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The Impact of Size and Age on Firm-Level Performance: Some Evidence from India

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Abstract. Using contemporary data for an extensive sample of 1020 Indian firms, this paper investigates the impacts that size and age of firms have on firm-level productivity and profitability. In India older firms are found to be more productive and less profitable, whereas the larger firms are, conversely, found to be more profitable and less productive. These performance differences are explained as arising from the market-restricting industrial policies that have been followed in India over the past three decades.

Key words: Firm-level profitability, size of firms, age of firms, Indian industry.

JEL Classification: D 21; D 24; L 52; O 53.

I. Introduction

The issues of whether larger firms are superior in performance to smaller firms, or vice-versa, and whether older firms are superior in performance to younger firms, or vice-versa, have generated large amounts of theoretical and empirical research in the economics, management and sociology disciplines. Yet, the theoretical postulates and empirical evidence are equivocal, at best, on the impacts that size and age have on firm-level performance, and it is likely that the true nature of the relationship is very environment-specific, and highly dependent on a number of institutional factors which affect the performance of firms. The hypotheses that derive from theory with respect to the impact of size and age on firms' performance are mediated by the institutional environment that firms face, and it is feasible that the equivocality in the literature arises because institutional issues, which necessarily are country-specific, have not been taken into account.

This paper briefly reports the results of an empirical study investigating the impacts that size and age have on the economic performance of firms in Indian industry. India is a unique economy in that attitudes with respect to the role and existence of large firms in the economy have been ambivalent, while the articulation and administration of policy have been at cross-purposes with each other (Jalan,

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1991). On one hand, the industrial policy resolution of 1956, and subsequent follow-up legislation, envisaged a clear and important role for small private firms in the economy and economies of scale issues were completely ignored so that in key industrial sectors there was a preponderance of units possessing sub-optimal scale (Little et al., 1987). Therefore, the role of the large private sector firm in the economy was given second-class status.

On the other hand, implementation of policy left much to be desired. Private sector industrial houses, through careful management of the political and administrative apparatus of the "license raj," and in conjunction with the active cooperation of a number of bureaucrats and politicians, were able to flaunt established norms and, consequently, attain both economic power and large size (Bhagwati and Desai, 1970; Krueger, 1974; Marathe, 1989; Rudolph and Rudolph, 1987). Therefore, a priori postulates on the relationship between size and performance in the Indian context are difficult to articulate and the direction of the relationship must be empirically determined.

With respect to the relationship between age and performance, in the Indian context a-priori postulates with respect to the direction of the relationship are likely to be equally fuzzy. India does have a tradition of indigenous industrial development undertaken by firms in the private sector (Ray, 1979), which took place despite the existence of a colonial regime and in 1947, at independence, there was a large industrial sector in existence (Bagchi, 1972). Yet, in an attempt to spur industrial progress, industrial policy during the 1960s aimed to establish a dominant role for state-owned enterprises as the drivers of industrial progress, and sought to downplay the role of private enterprise (Marathe, 1989). The role of private enterprises was circumscribed by autarkic policies which fostered an import-substituting, export-pessimistic regime, and policies by which entry and exit into sectors of industry were controlled by the government, leaving private enterprises no initiative to manage their operations (Mohan and Aggarwal, 1990; Nayyar, 1994).

Attitudes of a negative nature towards allowing private industry to develop persisted well until the late 1980s, when the realization dawned that the state-owned enterprises were not the "crown jewels" that they were meant to be, but had become "white elephants" (Jalan, 1991). Also, several successive Indian prime ministers started tinkering with restrictive industrial policies in an attempt to reform. For example, Mrs. Indira Gandhi (prime minister: 1980 to 1984) commenced "reforms by stealth." Her son, Mr. Rajiv Gandhi (prime minister: 1984 to 1989) continued "reforms with reluctance" (Bhagwati, 1993). Only after the commencement of the reforms in 1991, classified as "reforms by storm" (Bhagwati, 1993), by the Mr. P. V. Narasimha Rao government did the realization dawn that the private sector had a very important role to play in fueling the economic, and industrial, growth of India.

Against the brief backdrop of the Indian industrial situation, the paper unfolds as follows. In Section II, theoretical issues with respect to the impact that size

and age have on firm-level performance are briefly discussed, and the section also describes the empirical analysis carried out. Section III contains a discussion of the results obtained, and Section IV contains a brief conclusion.

II. Theory and Empirical Analysis

1. Theory

The size of a firm affects performance in many ways. Key features of a large firm are its diverse capabilities, the abilities to exploit economies of scale and scope and the formalization of procedures. These characteristics, by making the implementation of operations more effective, allow larger firms to generate superior performance relative to smaller firms (Penrose, 1959). Alternative points of view suggest that size is correlated with market power (Shepherd, 1986), and along with market power x-inefficiencies are developed, leading to relatively inferior performance (Leibenstein, 1976). Theory, therefore, is equivocal on the precise relationship between size and performance.

With respect to the impact of age, one stream of research suggests that older firms are more experienced, have enjoyed the benefits of learning, are not prone to the liabilities of newness (Stinchcombe, 1965), and can, therefore, enjoy superior performance. Another stream of research, however, suggests that older firms are prone to inertia, and the bureaucratic ossification that goes along with age; thus, they are unlikely to have the flexibility to make rapid adjustments to changing circumstances and are likely to lose out in the performance stakes to younger, and more agile, firms (Marshall, 1920). Again, theory is equivocal.

2. Empirical Analysis

The empirical analysis is carried out against the backdrop of equivocal relationships that extant theory provides. The economic performance of firms is captured using two measures, productivity and profitability. While the use of a total factor productivity index will be ideal, in the data-base of Indian firms that has been acquired the number of employees are not reported. Hence, following the example of and the precedent set by the Organization for Economic Cooperation and Development [OECD] (1994), productivity is measured as the ratio of value added to the value of production. This is not at all a precise or very satisfactory measure, but it is the best measure that can be computed, given the data limitations that are inevitably likely to arise especially if a large-sample data-base is collected in a developing country context.

Following precedence in the industrial organization and management literatures (Cowling and Waterson, 1976; Capon et al., 1990), profitability is measured as returns on sales, or the margin on sales. An extensive firm-level data set, for 1020 Indian firms, forms the basis for empirical analysis. These data were obtained from the Center for Monitoring the Indian Economy and supplemented by Bombay Stock

Exchange data. Guidance in data collection was also provided by the Reserve Bank of India. The data are cross-sectional, collected for each firm for one of the years between 1988 and 1994, depending on the availability of all key variables and missing value problems are sought to be avoided.

The principal independent variables are measured as follows: SIZE is measured as the natural log of total sales, while AGE is the number of years since the inception of the firm in the year the data are collected. However, in explanations of economic performance a number of other factors can have an influence. These factors may be firm-related, industry-related or related to aspects of the institutional environment. If the impact of other factors are not controlled for, the relationship between size, age and performance may be spurious.

Diversification by firms is one way for excess resources to be exploited, and the subsequent foray into new lines of business increases the repertoire of total skills and capabilities within firms, which then impacts on the total performance of the organization. Data on sales from specific business areas, per se, are not available; therefore, an index variable, DIVERSITY, is created, taking on the values of 0 for no diversification, 1 for multiple lines of activities in related areas and 2 if firms are very widely diversified. Similarly, in the Indian context a number of firms are owned by a common industrial house, much in the manner of Korean chaebols. Such common ownership can lead to the spillover of firm-specific capabilities among all members of the group, with an impact on the performance of each member. GROUP is a dummy variable taking on the value 1 if the firm belongs to an Indian industrial group, and is 0 otherwise.

The impact of foreign ownership has to be controlled and a reason why firms invest abroad is that they possess superior capabilities. The possession of these capabilities may lead a firm to display superior performance relative to domestically-controlled firms, and FOREIGN, which is a dummy variable taking the value 1 if there is foreign ownership present in the firm and 0 if no foreign ownership is present, is introduced into the regression. EXPORTS, which captures the export orientation of the firms studied is introduced to control for the export orientation of Indian firms. There is no specific theory, per-se, which links the export-orientation of firms to performance. However, if domestic and overseas markets are equally competitive, or both closed for that matter, differences in competitive intensity are going to be similar and performance differences between export-oriented and domestically-oriented firms are likely to be minimal. On the other hand, it can be postulated that if domestic markets are controlled and closed, as has been the case in many developing and transition economies when compared with the export markets in which firms from these countries operate, then significantly superior performance will be noted for firms that have a relatively greater export orientation. Thus, the impact of EXPORTS on observed performance is postulated to be positive

The ratios of advertising, distribution and marketing expenditures to total operating expenditures, ADVERTISING, DISTRIBUTION and MARKETING, control

at once both firm-related and industry- related factors. Some firms may spend heavily on advertising, distribution and marketing activities to gain increased market shares, with a consequent impact on profitability. The variables, therefore, capture firm-level predilections. On the other hand, some industry-settings may require heavier spending on advertising, distribution and marketing activities; thereby, industry-effects are also controlled to some degree.

Another industry-related factor is capital intensity, which is measured as the ratio of net fixed assets to total assets: CAPITAL INTENSITY. Additionally, the ratio of inventory to total assets, INVENTORY, helps control industry-effects given situations where some industries need greater stockholding, but business-cycle effects are also controlled for since in downturns inventories tend to accumulate, and vice-versa. No a-priori relationship is posited for CAPITAL INTENSITY, but INVENTORY is expected to yield a negative relationship since the stocking of inventories means a greater need for working-capital, higher interest costs and, therefore, an erosion of performance.

A variable which also has attributes in controlling industry-related and business-cycle factors is LIQUIDITY, which is the quick assets ratio or the ratio of cash to total current liabilities. Cash requirements may be conditioned by industry practices, but also by the overall economic climate, since in lean times cash-flow crises can arise. Additionally, LIQUIDITY also helps capture firm-specific attributes, since the ability to manage working capital and acquire a greater quantity of cash balances relative to current liabilities reflects superior skills which are also likely to be reflected in a firm's ability to generate relatively greater profits.

SALES GROWTH, which is the rate of change in sales between the observation-year and the preceding year also captures business-cycle effects and environmental volatility. In markets where sales growth is high, there are possibilities for firms to make larger profits; on the other hand, such growth trends may attract new entrants, quite a common occurrence in India in the post-reform period, and average profits for all players may be reduced. The actual relationship between SALES GROWTH and performance is left to be empirically determined.

EXCISE and DEBT EQUITY are two variables controlling institutional factors specific to India. The ratio of excise duties borne to gross sales, EXCISE, captures the indirect tax incidence firms face. The greater the ratio, the lower the performance since there are less incentives for firms to be commercially successful if a principal task is being an adjunct arm of the customs and excise collecting authority. With respect to DEBT EQUITY, in theory the greater the amount of debt, the more stringent is the monitoring of managers and, therefore, firms' performance will be superior. However, in India term-lending institutions are government-owned and the loans made to commercial firms effectively come out of public funds. Just as state-owned enterprises are comparatively inferior in performance vis-a-vis private sector firms, within private sector firms a greater quantum of debt will tend to reduce incentives for superior performance, because managers will face little accountability with respect to a large amount of capital invested in their enterprises.

The relationship between these two variables and performance is posited to be negative.

The ratio of imports to total operating expenses, IMPORTS, is introduced to control the impact of import-control regimes that firms face. While greater penetration of imported goods in any particular sector pressurizes domestic firms to perform better, whether allowability of imports of raw materials and supplies by individual firms does so is debatable. On the contrary, the existence of a quota system and import licensing, which has been the case in India, is expected to engender rent-seeking and the likely sign of IMPORTS is expected to be negative.

Finally, TIME is an index variable taking on the values between 0 and 5 for each of the years 1988 to 1994, since the observations being evaluated belong to either of these years. Time effects are thereby controlled, and whether the reforms process has led to a structural change in performance patterns can also be tested. If, indeed, firms have become more productive and profitable as a result of the opening-up of the Indian markets and the fundamental shift that has been brought about in industrial policy, then TIME, productivity and profitability will display a positive relationship.

III. Results and Discussion

1. Primary Findings

Two regressions are estimated, for each of the dependent variables. The results are shown in Table I and are obtained using the heteroscedastic-consistent covariance matrix estimation (White, 1980) to correct for the presence of heteroscedasticity in the data. The coefficients for SIZE are significant at the 1 percent level in both equations, while the coefficient for AGE is significant at the 5 percent level in explaining productivity and significant at the 1 percent level in explaining profitability. However, it is not the significance levels that are of interest as much as the direction of the relationships that emerge.

The coefficient for SIZE is negative in the productivity equation, but positive in the profitability equation. Conversely, the coefficient for AGE is positive in the productivity equation, but negative in the profitability equation. In India larger firms are less productive, in comparison to smaller firms, while the larger firms are more profitable. Conversely, older firms are more productive, but are less profitable in comparison with younger firms. These principal findings can be summarized as in Table II.

What are the implications of the above findings? The greater profitability of the larger Indian firms is consistent with a rent-seeking perspective that has been articulated by writers (Krueger, 1974; Marathe, 1989; Rudolph and Rudolph, 1987) to explain industrial regression in India. Industrial licensing, as a policy instrument, was explicitly meant to foster the growth of small-scale and medium-sized firms, while also explicitly attempting to control monopoly power. In reality, the fact that a lack of monitoring allowed canny entrepreneurs to exploit the system to their

TABLE I. Regression results

	Productivity		Profitability	
	Coefficient	t-ratio	Coefficient	t-ratio
SIZE	−1.778	3.57**	1.088	3.85**
AGE	0.065	2.39**	−0.053	3.46**
DIVERSITY	1.225	1.13	0.167	0.27
GROUP	2.313	2.08**	−0.806	1.27
FOREIGN	0.107	3.42**	0.063	3.53*
EXPORTS	0.077	2.46**	0.048	2.68**
ADVERTISING	0.407	1.04	−0.198	0.89
DISTRIBUTION	−0.170	0.84	0.193	1.68*
MARKETING	−0.675	3.59**	0.205	1.93**
CAPITAL INTENSITY	0.024	0.72	−0.014	0.74
INVENTORY	−0.052	1.07	−0.039	1.43*
LIQUIDITY	16.452	10.77**	−0.671	0.77
SALES GROWTH	−0.002	1.56*	−0.000	1.24
EXCISE	−0.114	1.84**	0.001	0.88
DEBT EQUITY	−0.197	1.40*	−0.341	4.26**
IMPORTS	−5.569	1.53*	−4.898	2.37**
TIME	0.515	1.08	−0.205	0.74
CONSTANT	24.151	7.00**	15.731	8.03**
R^2	0.176		0.077	
F	12.645		4.893	
N	1020		1020	

**$p < 0.05$; *$p < 0.10$.

TABLE II. Findings on size, age and performance in India

	Meaure of performance	
	Productivity	Profitability
Size of firm	Larger firms are less productive (−)	Larger firms are more profitable (+)
Age of firm	Older firms are more productive (+)	Older firms are less profitable (−)

advantage was noted, and brought to the attention of policy-makers by perceptive researchers such as Bhagwati and Desai (1970), with an Industrial Licensing Policy Inquiry Committee (ILPIC; headed by Mr. S. Dutt, I.C.S.) also set up which reported in 1969. Paranjape (1988, p. 2343), who was a member of the ILPIC, writes in respect of the findings of the committee, that: “in respect of licensing, the system

had failed practically on all counts . . . Licenses were issued in excess of capacity targets even in nonessential industrial . . . Influential parties and large houses were permitted to pre-empt capacities."

Capacity pre-emption by large industrial houses and firms, while giving them market power, also generated significant x-inefficiencies among these firms. X-efficiency theory proposes that environmental forces change the nature of incentives facing firms and permit slack-causing behavior. Licensing allowed a finite market size to be made available to each applicant succeeding in obtaining a license, which were principally the larger firms in India. Hence, there were no incentives for survival in a competitive battleground. Also, the government dictated all subsequent strategic and operational decisions for the firms which had acquired licenses to enter particular markets; therefore, Indian firms merely had to go through the motions of undertaking industrial activity (Bhoothalingam, 1993).

That large firms in Indian industry got away with living the "quiet life" (Hicks, 1935) seems evident from the data, because there were no reasons to minimize costs or strive for efficiency as a result of state-legitimized market pre-emption allowed to them and the day-to-day interference in firms' operations by the government. For example, in respect of such issues, Bhagwati (1993, p. 54) has also written that "the Indian embrace of bureaucratic controls was also encouraged by additional objectives, none of them served well by the control system in practice. One was the prevention of concentration of economic power, by licensing the creation and expansion of capacity. But, if monopoly power was to be reduced, the virtual elimination of domestic and foreign competition (i.e., the elimination of the "contestability" of the market) was hardly the way to do it." Simultaneously, the small-scale orientation of industrial policy, in conjunction with a policy of industrial dispersal, also led to a fragmentation of industrial units, so that large plants which could exploit economies of scale were not allowed to be established (Marathe, 1989; Mazumdar, 1991).

The results for AGE run contrary to those for SIZE, and the liability of newness argument may be invoked so as to explain why older firms are relatively more productive. As a labor-surplus economy, India traditionally has had a labor-intensive industrial sector (Goldar, 1986). Also, the importance of labor as a vital input becomes important because of the existence of an autarkic regime which led to the very low diffusion of modern technology, embodied in capital goods, because of significant import restrictions that exist (Mohan and Aggarwal, 1990). In Indian industry the management of industrial relations, therefore, was the key to being operationally-successful, and over the years a nexus developed between trade-union and corporate leaders (Bardhan, 1984). The existence of such a nexus enabled corporate leaders to avoid utilization problems connected with what in India is a key resource: manpower, since good labor-management relations were important to get the best out of industrial operations which deployed inadequate technology.

The nexus developed strongly over the years, because a number of older business groups in India had family continuity in their top management ranks, and labor leaders, who were also major politicians in their own right, were remarkably long-serving. These factors served to generate robust personal relationships. The existence of personal relationships between corporate families and labor leaders vitiated against the possibility of the management of newer industrial groups and the existing labor leaders in joining together to enter productivity agreements, because relationships between leaders of old-established businesses and labor leaders were built on old-established, strong personal ties (Weiner, 1986), thus inhibiting the newer industrial houses from getting the best out of their manpower resources. Of course, as faster technology diffusion occurs, with the opening-up of the economy, and Indian industry becomes more capital intensive, plus as older labor leaders give way to a younger generation, a different empirical relationship may well be noted between AGE and productivity.

A priori, one would also expect older firms to be more profitable because managing the licensing process yields significant experience in pre-empting market capacities, which can then yield superior profitability because of market capture. However, apart from profits arising from market pre-emption activities, through superior management of the licensing process, firms also become more profitable because of several strategic or operational reasons, one of which is that they are able to tap into the relevant customer segment and provide differentiated products that meet demand. One tragedy of the autarky-oriented industrial policy regime, which older firms have had more experience in, was the closure of the Indian economy to competitive pressures either from domestic or foreign competitors, as a result of which firms grew up to be strategically and operationally incompetent and unable to develop a market orientation (Bhagwati, 1993; Bhoothalingam, 1993).

Furthermore, as Jacobsson (1991) and Mazumdar (1991) have also both demonstrated, in respect of the engineering and textile industries, respectively, government policies skewed business decisions, particularly by the older firms, towards patterns of actions inconsistent with either the real needs of the market or their motivations to earn superior profitability. Such explanations, partial though they are, may be relevant in explaining why older firms have been less profitable in India. While the product markets in India have opened, very gradually though given the various start-stop episodes of reforms that Indian industry has gone through, the older firms have been less nimble and unable to shed their monopoly-oriented mind-set. At least the contemporary data show that older firms might seem to be unable to develop the ethos of a competitive culture that is required to be successful in markets where the concept of the consumer becomes important, and where choices are not thrust upon the consuming public by the government, but arise from customers' own volitions.

2. Secondary Findings

The coefficients of the control variables are broadly in line with expectations, and also reflect the impact of the institutional environment. DIVERSITY turns out to be insignificant for both dependent variables; GROUP is significant in the productivity equation, but insignificant in the equation for profitability. FOREIGN and EXPORTS are positive and significant in both equations; ADVERTISING is insignificant in both equations; DISTRIBUTION is insignificant for the productivity equation, while MARKETING is significant, but negative in both equations. CAPITAL INTENSITY is negative in both cases, INVENTORY is mildly significant and negative only in the profitability equation, while LIQUIDITY is strongly significant for the productivity equation, but not for profitability. SALES GROWTH and EXCISE are negative and significant with respect to productivity, while DEBT EQUITY and IMPORTS are negative and significant in both equations. Finally, TIME is insignificant in either case.

The results for the control variables shed light on some of the determinants of firm-level performance in the Indian context. Of contemporary policy interest, however, are the results shown by the FOREIGN, EXPORTS and TIME variables. The result for FOREIGN implies that firms in which foreign ownership exists do out-perform domestically-owned firms. This is an important consideration for foreign firms wishing to invest in India. Similarly, the result for EXPORTS implies that Indian firms, whether domestically or foreign-owned, which venture abroad do display superior economic performance. This is an important consideration since, after decades of export pessimism, the government is actually trying to fuel export-led growth, given the success stories of China, South Korea and Taiwan. Finally, the insignificant results for TIME imply that the opening up of the economy after 1991 has not yet had an appreciable impact on firms' performance.

IV. Conclusion

This paper has examined whether the size and age of firms influenced firms' productivity and profitability, and, using a sample of 1020 Indian firms, larger firms are found to be more productive and less profitable, whereas older firms are more profitable and less productive. These results are attributed to the institutional framework of the Indian economy, and industrial policy instruments, such as, inter-alia, restrictive entry policies, are purported to account for these findings with respect to the influences that size and age have on firm-level productivity and profitability. The Indian case demonstrates that how size and age relates to firms' performance cannot be analyzed outside the institutional framework that the firms operate within.

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