

Deregulation and Liberalization, Business Cycles and Performance of Indian Industry

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Abstract. Over two decade of Indian economic reforms aimed at removing the barriers to competition and access to new technology by Indian Industry. We examine the structural changes these market-friendly measures brought to Indian Industry by analysing inter-firm variations in performance. This is to understand how well firms across industries have adapted to these deregulatory measures over business cycles, that is, how firms have responded to and performed over the business cycles. In the structure-conduct-and-performance (S-C-P) framework, using step-wise discriminant analysis, we find that debt ratio, export intensity, gross fixed assets growth, and advertising, marketing and distribution expenses are the statistically significant discriminant variables that acted as principal discriminants between pre- and post-deregulation periods. Further, comparing the short-term impact of liberalization measures with the long-term over a decade-and-half of the post-liberalisation period, we find that new investment, export intensity, gross fixed assets growth, capital output ratio, employee cost, advertising, marketing and distribution expenses and sales growth are the statistically significant discriminants that differentiate the 1991-93 and 2005-07 period. We also find that our results predict Indian economic slowdown.

1. Introduction

The objective of the first set of part-reforms launched in 1985 was to remove industrial and trade policy constraints through deregulatory measures such as - de-licensing of firms, broad-banding, and capacity re-endorsement schemes. Following the major policy reforms during 1991_92, several public sector industries were de-reserved and downsized by divesting their equity to mutual funds. Foreign equity and MNE participation in Indian firms paved the way for import to MNEs. The trade policy reforms consisted of the removal of quantitative trade restrictions (QRs), export promotion, and market-determined exchange rate. These reforms relaxed the main entry barrier (licensing) that had dire implications for all the structure-conduct-and-performance variables, such as- investment, expenditures on technology, and advertisements (Pandit and Siddharthan, 2009). Against this backdrop, we empirically test the impact of these changes in the structure-conduct-and-performance of Indian industry as reflected in the endogenous variables by comparing the pre- and post-liberalization discriminants.

We examine the structural changes that these market-friendly measures have brought to Indian industry. How well have firms across industries adapted to these reforms? How have firms'-

responded to and performed over the business cycles? An inter-firm, inter-industry and inter-temporal variations in firms' performance analysis has been conducted. Section II briefly outlines the major industrial and trade policy reform measures. Section III buttresses the appropriateness of S-C-P framework for firm's performance analysis. While Section IV identifies the major discriminants in the pre- and post-deregulation period, Section V summarises the findings of the study.

2. Industrial and Trade Policy Reforms

2.1. Partial-Reforms in Industrial Policy during 1985_86

Beginning 1985_86, several policy initiatives were undertaken by the Government of India with a view to remove some of the policy constraints on industrial growth. It began with de-licensing of as many as 25 broad categories of industries in March 1985. It was extended to the manufacture of 82 bulk drugs and their related formulations in June 1985. In December 1985, de-licensing was extended to MRTP and FERA companies for 22 out of 27 industries exempted from Section 21 and 22 of MRTP Act; subject to the condition that such units were located in backward areas notified by the central government. For several industries, which remained within the purview of licensing, broad-banding was allowed. By January 1986, broad-banding was extended to 28 industry groups.

Towards the close of 1985, a capacity re-endorsement scheme was announced by the government with several caveats regarding location, infrastructure availability, and MRTP-FERA considerations. MRTP provisions were rationalized. Technology upgradation and import of foreign technology formed another important aspect of policy reforms. The economic reforms of 1985 created a solid foundation for the radical reforms of 1991-92.

2.2. Major Industrial and Trade Reforms during 1991-92

The major set of new economic reform measures were initiated during 1991-92 as part of a statement on industrial policy tabled in parliament on July 24 1991. The key policy reforms included aimed at deregulation, foreign investment and foreign technology and technology transfer.

During 1991-92 nine out of 17 industries were de-reserved. Divesting part of public sector equity of selected public enterprises to mutual funds was the second important policy reform. The third crucial reform measure was the abolishment of all industrial licensing with the exception of those concerned with national security or other public interest considerations such as- pollution-causing industrial clusters. Further, industrial units were to be free to expand capacity without obtaining any capacity-enhancement permission from the authorities. The next reform measure was abolition of the phased manufacturing programme. The mandatory convertibility clause was removed. Parliament passed the MRTP Amendment Bill removing the threshold limit of Rs.100 crore of assets for firms.

The removal of restrictions on foreign investment and import of foreign technology for specified loss of high-technology priority sectors was considered. Firms in these sectors would receive automatic approval and the automatic approval system would be applicable to all other industries if they fulfilled specific foreign exchange conditions. Automatic permission was to be given for foreign equity up to 51 per cent in high-priority sectors. A special board was to be constituted for promoting strategic alliances between foreign and domestic firms.

Firms were given freedom to negotiate the terms of technology transfer with the foreign suppliers and there was no need for government approval. A Foreign Investment Promotion Board (FIPB) was set up to examine large foreign investment cases where more than 51 per cent foreign equity could be permitted.

3. Structure-Conduct-and-Performance Framework

In order to analyse the impact of these major policy changes on firms' behaviour and performance across industry, we use the structure-conduct-and-performance (S-C-P) framework (Schmalensee 1989; Hay and Morris, 1991). We discuss its salient features to explain our selection of the relevant

variables and the appropriateness of the methodology used to study the impact of policy changes.

The S-C-P paradigm brings out the mutual causation and the resultant interdependence among the variables representing structure-conduct-and-performance clearly. The conduct of firms as seen by the expenditures including technology imports, advertisement, expenditures on skilled manpower, and investment in plant and machinery create a certain type of market structure characterized by buyer and seller concentration, entry conditions (including entry barriers), product differentiation, and threshold minimum size economies. Both these sets of structure and conduct variables influence industrial performance as indicated by profit rates and margins, growth, productivity, and international orientation. However, the relationship is not unidirectional, that is, from conduct and structure to performance.

Performance would influence conduct and structure. Higher profit margins and higher productivity would induce higher investment in technology, advertisement, and physical capital formation, as these expenditures have to be financed from profits. R&D and other expenditures on innovation are also influenced by market structure (Schumpeter, 1943). Investment depends on innovative activities (Deiaco et al., 1990). In-house R&D and import of technology are also related to each other (Odagiri, 1983; Siddharthan, 1988). In other words, most of these variables are endogenous to the system which creates serious econometric problems of specification and estimation (Schmalensee, 1989). He, therefore, suggests that the primary objective of these cross-sectional studies should be to describe the main patterns with descriptive statistics but not structural hypothesis testing. We have carried out appropriate step-wise discriminant analysis.

We, however, argue that prior to liberalization, the main entry barrier in India was the one erected by the government through the industrial licensing system (Pandit and Sidharthan 2009). Even if firms could overcome these barriers in a licensing regime, they could not start or even expand their units without an industrial license. Thus, a relaxation of the main entry barrier (licensing barrier) through changes in the government policy could drastically influence all the structure-conduct-and-performance variables, like investment, expenditures on technology and advertisements.

Modernization, technology imports, imports of capital stock, and investment in plant and machinery could in turn influence performance variables like profits, productivity, and growth. In other words, industrial and trade policy changes in general and de-licensing in particular were expected to influence conduct and structure variables directly and through them, the performance variables. Thus, the behaviour of the three sets of variables before and after liberalization was not likely to be the same. The methodology used in this study overcomes most of the criticisms of the S-C-P paradigm and the employment of regression techniques works in using cross-section data. Thus, step-wise discriminant analysis bypasses the endogeneity and simultaneity problems, and yet succeeds in scanning the data using the S-C-P framework.

3.1. Main Discriminants of the Pre- and Post- deregulation Samples

De-licensing and liberalization of licensing procedures would have a direct influence on the industrial structure through the entry of new units. Changes in structure would, in turn, influence the conduct of firms with respect to investment, R&D, expenditure on skill intensity, etc. These would affect the performance. Increase in investment by both the new and existing units is expected to have an impact on the average size of units, capital intensity, employment, and external borrowing. In addition, import intensities are also likely to increase.

The multivariate step-wise discriminant analysis involves the fitting of linear discriminant score functions to the values of the discriminating variables for the two groups, namely the pre- and post-regulation periods to examine whether industry characteristics, their conduct, and performance have changed as a result of reforms introduced in 1985. Individual observations were classified into groups based on the observed values of their respective discriminant scores. F-statistics are used to judge the goodness-of-fit and the correctness of classification. The step-wise procedure involves the

selection of the individual variable (discriminant) that provides the largest univariate discrimination (mean F-ratio). The first variable is then paired with the remaining variables to locate the combination that produced maximum discrimination. The variable that contributed to the best pair is selected. Then the procedure continues to identify triplets and so on. The discriminants considered are given in Table 1. Using the discriminants we construct the following model:

$$D_t = \Omega_0 + \Omega_1 * \text{CapOut} + \Omega_2 * \text{DE} + \Omega_3 * \text{Debtper} + \Omega_4 * \text{Royalty} + \Omega_5 * \text{PM} + \Omega_6 * \text{EC} + \Omega_7 * \text{SGA} + \Omega_8 * \text{ROCE} + \Omega_9 * \text{Exp} + \Omega_{10} * \text{Imp} + \Omega_{11} * \text{SalesGr} + \Omega_{12} * \text{GPAGr} + \Omega_{13} * \text{Inv} + \Omega_{14} * \text{CapperEmp} + \Omega_{15} * \text{SalesperEmp} + \varepsilon$$

Table 1

CapOut	Capital-Output Ratio- Gross Fixed Assets divided by Total Sales
DE	Debt-Equity Ratio of the Firm
Debtper	Debt as the Percentage of Borrowing
Royalty	Royalty Paid as the Percentage of Sales
PM	PAT/Total Income
EC	Employee Compensation as Percentage of Sales
SGA	Advertising, Marketing & Distribution Expenses as Percentage of Sales
ROCE	Return on Capital Employed
Exp	Export as the Percentage of Total Sales
Imp	Import as Percentage of Total Sales
SalesGr	Growth in Sales
GPAGr	Growth in Gross Fixed Assets
Inv	Cash Flow from Investing Activity
CapperEmp	Capital Employed per Employee
SalesperEmp	Sales per Employee

4.1. Data Structure

We consider 20 industries: textiles, inorganic chemicals, alkalies, dyes and pigments, organic chemicals, polymers, rubber and rubber products, cement, glass and glassware, gems and jewellery, refractories, casting and forging, steel tubes and pipes, aluminium and alkali products, copper and copper products, machinery, transport equipment, hotel and tourism and information technology. These were de-licensed in 1991. We conduct an empirical analysis on all the firms in these 20 industries as we believe changes in industry structure will affect all the firms present in the industry irrespective of their past history. In total we obtained 5940 firms in these industries from *Prowess Database* after a consistency and completeness of data check. We collected financial data on the above 15 variables for these 5940 firms for the years 1988-1993 and 2005-2007. After removing the firms for which 1988-1993 data was unavailable or discrepancy in some data points were observed, we were left with 1208 firms for which we got the data points for three periods: 1988-1990, 1991-1993 and 2005-2007.

4.2. Pre-Liberalization vs. Post-liberalization Analysis

We consider the period 1988-1990 as pre-liberalization period and compare this period's variables with the variables of the post-liberalization period that is 1991-1993. Using multivariate step-wise discriminants analysis, the selection of the individual variables (discriminant) that provide the largest univariate discrimination (in terms of group difference mean F-ratio) was done (Table 2).

Table 2: Variables Entered/Removed ^{a,b,c,d}

Wilks' Lambda

Step	Entered	Statistic	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
1	Debtper	.981	1	1	2258.000	43.389	1	2258.000	.000
2	Exp	.974	2	1	2258.000	30.147	2	2257.000	.000
3	GFAGr	.969	3	1	2258.000	23.986	3	2256.000	.000
4.	SGA	.965	4	1	2258.000	20.289	4	2255.000	.000

- Maximum number of steps is 24.
- Minimum partial F to enter is 3.84.
- Maximum partial F to remove is 2.71.
- F level, tolerance, or VIN insufficient for further computation.

The function gave four discriminating variables for the two periods. They are debt as the percentage of borrowing, export intensity, growth of gross fixed assets and advertising, marketing and distribution expense as the percentage of sales (Table 3).

Table 3: Variables in the Analysis

Step	Variable	Tolerance	F to Remove	Wilks' Lambda
1	Debtper	1.000	43.389	
2	Debtper	1.000	43.117	.993
	Exp	1.000	16.604	.981
3	Debtper	.999	43.993	.988
	Exp	.995	14.605	.975
	GFAGr	.995	11.386	.974
4	Debtper	.979	37.280	.981
	Exp	.978	11.436	.970
	GFAGr	.994	10.992	.971
	SGA	.962	8.947	.969

The first variable to enter the discriminant variable was debt as percentage of borrowings, the next important was export intensity followed by-growth of gross fixed assets and advertising, marketing and distribution expense as the percentage of sales (Table 4).

Table 4: Discriminant Variables

Variables	Mean	Standard Deviation	Mean	Standard Deviation
CapOut	59.7994	110.80036	148.2512	900.96947
DE	-.1503	49.32563	1.0306	12.58492
Debtper	37.3748	35.81888	47.5072	37.28973
Royalty	.2097	.71610	.2290	.62666
PM	-2.6861	78.98545	-18.1706	267.35501
EC	9.2241	17.85722	10.7172	12.42791
SGA	2.4964	3.30076	3.1170	3.22568

ROCE	6.8106	228.92232	-22.5436	853.11458
Exp	5.1579	17.07383	8.1349	17.38982
Imp	6.9836	15.77452	9.1080	24.57119
SalesGr	21.1525	149.91605	38.2088	252.41468
GFAGr	11.4532	81.87888	21.5800	51.14289

When a comparison is made for the two periods, debt as percentage of borrowings, export intensity, growth of gross fixed assets and advertising, marketing and distribution expenses as the percentage of sales has increased for the period 1991-1993 compared to 1988-1990 period. With four degrees of freedom, the functions, Wilks' Lambdas 0.965 and the test function is at one per cent level of significance. Using the density function when the input data was classified, 56.8 per cent of original grouped cases were correctly classified reflecting the goodness of the results. With the twelve variables, again the function's Wilks' Lambda is 0.962 and it is significant at one per cent level. Using this density function when the input data was classified then 56.2 per cent of original grouped cases were correctly classified, reflecting good results.

4.3. Post-liberalization vs. Concurrent Industry Scenario

The multivariate step-wise discriminant analysis is used to find the linear discriminant score functions on the basis of the data on the values of the discriminating variables for the 1991-1993 period and 2005-2007 period to examine whether industry characteristics, their conduct, and performance have changed over the fifteen years of liberalization. Individual observations were classified into groups based on the observed values of their respective discriminant scores. F-statistics are used to judge the goodness of fit and the correctness of classification. The step-wise procedure is again used to select the individual variable (discriminant) that provides the largest univariate discrimination (in terms of group difference mean F-ratio). The first variable is then paired with the remaining variables to locate the combination that produced maximum discrimination.

4.4. Step-wise Discriminant Analysis:

Table 5: Variables Entered/Removed

Step	Entered	Wilks' Lambda			
		Statistic	df1	df2	df3
1	NewInv	.980	1	1	2244.000
2	Export	.973	2	1	2244.000
3	GFAGr	.964	3	1	2244.000
4	CapOut	.959	4	1	2244.000
5	EC	.956	5	1	2244.000
6	SGA	.953	6	1	2244.000
7	SalesGr	.951	7	1	2244.000

Note: At each step, the variable that minimizes the overall Wilks' Lambda is entered.

The function gave seven discriminating variables for the two periods (Table 5). They are new investment, export intensity, gross fixed assets growth, capital output ratio, employee cost as percentage of sales, advertising, marketing and distribution expenses as the percentage of sales and sales growth.

Table 6: Discriminating Variables

Group		Mean	Std. Deviation	Mean	Std. Deviation
1.00	CapOut	888.1693	7184.40012	148.2512	900.96947
	DE	1.0011	8.38095	1.0306	12.58492
	DebtPer	66.4506	233.30861	47.5072	37.28973
	NewInv	-27.7647	139.78699	.0000	.00000
	Royalty	.2478	.82634	.2290	.62666
	RD	4.2154	132.73268	.0996	.43436
	PM	-107.5650	1200.06073	-18.1706	267.35501
	EC	59.6788	502.28624	10.7172	12.42791
	SGA	3.6868	4.49524	3.1170	3.22568
	ROCE	-32.0481	1274.58153	-22.5436	853.11458
	Export	11.9891	21.11635	8.1349	17.38982
	Import	10.0858	13.11371	9.1080	24.57119
	SalesGr	15.1091	67.38060	38.2088	252.41468
	GFAGr	13.5442	42.72369	21.5800	51.14289

When compared for the two periods, capital-output ratio, new investment, employee cost and export intensity has increased for the period 2005-2007 compared to 1991-1993 but sales growth and gross fixed assets growth have decreased (Table 6). With seven variables in the function, the Wilks' Lambda is 0.951 and the function is significant even at one per cent level. Using the density function when the input data was classified, 59.2 per cent of original grouped cases were correctly classified reflecting good results. With all 16 variables in the function, the Wilks' Lambda is 0.943 and the function is significant even at one per cent level. Using the density function, when the input data was classified, 61.4 per cent of original grouped cases were correctly classified reflecting good results.

5. Findings, Conclusion and Future Scope

We analyzed the impact of the policy reforms introduced in 1991 on the structure-conduct-and-performance of the Indian industry. Using the techniques of step-wise discriminant analysis variables were identified that acted as principal discriminants between pre- and post- deregulation periods. It is observed that debt as the percentage of borrowing, export intensity, growth of gross fixed assets and advertising, marketing and distribution expenses as the percentage of sales are the statistically significant discriminants that differentiated the samples. On the other hand, variables representing capital-output ratio, royalty paid, profit margin, employee compensation, return on capital employed, import intensity, capital per employee, sales per employee were not statistically significant. In addition, when the two periods are compared, debt as percentage of borrowings, export intensity, growth of gross fixed assets and advertising, marketing and distribution expenses as the percentage of sales has increased for the period 1991-1993 compared to 1988-1990 period. On the whole, the results indicate a positive impact of liberalization on the attitude towards debt borrowing, export as percentage of sales, fixed assets growth and advertising intensity.

We further compared the short-term impact of liberalization with the long-term effect in the context of the structure-conduct-and-performance framework for the Indian industry. It is observed that new investment, export intensity, gross fixed assets growth, capital output ratio, employee cost as percentage of sales, advertising, marketing and distribution expenses as the percentage of sales and sales growth are the statistically significant discriminants that differentiate the 1991-1993 and 2005-2007 period. In addition, capital output ratio, new investment, employee cost and export intensity have increased for the period 2005-2007 compared to 1991-1993 but sales growth and gross fixed assets growth have decreased.

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