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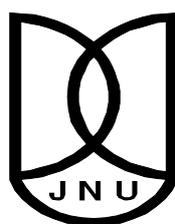
Corporate governance and Competition: A Case Study of India

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ABSTRACT

The aim of this paper is to show the interaction effect of product market competition and corporate governance variables on firm performance. While the linkage between internal governance mechanism and firm performance is well established in several studies, the interaction between internal and external governance mechanism has received very little attention in emerging market economies. Here we have shown the independent and interaction effect of ownership and competition variable on firm level productivity. Contrary to conventional wisdom, we document that competition has in reality become a discernible force in developing economies. The econometric modelling result confirms while the standalone effect of ownership variable on productivity is mostly insignificant, there is a strong positive interaction effect with competition variables.

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I. Introduction.

The prevalence of neo-classical models has obscured the institutional aspect of production. Since in the neo-classical model a profit-maximizing firm strives to reach the highest production possibility frontier given the demand and cost conditions, institutions *per se* have received little significance. Despite the path breaking work of Coase in 1937 on transaction cost, the emerging market literature on industry has evolved around the structure-conduct-performance (SCP) paradigm. One inadvertent

fallout of East Asian crisis is the wider acceptance of sound institutions as the pillar of economic success. The association between corporate governance and productivity has become a thrust area of research since then. In a recent study, Bartelsman and Doms (2000) have pointed out four factors that influence productivity growth in which firm ownership and control is identified as an important one. Palia and Lichtenberg's (1999) study suggest that managerial ownership changes are positively related to changes in productivity. They have provided empirical proof of a stock market reward for firms with higher productivity levels. This paper advances the literature of linkage between corporate governance and product market competition and their effect on firm level productivity from an emerging market economy perspective.

We have defined governance as synonymous with the exercise of authority, direction and control. In the Modern Corporation, share ownership is one of the key mechanism through which one can exercise this control. The choice of input, technology, man-power and to some extent operational environment is fundamentally a choice made by the dominant owner. Therefore, we construe corporate governance as the mixture of firm's control concentration and structure, capital structure and their interaction with product market competition. Competition and concentrated ownership can help in reducing the collective action problem present in a Modern Corporation. While trying to identify which corporate governance mechanism is better, Shleifer and Vishny (1997) have observed that strong legal protection of investors and some form of concentrated ownership are essential elements of a good corporate governance system. The transaction cost involved in the decision making process of giant corporations can be substantially lessened by concentrated ownership structure. In other words, collective action problem can be resolved by partial concentration of ownership and control in the hands of one or a few large investors (Becht *et al.*, 2003).

We use total factor productivity as our measure of corporate performance. It is argued that productivity is a more reliable measure of firm performance than financial measures as accounting profit rates can be manipulated and stock prices can be biased. While many studies have estimated production function to determine productivity, the corporate governance variables have been generally ignored in the case of India (See, Kato, 2005). Earlier this problem has been addressed by including firm specific fixed effects. However, instead of treating governance variable as an unobserved firm specific effect, we have included such variables in the productivity estimation.

As an institutional background, India has embarked upon the path of reform after a balance of payment crisis in 1991. It has improved its competition climate via a series of changes in both domestic and trade policies. The government has started gradually moving out from production activities and private sector is being allowed in most of the industries which were earlier reserved for public sector and small scale industries. The salient policy change after 1991 was the 'industrial licensing policy of 1991' which remarkably improved the conditions of entry for both domestic and foreign firms (Pant and Pattanayak, 2005). In addition, the pro-competition stance in trade and investment policy has been equally noteworthy. Besides making the exchange rate more market oriented, the trade policy has eliminated quantitative restrictions on imports, cut import tariffs and done away with selective protection for the small-scale industries. These institutional changes have impacted almost every sphere of economic activities and set the stage for this study. Finally, the passage of the Competition Act,2002 and subsequent amendments have brought competition to the centre of regulatory concerns in India.

This paper is organised as follows. In the next section we present a brief overview of the literature. Section III then sets out our explanatory model and the principal hypotheses. The results of the estimation are presented in Section IV while Section V concludes the paper.

II. Theoretical Background and Evidence

II.1. Does Competition Matter?

Internal as well as global competition in the firm's product market is a potent force in ensuring good corporate governance. It could limit the managerial discretion. Micro-economic theory suggests that competition forces price to equal marginal cost, which brings about allocative efficiency. Competition in the product market ensures that best firms in the industry survive and also fosters managerial incentive to perform. Therefore, if the product market is sufficiently competitive, management will be constrained to act in accordance with shareholders' interests, or else succumb to bankruptcy.

The literature suggests that competition can reduce agency problems between owners and managers (Alchian, 1950; Stigler, 1958). In one paper, Hart (1983) has differentiated between the entrepreneurial firm and the managerial firm and has shown the ultimate reduction in cost of production when the managerial firm competes with the entrepreneurial firm. Schmidt (1997) argues intense competition has two effects on the manager's optimal effort. Greater competition lowers the price that the firm receives for its output and, *ceteris paribus*, increases the risk that the owner will find it optimal to liquidate the firm. Therefore, the manager has an increased incentive to work harder to avoid liquidation. However, since increased competition reduces profits it may reduce the benefits of a cost reduction. The owner may not be interested in paying the manager the high rents necessary to achieve a cost reduction. In the Schumpeterian firm widening price-cost margin acts as an incentive to innovation. As competition lowers the margin, it may retard the pace of organic growth of firm due to lower R&D expenditure and hence innovation. In the same vein, Smirlock and Marshall (1983) have expressed doubt on the efficacy of competition and argued that imperfect information, costly monitoring and difficulties in enforcement of contract may not completely eliminate managerial discretionary behaviour in a competitive market.

While there is imperfect convergence in theoretical models, most of the empirical evidence suggests a positive impact of competition on firm productivity. Nickel *et al.* (1997) estimate the effect of product market competition, shareholder control, and debt levels on firm level productivity growth in U.K. They find a positive impact of product market competition, ownership control, and financial pressure on productivity growth.[i] Grosfeld and Tressel (2001) find a positive impact of competition on productivity of Polish firms. Griffith (2001) finds for U.K firms that an increase in productivity level and growth due to competition occurs in principal-agent type firms, and not in those where managerial control and ownership are more closely related.[ii] Anderson *et al.* (1999) find perfectly competitive firms having double the efficiency of monopolies in case of Mongolian firms. Januszewski *et al.* (1999) examined the role of product market competition and corporate governance as determinants of productivity growth in German manufacturing firms, using a panel data set of 400 firms over 1986-

94. They find a negative impact of rent on productivity growth, indicating that product market competition has a positive impact on productivity growth.

In another study, Koke (2001) finds that German firms under concentrated ownership have higher productivity growth. This effect is larger for firms which are earning lower rents. Habib and Ljungqvist (2003) have examined the effect of product market competition, as measured by a Herfindahl index based on four-digit SIC codes, on firm value. They provide evidence that firm value is positively related to product market competition. Beiner *et al.* (2004) find that more intense product market competition is associated with stronger incentive schemes for managers and the positive influence of competition on incentive schemes is stronger for firms operating in a high competitive environment. However, they obtain a positive but insignificant relation between firm value and product market competition. Finally, Kato (2005) has studied the impact of competition and debt intensity on productivity of Indian firms. He finds higher productivity growth for smaller firms when the market is less concentrated.

II.2. Competition and Corporate Governance

In governance studies, though it is imperative to examine the degree of influence of different variables on firm performance, it is also necessary to study their mutual interaction. Independently they can constrain the managerial discretion or can induce mangers/insiders to align their interest with shareholders interest. On the other hand, there may be some complementarity or substitutability relation between different variables. Specifically, competition and corporate governance indicators may move in a particular direction or in opposite direction while affecting productivity. When they move together and in the same direction, we say they are complementary. When they move in the opposite direction, then they are substitutes. Product market competition restricts managerial discretion and therefore acts as an alternate mechanism to other corporate governance variables. Also, it can strengthen certain market forces. For example, higher competition can dampen corporate profit thereby eroding market value of shares. It may signal for a corporate takeover, thereby putting pressure on managers to perform well (Roe, 2004). When the devices are complementary, the impact of product market competition would be greater in firms with efficient governance structure.

The substitution effect implies when corporate governance is weak; competition plays an important role as a disciplinary device forcing mangers to improve performance and reduce slack. If competition and corporate governance were complements, product market competition might not alone be sufficient to reduce productive inefficiencies in an environment with poor corporate governance. A number of theoretical papers investigate the effects of competition and corporate governance on firm performance. Aghion and Howitt (1997) and Aghion *et al.* (1999) developed a model in which competition appears as a substitute to good corporate governance which is measured by financial pressure at the firm level. On the other hand, Holmström and Milogrom (1994) analyze initiative and various incentive mechanisms as complementary in a multitask principal-agent framework.

The empirical evidence is not unambiguous in its findings. Nickell *et al.* (1997) find that financial pressure and dominant shareholder control from the financial sector act as a

(weak) substitute for product market competition in case of UK firms. They find rent to be negatively related to total factor productivity (TFP) growth; whereas interest payment and dominant shareholder control are positively related to total factor productivity growth. They confirm that the last two factors can substitute for competition. The impact of competition on productivity performance is lower when firms are under financial pressure or when they have a dominant external shareholder. Januszewski *et al.* (1999) find that firms in highly competitive industries have higher rates of productivity growth. Furthermore, they confirm competition has a positive effect on productivity growth for those firms which have concentrated ownership of their shares (complementary effect). Grosfeld and Tressel (2001) have studied the interaction effect of governance and competition for the Warsaw Stock Exchange listed firms. They find competition to be positively affecting productivity. They confirm that the impact of product market competition depends on the ownership structure. Product market competition has significant impact on productivity in companies whose ownership structure is more dispersed or more concentrated.

With regard to China, Hu *et al.* (2004) find that ownership, corporate governance and competition are important predictors of firm performance. When they have examined joint effect of the above three variables, ownership and corporate governance turned out to be more important than competition. They have also found some substitutability between private ownership and competition. Li and Niu (2006) find moderate concentrated ownership and product market competition to be complementary, so also relative dispersed ownership and competition. They find evidence for a substitution effect between high concentrated ownership and competition i.e., firms with high concentrated ownership in competitive environment to be producing less. Koke *et al.* (2001) have found complementary effect between concentrated ownership and competition for German firms. They found when owner control is tight, competitive pressure boosts higher productivity growth. In a subsequent study, Koke and Renneboog (2005) found differential effect of competition and ownership for U.K and German firms. In case of U.K, weak product market competition has a negative impact on productivity growth of profitable, widely held firms. Block holder control has no impact on the productivity growth in firms which are subject to strong competition, but the presence of larger block holders like insiders reduces the negative impact of weak competition. The relation between strong block holder control and productivity growth is limited in case of German profitable firms. However, controlling banks, insurance firms, and government stakes are able to reduce the negative effects of weak product market competition.

Some of the studies have examined the interaction of product market competition and capital structure. Chevalier (1995a) finds that highly leveraged firms are weak competitors in the product market. Kovencock and Philips (1997) also presented the case that firm leverage and product market competition is important in determining future firm performance.

III. The Hypothesis.

III.1. Productivity as a Measure of Performance

Productivity is an indicator of long term performance of firms. It shows the potential for growth and tends to have more stable effects on firm value. Hitherto most of the studies have focused on the relationship between ownership and firm value i.e., Tobin's Q. However, Tobin's Q is affected by investors' psychology/perception about the firm's

future performance. While calculating Tobin's Q, we take a single day's stock price information at the end of the year. If the capital market is highly volatile, then Tobin's Q may misrepresent the performance of the firm. Hence, accounting for firm performance by way of productivity as against Tobin's Q or profitability may reduce random noise due to price changes or stock market volatility.

In one study, Palia and Lichtenberg (1999) have used productivity as a measure of firm performance. They confirm that stock market rewards higher productivity firms with higher Q values. Similarly, Allen *et al*. (1989) show that growth in equilibrium firm profits and the values of stock price index are both increasing functions of the exogenous productivity growth rate They argue that share price data can be used to make inferences about the rate of productivity growth in sectors such as services. In aanother study, Gordon and Parsons (1985) illustrate that profit changes can be measured as a function of productivity and changes in price recovery while Bulan et al. (2005) argue that productivity is a more fundamental source of value for the firm and more productive firms are worth more. They find a non-monotonic relationship between managerial ownership and productivity. Finally, Baily and Scultze (1990) while analyzing the effects of an exogenous reduction in the rate of labour augmenting productivity growth in a one sector neoclassical growth model, show that decline in the growth rate of productivity results in a decline in the rate of profit. Therefore, differences between firms in productivity are likely to be positively correlated with differences in stock prices. In this study, we have used productivity as a measure of firm performance.

III. 2. The Hypotheses.

Empirical evidence and some of the theoretical predictions have indicated that competition has a positive effect on firm productivity. Competition in firm's product market is a very influential force for ensuring good corporate governance. Even in the presence of weak internal monitoring, high product market competition may ensure that management does not shirk. Here, Hart (1983) argues that in the presence of strong competition, the amount of managerial slack would be less while Hermalin (1992) argues that when income effect is positive, then agency cost decreases with intensified product market competition. Martin (1993) predicts a negative relation between product market competition and managerial slack. There seems to be sufficient empirical evidence to suggest a positive relation between increased product market competition and firm performance (Nickell etal, 1997; Koke, 2001; Januszewski *et al*, 1999). It can be said that competition provides a benchmark to measure manager/insiders performance. Higher product market competition forces the managers/insiders to focus on high performance, because if they do not, it would ultimately result in bankruptcy and closure of the firm. Since it ncreases the chances of bankruptcy, competition incites the insiders to greater effort and forces costs reduction necessary to avoid bankruptcy. In addition, competition has severe reputational implications. As the firm's performance would be compared with its peers, it puts lots of moral pressure on the family/insiders to perform. On the basis of above argument, we hypothesize that:

1. ***Competition has positive effect on productivity.***

2. ***Higher amount of insider ownership has a positive effect on firm productivity.***

3. ***The impact of insider ownership on firm productivity is stronger when competition in firm's product market is intense.***

The government owned financial institutions have distorted objective functions. The purpose of setting up of Development financial institutions in India is to foster industrialization. Therefore, the quantum of debt has been the performance measurement criteria for them rather than the quality of loans. The amount of stock ownership by DFIs in companies is more of a political decisions rather than driven by business motives. However, institutional investors can exert pressure on management by offloading large amount of shares. As they have commitment to their investors, they will ensure that the firm is getting managed in the most efficient manner and the resource allocation is optimal to get best output. The efficient monitoring hypothesis (Pound, 1988) proposes a positive relation between institutional investors share ownership and firm performance. On the basis of above argument, we hypothesize that:

4. **Development financial institutions' shareholding has negative effect and institutional investors' share holding has positive effect on firm productivity.**

Business groups fill the void of missing markets for labour and capital in emerging economies. Group affiliated firms get access to critical resources such as technology, input and infrastructure from their parent firms. Also group structure provides a mechanism for pooling and mobilizing managerial talent across the board. Hence, we hypothesize here:

5. ***Group affiliation has a significant positive effect on firm productivity.***

It is argued that debt acts as a bonding mechanism between shareholders and mangers. By putting constraint on the free cash flow, debt aligns the interest of the manager with shareholders. The signalling argument proposes a positive relation between higher amount of debt and firm value as investors read larger amounts of leverage as a signal of higher quality firm. This is because debt is a contractual obligation to repay interests and principals. Failures to make payments can lead to bankruptcy and managers may lose their jobs. However, in India most of lending institutions are government owned. They thus have a soft budget constraint. Therefore, the threat of bankruptcy is very poor. Financial institutions have reduced incentives for monitoring their debtor firms. The managers of highly leveraged firms may undertake negative net present value projects or involve in discretionary spending. Second, due to accumulation of public debt, the companies lose their credibility in the market. Even if they have positive net present value projects, they have to sacrifice the project because of unavailability of fresh loans. Therefore, though debt may positively affect firm value as it is based on investors' perception, it may negatively affect the productivity. Here, Koke *et al.* (2001; 2005) has found positive effect of bank debt on productivity. Nickell *et al*. (1999) have found a positive impact of financial pressure on firm productivity. On the other hand, Kato (2005) has found a negative relation between debt intensity and productivity in case of India. Therefore, we hypothesize that:

6. **Financial pressure or debt concentration has a negative effect on productivity.**

IV. THE EMPIRICAL MODEL

IV.1 The Specification

Productivity of a firm is determined by several factors including competitive environment and ownership structure. The more apparent measure of productivity is the ratio of outputs to inputs. Since the firm employs several inputs, there are different ways of explaining productivity. In this study, we have measured total factor productivity which is widely used in the extant literature.

Total factor productivity (TFP) is defined as output per unit of total input, where total input is the weighted sum of the individual inputs: $A_{it} = {Y_{it}}/{f(k,l)}$ (Palia and Lichtenberg, 1999). Here, A denotes TFP, $f(k,l)$ denotes total input, l denotes labour input, and k denotes capital input. Rearranging the above equation, we can obtain a production function which is: $Y_{it} = A_{it} * f(k_{it}, l_{it})$. This explains that output produced is determined by the quantities of inputs employed and the efficiency of the producer. Assuming $f(.)$ as a Cobb-Douglas production function, we can write: $Y_{it} = A_{it} * l_{it}^{\alpha} k_{it}^{\beta}$. Taking logarithms we can express this as: $\ln y_{it} = \ln A_{it} + \alpha_{it} \ln l_{it} + \beta_{it} \ln k_{it}$.

If the technical parameters α and β are invariant across firms and TFP is varying across firms and unobservable, we can write the above equation as: $\ln y_{it} = \alpha \ln l_{it} + \beta \ln k_{it} + u_{it}$ where $u_{it} = \ln A_{it}$.   Hence, we can hypothesize that productivity, u_{it}, is related to insider ownership and competition by some functional form $g(.)$. Now we can express the above equation as: $\ln y_{it} = \alpha \ln l_{it} + \beta \ln k_{it} + g_{it}(.) + e_{it}$ (where $\ln A_{it} = u_{it} = g_{it}(.) + e_{it}$). So, g_{it} embodies all factors that affect productivity level. We can express it as: $g_{it} = \chi + \delta X_{it}$, that is the level of total factor productivity is a function of X_{it} variables. Bringing this to the primary equation, we can write: $\ln y_{it} = \chi + \delta X_{it} + \alpha \ln l_{it} + \beta \ln k_{it} + e_{it}$. X_{it} is a vector of variables that could affect the productivity level of a firm and e_{it} is a random disturbance term, capturing all other shocks. Including industry dummy, θ_i, and time dummy θ_t, the model can be expressed as : $\ln y_{it} = \chi + \theta_i + \theta_t + \delta X_{it} + \alpha \ln l_{it} + \beta \ln k_{it} + e_{it}$. In the Appendix, we have defined each of the explanatory variables.

IV.2. Data and Empirical Results

The data are retrieved from *Prowess*, a database provided by the Centre for Monitoring the Indian economy (CMIE). The initial sample consists of 1,833 listed firms for the period 2000-01 to 2003-04. Firms for which there is no shareholding data, stock price data and sales data are dropped from the sample. We have not included firms which are classified as diversified for this productivity analysis which resulted in dropping of 26 firms (i.e., 104 firm years). Firms for which gross fixed assets, gross value added or wages and salaries are missing are also dropped in the modelling process. Our final sample consists of 1,660 listed firms.

To measure corporate governance, this study used data on ownership structure, leverage and business group information. The main variable used to measure ownership is the share holding of insiders/promoters. In the governance structure of Indian corporate, insiders/promoters plays a larger role. In the context of India, promoter control, founding family control, ownership control, ownership concentration, and management control have a similar meaning. The promoter/family characterizes a distinctive class of shareholder with poorly diversified portfolios, is a long term investor

and often controls senior management. Since the state run financial institutions rarely go against the promoters, the decision making process in the firm is more or less determined by this class of shareholders (Varma, 1997). It is argued that the problem of corporate governance in India is not that of disciplining management rather it is of disciplining dominant shareholder. Promoters are the dominant shareholder in India. Therefore, it is imperative to study the impact of this class of shareholders on firm productivity.

Another ownership variable of equal interest is of institutional investors. Institutional investors being a major block holder in a company can influence firm performance. They can exert influence through voice option or exit option. The greater amount of shareholding by institutional investors makes monitoring more rational. However, they can sell instead of intervening when they find large scale managerial problems. In India, institutional investors have large amounts of investment in companies and therefore the potential for institutional monitoring is greater than it is in the market-dominated economies like the US and the UK. Besides that, we have included three more ownership variables such as foreign, DFIs and Corporate. We have also included the capital structure variable which is measured as total borrowings to total assets. An alternative measure of leverage has been used which we will discuss later.

To measure product market competition, we have created four variables i.e., CR4, Herfindahl-Hirschman index (HHI), Rent and Market Share (MKT-SH). To note here, CR4 and HHI are the most important variable through which we have captured incentive power of market discipline. The concentration index, CR4, is defined as the sum of the largest four firms share in their respective product market (defined by NIC-2 digit output).[iii] It is very difficult to determine what the relevant market is for a firm. Though a 4 or 5 digit NIC classifications will be a more precise proxy for the firm's market, it will be too restrictive for a significant proportion of firms which operate in 2, 3 or 4 digit industries. If we identify a firm as belonging to 4 digit industries, we assume that all sales are realized in this sector. However, a part of firm's product may belong to 2 or 3 digit group. Therefore, there will be overstatement of firm's market power in 4 digit industries. On the contrary, such problems won't arise if we use 2-digit market share as it does not overstate the market power of the firm (Grosfeld and Tressel, 2001).

The higher the concentration ratio, the greater is the monopoly power or market concentration in the existing industry. The Herfindahl-Hirschman index (HHI) is defined as the sum of the squared market shares of firms in the industry, $\sum_{i=1}^{n}(p_i)^2$ where $p_i = q_i / Q$, q_i is output of ith firm and Q is total output of all the firms in the industry. The maximum value for this index is one where only one firm occupies the market. The HHI will be minimum (i.e., 1/n) when the n firms in the industry hold an identical share. HHI is a widely accepted index as it takes account of all the firms and their relative sizes into account. Both CR4 and HHI are inverse measure of competition because the higher the ratio, the less competitive is the industry/market.

Another variable 'rent' has been constructed to measure competition in a firm's product market. It can be interpreted as an *ex-post* measure of market power. It exhibits above normal profit which reflects the overall extent of competition faced by a firm. The firms can generate higher rent only if they operate in a less competitive environment. In a highly competitive environment, rents from production activities will be less. Rent is

defined as total sales less labour, raw material, power and capital cost normalized by gross value added (Koke, 2001; Kato, 2005).[iv]

The firm's output, y_{it}, is defined as gross value added, deflated by whole sale price index with base year 1993-94. The firm's capital, k_{it}, is defined as gross fixed assets, deflated by machinery and machine tools price index with base year 1993-94. As a robustness check we have generated capital stock variable which is defined as $k_0 + (k_t - k_{t-1})$, deflated by machinery and machine tools price index. We have taken gross fixed assets of year 2000 as k_0.[v] However, there is the problem of quality change as the different vintages of capital in the above formula are of heterogeneous quality. Again, the choice of k_0 is arbitrary. In our sample, the average age of firm is 26 years with median age of 20. The range (maximum-minimum) of age variable is 139 years. Therefore, the choice of base period (i.e., k_0) is largely dependent upon the availability of GFA information for large number of firms which is the primary driver of choosing year 2000 as the initial year in our case. Hence, k_0, neither represent the initial capital of the firm nor it shows the vintage of capital.

The firm's labour input, l, is defined as wages and salaries, deflated by consumer price index of industrial workers with base year 1993-94. Labour can be measured as number of employees, amount of man-hours (years) or in terms of wages (Varagunasingh, 1993). The *Prowess* database does not provide historical data on number of employees. Some of the researchers have done a mapping with Annual Survey of Industries (ASI) data to arrive at employee numbers (see, Pant and Pattanayak, 2005 for the methodology). However, the major shortcoming of this approach is the assumption of uniformity of wage rate in a particular industry. Also, ASI does not cover a lot of industries; therefore imputing their wage bill by similar industry group is another arbitrariness of the approach. Therefore, we have used employee cost of the firm for labour.[vi] Other control variables are defined in the Appendix.

IV. 3. **Analysis of Results**

We begin our analysis with some preliminary evidence based on a measure of productivity. We estimate a standard two factor Cobb-Douglas production function with gross value added (GVA) as dependent variable, labour and capital as independent variable. We take the residuals from this regression as a measure of relative productivity (i.e., relative to the regression line). Hence we can have positive or negative relative productivity. We have included time and two digit industry dummies to account for temporal and cross-sectional shocks.

To understand the relationship between competition and productivity, we provide data on industry-wise productivity and concentration in Table-1. Here, we have tried to understand at a broad level the association between productivity and sector-wise concentration. The average level of concentration (i.e., CR4) in the Indian industry is 53 percent with median value of 50 percent. This suggests a gradual evolution to a moderate competitive environment in Indian industry. Out of 43 industries, there are 22 industries where CR4 is less than or equal to 50 percent and 5 industries where CR4 is less than 30 percent. On the basis of both the measures (i.e., CR4 and HHI), industries such as Food and Beverages, Textiles, Chemical and Electrical Machinery are highly competitive. On the other hand, industries such as Oil and Gas, Mining and Tobacco are

highly non-competitive. However, these industries were in the past dominated by public sector firms. There are a few private players in such industries because of which it is showing high level of concentration.

In column 2 of the table, we have reported the direction of average productivity at the industry level. The four year average (2001 to 2004) of productivity shows that all the industries have positive relative productivity except a few like Oil and Gas, Tobacco, Recorded Media, Electrical Machinery and water transport. It is to be observed that these industries have the highest level of concentration barring electrical machinery. Therefore, this provides ad-hoc evidence that industries which are non-competitive have negative relative productivity.

In Table-2 the relationship between insider ownership, competition and productivity has been shown. We have defined an industry as competitive if its concentration ratio (CR4) is less than median concentration (i.e., CR4<=0.4982). When insider ownership is more than 40 percent and the industry is competitive, the relative productivity level is positive. however, when promoter share is 10-20 percent and 30-40 percent, the relative productivity level is negative. In case of non-competitive industries, relative productivity is negative even while insider ownership stake is quite large i.e., more than 75 percent. This provides a weak evidence of complementarity between competition and insider ownership. Firms with large insider share have positive productivity in competitive industries. In case of non-competitive industries, the relationship is less clear..

As a further check, we have examined the level of relative productivity when insiders have a majority stake in a firm (i.e., >51 percent). In a competitive industry when insider have more than 51 percent stake, the productivity level is 2.8 percentages more in comparison to non-competitive industry. When insider have less than 51 percent stake in a firm, productivity level is low in competitive as well as non-competitive industries. Finally, we have examined the productivity difference between group and standalone firms. We have found that standalone firms are more productive than group firms and the mean difference is statistically significant.

We now turn to a discussion of our regression model. to examine the effects of ownership and competition on productivity level. All regressions are estimated using the fixed effects method (least square dummy variable). The coefficients on year and industry dummies are not reported. In Table-3, we have used CR4 as the measure of competition. The model-1 is our baseline specification where we include only labour, capital and ownership variables. The model is highly statistically significant with adjusted R-square value of 0.86. We observe that input share of labour in model-1 is 0.71 and input share of capital 0.33. Both the variables are highly significant. This finding is consistent with the result of Palia and Lichtenberg (1999) in case of US firms. The insider ownership variable (INS) is found to be positive and significant. To investigate the non-linear relationship between insider ownership and firm productivity, we have introduced a quadratic and cubic term of insider ownership.[vii] We find the higher order terms are highly insignificant. Thus, linear specification better captures the relationship between managerial ownership and firm productivity than any form of non-linear specification.

In model-1, the next ownership variable is institutional investors' share (IINV). In India among institutional investors, mutual funds, UTI and insurance companies hold the maximum amount of shares. The prime concern of institutional investors is to increase

the value of their portfolio. Therefore, they can be very opportunistic and offload the shares of the companies at the slightest sign of irregularity. As the voice option is costlier than exit option, they may prefer to change their portfolio allocation than govern the company. Sometimes they can be very short-termism and may try to maximize the value of shares of their customers without performing the monitoring role as large investors. We found a positive and significant sign of institutional investors (IINV) in model-1. *The positive relationship between productivity and IINV's share ownership draw attention to their monitoring role as major block holder.*

We find a significantly negative association between Development financial institutions (DFI's) shareholding and total factor productivity (TFP). DFIs are setup with the objective to provide long term finance to the firms. However due to soft budget constraint and distorted or political objectives, they have failed to generate the necessary incentives for managers to boost firm productivity. The DFIs are evaluated on the basis of quantity of loans they have disbursed rather than the quality of loans. The choice to be the shareholder of a company is more or less a political decision. The nominee directors of DFIs play an insignificant role in the board meeting and with their support promoters of Indian companies sometimes enjoy managerial control with very little equity investment of their own (Charkrabarti, 2005). In such firms because of low cash flow right and higher control right, the insiders have little interest/incentive to manage the company properly. They can divert the resources to the company where they have higher amount of ownership stake (Patibandla, 2006; Chakrabarti, 2005). *Hence, the negative relationship shows the poor monitoring role played by DFIs in the governance structure of a firm.*

The coefficient of corporate ownership variable (CORPORATE) is positive and statistically significant. This implies inter-corporate ownership has positive impact on firm productivity. Companies generally hold shares in firms where they have strategic interest. It can be an upstream firm (purchaser of final product) or downstream firm (supplier of raw material) or any other. Inter-corporate shareholding facilitates sharing of technology, basic infrastructure, managerial skills and critical knowledge. The financial pressure is substantially reduced because of inter-corporate lending and investment. Sometimes such kinds of pyramidal ownership and cross-holdings bring deviation in cash flow and control rights. Inter-corporate shareholding may facilitate inter-corporate transfer of resources to the detrimental of minority shareholders. Also, due to collusion among top management of companies, the threat of takeover becomes weak. *In our study, the positive coefficient of corporate ownership indicates the performance enhancing role played by corporate shareholder.*

We found a positive influence of foreign ownership (FOREIGN) on firm productivity. The size of the point estimate is larger than any other ownership variable.[viii] Since foreign ownership also represents foreign institutional investors (FII), it indicates the performance monitoring role played by FIIs.[ix]In model-2, we have included competition, leverage and other control variables. To measure competition, CR4 variable is used in the model.[x] The sign of CR4 is negative which implies higher the industry competition; lower is the productivity level of firms. However, we find the variable to be insignificant in the model. *It indicates competition as such does not have any disciplinary effect and it does not enhance firm productivity*. This finding is being supported by the empirical evidence provided by Koke (2001). In this model and in the subsequent models, the IINV variable becomes insignificant. Hence*, institutional investors may not contribute to the enhancement of firm productivity*. They can influence firm value through their large

scale sale and purchase of shares. But, their influence on firm productivity is very negligible or statistically insignificant. The other variable of interest is business group indicator (Group). *The dummy variable (i.e., 1-Group, 0-others) is insignificant which means group or network structure does not have any impact on productivity.*

Firm size is measured by natural logarithm of sales i.e., Ln(S). As per economies of scale and scope argument, firm size and productivity is positively associated. Here, *we find a positive and statistically significant relationship between firm size and productivity*. With respect to other control variables, *research and development intensity (R&D) and advertisement intensity (ADV) have positive impact on firm productivity.* Firms with higher R&D intensity are expected to have higher productivity as high R&D firms are more foresighted and have a higher scope for innovation. The development of cost-cutting technology is possible only in high R&D firms. Similarly, advertisement expenditure is a soft capital. Higher amount of advertisement spending helps in building brand name and develop customer-loyalty. *Though we cannot establish a priori a relationship between advertisement and productivity, we find a positive association in this study.*

In the post-reform era, the scope of importing capital goods has increased in India. Recently Ray (2004) and Goldar, Renganathan and Banga (2004) have found that import intensity and technology import payment intensity has positive impact on firm productivity and efficiency. Since liberalization of external controls and with removal of quantitative restriction on capital goods, the access of Indian companies to outside world has increased tremendously. Due to imports of materials and machineries with advanced technology, it is expected that the productivity level will increase. In this study, we have taken import of capital goods intensity (CAPIMP-INT) as a predictor of firm productivity. *The estimated relationship suggests that firms with higher level of imported capital goods have higher productivity.*

We measure vertical integration (VERTICAL) of a firm by the ratio of gross value added to value of output (Goldar *et al*., 2004). There are several studies which indicate a higher performance of vertically integrated firms (Kerkvliet, 1991; Mansson, 2004). Integration can have both positive and negative impacts on firm productivity and efficiency. The downstream integration can have positive effects as inputs will be available at lower cost. At the same time, there can be substantially reduction in input quality as the firm sacrifices purchasing from a competitive market. Integration may be beneficial from a transaction cost perspective. The possibility of hold-up problem will be reduced significantly and the cost of negotiation and bargaining will be very minimal. *In this study, we find a positive impact of integration (VERTICAL) on firm productivity.* In a recent study, Goldar *et al*. (2004) also find a similar e relationship between vertical integration and technical efficiency.

The next control variable is EXCISE which is measured as the ratio of excise tax paid to value of output (Goldar *et al*., 2004). Higher excise tax rate has detrimental effect on production. It will affect productivity and efficiency only when it influences the allocation of resources*. A negative association between EXCISE and productivity is expected as the likelihood of excise tax affecting internal resource allocation is very high.* In model-2, the sign of variable 'EXCISE' is negative and statistically significant. The result suggests that firms subject to higher rates of excise duty have a lower level of productivity. The variable DEP-INT i.e., depreciation intensity measures the vintage of capital and controls for the technology used in the firms. We find that firms with higher

depreciation intensity are having lower level of productivity. The depreciation rate will be higher in the firms where the plants and machineries are old. *Hence, the negative sign of DEP-INT variable is as per our expectation.*

We have measured financial pressure of the firm by total borrowings to total assets (BORROW).[xi] Earlier we have argued as most of the debt is from government owned financial institutions and public sector banks, the disciplinary effect of the debt may not be very high in India. Therefore, the interest payment pressure may not be too restrictive to induce managers to perform more. However, the cumulative borrowing from different government owned financial institutions may make the companies unfavourable for further lending. This can affect their overall financial position and they may face financial constraint. *Hence, we expect a negative effect of financial pressure (BORROW) on firm productivity.* Nickell and Nicolitsas (1999) have measured the financial pressure by interest payment ratio which is defined as interest payments to profit before tax, depreciation and interest payments (PBDIT). They find a negative effect of interest payment on employment and pay-rise. But, they have found a positive impact of financial pressure on productivity even though the effect size is very small. When we have used their measure in model-2, the estimate turned out to be insignificant which means the productivity level is neutral to interest payment ratio.[xii] As we have explained above, this shows the non-disciplinary effect of interest payment. Koke and Renneboog (2005) have found a positive impact of bank debt on productivity growth for German firms. However, they didn't find any impact of interest payment ratio or debt-equity ratio on productivity growth. They conclude that the degree of leverage is not important for monitoring rather the type of creditors matter. *In this study, we find the effect of leverage (BORROW) on firm productivity as negative.* When a firm has the mean level of debt-assets ratio which is 0.33, then the productivity decline will be of 10 percent. Thus, the rise in indebtedness of the firm reduces firm productivity. In the literature it is argued that when the productivity level of a firm is consistently low, then the firm's reliance on debt is more as internal accruals is low. Therefore, debt may be negatively related to productivity (Kato, 2005).

IV.4. Interaction Between Competition and Ownership.

We now look at the effects of corporate governance and competition on total factor productivity. In model-3 of Table-3 we have included the interaction variable of insider ownership and CR4 (i.e., CR4*INS). The sign and significance of all other variables remain unaltered. Now the competition variable (CR4) has become significant and positive.[xiii] *This highlights the fact that competition has little disciplinary power when it is considered independent of insider ownership level.* The insider ownership (INS) estimate is positive and statistically significant. The interaction term (CR4*INS) is negative and statistically significant. The interaction effect of insider ownership and competition shows complementary nature of both the variables. As a result of the interaction effect in the model, *the increase in productivity with one percentage increase in insider ownership stake is greater, the higher the level of competition* (i.e., the lower the value of CR4). To measure the effect we can partially differentiate the equation with respect to insider ownership, $\frac{\delta y}{\delta(INS)} = 0.6608 - 1.0793 * CR4$; therefore when CR4 is equal to 1, the changes in productivity is negative (i.e., -0.418) with respect to marginal increase in insider share. When CR4 is equal to 0.5 (i.e., when top four firms have 50 percent of market share); the change in productivity to a unit increase in insider ownership is 0.12.

The slope of the response function when CR4 is equal to 0.3 is 0.33. Therefore, *a percentage increase in insider share has a lager effect on productivity when competition is at a higher level than when it is at a lower level*. This further confirms the strong synergy between ownership and competition in an emerging economy. *Higher amount of promoter shareholding has positive impact on productivity when competition in firm's product market is fierce*. In a similar study, Kato (2005) could not find any effect of competition on productivity in case of Indian corporate sector. From this study, it is apparent that competition has significant effect on productivity when it is considered along with insider ownership.[xiv]

In Table-4 we have used different measures of competition. In model-4 we have used Herfindahl-Hirschman index (HHI) as the measure of competition. In model-5, we have studied the interaction of competition (HHI) and ownership (INS). In model-6, we have used 'rent' as a measure of competition and in model-8 we have applied market share as a proxy measure for competition. In model-4, the competition variable (HHI) is negative but statistically insignificant. This finding reinforces our earlier hypothesis that there is a significant interaction relationship between competition and insider ownership. Competitive pressure has very negligible effect on productivity when it is studied separately. Though the point estimate of HHI is -0.468 in model-4, it is not statistically significant. In model-5, we have introduced the interaction effect between insider stake and HHI. Now, the variable HHI has turned out to be positive and significant. When we partially differentiate the equation with respect to INS, the equation which we get is:

$$\frac{\delta y}{\delta (INS)} = 0.4112 - 1.9857 * HHI$$. When there is only one firm in the market the HHI value

is 1 and when the market is equally shared by all firms the HHI value turns to be 1/N. When HHI is equal to 1, the rise in insider share has negative effect on productivity. The smaller the value of HHI, higher is the competitiveness of the market. The mean (median) value of HHI in our sample industry is 0.15 (0.09). As a result of the interaction effect in the model, the increase in productivity with one unit increase in insider ownership is greater, the smaller the value of HHI (i.e., higher is the competition). If a firm is operating in an industry where the HHI value is industry average (i.e., 0.15), one unit increase in insider stake will result in 0.11 unit increase in productivity. *The similarity in result using CR4 and HHI suggests that this finding is not biased because of the choice of measure of competition.*

Following Koke, (2001); Koke and Renneboog, (2005); Januszewski,(1999) and Grosfeld and Tressel, (2001) we have used 'rent' which is an *ex-post* measure of the degree of competition. Rent is supposed to capture the above normal profit which will reflect the extent of competition faced by a firm. In model-6, the coefficient of 'rent' is negative and statistically significant. This finding provides evidence that monopoly rent is negatively related to productivity which is similar to the findings of Grosfeld and Tressel (2001). It is argued that rent is not only correlated to market power but also with profitability. However, if rent is acting as a proxy for profitability, then it should have a positive sign with productivity. To note here, we could not find any interaction effect between insider shareholding and rent. In model-7, we have introduced market share (MKT-SH) as a proxy for competition. Though the sign of the variable is as per our expectation, it turned out to be statistically insignificant. Also we fail to find any interaction effect between market share and insider ownership.

IV.5. Sensitivity Analysis

To check the sensitivity of our findings, we have carried out several robustness tests.[xv] First, we have used alternative definition of leverage and assessed its impact on productivity. There are several ways in which the term leverage has been defined (Rajan and Zingales, 1995). The suitable definition for a study depends upon the objective of the analysis. Since there is no unique way to define leverage, we have used alternative measures to see the sensitivity of our previous results. Second, we have used perpetual inventory method (PIM) to construct capital stock variable. The variable 'capital stock' has been measured in several ways. To study technical efficiency in Indian industry, Goldar *et al.* (2004) have used perpetual inventory method to construct capital stock. Also, they have used a multiplier to adjust for vintage of capital. Ray (2004) has measured the capital by adding depreciation, 15 percent of fixed assets and inventories. We have tested the robustness of our result by measuring capital by perpetual inventory method. Third, we have regressed the residuals from a two factor Cobb-Douglas production function on several firm characteristics to examine several of our hypotheses. Finally, we have split the sample and estimated the production function only for manufacturing sector firms.[xvi]

In Table-5 (A) and (B), we have used different measures of leverage. In Model-8 of Table-5 (A) leverage is defined as total borrowings to total paid-up equity capital. The variable is positive and statistically significant which goes against our earlier findings of a negative relationship. The model exhibits the complementary nature of insider ownership and product market competition. In model-9, we have defined leverage as long term borrowings to total assets. The variable is negative and statistically significant and supports our earlier evidence. Thus, the variable which shows *debt concentration* has a negative impact on productivity. In model-10, we have taken debt-equity ratio as the measure of leverage or capital structure. It is defined as the ratio of total borrowings to net worth.[xvii] We find a negative estimate for leverage which is statistically significant. Thus, it confirms our earlier hypothesis that *as the ratio of total borrowings increases with respect to firm's net worth, the productivity of the firm will be affected negatively.*

In Table-5 (B), we have considered three more variables as measure of debt/leverage. In model-11, leverage is defined as the ratio of total borrowings to total borrowings plus paid-up equity capital. The estimate is negative and statistically significant. In model-12 and 13, we have measured financial pressure by nature of debt and type of lender. In model-12, the variable LEVERAGE is defined as short term debt to total borrowings. When the amount of short term debt is high in firm's basket of total borrowing, the financial pressure on firm will be very high. In model-12, the variable LEVERAGE confirms our earlier hypothesis that *while higher amount of debt signals the quality of the firm or its investment opportunity, the financial pressure may reduce the productivity of the firm.* Finally, in model-13 the variable LEVERAGE represent bank loan to total borrowing. Mostly bank loans are short-term in nature and bank exerts pressure on firms for repayment of the loan at the stipulated time. We find the variable sign to be negative and statistically significant. To note here, *in all the models, competition variable has same complementary relation with insider ownership stake.* Also, the control variables are having the same sign and significance as in table 1 and 2.

In addition, we have changed the definition of capital stock. This has been measured by perpetual inventory method. With the introduction of new capital measure, we find a positive relationship between insider shareholding and firm productivity. The variable is highly statistically significant. The complementary relation between product market competition and insider ownership remains intact. However, in case of few variables we

find a change in the statistical significance. The institutional investors' shareholding and group dummy variable turned out to be statistically significant. The variable 'age' has become negative and statistically significant. This suggests that older firms are more productive than younger firms. When we have estimated the equation only for manufacturing sector firm, the insider ownership, corporate ownership and foreign ownership variables are found positive and statistically significant. The institutional investors' shareholding and DFI's shareholding and group dummy have become statistically insignificant. As a final sensitivity check, we have taken the residual from a two factor Cobb-Douglas production function as dependent variable. We have regressed the residual with all other independent variables in the model. In this formulation too, we could establish all of our stated hypothesis and observed a complementary relation between competition and insider ownership on firm productivity.

V. Concluding Remarks

This paper analyzes the impact of corporate governance mechanisms (ownership type and concentration, group affiliation, capital structure) and product market competition on productivity. We have used a panel of more than 1,660 firms over the years 2000-01 to 2003-04. It is noted that ownership has a positive impact on productivity. This strengthens our argument that the higher amount of insider stake in Indian firm enhances firm efficiency and productivity which is beneficial for the whole economy. It provides further evidence that countries with weak legal enforcement can have better firm performance with moderate concentrated ownership.

Our finding of negative effect of DFI's holding on firm productivity gives further impetus to the argument that government funded/raised financial institutions are poor monitors of corporations. Their soft budget constraint and ambiguity in objectives are detrimental to the economy as it erodes firm value and results in lower firm productivity. This evidence calls for a change in Indian financial system. Also, institutional investors do not play significant role in improving firm productivity. At best, their investment in large amount can boost investor's confidence in a particular company. But, from a long term perspective institutional investors' shareholding is not helpful in enhancing firm productivity. Corporate shareholders and FIIs are strategic investors. They have proven to be advantageous from a long term perspective as their shareholdings resulted in higher firm productivity.

The major finding of this paper relates to the complementary nature of relationship between insider ownership and competition. We find that firms with higher amount of insider stake are more productive only when competition in firm's product market is intense. This finding of beneficial effect of competition is in conformity with the theoretical predictions and existing empirical evidence. Financial pressure or debt intensity is seen to have a negative impact on firm productivity. It provides further evidence that large amount of debt may be creating financial constraint because of which we observe a negative relation of debt intensity with productivity.

These findings have some policy implications. The positive impact of increased product market competition on productivity requires that competition policy should aim at fostering competition. India has embarked upon economic reforms since 1991. It has

taken several pro-competitive measures via a series of changes in both domestic and trade policies which is getting reflected in the complementary nature of insider ownership and competition .The negative effect of DFI's ownership on firm productivity calls for a reversal in the goals and objectives of the institutions. Finally, the negative effect of debt intensity on firm productivity raises question about the long term disciplinary power of the debt.

TABLES

Table 1. Sectoral Measures of Competition and Productivity

Sector Name	Average Productivity (+,-)	CR4	HHI
• Agriculture, Hunting and Related Activities	+	0.3557	0.0529
• Mining of Coal and Lignite; Extraction of Peat	+	0.6767	0.2089
• Extraction of Crude petroleum and Natural gas; Service activities incidental to oil and gas extraction, excluding surveying	-	0.9850	0.8055
• Mining of Metal Ores	-	0.8597	0.1909
• Other Mining and Quarrying	+	0.5007	0.0956
• Manufacture of Food Products and Beverages	+	0.1531	0.0128
• Manufacture of Tobacco Products	-	*0.9490*	*0.6203*
• Manufacture of Textiles	+	0.1286	0.0108
• Manufacturing of Wearing Apparel, Dressing and Dying of Fur	+	0.3001	0.0525
• Tanning and Dressing of Leather, Manufacture of Luggage, Handbags, Saddlery and Footwear	+	0.6272	0.1853
• Manufacture of Wood and of products of wood and cork, except furniture, Manufacture of articles of straw and plaiting Materials	+	0.5693	0.1104
• Manufacture of Paper and Paper Products	+	0.3685	0.0566
• Publishing, Printing and reproduction of Recorded Media	-	0.5512	0.1225
• Manufacture of Coke, Refined Petroleum products and Nuclear Fuel	+	0.8736	0.2372
• Manufacture of Chemicals and Chemical Products	+	0.2007	0.0166
• Manufacture of Rubber and Plastic Products	+	0.3625	0.0438
• Manufacture of Other Non Metallic Products	+	0.3215	0.0401
• Manufacture of Basic Metals	+	0.3952	0.0631
• Manufacture of Fabricated Metal Products, Except Machinery and Equipments	+	0.3686	0.0502
• Manufacture of Machinery and Equipment	+	0.3516	0.0654
• Manufacture of office, accounting and Computing Machinery	+	0.6285	0.1287
• Manufacture of Electrical Machinery and Apparatus	-	*0.2923*	*0.0346*
• Manufacture of Radio, television and Communication Equipments and apparatus	+	0.4661	0.0772
• Manufacture of medical, precision and optical instruments, watches and clocks	+	0.4692	0.0957
• Manufacture of Motor vehicles, trailers and semi-trailers	+	0.5078	0.0825
• Manufacture of other Transport equipment	+	0.7489	0.1638
• Manufacture of furniture, manufacturing	+	0.3882	0.0665
• Electricity, gas, steam and hot water supply	+	0.5265	0.1305
• Construction	+	0.3818	0.1177
• Wholesale Trade and commission Trade, Except of Motor Vehicles and motor cycles	+	0.3989	0.0635
• Retail Trade, Except of motor vehicles and motor cycles, repair of personal and household goods	-	0.9097	0.4848
• Hotels and Restaurants	+	0.4247	0.0680
• Land Transport, Transport via pipelines	+	0.5988	0.2741
• Water Transport	-	*0.7860*	*0.2660*
• Supporting and Auxiliary Transport activities, Activities of Travel agencies	+	0.8616	0.2401
• Post and Telecommunication	+	0.8512	0.3520
• Financial Intermediation, Except insurance and Pension Funging	+	0.2892	0.0413
• Activities auxiliary to financial intermediation	+	0.7780	0.3597
• Real Estate Activities	+	0.7368	0.2123

• Computer and Related Activities	+	0.4876	0.0715
• Other Business Activities	+	0.4981	0.0863
• Health and Social Work	+	0.7371	0.2630
• Recreational, cultural and sporting activities	+	0.4721	0.0913

Notes: *Productivity is approximated by the residuals from the pooled OLS estimation of a two factor Cobb-Douglas production function including time and two digit industry dummies. Industry level average has been taken to arrive at the final number.*

Table 2. Insider Ownership, Competition and Productivity

Promoter Share *(In Percentage)*	Avg. Productivity **(competitive)**	Avg. Productivity **(Non-competitive)**
0-10	+	+
10-20	-	-
20-30	+	-
30-40	-	-
40-50	+	+
50-75	+	+
75-100	+	-

Notes: *An industry is defined as competitive if its concentration ratio is less than or equal to the median concentration level which is 0.4982.*

Table 3. Effects of Ownership and Competition (i.e., CR4) on Productivity

VARIABLE	DEPENDENT VARIABLE: LN(GVA)		
	INDUSTRY FIXED EFFECTS		
	MOD-1	**MOD-2**	**MOD-3**
Ln (K)	0.3359	0.1685	0.1660
	(23.73)*	(11.71)*	(11.54)*
Ln (L)	0.7120	0.3283	0.3303
	(55.56)*	(23.28)*	(23.49)*
OWNERSHIP			
INS	0.5008	0.2823	0.6608
	(6.60)*	(5.03)*	(6.38)*
IINV	0.7285	0.2032	0.1976
	(2.69)*	(1.00)	(0.98)
DFIS	-1.8685	-0.5274	-0.4886
	(-5.52)*	(-1.93)*	(-1.78)**
CORPORATE	0.7412	0.1945	0.1909
	(6.46)*	(2.18)*	(2.14)*
FOREIGN	1.1759	0.6050	0.5877
	(7.76)*	(5.76)*	(5.60)*
COMPETITION			
CR4		-0.1296	0.4068
		(-0.70)	(1.85)**
INTERACTIONS			
CR4*INS			-1.0793
			(-4.38)*
DEBT RELATED			
BORROW		-0.2999	-0.2947
		(-5.52)*	(-5.51)*
OTHER VARS			
GROUP		0.0075	0.0077
		(0.43)	(0.44)
Ln(S)		0.5752	0.5758
		(34.52)*	(34.59)*

VARIABLE			
R&D		0.6474	0.6295
		(2.46)*	(2.40)*
ADV		1.0386	1.0910
		(2.33)*	(2.45)*
CAPIMP-INT		0.7143	0.7085
		(3.83)*	(3.82)*
DEP-INT		-0.3675	-0.3709
		(-3.57)*	(-3.60)*
VERTICAL		0.2163	0.2157
		(3.38)*	(3.38)*
EXCISE		-0.7874	-0.7890
		(-7.30)*	(-7.33)*
LN(AGE)		-0.0135	-0.0161
		(-0.90)	(-1.07)
Adj. R-square	0.8620	0.9189	0.9191
F stat:Prob>F (Model)	3052.88	2913.55	2772.76
	(0.00)	(0.00)	(0.00)
Year & Industry Dummy	Yes	Yes	Yes
Obs.	6638	6634	6634

Notes:

- *Heteroskedasticity consistent t-statistics are in Parentheses. Standard Errors are calculated using White's heteroskedasticity consistent variance-covariance matrix.*
- ** indicates significance at 5 percent level, ** indicates significance at 10 percent level, § indicates significance at 15 percent level.*

Table 4. Effects of Ownership and Competition (i.e., HHI, RENT, MKT-SH) on Productivity

VARIABLE	DEPENDENT VARIABLE: LN(GVA)			
	INDUSTRY FIXED EFFECTS			
	MOD-4 (with HHI)	MOD-5 (Interaction effect)	MOD-6 (With Rent)	MOD-7 (With Market Share)
Ln (K)	0.1684	0.1661	0.1467	0.1686
	(11.70)*	(11.57)*	(11.14)*	(11.71)*
Ln (L)	0.3284	0.3300	0.3104	0.3283
	(23.28)*	(23.41)*	(23.13)*	(23.28)*
OWNERSHIP				
INS	0.2824	0.4112	0.2682	0.2819
	(5.03)*	(6.71)*	(4.92)*	(5.02)*
IINV	0.2022	0.2035	0.1929	0.2145
	(1.00)	(1.01)	(0.98)	(1.06)
DFIS	-0.5269	-0.5182	-0.3541	-0.5301
	(-1.93)*	(-1.89)*	(-1.52)§	(-1.94)*
CORPORATE	0.1945	0.1900	0.1797	0.1941
	(2.18)*	(2.15)*	(2.07)*	(2.17)*
FOREIGN	0.6057	0.5845	0.5775	0.6148
	(5.77)*	(5.58)*	(5.65)*	(5.82)*
COMPETITION				
HHI	-0.4686	0.6302		
	(-1.28)	(1.61)**		
RENT			-0.0041	
			(-6.50)*	
MKT-SH				-0.1787
				(-1.18)
INTERACTIONS				
HHI*INS		-1.9857		
		(-5.81)*		
DEBT RELATED				
BORROW	-0.2999	-0.2933	-0.2733	-0.3005
	(-5.53)*	(-5.49)*	(-5.83)*	(-5.54)*
OTHER VARS				
GROUP	0.0075	0.0097	0.0074	0.0078
	(0.43)	(0.56)	(0.43)	(0.45)
Ln(S)	0.5752	0.5758	0.6121	0.5762
	(34.52)*	(34.63)*	(41.32)*	(34.39)*

R&D	0.6470	0.6296	0.6458	0.6407
	(2.46)*	(2.39)*	(2.51)*	(2.43)*
ADV	1.0371	1.0744	1.0408	1.0432
	(2.33)*	(2.41)*	(2.34)*	(2.33)*
CAPIMP-INT	0.7112	0.7122	0.7279	0.7127
	(3.82)*	(3.82)*	(3.96)*	(3.82)*
DEP-INT	-0.3668	-0.3686	-0.3246	-0.3669
	(-3.56)*	(-3.58)*	(-3.07)*	(-3.57)*
VERTICAL	0.2160	0.2154	0.2168	0.2166
	(3.37)*	(3.38)*	(3.40)*	(3.38)*
EXCISE	-0.7868	-0.7965	-0.7808	-0.7865
	(-7.29)*	(-7.31)*	(-7.30)*	(-7.30)*
LN(AGE)	-0.0136	-0.0149	-0.0107	-0.0133
	(-0.90)	(-0.99)	(-0.74)	(-0.88)
Adj. R-square	0.9189	0.9192	0.9234	0.9189
F stat:Prob>F (Model)	2903.93	2762.72	2950.18	3228.14
	(0.00)	(0.00)	(0.00)	(0.00)
Year & Ind. Dummy	Yes	Yes	Yes	Yes
Obs.	6634	6634	6634	6634

Notes:

- *Heteroskedasticity consistent t-statistics are in Parentheses. Standard Errors are calculated using White's Heteroskedasticity consistent variance-covariance matrix.*
- ** indicates significance at 5 percent level, ** indicates significance at 10 percent level, § indicates significance at 15 percent level.*

Table 5. (A) Productivity Estimation with Alternative Measures of Leverage

VARIABLE	WITH DIFFERENT MEASURES OF LEVERAGE		
	DEPENDENT VARIABLE: ln(GVA)		
	INDUSTRY FIXED EFFECTS		
Measures of Leverage→	**MOD-8** (tot. borr/paid-up equity capital)	**MOD-9** (Long term borr/Total Assets)	**MOD-10** (tot borr./Net worth)
LN(K)	0.1502	0.1600	0.1477
	(11.63)*	(10.83)*	(10.96)*
LN(L)	0.3411	0.3336	0.3382
	(24.20)*	(23.65)*	(23.99)*
OWNERSHIP			
INS	0.7055	0.6953	0.7170
	(6.75)*	(6.68)*	(6.79)*
IINV	0.3178	0.2700	0.2874
	(1.56)§	(1.33)	(1.41)
DFIS	-0.6727	-0.5614	-0.6167
	(-2.42)*	(-2.03)*	(-2.23)*
CORPORATE	0.1892	0.1941	0.1916
	(2.13)*	(2.17)*	(2.15)*
FOREIGN	0.5987	0.6078	0.6193
	(5.90)*	(5.82)*	(5.98)*
COMPETITION			
CR4	0.4708	0.4447	0.4735
	(2.15)*	(2.02)*	(2.15)*
INTERACTIONS			
CR4*INS	-1.1647	-1.1385	-1.1795
	(-4.58)*	(-4.57)*	(-4.63)*
DEBT RELATED			
LEVERAGE	0.0028	-0.1894	-0.0002
(LEV, Short, Bank)	(5.84)*	(-2.89)*	(-3.07)*
OTHER VARS			
GROUP	-0.0144	0.0049	-0.0055
	(-0.84)	(0.28)	(-0.31)
Ln(S)	0.5734	0.5759	0.5812
	(35.44)*	(34.44)*	(35.39)*
R&D	0.8765	0.7286	0.8440
	(3.05)*	(2.64)*	(2.99)*
ADV	1.3718	1.2317	1.3127
	(3.18)*	(2.84)*	(3.03)*

CAPIMP-INT	0.7580	0.7436	0.7630
	(4.08)*	(3.99)*	(4.08)*
DEP-INT	-0.4110	-0.3867	-0.4014
	(-4.08)*	(-3.81)*	(-3.95)*
VERTICAL	0.2174	0.2176	0.2184
	(3.39)*	(3.38)*	(3.39)*
EXCISE	-0.7724	-0.7817	-0.7838
	(-7.19)*	(-7.26)*	(-7.31)*
LN(AGE)	-0.0164	-0.0136	-0.0087
	(-1.10)	(-0.89)	(-0.59)
Adj. R-square	0.9181	0.9181	0.9178
F stat:Prob>F (Model)	2762.61	2744.51	2738.49
	(0.00)	(0.00)	(0.00)
Year & Ind. Dummy	Yes	Yes	Yes
Obs.	6634	6634	6634

Notes:

- *Heteroskedasticity consistent t-statistics are in Parentheses. Standard Errors are calculated using White's Heteroskedasticity consistent variance-covariance matrix.*
- ** indicates significance at 5 percent level, ** indicates significance at 10 percent level, § indicates significance at 15 percent level.*

Table 5 (B). Productivity Estimation with Alternative Measures of Leverage

VARIABLE	WITH DIFFERENT MEASURES OF LEVERAGE		
	DEPENDENT VARIABLE: LN(GVA)		
	INDUSTRY FIXED EFFECTS		
Measures of Leverage→	**MOD-11** tot borr./(tot borr.+paid-up Equity capital)	**MOD-12** (SHORT)	**MOD-13** (BANK)
Ln (K)	0.1526	0.1416	0.1431
	(11.11)*	(10.35)*	(10.55)*
Ln (L)	0.3371	0.3402	0.3406
	(23.81)*	(24.16)*	(24.19)*
OWNERSHIP			
INS	0.7126	0.6871	0.7012
	(6.75)*	(6.52)*	(6.66)*
IINV	0.2464	0.2811	0.2133
	(1.21)	(1.39)	(1.05)
DFIS	-0.6049	-0.6700	-0.6443
	(-2.19)*	(-2.43)*	(-2.33)*
CORPORATE	0.2026	0.1635	0.1649
	(2.27)*	(1.82)**	(1.84)**
FOREIGN	0.6036	0.6107	0.6164
	(5.79)*	(5.89)*	(5.95)*
COMPETITION			
CR4	0.4603	0.4436	0.4640
	(2.09)*	(2.03)*	(2.12)*
INTERACTIONS			
CR4*INS	-1.1658	-1.1341	-1.1633
	(-4.58)*	(-4.49)*	(-4.59)*
DEBT RELATED			
LEVERAGE	-0.0910	-0.1642	-0.1327
(LEV, Short, Bank)	(2.58)*	(-6.27)*	(-5.34)*
OTHER VARS			
GROUP	-0.0020	-0.0114	-0.0137
	(-0.11)	(-0.66)	(-0.79)
Ln(S)	0.5851	0.5903	0.5851
	(35.22)*	(35.15)*	(35.51)*
R&D	0.7977	0.8860	0.8325
	(2.93)*	(3.21)*	(3.02)*
ADV	1.2237	1.1588	1.2119
	(2.80)*	(2.66)*	(2.80)*
CAPIMP-INT	0.7647	0.7350	0.7463
	(4.06)*	(3.95)*	(4.06)*
DEP-INT	-0.4003	-0.3989	-0.3880

	(-3.91)*	(-3.83)*	(-3.83)*
VERTICAL	0.2191	0.2177	0.2157
	(3.39)*	(3.40)*	(3.37)*
EXCISE	-0.7908	-0.8019	-0.7921
	(-7.32)*	(-7.45)*	(-7.25)*
LN(AGE)	-0.0034	-0.0056	-0.0095
	(-0.23)	(-0.38)	(-0.64)
Adj. R-square	0.9178	0.9183	0.9181
F stat:Prob>F (Model)	2746.56	2831.50	2900.72
	(0.00)	(0.00)	(0.00)
Year & Ind. Dummy	Yes	Yes	Yes
Obs.	6634	6634	6634

Notes:

- *Heteroskedasticity consistent t-statistics are in Parentheses. Standard Errors are calculated using White's heteroskedasticity consistent variance-covariance matrix.*
- ** indicates significance at 5 percent level, ** indicates significance at 10 percent level, § indicates significance at 15 percent level.*

Appendix: Variable Description

Variables	Abbreviation	*Definition*
Output	Y	Output measured by Gross Value added deflated by Wholesale price index.
Capital	Ln(K)	Log of Capital. Capital is defied as Gross fixed assets deflated by Machineries and Machine Tools Price Index.
Labour	Ln(L)	Log of Labour. Labour is measured by wages and Salaries deflated by consumer price index of industrial workers.
Insider Share	INS	Share of Promoter/Insider. In the estimation, it is used in a 0 to 1 Scale. The word Promoter and Insider is used Interchangeably.
Institutional Investors' Share	IINV	Institutional investor's i.e., Mutual funds, UTI and Insurance companies' share. Measured in 0-1 scale.
Development Financial Institutions' Share	DFIS	Development Financial Institutions i.e., Banks and financial institutions' Share. Measured in 0-1 scale.
Corporate Shareholding	CORPORATE	Private corporate bodies' share. Measured in 0-1 scale.
Foreign Shareholding	FOREIGN	FII+NRI/OCB's Share. Measured in 0-1 scale.
Group Affiliation	GROUP	Dummy for Group Affiliation. Group=1 if affiliated to a business house, 0 otherwise.
Sales	Ln(S)	Natural Logarithm of Sales
R&D Expenditure	R&D	Aggregate Research and Development Expenditure scaled by Gross fixed assets.
Selling Expenses	ADV	Advertising Exp. + Marketing Exp. + Distribution Exp. scaled by Gross Fixed Assets
Capital Import Intensity	CAPIMP-INT	Capital goods imports scaled by sales
Depreciation Intensity	DEP-INT	Depreciation provision scaled by gross fixed assets
Vertical Integration	VERTICAL	Ratio of Gross Value added to value of output
Excise-tax intensity	EXCISE	Ratio of Excise tax to value of output
Age	Ln(Age)	Natural Logarithm of Age. (Age=2004 – Year of Incorporation)
Debt Intensity or Leverage	BORROW	Total Borrowings by total assets. Used one year lagged values.
Short-term borrowing	SHORT	Short term bank loan + Commercial Paper + Debenture to total borrowings. Used one year lagged values.
Bank Borrowing	BANK	Bank Loan to total borrowings. Used one year lagged values.
Four-firm concentration Ratio	CR4	Four firm concentration Ratio. Calculated for each NIC 2-digit sector separately. While calculating we have considered all the firms in their respective sector in the database.
Herfindahl-Hirschman index	HHI	Herfindahl-Hirschman index. Calculated for each NIC 2-digit sector separately. While calculating we have

		considered all the firms in their respective sector in the database.
Rent	*RENT*	Rent is defined as total sales less labour, raw material, power and capital cost normalized by gross value added.
Market Share	*MKT-SH*	Market share of firm' in their respective 2-digit industry group.
Interaction of CR4 and Insider Share	*CR4*INS*	The interaction of CR4 and Insider share
Interaction of Herfindahl-Hirschman index and Insider share	*HHI*INS*	The interaction of HHI and Insider share

Footnotes

[i] There are other studies who also find a positive relationship between competition and firm performance including – Nickell (1996), Caves and Barton (1990), Green and Mayes (1991), Caves *et al*. (1992), Haskel (1991), Nickell *et al*. (1992).

[ii] Griffith (2001) defined group firms or firms that have subsidiary plants, sibling plants and/or foreign owned as Principal-agent (managerial) type firms. Sole proprietorship and partnership firms are defined as single or entrepreneurial firms.

[iii] Concentration Ratio can be defined as $C = \sum_{i=1}^{m} p_i, m = 4,8,10,12...etc$, where p_i=market share of *i*th firm in descending order. The normal practice is to take four firm concentration ratio. However, if the number of firms in the industry is more, one can calculate 8 firm or 10 firm concentration ratio.

[iv] Capital cost has been calculated as: total capital*user cost of capital. User cost of capital is proxied by prime lending rate of India's largest commercial bank (SBI) minus inflation plus a constant depreciation rate (7.1%). Total capital is defined by net worth plus total borrowings.

[v] For year-2001, we have taken GFA of year-2000 as K_0 and the differential quantity of GFA in year-2001 and year-2000 as Investment. The sum of K_0 and I is capital stock for year-2001.

[vi] Also, Ray (2004) and Caves and Bailey (1992) have used employee cost as proxy for labour.

[vii] The result is not reported in a table format for the sake of brevity. In the quadratic equation, the estimates of INS and INS^2 are 0.21 with P-value of 0.41 and 0.28 with P-value of 0.24 respectively. In the cubic specification though the significance level increased marginally in model-1, it is not stable. When we have introduced the cubic term in the fully specified model-2, we found all the insider ownership variable to be highly insignificant.

[viii] When we have checked the standardized estimates of each ownership variable, the beta estimates of foreign ownership is marginally higher than insider ownership and corporate ownership. However, there is a large difference between the estimates of IINV and Foreign. Foreign ownership estimate is 5 times larger than IINV estimates. DFI's estimate is significantly negative.

[ix] Just for robustness check, we have estimated another model where we have taken only manufacturing sector firms. We find no change in the sign of the estimates. Also, the changes in the size and significance of the variable are very minimal. Hence, for our further analysis, we have taken all the industries into account except firms categorized as diversified.

[x] CR4 is four-firm concentration ratio. It is the sum total of four firms share in their respective industry group.

[xi] To Rajan and Zingales (1995) the most appropriate definition of financial leverage is by the ratio of debt (both short term and long term) to total assets. They have argued that the broadest definition of stock leverage is the ratio of total liabilities to total assets.

[xii] This is one of the several investigations which we have carried out throughout this study. The result is not reported for the sake of conciseness.

[xiii] Here caution must be exercised while interpreting competition variable (CR4). Since CR4 has been interacted with insider ownership variable, while interpreting the coefficient, the interaction effect must be taken into account.

[xiv] We have conducted the joint significance test for CR4, insider share and the interaction term for which the null hypothesis is that all these variables are jointly zero. The null hypothesis has been rejected as the value of F-statistics is 14.80 with P-value <0.001.

[xv] Some of them are reported in a table format. Others are not reported for the sake of brevity. However, the findings are discussed in the text.

[xvi] For the sake of conciseness, we have not presented several estimation results for the robustness study. However, in the text we have discussed the major findings.

[xvii] This is the definition of Debt-Equity ratio in the PROWESS database. The variable 'net worth' represents the share capital plus retained earnings of a company.