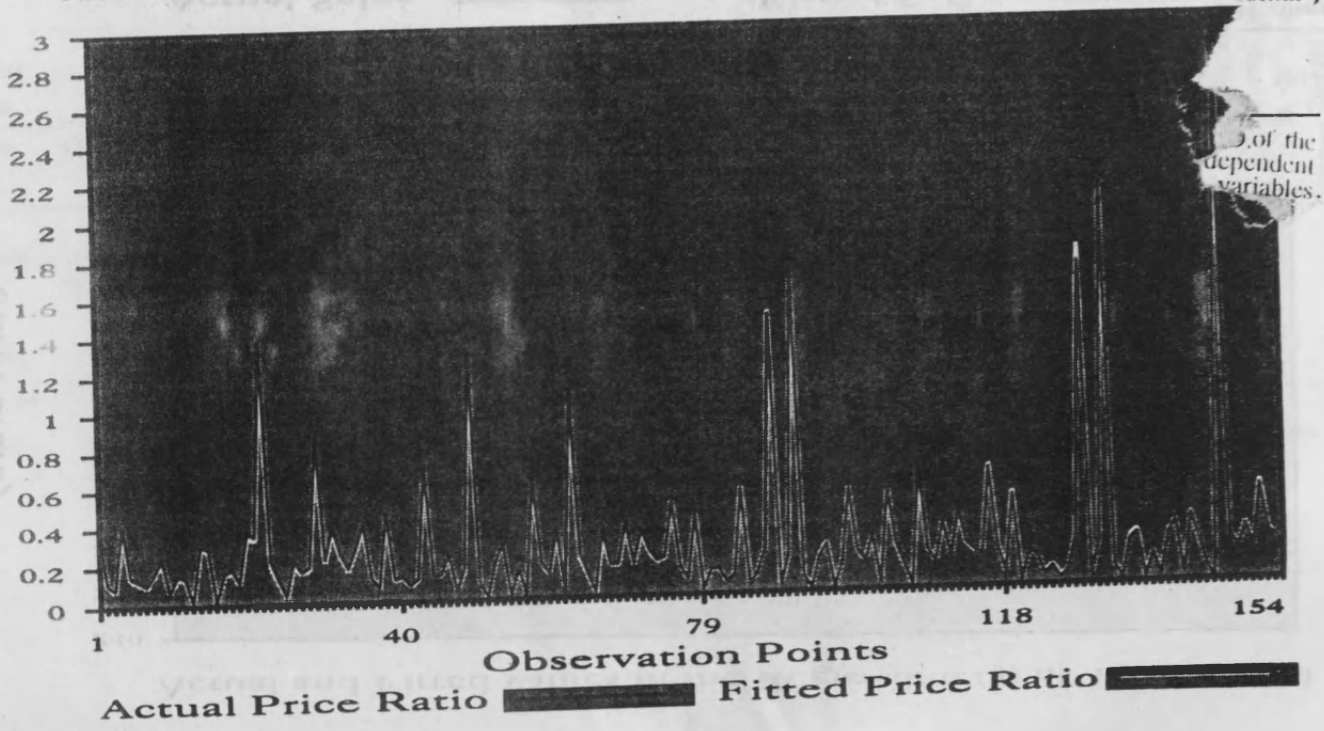
Note : All the variables (at 1980-'81 prices) are deflated by the value of NFA at 1980-'81 prices. The data set contains 154 observations. The figures within the paranthesses are the standard errors of the corresponding regression coefficients.

* Significant at 5% level.

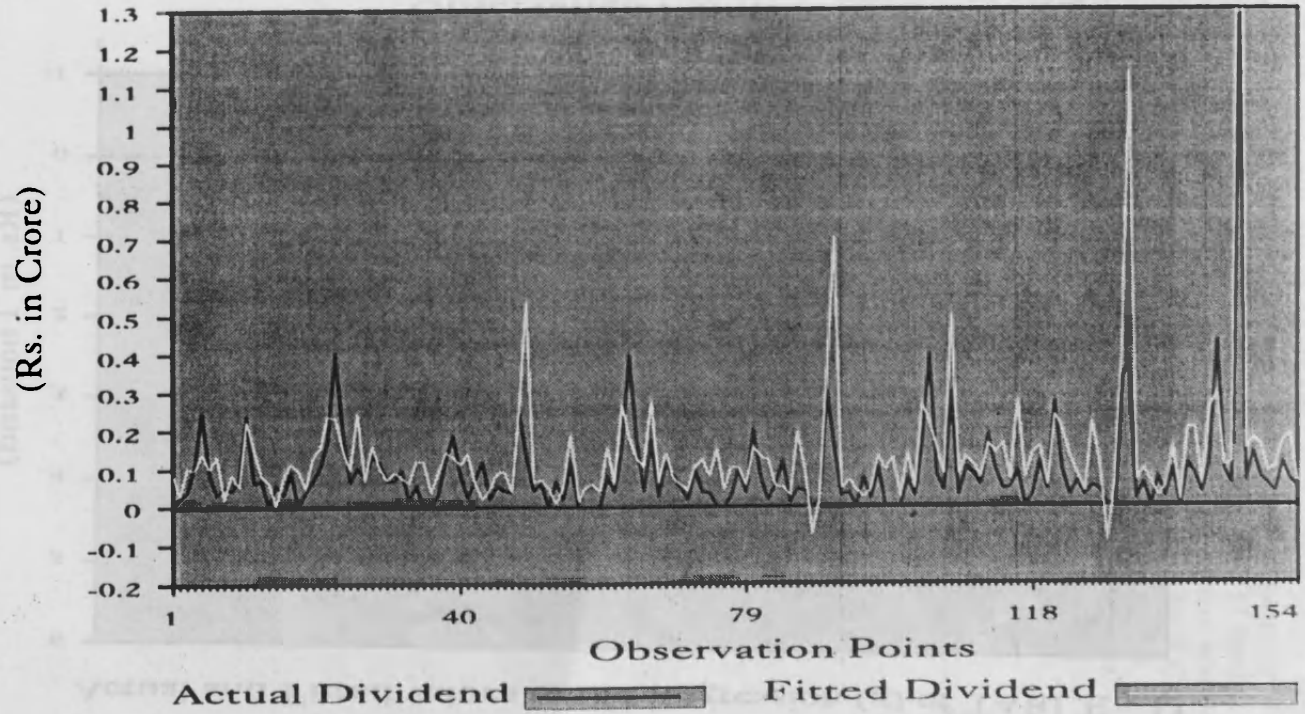
Actual and Fitted values in the Regression (a) of TABLE - 11



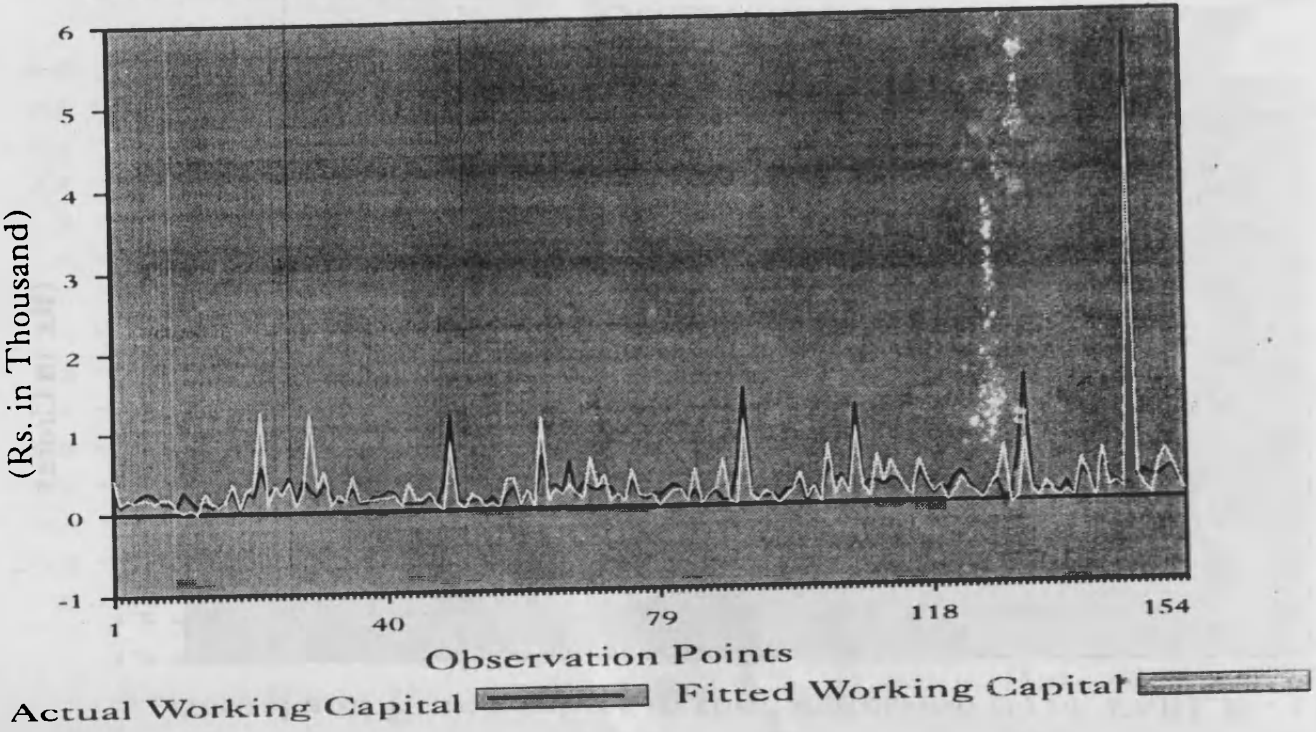
Actual and Fitted values in the Regression (d) of TABLE - 1



Actual and Fitted values in the Regression (f) of TABLE - 11



Actual and Fitted values in the Regression (g) of TABLE - 11



Apart from the above exercises, some regressions were also attempted at the original levels of the variables for the same set of 154 observations, to explore the kind of relations that exist between the fundamental variables of the companies/firms. The results are presented in table 12 which shows that in general, the regression results are in conformity with each other for both the deflated as well as non-deflated (at the levels) series though in the later case performance in terms of R^2 is bad.

TABLE 12

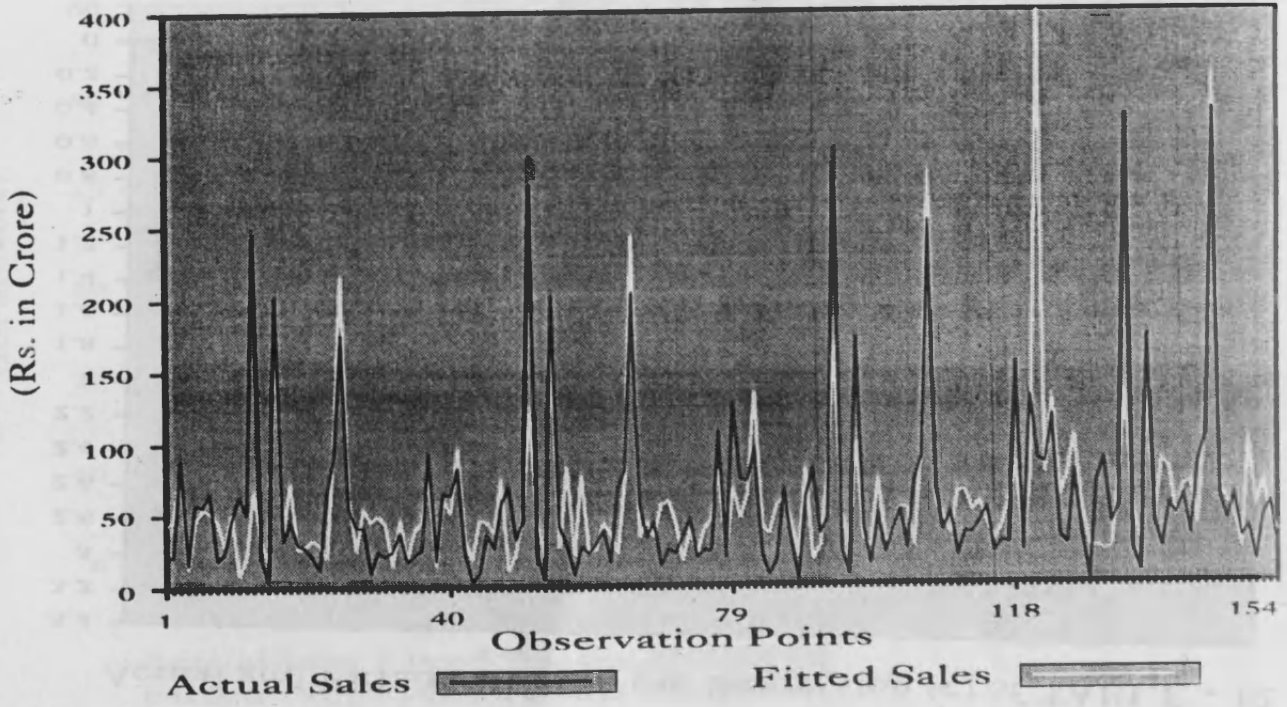
Independent Variables

Dependent Variables	Constant	Bank borrowings	Price ratio	Institutional borrowings	Sales	Net Profit	R^2	$\bar{R}^2$	S.D of the dependant variable
(a) Sales	159. 634 (83.284)	8.268 (0.5366)	-181.76 (104.22)	-----	-----	-----	0.617	0.612	61.0263
(b) Dividend	0.1362* (0 0372)	-----	-----	-----	-----	0.218* (0.0147)	0.593	0.59	0.5639
(c) Dividend	0.0202 (0.0331)	-----	-----	-----	0 00478* (0.00054)	0.116* (0.116)	0.731	0.727	0.5639
(d) Net Fixed assets	4.5091* (0.8659)	-----	-----	2 4027* (0.2708)	-----	-----	0.341	0.337	11.0672
(e) Working capital	281.5753* (67.3308)	179.595* (8.6921)	-----	-----	-----	-----	0.737	0.735	1199

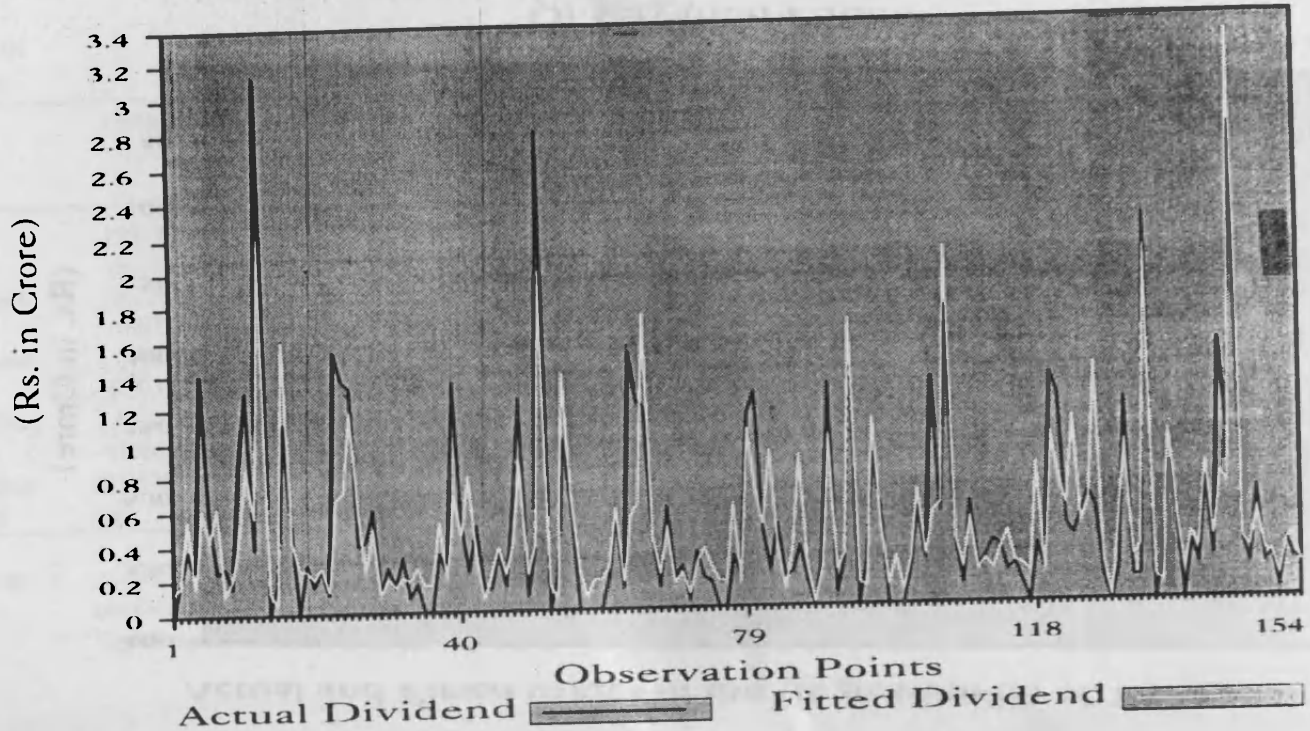
Note : All variables are expressed at 1980-'81 prices. Figures in the parentheses are the standard error of the corresponding coefficients.

* Significant at 5% level.

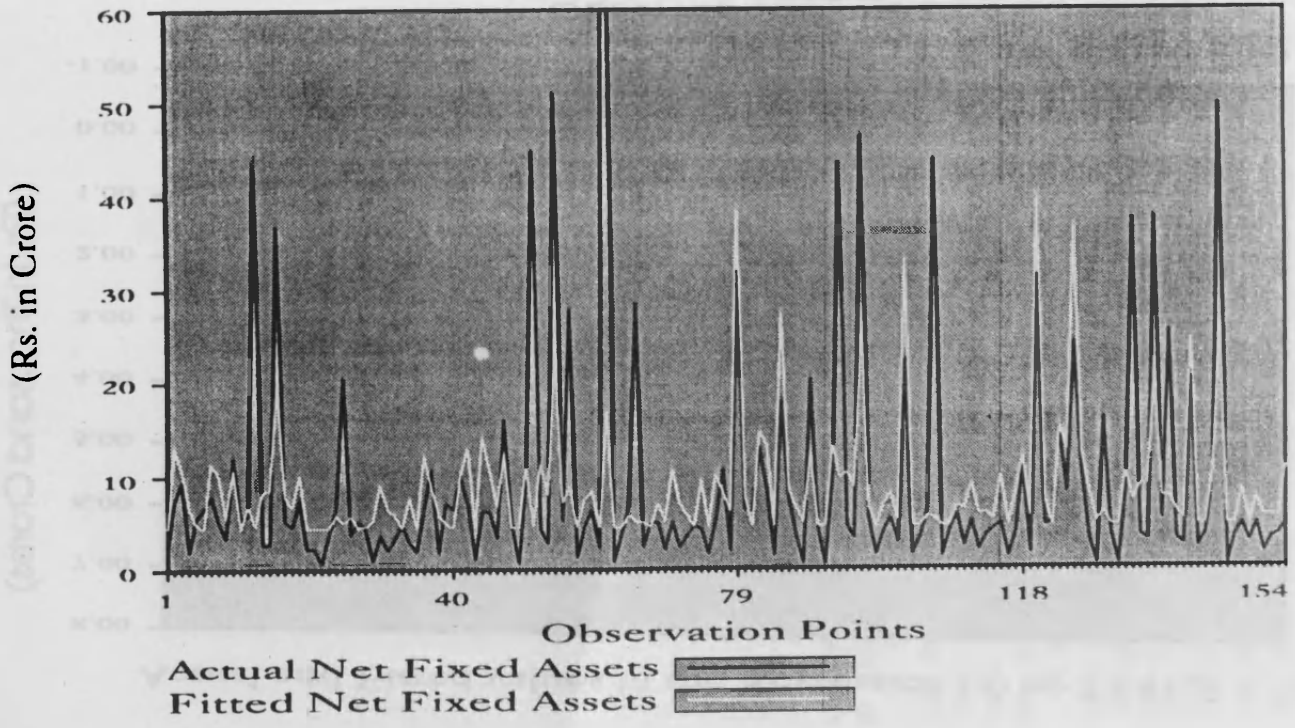
Actual and Fitted values in the Regression (a) of TABLE - 12



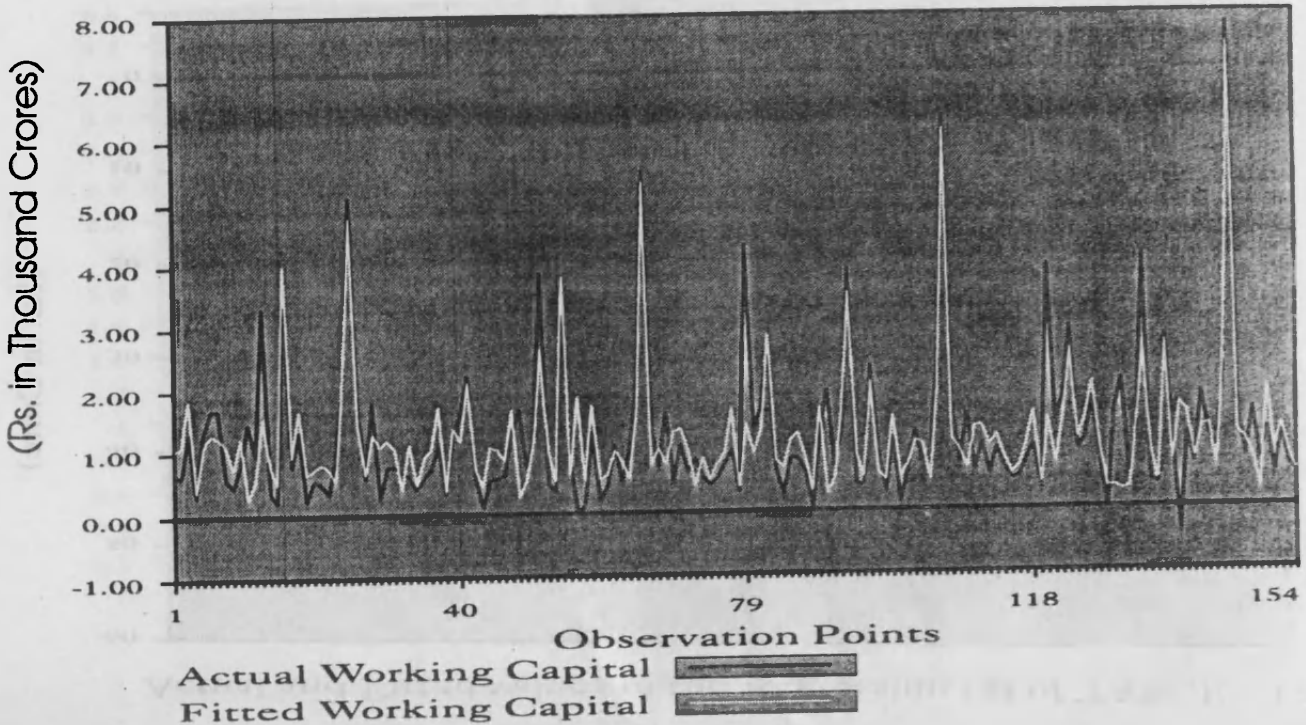
Actual and Fitted values in the Regression (c) of TABLE - 12



Actual and Fitted values in the Regression (d) of TABLE - 12



Actual and Fitted values in the Regression (e) of TABLE - 12



Similar kind of exercises have also been tried for the second group, consisting of only those companies that appear in all the four years and containing 132 observations. As mentioned above, in this case, our focus in on the relations that exist between the change of the variables. As this group involves 33 companies, we therefore lose 33 observations while considering one period lagged values and thus the regression results are being obtained on the basis of 99 observations. Here also we use the same deflators along with the non-deflated series. The results are given in tables 13 and 14.

In table 13, for both the relations explaining one period change in the inventory of finished goods, change in bank borrowings appears to be statistically significant. The same result repeats itself for the change in the inventory of raw materials as well.

For the other deflated series, where the value of NFA at 1980-'81 prices, is used as the deflator, the following results have been obtained as shown in table 14.

TABLE 14

Dependent Variables	Independent Variables				
	Constant	Change in bank borrowings	R^2	$\bar{R}2$	S.D. of the dependent variable
(a) Change in the inventory of finished goods	0.07085 (0.05628)	1.3581* (0.03439)	0.9414	0.9408	2.294
(b) Change in the inventory of raw materials	----- -----	1.0688* (0.02403)	0.9523	0.9523	1.7916
(c) Change in the inventory of raw materials	0.03523 (0.0395)	1.067* (0.02414)	0.9527	0.9522	1.7916

Note : All the variables (at 1980-'81 prices) are deflated by the value of NFA at 1980-'81 prices. The data set contains 99 observations. Figures in the parentheses are the standard errors of the corresponding regression coefficient.

* Significant at 5% level.

TABLE 15

Dependent Variables	Independent Variables										
	Constant	Price ratio	Bank borrowings	NFA	Net profit	Sales	EPS	Institutional borrowings	R^2	$\bar{R}^2$	S.D. of the dependent variable
(a) Sales	88.96 *	-95.85	8.21 *	—	—	—	—	—	0.628	0.623	63.308
	(41.22)	(54.26)	(0.56)								
(b) Sales	86.79 *	-96.85 *	2.75 *	3.92 *	—	—	—	—	0.831	0.827	63.308
	(27.87)	(36.68)	(0.58)	(0.32)							
(c) Equity	0.161 *	—	—	—	0.214*	—	—	—	0.58	0.577	0.583
dividend	(0.042)				(0.016)						
(d) Equity	0.032	—	—	—	0.113*	0.005*	—	—	0.716	0.711	0.583
dividend	(0.039)				(0.018)	(0.001)					

(Table 15 contd.)

(Table 15 contd.)

Dependent Variables	Independent Variables										
	Constant	Price ratio	Bank borrowings	NFA	Net profit	Sales	EPS	Institutional borrowings	R^2	$\bar{R}^2$	S.D. of the dependent variable
(e) Share price	158.287 * (74.37)	—	—	—	—	—	12.36 * (0.93)		0.577	0.574	1242
(f) NFA	3.9194 * (0.9725)	—	—	—	—	—	—	3.128* (0.3856)	0.336	0.331	11.103

Note : All the variables are expressed at 1980-'81 prices. The figures in the parenthesis are the standard errors of the corresponding regression coefficients.

* Significant at 5% level.

Table 14 confirms the previous result that for both the changes in the inventory of finished goods and the raw materials, change in the bank borrowings, explain a large part of the variation.

The results obtained on the basis of non-deflated series (levels) for 132 observations are presented in table 15.

In the above econometric exercises, we find the importance of bank and non-bank credit on the real variables.This suggests that inspite of the vast expansion of stock markets in India institutional credit is still an important determinant of industrial activities.

7. Share prices and fundamentals of the drugs and medicines firms.

In table 16, we have presented the results that have been obtained while trying to trace out the relations between the movement of the share price and the values of the fundamentals of the respective companies. The received wisdom in the literature is that relating stock prices with fundamentals should be done in an intertemporal framework as in Campbell and Shiller (1987), Galeotti and Schiantarelli (1994), LeRoy (1989), LeRoy and Porter (1981), Poterba and Summers (1988), Shiller (1981), Summers (1986), West (1988) etc. because demand for shares depends upon the expected flow of future earnings. However, one can very well conceive of a short run demand for shares which can be thought of as depending upon the current performance of the companies reflected in current cash flow, profit, equity dividend etc. We have tried to relate share prices with the current fundamental values of the respective companies.

At the absolute levels, the real variables do not appear to have any statistically significant relations with the price of the scrips. However, interesting results are obtained when the fundamental values per share are taken as the regressors. Table 16 contains such results obtained on the basis of the set of 154 observations.

TABLE 16

Dependent Variables	Independent Variables								
	Constant	Sales per share	Earnings per share	Equity dividend per share	Cash flow per share	Net worth per share	R^2	$\bar{R}^2$	S.D. of the dependent variables
(a) Share price	104.00 (70.62)	0.8748 * (0.0703)					0.505	0.501	1156.8
(b) Share price	141.32 * (63.61)		12.412 * (0.8561)				0.580	0.576	1156.8
(c) Share price	-50.216 (68.84)			122.68 * (8.47)			0.580	0.577	1156.8
(d) Share price	154.68 * (64.19)				8.363 * (0.59)		0.570	0.567	1156.8

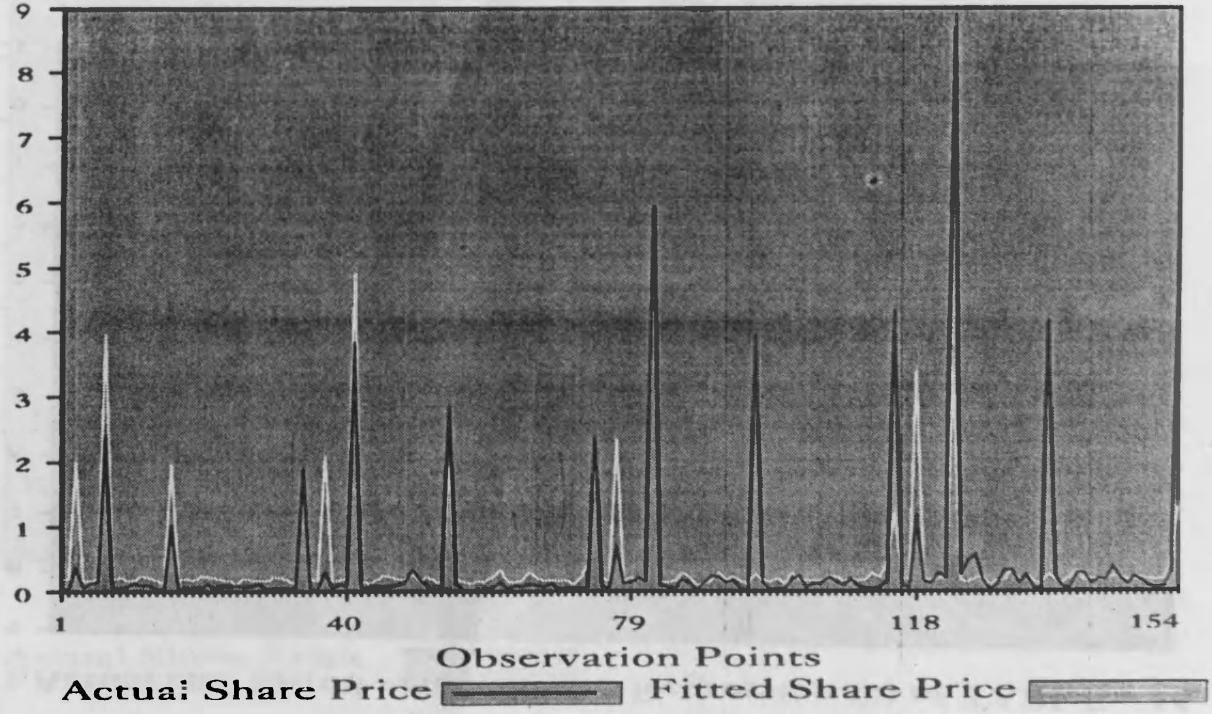
(Table 16 contd.)

(Table 16 contd.)

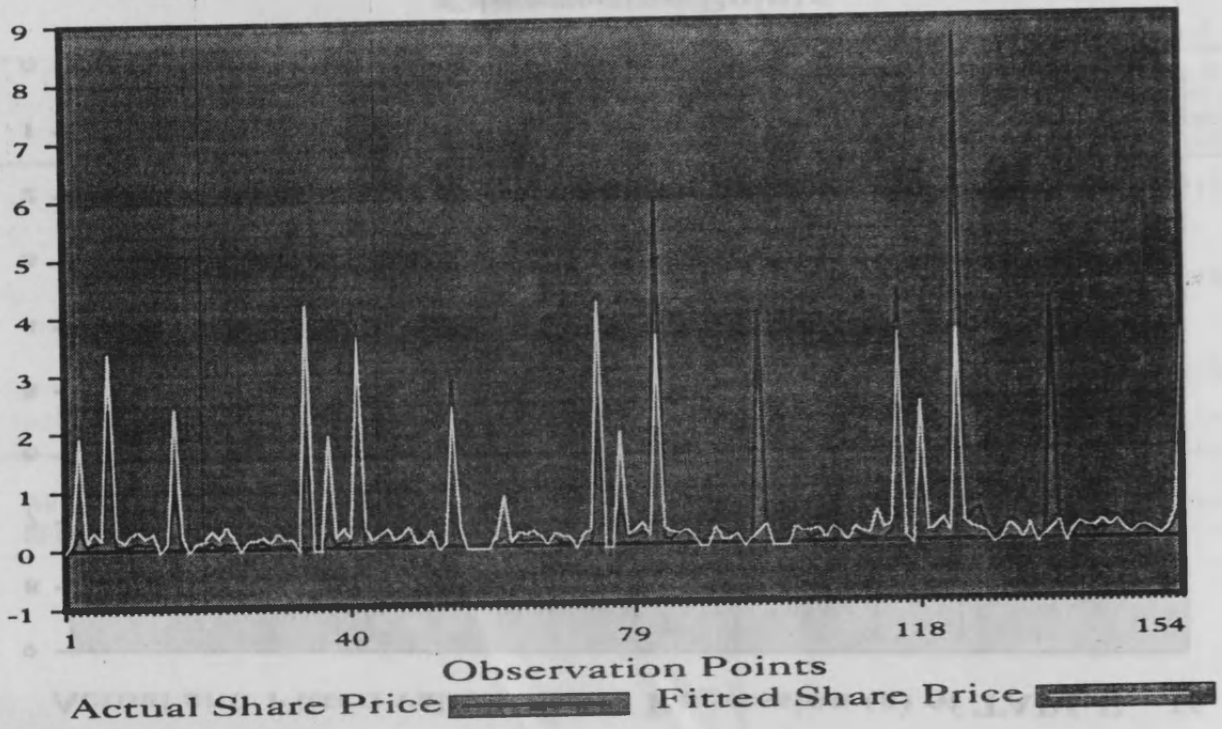
Dependent Variables	Independent Variables								
	Constant	Sales per share	Earnings per share	Equity dividend per share	Cash flow per share	Net worth per share	R^2	$\bar{R}^2$	S.D. of the dependent variables
(e) Share price	94.448 (63.94)					6.155 * (0.42)	0.589	0.586	1156.8
(f) Share price	12.78 (66.44)			69.966 * (14.265)	4.376 * (0.98)		0.629	0.624	1156.8
(g) Share price	4.951 (67.48)			60.467 * (18.134)		3.463 * (0.903)	0.617	0.612	1156.8

Note : All the independent variables are expressed at 1980-'81 prices. The figures in the parentheses are the standard errors of the corresponding regression coefficients.

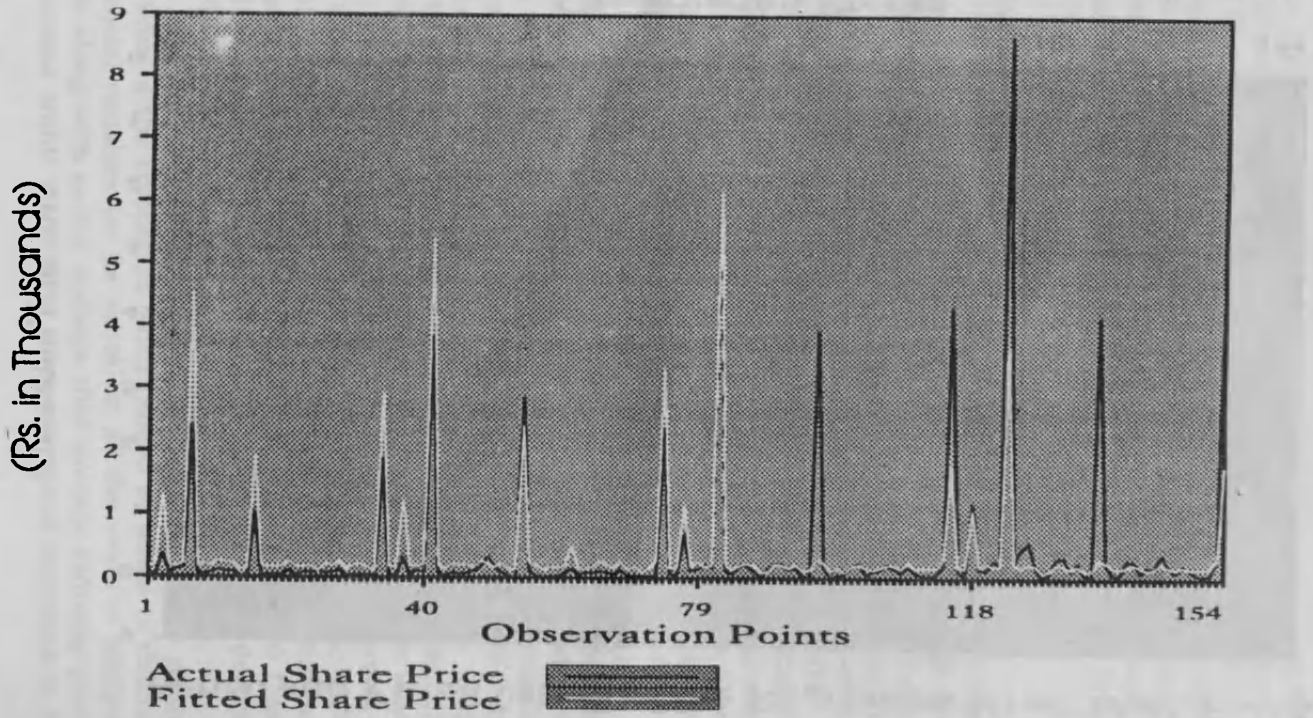
Actual and Fitted values in the Regression (a) of TABLE - 16



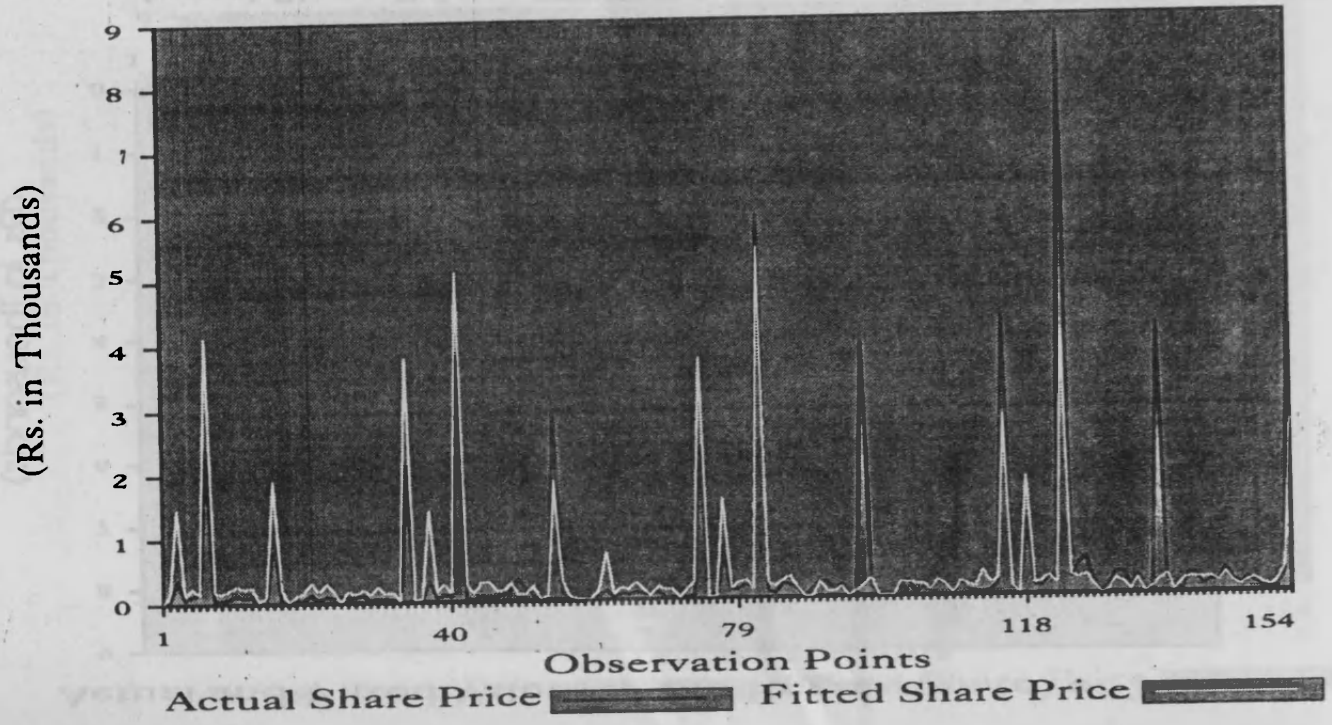
Actual and Fitted values in the Regression (c) of TABLE - 16



Actual and Fitted Values in the Regression (e) of Table 16



Actual and Fitted values in the Regression (f) of TABLE - 16



It can be easily seen that net worth per share, in its individual capacity explains more than half of the variation in the movement of share prices. However, a better explanation is obtained if we consider the equity dividend and cash flow per share as the regressors to explain the share price variation. But the contribution of cash flow per share in explaining the variation in the share price is only marginal. In all these cases the regressors are as of current period. We also tried to explore the relation between share price movement and lagged values of different fundamental variables. In this case no better result is obtained and hence is not reported in the table.

8. Conclusions.

In this paper we tried to explore the behaviour of Indian firms, particularly for a set of 42 firms of the drugs and medicines industry. On the one hand, we considered the interactions between different financial variables, and on the other, the determinants of share price movements. Our period of study is from 1989-'90 to 1992-'93 which is the period of liberalization and as a result a period of several adjustments on the part of the firms. To start with, we had no testable hypothesis derived from a specific model. Instead, we found out the empirical relations between different variables employing both non-parametric and parametric methods. We have found a number of interesting results involving empirical relations between different financial variables as also the share price movement with what are called the company fundamentals. The industry averages of the financial variables (and also some important ratios) whether deflated by sales or NFA displays little change for the first three years of analysis 1989-'90 to 1991-'92. In the fourth year, viz. 1992-'93 profits, GFA or NFA etc. improved compared to the previous three years. This is evident from the fact that the average proportion of bank borrowings in total borrowings has declined (from 0.49684 in 1989-'90 to 0.42551 in 1992-'93) and that of institutional borrowings in total borrowings has increased (from 0.13967 in 1989-'90 to 0.17556 in 1992-'93), the former has declined by 0.07233 and the latter increased by 0.03589.

Another important result is the stability of the relative position of the companies when ranked in terms of different financial variables (or for ratios) in all the years of analysis. This along with earlier findings that average industry profits remained stable in the first three years and improved in the

fourth year shows that relative position of the companies did not change whether the industry as a whole accrued higher profits or lower one. The stability in respect of rankings of companies in all the four years implies that either the companies were efficient in pre-liberalisation period so that the policy of liberalization has not changed their efficiency or that the policy of liberalization has nothing to do with their efficiency. However, our study can't throw any light which one is the cause of such a stability of rankings. Then we found in a non-parametric frame-work that the degree of association between some of the financial variables turned out to be quite robust and in conformity with what one would expect from a typical firm in an LDC like India.

In the subsequent two sections we have presented the econometric results relating to the interactions between different financial and policy variables as well as the movement of share prices. In case of the former the econometric results have augmented the non-parametric tests for the degree of association. In the other case we found that around sixty per cent variations in share prices can be explained when regressed on current values of company fundamentals.

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APPENDIX

Names of the companies that our database

Sl. No.	Company Name
1.	ABBOTT LABORATORIES (I) LTD.
2.	ALBERT DAVID LTD.
3.	ALEMBIC CHEMICAL WORKS CO.
4.	ASTRA-IDL LTD.
5.	ATUL PRODUCTS LTD.
6.	BOOTS PHARMACEUTICALS LTD.
7.	BURROUGHS WELLCOME (INDIA).
8.	CIPLA LTD.
9.	CHEMINOR DRUGS LTD.
10.	CORE LABORATORIES LTD.
11.	CORE PARENTERALS LTD.
12.	DR. REDDY'S LOBORATORIES LTD.
13.	DUPHAR-INTERFRAN LTD.
14.	EBERS PHARMACEUTICALS LTD.
15.	E. MERCK (INDIA) LTD.
16.	ESKAYEF LTD.
17.	FULFORD (INDIA) LTD.
18.	GERMAN REMEDIES LTD.
19.	GLAXO INDIA LTD.
20.	GUJARAT INJECT LTD.
21.	GUJARAT LYKA ORGANICS LTD.
22.	HOECHST INDIA LTD.
23.	J. B. CHEMICALS & PHARMACEUTICALS
24.	JAYANT VITAMINS LTD.
25.	LI TAKA PHARMACEUTICALS LTD.
26.	LYKA LABS LTD.
27.	M. J. PHARMACEUTICALS LTD.
28.	MERIND. LTD.
29.	NICHOLAS PIRAMAL LTD.
30.	PAAM PHARMACUTICALS (DELHI).
31.	PARKE-DAVIES (INDIA) LTD.
32.	PFIZER LTD.
33.	RANBAXY LABORATORIES LTD.
34.	RHONE-POULENC (INDIA) LTD.
35.	ROCHE PRODUCTS LTD.
36.	SEARLE (INDIA) LTD.
37.	SOL PHARMACEUTICALS LTD.

Sl. No.	Company Name
38.	STANDARD ORGANICS LTD.
39.	TAMILNADU DADHA PHAMARCEUTICALS.
40.	TTK PHARMA LTD.
41.	UNICHEM LABORATORIES LTD.
42.	ZANDU PHARMACEUTICAL WORKS.

The companies with serial numbers 5. 9. 10. 11. 14. 17. 24. 25. were not included in 1989-'90, with serial numbers 5. 14 in 1990-'91, with serial number 24 in 1991-'92 and with serial numbers 10. 25. 27 in 1992-'93.

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