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Evidence from India

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Corporate Governance, Competition and Firm Performance: Evidence from India

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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 scanty attention in emerging market economies. Here we have shown the independent and interaction effect of ownership and competition variable on firm productivity. Contrary to conventional wisdom, we document that competition has in reality become a discernible force in developing economies. The econometric modelling result shows 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 sub-prime crisis and the breakdown of the financial sector in the USA starting October 2008 has seen its impact spreading to the rest of the world. So much so that many commentators have viewed the consequent slowdown in economic activity throughout the world as an indicator of recessionary conditions worldwide not seen since the Great Depression of the 1930s. One of the causes of this crisis has been the breakdown of the regulatory framework which allowed financial institutions to expand their asset base to include what are now considered 'toxic assets'. While the origin of these 'toxic assets' was speculative activity in the real estate market, many manufacturing firms are now being impacted by the slowdown in economic activity. It is now also being argued that the regulatory bodies failed to enforce accountability and good governance on the managers of many of these financial institutions.

While studies of corporate governance have proliferated in recent years they have been mainly concerned with the issue of internal governance mechanisms like form and type of firm ownership. So the question raised is whether insider ownership promotes or retards shareholder wealth. The answer to this question raises important policy issues on the nature of the variables that regulatory bodies should monitor. However, an important issue at the macro level is the impact of external governance mechanisms in moderating the impact of insider ownership on shareholder wealth. One such mechanism is competition in the firm's product and factor market. This issue is particularly important in developing countries many of which have legislated competition laws in recent years and are now putting in place the necessary regulatory authority.

Does product market competition discipline insiders and induce better firm performance in a developing economy? The empirical evidence from the developed countries (Nickel *et al.* (1997), Griffith (2001), Januszewski *et al.* (1999), Koke and Renneeboog (2005)) gives an answer in the affirmative. Yet there is limited evidence on this issue in the case of developing countries like India which have enthusiastically embraced a pro competition regulatory regime. As is well known, India embarked upon the path of economic reforms after a balance of payment crisis in 1991. In this context, it improved its competition climate via a series of changes in both domestic and trade policies. The government gradually moved out from production activities and private sector is now allowed in most of the industries which were earlier reserved for public sector and small scale industries. The most important policy change after 1991 was the industrial licensing policy of 1991 which significantly improved the conditions of entry for both domestic and foreign firms. The pro-competition stance in trade policy has been equally remarkable. Apart from making the exchange rate more market oriented, the main thrusts of trade policy changes have been to reduce quantitative restrictions on imports, reduce import tariffs and end selective protection for the small-scale industries. These institutional changes have impacted most of the economic activities and (*see* Pant and Pattanayak, 2005; Panagariya, 2005) and set the stage for competitive outcomes in economic activities.

There are several studies which have discussed the competitive aspect in Indian industries and related it to firm level productivity in post-liberalization period (see, Das and Pant (2006); Pant and Pattanayak (2005); Goldar and Agarwal (2004); Unel (2003); Srivastava et al. (2001), Balakrishnan et al. (2000)). There is however mixed evidence - while Unel (2003) confirms that productivity growth accelerated after economic deregulation in

1991; Srivastava et al. (2001) and Balakrishnan et al. (2000) find strong evidence of a decline in productivity growth rates in 1990s. Similarly, Pant and Pattanayak (2005) have found the prevalence of higher monopoly elements in Indian industries in the post liberalization period. In another paper, Goldar and Aggarwal (2004) have provided evidence that the price-cost margin has increased in most of the industries in post-liberalization period. However, Pushpangadan and Shanta (2005) provide evidence that out of 14 major Indian industries the monopoly element has increased in two industries, remained the same in two others and reduced in the remaining ten industries.

Despite the significant amount of work on competitiveness and productivity growth of Indian industries, there still exist some missing links. Thus, very little attention has been paid to corporate governance issues and its influence on firm productivity. Moreover, the influence of ownership on firm productivity in different competitive environments has been rarely examined . Most of the productivity studies for India have considered numerous firm specific characteristics without accounting for the institutional structure of production. In a recent study, Bartelsman and Doms (2000) have pointed out four factors that are likely to influence productivity growth where firm ownership and control has been identified as the most important one. Palia and Lichtenberg's (1999) study suggests that managerial ownership changes are positively related to changes in productivity. Their empirical evidence suggests that a stock market rewards firms with higher productivity levels. In this paper, we have provided additional evidence by linking corporate governance, product market competition and their interaction effect on firm level productivity.

We have defined governance as synonymous with the exercise of authority, direction and control. In the modern corporation, share ownership is one of the important mechanism through which one can exercise the control. To note, ownership plays an important role in the decision making process of a firm. The choice of input, technology, man-power and operational environment is fundamentally a choice made by the dominant owner. Hence, 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 remarked 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 a few studies have estimated production functions to determine productivity, the 'ownership' variables have generally been omitted in the case of studies specific to India (*See*, Kato (2005)). In general, econometric studies address this problem by including firm specific fixed effects.. However, instead of treating this managerial variable as an unobserved firm specific effect, we have included the share ownership variable in our productivity estimation. Hence, our study attempts to set up an explanatory model for productivity of firms by including both internal and external governance mechanisms along with the usual real input variables of standard models of productivity estimation. By separately including governance mechanisms we try to improve on standard productivity estimation while at the same time answer the question of how external governance mechanisms can influence the traditional relationship

between insider ownership and firm performance. It is our contention that this latter interaction between internal and internal governance mechanisms offers some new results on the impact of institutions on firm governance.

The remainder of the paper is organized as follows: Section II of the paper discusses existing literature on ownership and competition and Section III extends this by providing evidences on mutual interaction of the duo. Section IV lays out the basic hypotheses of the study. Empirical model is specified in section V followed by a discussion of data source and variable creation in Section VI. Main result of the study is discussed in Section VII and VIII. Section IX presents evidence on the interaction effect between product market completion and insider ownership. Section X concludes the paper.

II. THEORETICAL BACKGROUND

Since Berle and Mean's (1932) seminal thesis on the separation of ownership from control, a large amount of work has been done on the dispersion of ownership and the resulting separation of ownership and control. Examination of the effects of different types of owners has become a primary area of research in the literature. The convergence of interest or incentive alignment argument states that firm performance is an increasing function of insider share ownership (Jensen and Meckling, 1976). The separation of ownership and control creates an agency conflict. The agency cost will be limited if the owner-manager holds substantial amount of share in the firm. The logical concomitant of this hypothesis is that there is a 'steady positive relationship' between management or insider ownership and corporate value. The reward argument predicts a positive relationship between insider ownership and firm performance. This suggests that firms reward their managers with equity ownership for their strong past performance (Kole, 1996).

Cho (1998) has stated that 'other things being equal, managers may prefer equity compensation when they expect their firm to perform. As a result, higher levels of insider ownership are expected in firms with high corporate values'. Cho's prediction is fundamentally different from Kole's argument so far as timing is concerned because Kole emphasizes the relationship between past performance and present ownership whereas Cho predicts the relationship between expected performance and current ownership.

The second line of argument predicts a negative relationship between insider shareholding and firm value. When insiders hold a lower amount of equity and shareholders are too dispersed to take action against non-value maximization behaviour, insiders may deploy corporate assets to obtain personal benefits such as shirking and perquisite consumption. Also as Demsetz (1983) and Fama and Jensen (1983) point out, insiders holding a substantial portion of a firm's equity may have enough voting power to ensure that their position inside the company is protected. As a result, they may become to a great extent insulated from external disciplining forces such as the takeover threat or the managerial labor market. Morck, Shleifer and Vishny (MSV, 1988) have named this as the entrenchment effect. However the question arises if the insider is the majority owner, then as per incentive alignment thesis he/she should endeavour to maximize profit. But, isn't it too much generalization of managerial/insider behaviour? The manager may become increasingly less motivated by money as his wealth increases. Things such as 'power', 'prestige', 'empire building' may be equally or possibly more important for an extremely wealthy person.

There is another string of argument which says the relationship is cyclical. Thus, Stulz (1988) has developed a formal model of an inverse U-shaped relationship between management ownership (through voting rights) and firm performance. Firm performance

tends to rise at marginal increment in managerial share at the beginning. However, it falls and reaches its minimum when the manager/insider holds more than fifty percent share in a firm. Stulz's analysis revolves around the takeover premium argument. The basic argument is that insiders with higher levels of ownership are positioned to oppose takeover threat from the market because of which the acquirer has to pay higher takeover premiums to increase the likelihood of the success of the takeovers. But, with higher levels of managerial ownership the possibility of successful takeover diminishes and therefore firm performance starts to decline after a sufficiently high level of ownership. Firm performance reaches its minimum when insider shareholding is around fifty percent in the firm because with majority ownership the chances of successful takeover become dim.

Demsetz has gone a step ahead and argued that ownership structure is an endogenous outcome of several competitive processes so that there is no a priori linkage between managerial ownership and firm performance. Demsetz (1983), Demsetz and Lehn (1985), Demsetz and Villalonga (2001) and Kole and Lehn (1997) have argued for such a relationship. Their basic argument is that ownership structure with insufficient performance will fail to survive in the long run. Demsetz (1983) has put a strong criticism against Berle and Means (1932) thesis that an inverse correlation exists between diffussion of ownership and firm performance. In another paper, Demsetz and Villalonga (2001) have argued that the ownership structure of a firm is an endogenous outcome of decisions that reflect the influence of shareholders and of stock market trading. The ownership structure that emerges, whether concentrated or diffused, is influenced by profit maximizing interest of the shareholders, so that there is no systematic relationship between variation in ownership and performance.

Despite the varied theoretical viewpoints, empirical studies provide ample evidence that ownership matters and the economic performance of the firm is influenced by allocation of property rights. On the other hand, the influence of different governance mechanisms is rarely understood. Different types of shareholders have divergent abilities or incentives to monitor management. Thus, not only concentration of ownership but also its structure is important for firm performance. The behaviour of insiders would be different if the market for corporate control is very strong. Similarly, the performance of managers or directors would be greatly predictable if they operate in an industry which is highly competitive. In the next section, we will discuss the influence of competition on firm performance, specifically linking ownership, competition and productivity.

Product market competition is an important external governance mechanism. It could limit managerial discretion. Micro-economic theory suggests that competition forces prices 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.

In the literature it is argued that competition can reduce agency problems between owners and managers ((Alchian (1950); Stigler (1958)). Hart (1983) has differentiated between the entrepreneurial firm and the managerial firm and shows a reduction in cost of production when the managerial firm competes with the entrepreneurial firm. Schmidt (1997) argues that increasing 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 and hence the benefits of a cost reduction. The owner may not be interested to pay 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 firm growth due to lower R&D expenditure thus innovation. Smirlock and Marshall (1983) have expressed doubt on the efficacy of competition : costly monitoring and difficulties in enforcement of contracts may not completely eliminate managerial discretionary behaviour in a competitive market.

III.   INTERACTION OF COMPETITION AND GOVERNANCE

In governance studies, though it is imperative to examine the degree of influence of different variables on firm performance it also makes sense to study their mutual interaction. Independently they can constrain the managerial discretion or can induce mangers/insiders to align their interest with shareholders interest. At the same time there may be some complementarity or substitutability relation between different variables. Specifically, competition and corporate governance indicators may jointly move in a direction or in opposite direction while affecting productivity. When they move in the same (opposite) direction, we say they are complements (substitutes) to each other. Product market competition restricts managerial discretion and therefore acts as an alternate mechanism to other corporate governance devices. Also, it can strengthen certain market forces. For example, higher competition can dampen the 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 an efficient governance structure.

The substitution effect implies that when corporate governance is weak competition plays an important role as a disciplinary device forcing mangers to improve performance and reduce slack. On the other hand, 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) develop a model in which competition appears as a substitute to good corporate governance measured by financial pressure at the firm level. On the contrary, 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 share ownership (complementary effect). In another study, Grosfeld and Tressel (2001) have studied the interaction effect of governance and competition for the Warsaw Stock Exchange listed firms. They find competition to positively influencing productivity. They confirm that the impact of product market competition depends on the ownership structure. Thus, product market competition has a significant impact on productivity in companies whose ownership structure is highly dispersed or highly concentrated.

In case of China, Hu *et al*. (2004) find that ownership, corporate governance and competition are important predictors of firm performance. When they examine joint effect of the above three variables, ownership and corporate governance turned out to be more important than competition. They find some substitutability between private ownership and competition. Li and Niu (2006) find moderate concentrated ownership and product market competition are complementary as also relative dispersed ownership and competition. They find evidence of a substitution effect between highly concentrated ownership and competition i.e., firms with high concentrated ownership in a competitive environment tend to be less productive. Koke (2001) has found complementary effect between concentrated ownership and competition for German firms. They found that when owner control is strong, competitive pressure boosts higher productivity growth. In a subsequent study, Koke and Renneboog (2005) found a differential effect of competition and ownership for U.K and German firms. In the 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.

IV. MAJOR HYPOTHESIS

Empirical evidence and theoretical studies suggest 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. 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. Increasing the chances of bankruptcy, competition incites the insiders to greater effort allowing costs reduction necessary to avoid bankruptcy. Also, competition has severe reputational implications. Since 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:

- Competition has a positive effect on productivity

- Higher amount of insider ownership has a positive effect on firm productivity

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

Public financial institutions act as lenders and investors in India. While Mutual funds and foreign institutional investors are the investment institutions, domestic financial institutions (DFIs) like IDBI, IFCI, ICICI and banks are the leading lending institutions.[1] It is

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[1] The Industrial Finance Corporation of India (IFCI) was established in 1948. Its counter parts at the state level – the State Financial Corporations were established in 1951. The National Industrial Development Corporation (NIDC) was floated in 1954. The Industrial Credit and Investment Corporation of India (ICICI) was set-up in 1955. The Industrial Development Bank of India (IDBI) was established in 1964 as the main institution of long and medium term finance.

argued that in India government owned financial institutions have distorted objective functions (Goswami, (2003)). The purpose of setting up of Development financial institutions in India is to foster industrialization. The Narasimhan Committee in 1991 have acknowledged that DFI loans had not been monitored for decades. Therefore, the quantum of debt is the performance measurement criteria for them rather than quality of loans. The amount of stock ownership by DFIs in companies is more of a political decisions rather than driven by high powered business incentives. However, institutional investors can exert pressure on management by offloading large amount of shares. As they have commitment to their investors, they shall ensure that the firm is getting managed in the most efficient manner and the resource allocation is optimal to get best output. Besides, the efficient monitoring hypothesis (Pound, 1988) proposes a positive relation between institutional investors share ownership and firm performance. Thus, we hypothesize that:

- Development financial institutions' shareholding has a negative effect and institutional investors' share holding a 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 interest and principal. Failures to payment can lead to bankruptcy and managers may lose their jobs. However, in India most of lending institutions are government owned. They 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 such firms may undertake negative net present value projects or involve in discretionary spending. Second, due to larger accumulation of public debt, the companies appear vulnerable to interest rate or other macro-economic shocks. Larger accumulation of debt sometimes prove to be a deterrent to undertake positive net present value projects due to 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. Koke (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. Kato (2005) has found a negative relation between debt intensity and productivity in case of India. Therefore, we hypothesize that:

- Financial pressure or debt concentration has negative effect on productivity in India.

V.   EMPIRICAL MODEL 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 used total factor productivity as is typical in the existing 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: $A_{it} = \dfrac{Y_{it}}{f(k,l)}$. 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. The specification thus becomes - $\ln y_{it} = \chi + \delta X_{it} + \alpha \ln l_{it} + \beta \ln k_{it} + e_{it}$. 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 Appendix-1, we have explained each of the explanatory variables in detail. As we have discussed earlier the focus of our study are the variables included in X_{it} and represent the institutional factors that impact productivity. These institutional factors include both internal and external governance mechanisms.

VI.   DATA, EMPIRICAL RESULT AND ANALYSIS

The data is obtained 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 in terms of products produced 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 for the final estimation.

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 amount by insiders/promoters. In the governance structure of Indian corporates, insiders/promoters plays a larger role. In the context of India, promoter control, founding family control, ownership control, ownership concentration, and management control have the same connotation. The promoter/family characterizes a distinctive class of shareholders 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 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 their stock holding instead of intervening when they find large scale managerial problems. In India, institutional investors have greater equity exposure in companies and therefore the potential for institutional monitoring is greater than it is in market-dominated economies like the US and UK. Besides that, we have included three more ownership variables representing foreign ownership, development finance institutions (DFIs) and Corporate ownership. We have included the capital structure variable which is measured as total borrowings to total assets. Also, the 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 variables through which we have captured incentive power of market discipline. The concentration index, CR4, is defined as the sum of the four firm's share in their respective product market (defined by NIC-2 digit output).[2] 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. 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 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

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[2] 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 ith 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.

labour, raw material, power and capital cost normalized by gross value added (Koke, 2001; Kato, 2005).[3]

The firm's output, y_{it}, is defined as gross value added, deflated by using whole sale price index with base year 1993-94. The firm's capital, k_{it}, is defined as gross fixed assets, deflated using 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.[4] 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.[5] Other control variables are defined in *Appendix-1*.

VII. ANALYSIS OF THE DESCRIPTIVE RESULT

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 the dependent variable and labour and capital as independent variables. We take the residuals from this regression as a measure of relative productivity (i.e., relative to the regression line). 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 industry-wise productivity and concentration in Table 1. Here, we explain at an aggregate 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 of 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 they show a high level of concentration.

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[3] 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.

[4] 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.

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

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.

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 productivity except 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 except electrical machinery. Therefore, this provides an ad-hoc evidence that industries which are non-competitive tend to have lower average 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 average productivity level is positive. Only when promoter share is 10-20 percent and 30-40 percent, the average productivity level is negative. In case of non-competitive industries, productivity is negative even while insider ownership stake is quite large i.e., more than 75 percent. This provides some indication of the complementarity between competition and insider ownership. Firms under large insider share have positive productivity in competitive industries. In case of non-competitive industries, the productivity and share ownership do not seem to have a linear relationship.

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.

As a further check, we have examined the level of productivity when insiders have 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 insiders have less than 51 percent stake in a firm, productivity level is low in competitive as well as non-competitive industries. Finally, we examined the productivity difference between group and standalone firms. It is seen that standalone firms are more productive than group firms and the mean difference is statistically significant.

VIII. DESCRIBING ESTIMATION RESULT

In this section, we examine the effects of ownership and competition on productivity levels. 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 quadratic and cubic terms for insider ownership.[6] We find the higher order terms are highly insignificant. Thus, linear specification better captures the relationship between insider ownership and firm productivity than any form of non-linear specification. Moreover, the result remains invariant to the changes in capital stock variables.

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 allocations rather than directly affect governance of the company. Sometimes they can be very short-sighted and may try to maximize the value of shares of their customers without performing their monitoring role as large investors. However, we found a positive and significant sign of institutional investors (IINV) in model-1. The positive relationship between productivity and IINV's share ownership draws attention to their monitoring role as major block holder.

The study finds 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 rights and higher control rights, 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.

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[6] The result is not reported in a table format for the sake of brevity. In the quadratic equation, the estimates of INS and INS² 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.

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)*
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.*

The coefficient of corporate ownership variable (CORPORATE) is positive and statistically significant. This implies inter-corporate ownership has a positive impact on firm productivity. Companies generally hold shares in firms where they have a strategic interest. It 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 estimate of corporate ownership indicates the performance enhancing role played by the 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.[7] Since foreign ownership also represents foreign institutional investors (FII), it indicates the performance monitoring role played by FIIs.[8]In model-2, we have included competition, leverage and other control variables. To measure competition, CR4 variable is used in the model.[9] The sign of CR4 is negative which implies higher the industry concentration; lower is the productivity level of firms. However, we find the variable to be insignificant in the model. It indicates competition per se does not have any disciplinary effect and 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.

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[7] When we have checked the standardized estimates of each ownership variable, the beta estimate 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.

[8] 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.

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

In the post-reform era, the scope of importing capital goods has increased in India. Recently Ray (2004) and Goldar *et al.,* (2004) have found that import intensity and technology import payment intensity have a positive impact on firm productivity and efficiency. Since liberalization of external controls and removal of quantitative restrictions on capital goods, the access of Indian companies to the 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 effects 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 also beneficial from a transaction cost perspective. The possibility of the hold-up problem will also be reduced significantly and the cost of negotiation and bargaining will be very minimal. This study finds a positive impact of integration (VERTICAL) on firm productivity.

The next control variable is EXCISE which is measured as the ratio of excise tax paid to value of output. 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 have a 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).[10] 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 magnitude of the effect is low. 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

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[10] 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.

payment ratio.[11] 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. 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 are low. Therefore, debt may be negatively related to productivity (Kato, 2005).

IX. 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. However, now the competition variable (CR4) becomes significant and positive.[12] 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. From this study, it is apparent that competition has significant effect on productivity when it is considered along with insider ownership.[13]

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[11] 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.

[12] 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.

[13] 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.

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.*

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 *(t-value=-1.28)*. In model-5, we have introduced the interaction effect between insider stake and HHI. Now, the variable HHI turns 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. 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 equals the industry average, 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 competitive measure.

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.

X. 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 1,833 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 to the fact that countries with weak legal enforcement can have better firm performance with moderate concentrated ownership.

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. Our finding regarding the beneficial effect of competition is in conformity with the theoretical predictions and existing empirical evidence. The complementary nature of competition and

insider share is being supported by previous empirical evidences. 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. At the same time, it highlights the signalling argument of debt because of which we see a positive association between debt intensity and firm value.

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, domestic institutional investors do not play a significant role in improving firm productivity. At best, their investment in large amounts 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.

These findings have important 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 would affect firm-performance positively. The complementary nature of insider ownership and competition shows that policies relating to ownership dilution must be enacted with due cautions. 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 government agencies debt.

Appendix 1: 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

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