Does the Firm Size Matter? An Empirical Enquiry into the Performance of Indian Manufacturing Firms

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Does the Firm Size Matter? An Empirical Enquiry into the Performance of Indian Manufacturing Firms

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Abstract

The *Law of Proportionate Effect* depicts that *firm's growth rate is independent of its size*; Gibrat (1931). Some of the existing studies support the Gibrat's Law: Hymer and Pashigian (1962), Mansfield (1962), among others. However, Gale (1972), Shepherd (1972) and recently Punnose (2008) report a *positive* relationship, while Haines (1970) and Evans (1987) observe an *inverse* relationship between firm size and profitability. Baumol (1959) opined that *rate of return increases with firm size*. Therefore, the extant empirical research on the firm size – performance relationship provides inconclusive results.

Manufacturing firms' data from the Steel and Electrical & Electronics (EE) industries are taken from CMIE Prowess database for the period 2004-05 to 2006-07. Results show that firm size *affects* current profitability: *positively* in the Steel and *negatively* in the other. Some more determinants of firm performance are explored. Retained earnings have *negative* impact on profitability in Steel but, *positive* in EE. Bank credit is found *negatively* significant in both the industries. Market share of firms and industry concentration ratio (CR_4) although inconsistently are the other significant determinants of firms' performance. Firms' market value (Q) is found positively significant for both the industries. This signifies that high market value of firms reflects their goodwill, knowledge stock and prospective investment opportunities which positively influence the firms' performance. The significance of having high *brand equity* which the corporate firms thrive for becomes apparent. Interestingly, the impact of size is affected by firms' market value: firm size *positively* affects profitability both in Steel and EE. Furthermore, ineffectiveness of *Law of Proportionate Effect* is strengthened when tested over the combined data of Steel and EE firms. The short-run dynamism in firm performance is also impacted by presence of Tobin's Q.

Key words: Gibrat's law, firm size, profitability, Tobin's Q, manufacturing firms.

JEL Classification: L6, L25, M21.

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I. Introduction

A firm's performance can be measured by its profit rate, return on assets, and stability of market share, amongst others. Some of these alternative measures of performance are found related to the firm size. The *Law of Proportionate Effect* (Gibrat's Law) depicts that a *firm's growth rate is independent of its size*; Gibrat (1931).[1] On the other hand, Baumol (1959) hypothesizes that the *rate of return increases with the size of the firm*. But, the argument that mere size influences the rate of return has intrigued researchers over the years.

Hymer and Pashigian (1962), Mansfield (1962), among others empirically validated the Gibrat's Law. Later, other researchers observed that larger the firm size, higher is the profit rate; e.g., Hall and Weiss (1967), Gale (1972), and Shepherd (1972). Recently, Punnose (2008) also shows *positive* relationship between firm size and profitability. Another set of studies however, report that larger firms experience lower profit rates owing to diminishing returns to the fixed factors of production; Marshall (1961) and Marcus (1969), among others. For instance, Haines (1970) using data for the large U.S firms observed *negative* correlation between firm size and profit rate; [2] similarly, Evans (1987) also found an *inverse* relationship between size and firm growth rate. Audretsch *et al*. (2002) provides a detailed survey of empirical studies testing the 'law of proportionate effect'. Researchers verifying the link between economies of scale and profits generally find that industry profits are higher when production and marketing processes display economies of scale.[3] Sutton (1997) points out the discrepancies in conclusions about the validity of Gibrat's Law. Therefore, the extant empirical literature (mostly) using manufacturing data provides inconclusive information about the effect of size on firm performance.

This study, apart from exploring the effect of firm size on performance further extends to identify some of the other major determinants of firm performance using pooled data from Indian manufacturing firms for the period 2004-05 to 2006-07. Following Simon and Bonini

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[1] One implication of Gibrat's Law is that it holds only if persistent firm growth rate is observed (Singh and Whittington (1975)); the other implication is that large and small firms have the same average proportionate rates of growth. Mansfield (*op. cit.*), however, argued that the departure from the Law decreases as firm size increases due to the exit of slow-growing small firms from the industry.

[2] The *inverse* relationship can be explained as the large firms might have grown beyond the optimum, and so would be growing less fast compared to their smaller counterparts, which are still moving towards their optimum.

[3] The existing studies consider two types of economies of scale: economies of scale in production processes as reflected in 'capital to sales ratio' and others examine it in marketing processes as 'advertising to sales ratio'.

(1958), we assume that the Gibrat's Law applies only to the firms that are large enough to have overcome the *minimum efficient scale* of a given industry.

It is well known that manufacturing sector forms the backbone of any industrialized as well as developing economy. For India, in particular, investments in manufacturing yields approximately four times effect on GDP growth; thus it is crucial for generating substantial employment. Steel manufacturing being a highly capital intensive industry, has its growth intertwined with the growth of economy at large. Per capita steel consumption is now considered as an index of economic development of a nation. Moreover, growth in Steel industry is interlinked with the growth of the steel consuming industries such as automobile, housing and infrastructure. Steel, given its *backward* and *forward* linkages, also has a large multiplier effect. Post liberalization, Steel industry in India has experienced a substantial growth, due to growing domestic and international demand and free trade allowance. In the recent past (2001-02 to 2005-06), steel consumption has increased by 47.71%. This has not only led to significant increase in the production of steel (44.41%), imports have also shot up by 107.11 % during the same period (*GOI*, Economic Survey, 2004-05 and 2006-07). With capital investments of over Rs.100,000 crore, the Indian Steel industry currently provides (direct/indirect) employment to over 2 million people.[4] Another important manufacturing sector in the Indian context is the Machinery industry in which Electronics & Electrical (EE) constitutes a major portion. It is the Electrical equipments and Electronics sectors that have attracted highest FDI inflow (cumulatively) during the period 1991-2006. The Machinery industry as a whole has reported a robust growth rate of 12.2 % during Apr. – Nov. 2007, Economic Survey (2007-08), *GOI*. The Electronics industry, despite experiencing ups and downs in the recent past, is expected to grow at an approximate rate of 14 % in 2008. Moreover, the growing domestic market and significant foreign investment have made the business environment favorable for this industry. The Electrical industry having explored the foreign markets, recorded 14% growth in 2007-08. New product development (innovation) and technological changes (up gradation) are much rapid in Electrical and Electronics sector than Steel industry. In this study, we consider only *medium* and *large* manufacturing firms selected from Steel, Electrical and Electronics industries in India.

[4] With the recent trends of Tata Steel acquiring Corus, Bhushan Steel increasing its capacity, India will be able to achieve the production level of 275 million tons by the year 2020, which is expected to make it the second largest producer of steel in the world market.

The rest of the paper is as follows. Section II describes the data set and variables, followed by the estimation method and econometric diagnostic (specification) tests in Section III. The regression results are reported in Section IV and finally, concluding remarks are provided in Section V.

II. Data and Variables

Firm level data have been taken from the CMIE Prowess database. The data period considered in this study spans from 2004-05 to 2006-07. We select only those firms that have achieved net sales ≥ Rs. 200 crore for the period 2006-07.[5] In other words, we assume that the Steel and EE manufacturing firms[6] having net sales revenue earnings greater than equal to Rs. 200 crore are either medium or large sized firms.[7] Therefore, although the Prowess database initially provided us with 61 firms in Steel and 142 in Electrical & Electronics (EE) industry, data unavailability and inconsistency left us with 46 firms for Steel and 70 for EE. Hence, in the Steel industry we have total 92 (46×2) observations and in EE 140 (70×2) observations. Our selection of firms for the mentioned data period also eliminates any possible bias due to entry and exit of firms from the selected sample during the concerned time period. See, Table 1 for descriptive statistics on net sales in the selected manufacturing industries. Looking at the median net sales and minimum net sales values for both the industries in the year 2006-07, the judgment of using Rs. 200 crore as the cut-off value for identifying medium and large size firms seems reasonable.

Table 1: Net Sales (Rs. Crore)

Steel			**Electrical & Electronics**		
	2005-06	**2006-07**		**2005-06**	**2006-07**
Mean	2384.45	2936.75	Mean	724.05	957.69
Median	612.81	711.91	Median	324.91	418.31
Std. Dev.	5404.48	6558.48	Std. Dev.	1140.68	1458.46
Maximum	32299.50	39301.50	Maximum	7580.33	8710.26
Minimum	217.20	218.57	Minimum	88.86	200.90

[5] Piergiovanni *et al*. (2002) mentions that one major impediment to examining the relationship between firm size and growth is the lack of access to sufficiently large longitudinal data sets.

[6] Homogeneity in the data of Electronics and Electrical industry allow us to club them under a single head EE. The (statistical) specification tests performed first separately on each of the two data sets and then on the clubbed data set show consistency.

[7] Kadapakkam *et al*. (1998) describe similar definition of firm size.

The existing literature mentions an array of alternative measures of firm size. Similar to Amirkhalkhali *et al*. (1993) and Abdurahman *et al*. (2003), we consider natural logarithm of net sales (*Ln* NS) as the measure of firm size. Firm performance is represented by profitability. In order to sustain profit growth rate, capital intensive industries such as Steel and EE demand advanced R&D and sophisticated capital equipments upgradation that require both internal as well as external financing. Baumol (1959, p. 33), argued that "… increased money capital will not only increase the total profits of the firm … it may very well also increase its earnings per dollar of investment". Capital structure is an important element of input mix particularly in the heavy industries such as Steel, Electrical equipments and Electronics. Profit maximization would require some optimal rate of internal financing and external borrowing, which differs from industry to industry depending on the growth prospects. We consider one period lagged *retained earnings* as a measure of availability of internal finance (*IF*), and last period's available *bank credit* as the proxy for external source of funds (*EF*). Both these liquidity variables are deflated by the size variable. Market share (*MS*) defined as 'ratio of net sales of the firm over total net sales in the industry' is considered to capture the impact of economies of scale on firm performance.[8] In order to illustrate the effect of varying degree of industry level competition on firms' performance, (Four-firm) *concentration ratio* (CR_4) is included as one of the explanatory variables. While relative market share relates a firm to its competitors, the concentration ratio is an industry level variable. Lastly, on the lines of Lee *et al*. (1999), we construct Tobin's Q as the 'ratio of market value of company's financial claims to the replacement value of capital'. Company's financial claims include both equity capital and debt capital. Market capitalization of firm is used to measure its market value of equity.[9] Debt capital is measured as the sum total of book value of both secured and unsecured borrowings. Replacement value of capital is measured by the book value of total assets, excluding the miscellaneous expenditures (e.g. preliminary expenses, R&D expenditure amongst others). While constructing the Q variable, due to data unavailability and inconsistency over the selected data period, sample size for the Steel and EE reduces to 32 and 56, respectively.

[8] Punnose (2008) however, measures market share as the sum of sales by a firm during the study period divided by total sales of the firms in the selected sample for his study period.
[9] Market capitalization is computed as [High Price + Low Price]/2 × number of outstanding shares for the first week of April in the current financial year.

III. Estimation Method

Regression functions are estimated by the OLS method. Having manufacturing firms' data for the period 2004-05 to 2006-07, we estimate the empirical models with pooled cross section – time series data.[10] One of the important assumptions of the classical normal linear regression model is that regressors should not be (perfectly) correlated as then the variance of the error term becomes infinite and causes the model to fail. Precisely, in such a case the explanatory variables are said to exhibit multicollinearity.[11] The *Gauss-Markov theorem* states that among all linear unbiased estimators, the *ordinary least squares* estimator has the smallest variance. Although this result is useful, it does not assure us that the least squares estimator has a small variance in absolute sense. In order to take care of probable multicollinearity problem, we use the correlation matrix with the cut-off value of 0.5 as the correlation coefficient among the right-hand side variables. Considering the data period of only two years, the possibility of existence of any autocorrelation problem does not arise. In fact, we do not have sufficient time series data to conduct Durbin's *h* test.[12]

III.1 Exogeneity Test (Hausman (1978))

Conventional linear regression specification assumes two properties: Orthogonality and Sphericality. The Orthogonality assumption implies that the explanatory variables are *not* correlated with the random error terms, and hence are exogenous to the model.[13] We follow Hausman (1978) to detect failure of this property. Relative ranks are used as *instruments* in the exogeneity tests of all the explanatory variables, with the assumption that the instruments satisfy the exogeneity property. See, Durbin (1954). It has been confirmed that the instrument in each case is statistically significant at 1 %. Under H_0, the test statistic (*LM*) asymptotically approaches χ^2 distribution with 1 *df*. If H_0 is *rejected* then the concerned explanatory variable is *endogenous* at a particular significance level. Table 2 reports the Hausman (*ibid*.) *LM* test results. Firm size (*Ln* NS) and bank credit (*EF*) are endogenous in both the industries,

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[10] Having a data period of only two years (T = 2), one can argue that we practically use a cross-section data set. However, since the time period is greater than one year (T > 1) and construction of lag variables take the data set back by another year, we call this a pooled data. It is known that, panel data estimation methods refer to cases where $n > 1$, $T > 1$ and $N = n$T. For details, see Johnston and DiNardo (1997, p. 388).

[11] Even small changes in the data can produce wide swings in the parameter estimates; coefficients may have high standard errors and low significance levels or may have wrong signs or implausible magnitudes.

[12] The existence of cross-time dependence in the disturbance term has rarely been considered by the researchers investigating the 'law of proportionate effect'. See, however, for exceptions Chesher (1979), Creedy (1974), and Hart (1976).

[13] $E(u|X) = 0$ where u is the vector of random error terms and X is the vector of explanatory variables.

however, retained earnings (*IF*) is endogenous only in EE. All other regressors are found exogenous.

Table 2: Hausman *LM* Test Results

Dependent Variable: $\dfrac{\text{Profit after Tax}}{Ln \text{ Net Sales}}$

Steel		Electrical & Electronics	
Variable	***LM* Statistic**	**Variable**	***LM* Statistic**
$Ln\ \mathrm{NS}_t$	39.92^{a}	$Ln\ \mathrm{NS}_t$	14.51^{a}
$(CR_4)_t$	0.13×10^{-14}	MS_t	2.63
$\dfrac{\mathrm{RE}_{t-1}}{Ln\ \mathrm{NS}_{t-1}}$	0.22	$\dfrac{\mathrm{RE}_{t-1}}{Ln\ \mathrm{NS}_{t-1}}$	8.20^{a}
$\dfrac{\mathrm{BC}_{t-1}}{Ln\ \mathrm{NS}_{t-1}}$	6.79^{a}	$\dfrac{\mathrm{BC}_{t-1}}{Ln\ \mathrm{NS}_{t-1}}$	7.69^{a}
$\dfrac{\mathrm{PAT}_{t-1}}{Ln\ \mathrm{NS}_{t-1}}$	0.0013	$\dfrac{\mathrm{PAT}_{t-1}}{Ln\ \mathrm{NS}_{t-1}}$	6.31
Q_{t-1}	4.58	Q_{t-1}	3.47

Critical value of χ^2 (1 *df*) = 6.63 (at 1%). a: H_0 is rejected at 1%.

III.2 White (1980) Correction for Heteroskedasticity

The *sphericality* assumption of the conventional linear regression model implies that the variance of the disturbance term is constant (or homogenous) across the observations. If this assumption is violated then the error term is said to be heteroskedastic. For mild heteroskedasticity, OLS model holds good. However, to counter severe heteroskedasticity present in the data set, White (1980) obtained a covariance matrix estimator. This estimator is consistent even in the presence of heteroskedasticity and does not depend on any specific heteroskedastic structure of the error term. Using this covariance estimator, we obtain heteroskedasticity corrected *t*-values for all parameter estimates of the regression models;[14] see Olsen (1980) and Hall (1987).

[14] Initially, we have computed the Breusch-Pagan (1979) statistic to check for heteroskedasticity. However, White (*op. cit.*) correction has been performed throughout our regression estimations.

IV. Regression Results

Two alternative empirical models are estimated to illustrate the relationship between firm size and profitability, along with identifying some other determinants of firm performance. However, our choice of empirical models has largely been constrained by the availability of consistent data. Parameter estimates from the two empirical models for both the (manufacturing) industries are reported in Table 3 and 4. Having performed the Hausman (*ibid*.) exogeneity test, for the *endogenous* regressors, their predicted values from regression on respective instruments is used as regressors. Hence, any possible endogeneity amongst the explanatory variables is eliminated. As mentioned in Section III, the regression results obtained are free from multicollinearity problem. The reported *t*-statistics are White (*ibid*.) corrected to eliminate any effect of heteroskedasticity present in our (selected) data and thus we obtain robust statistical estimates.

In the first model, we hypothesize that *firms' (current) performance is determined by their size, industry concentration ratio, relative market share, availability of internal as well as external funds and last period's profitability*.

$$\left(\frac{\text{PAT}}{Ln\ \text{NS}}\right)_{it} = \alpha_{it} + \beta_1\ Ln\ \text{NS}_{it} + \beta_2\ \left(CR_4\right)_{it} + \beta_3\ MS_{it} + \beta_4\ IF_{i,t-1} + \beta_5\ EF_{i,t-1} + \beta_6 \left(\frac{\text{PAT}}{Ln\ \text{NS}}\right)_{i,t-1} + \varepsilon_{it}$$

The 'law of proportionate effect' is found *invalid* for both the industries, See, Table 3. Results show mixed evidences: firm size is *positively* significant (at 1%) in Steel and *negatively* significant (at 5%) in EE. The coefficient values of the size variable across the two industries are almost the same and stable. Therefore, while relatively bigger firms perform better in Steel, the opposite holds true in EE.[15] Industry concentration ratio and market share of firms are found to be competing with each other in the selected two industries.[16] While CR_4 is (weakly) *negatively* significant (at 10%) in Steel, (relative) market share has a strong *positive* impact (at 1%) on EE firms. Since 1991, almost a dozen of new firms (of the selected sample of 46) have started their operations in the Indian Steel manufacturing sector.[17] With the abolition of the *licence-permit raj* and entry becoming relatively easier these handful of

[15] Size as an indicator of diversification affects firm performance negatively. See, Rumelt (1982), Porter (1987), and Montgomery *et al*. (1988). Recall Section I, EE firms are more diversified than their Steel counterparts.

[16] There has been problem of severe multicollinearity; hence, both the variables were not found statistically significant simultaneously.

[17] With the opening up of the Indian economy, the (domestic and as well as exports) market expansion was supported by improved industrial infrastructure.

new firms eyed profit potential in Steel manufacturing and thus lowered the industry concentration ratio (market power). In the presence of technological opportunities in a growing market like India, entry of new firms erodes the market share of existing (large) firms. Also, faster growth of demand, by itself, usually reduces the market share of large firms because of constraints on capacity expansion. However, in EE, firms with larger market share experience the advantage of economies of scale and thus reap better profits.[18] Availability of internal funds is negatively significant (at 5%) in Steel and positively significant (at 1%) in EE. On the other hand, bank credit negatively affects firm performance only in EE. The coefficient values and statistical significance of the liquidity variable(s) in the two industries suggest that EE firms are more credit constrained than the firms in Steel industry. The lagged dependent variable is positively significant (at 1%) only in Steel industry emphasizing the presence of short-run dynamism and forward looking nature in Steel firms' profitability.

Table 3: Regression Results for the First Empirical Model

Steel		Electrical & Electronics	
Intercept	1019.74 (1.52)[c]	Intercept	31.36 (2.21)[a]
$Ln\ \text{NS}_{it}$	5.09 (2.35)[a]	$Ln\ \text{NS}_{it}$	− 5.00 (2.02)[b]
CR_4	− 1959.51 (1.57)[c]	MS_{it}	340.48 (9.53)[a]
$\frac{\text{RE}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$	− 0.007 (1.93)[b]	$\frac{\text{RE}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$	0.71 (2.62)[a]
$\frac{\text{BC}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$	− 0.03 (0.83)	$\frac{\text{BC}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$	− 0.12 (2.52)[a]
$\frac{\text{PAT}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$	0.75 (37.78)[a]		
$\overline{R}^2 = 0.93;\ N = 92$; $F = 238.82 \rangle F^*_{0.01}$		$\overline{R}^2 = 0.37;\ N = 140$; $F = 21.84 \rangle F^*_{0.01}$	

a: significant at 1%; b: significant at 5 %; c: significant at 10%.
White corrected *t*-statistics in parentheses.

[18] Large firms are usually more profitable and able to acquire bigger market share by exploiting scale economies, bargaining power, patents, reputation and financial resources to deal with adverse shocks and business downturns [Dean *et al*. (1998)].

In the second empirical model, we explore whether previous year's market value of firms vis-à-vis future investment opportunities affect current firm performance. Without compromising with the main objective of this study (i.e., statistically testing the validity of Gibrat's Law) we hypothesize that *one-period lagged market value of the firms, along with their current size and previous year's profitability affect current firm performance.* [19]

$$\left(\frac{\text{PAT}}{Ln\ \text{NS}}\right)_{it} = a_{it} + b_1\ Ln\ \text{NS}_{it} + b_2\ \text{Q}_{i,t-1} + b_3\left(\frac{\text{PAT}}{Ln\ \text{NS}}\right)_{i,t-1} + u_{it}$$

Regression results are reported in Table 4. Tobin's Q is found positively significant (at 5%) in both the Steel and EE industries. The coefficient value is significantly higher in Steel than in EE. That is, high market value of firms reflects their goodwill, knowledge stock and prospective investment opportunities which positively influence the firms' performance. Gibrat's Law is again found *invalid*; however, there now emerges *positive* dependence of profitability on firm size in both the industries. Size matters more to the Steel firms than their EE counterparts. The recent trend of acquisition and capacity expansion by the Indian Steel firms reflect this. The short-run dynamism that was missing earlier in EE is now witnessed in the presence of Tobin's Q.

Table 4: Regression Results for the Second Empirical Model

Steel		**Electrical & Electronics**	
Intercept	– 234.89 (3.08)[a]	Intercept	– 29.18 (2.54)[a]
$Ln\ \text{NS}_{it}$	33.76 (3.00)[a]	$Ln\ \text{NS}_{it}$	5.06 (2.42)[a]
$\text{Q}_{i,t-1}$	30.84 (1.93)[b]	$\text{Q}_{i,t-1}$	2.06 (2.02)[b]
		$\frac{\text{PAT}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$	0.51 (1.88)[b]
$\overline{R}^2 = 0.21; N = 64$; $F = 9.57 \rangle F^*_{0.01}$		$\overline{R}^2 = 0.29; N = 112$; $F = 16.23 \rangle F^*_{0.01}$	

a: significant at 1%; b: significant at 5 %.
White corrected *t*-statistics in parentheses.

[19] In the presence of Tobin's Q, both the liquidity variables (*IF* and *EF*) are statistically insignificant. Also, inclusion of either CR_4 or (relative) market share worsens the statistical fit of the model.

Furthermore, we went on testing the validity of the *law of proportionate effect* over the complete sample of selected medium and large Indian manufacturing firms from two specific industries i.e. Steel and EE.

$$\frac{\text{PAT}_{it}}{Ln\ \text{NS}_{it}} = -22.09 + (3.75)\ Ln\ \text{NS}_{it} + (1.82)\ \text{Q}_{i,t\text{-}1} + (0.72)\ \frac{\text{PAT}_{i,t-1}}{Ln\ \text{NS}_{i,t-1}}$$

$$(2.15)^{b}\quad (1.99)^{b}\qquad\qquad (2.22)^{b}\qquad (20.58)^{a}$$

$$\overline{R}^{2} = 0.85 \quad F = 331.12 \rangle F^{*}_{0.01} \quad N = 176$$

a: significant at 1%; b: significant at 5 %; White corrected *t*-statistics in parentheses.

In the combined data of 88 firms over the two years, we have total 176 observations. The Hausman (*ibid.*) *exogeneity* test over the combined data reveals that firm size continues to be *endogenous*. Both the liquidity variables (*IF* and *EF*) are statistically insignificant in presence of Tobin's Q. However, the model fits the combined data very well, for high $\overline{R}^{2}$ value and *F*-statistic. Of all the explanatory variables, firm size has the highest coefficient value followed by Tobin's Q. Both these regressors are *positively* significant at 5%. Therefore, in the combined dataset of two (manufacturing) industries, the law of proportionate effect remains *invalid*! The lagged dependent variable is again significant implying the forward looking nature of the firms' profitability.

V. Conclusion

The 'law of proportionate effect' does not hold in the selected Indian manufacturing industries. Hence, in our study, size does matter! It has been often argued that larger firms in an industry are relatively more efficient than the smaller ones. If this is not so, then why does a firm aspire to be larger and larger; and if this is so, then how do smaller and larger firms co-exist in the same industry. Every business is normally encountered with risks and uncertainties: bigger the firm, it is expected to be stronger to face such risky and uncertain situations. A bigger firm can perhaps devise better ways and means to fight the market risks and uncertainties. A relatively bigger firm is expected to have better chances to offset random losses. Moreover, size brings bargaining power over the suppliers and competitors. When products are standardized and can be produced on a mass scale with longer production-runs such as Iron and Steel, a large firm will be more efficient. A big firm because of its control over the market can buy up the best sites with locational advantage, the superior technology and best professional experts.[20] The well-known Schumpeterian hypothesis also suggests that bigger firms have an advantage in the R&D process by enjoying economies of scale in the R&D effort and also having a superior ability to exploit the outcomes of research [Schumpeter (1950), Kamien and Schwartz (1982)].

This micro-econometric study on medium and large sized Indian manufacturing firms finds firm size affecting profitability: *positively* in Steel and *negatively* in Electrical & Electronics (EE). Interestingly, in EE the relationship reverses in presence of Tobin's Q. High market value improves firm performance. Profitability of high-tech manufacturing firms also depends on the availability of funds. Results show that EE firms are relatively more credit constrained than their counterparts in the Steel industry. The industry structure is important in determining the performance of Steel firms. Entry of new firms seems to be relatively easier in Steel manufacturing. On the other hand, EE firms are more concerned about their market share and want to gain the economies of scale advantage to improve upon their current performance. When we combine the data of two industries, the law of proportionate effect remains *invalid* and positive dependence of profitability on firm size is observed. The (inconsistent) positive significance of lagged dependent variable shows that previous period's profitability affects current profitability. Hence, short-run profit dynamism exists among the selected Indian manufacturing firms.

This study does not claim to identify all the determinants of firms' profitability. We attempted to identify only a few. Organizational structure, outward (export) orientation, agency costs and transaction costs are some of the other probable determinants of firm performance. Some macroeconomic policy factors may also affect firm performance for instance, the corporate tax rate, investment tax credit, etc. We plan to explore these issues in future research.

[20] We also have the recent experiences where even the giants had fallen; e.g., the bankruptcy of Lehman Brothers, American International Group (AIG) show that indiscriminate increase in size without prudent regulation can lead to doom. Moreover, as a firm gets bigger beyond a certain limit, X-Inefficiency can also set in; Leibenstein (1966).

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