Product Market Development and Business Group Affiliation Value: Evidence from an Emerging Market*

Narahari Hansoge[a]

Indian Institute of Management Tiruchirappalli

Vijaya B. Marisetty[b]

Department of Economics, Finance, and Marketing, RMIT University

Poonam Singh[c]

Economics and Strategy, National Institute of Industrial Engineering

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[a]Indian Institute of Management Tiruchirappalli (IIMT), NIT Trichy Campus, Thuvakudi, Trichy - 620015, India. Tel: +91-0431-2505054. E-mail: narahari@iimtrichy.ac.in

[b]Corresponding author. Level 11, Building 80, 445 Swanston Street, Melbourne, Australia-3000. Tel: +61 3 99251431. E-mail: vijayabhaskar.marisetty@rmit.edu.au

[c]National Institute Of Industrial Engineering, Vihar Lake, Mumbai - 400087, India. Tel: +91-022-28573371. E-mail: poonammehraster@gmail.com

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Abstract

In this paper, we attempt to understand whether business group affiliation continues to create value with improvements in institutional environment, especially with increased product market competition. This question comes at a time when there is growing awareness that business groups dominate product markets even in developed economies (Boutin et al., 2013) and their existence is not limited to poor institutional environments (Khanna and Palepu, 2000). We exploit an exogenous regulation in India that aims to penalize anti-competitive practices of complex business structures akin to business groups. Using around 36,500 firm year observations, spanning 23 years, we find that business group affiliation value diminishes with improvements in product market environment. The effect is more significant for business groups that diversify through vertical integration. However, business groups with deep pockets continue to sustain value creation, indicating their aggressive strategies that restrict new entrants (Boutin et al., 2013).

JEL Classification: G38, L25, L40.

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1. Introduction

There is growing awareness that the business group model persists in both developing and developed economies. A recent study by Boutin et al. (2013) finds that, in a developed nation like France, 30% of the manufacturing firms are affiliated to business groups. More importantly, the affiliates of business groups generate 72% of sales in their respective product markets. Ramachandran et al. (2013) argue that business groups in developing countries act as "evangelical architects" that focus on shaping the industries they enter. Likewise, Chittoor et al. (2014) report that capital market development strengthens business group affiliation, rather than making them an endangered species. The growing global significance of business groups corroborates the evidence found in these recent empirical studies[1].

The existing notion that business groups dominate primarily due to weak institutional environment (Khanna and Palepu, 2000) and weak corporate governance environment (Bertrand et al., 2002) implies that, as markets develop, business groups could become dinosaurs. This argument is being mellowed down by these recent studies that highlight how business groups use their structural ability and deep pockets to compete aggressively in product markets (Boutin et al., 2013). There have been second thoughts on the Institutional Voids Hypothesis (Khanna and Palepu, 1999 and 2000) which proposes that benefits of deep pockets are mainly associated with market underdevelopment (Manikandan and Ramachandran, 2014).

Our paper aims to extend this stream of the literature by focusing on how business groups respond to product market development when institutional environment is strengthened by the regulator through competition reforms. In other words, we revisit Khanna and Palepu (2000) to understand whether improved product market competition due to institutional development

[1] As per McKinsey, over the past decade, 80% of the largest 50 companies by revenue in South Korea were group affiliated firms and their revenues grew at an annual average of 11%. In India, group affiliated firms constituted 90% of the top 50 companies (excluding state firms), and had an annual average revenue growth of 23%. For more details, see the Schumpeter Column "*From dodo to phoenix*" in the Economist, 11th January 2014.

really reduces the business group affiliation value. More importantly, we address the question that is still wide open on how business groups transform their structure and continue to dominate the corporate landscape. Given that most of the emerging economies are going through significant institutional development and domestic business groups are transforming into global leaders[2], a deeper understanding of the business group model dominance is much needed. Such a transitional phase of developing economies allows us to observe business groups' adaption process to improve their efficiency and whether such changes generate value for affiliated firms.

Although, a study by Boutin et al.(2013) confirms that business groups are efficient and beneficial in the French market that is highly competitive (with considerable institutional development), their finding answers only part of the question for the following two important reasons. First, their sample contains only those business groups that survived transition from poor to improved institutional environment. Hence, their analysis suffers from survivorship bias. In their study, it is hard to attribute business group dominance to group characteristics as their sample includes only survived business groups. They cannot observe factors contributing towards failure of business groups during the transitional phase of the French economy. We address this issue by exploiting an exogenous shock that occurred in India, where a new Competition Act (2002) provided a framework for penalizing anti-competitive practices and creating a level playing field for all market participants. We argue that our empirical setting is less susceptible to the survivorship bias problem as we follow business group evolution one decade before and one decade after the enactment of the Competition Act. Hence, we can observe performance of both successful and unsuccessful business groups in our sample.

Second, their focus is mainly to explain how business groups' deep pockets act as a competitive advantage by alleviating their financial constraints and deterring entry of competitors in

[2]For instance, Samsung group in South Korea and Tata group in India are giving stiff competition globally in their respective product markets. Fortune 500 list for the year 2014 has Samsung Electronics in the 13th position and two of Tata group companies, namely, Tata Motors and Tata Steel in the 287th and 486th positions respectively (http://fortune.com/global500/; Accessed on December 30, 2014).

product markets. However, we argue that two business groups, with the same amount of deep pockets, may not respond in the same way with changing institutional environment. Hence, how business groups adapt, plays a critical role to distinguish their competitive advantage with improvements in competition and institutional environment. Sull et al.(2003) point out that both Korean cheabols, Daewoo and Samsung, were of equal size during early 1990s. However, Daewoo could not sustain its growth with the advent of improvements in product market competition; Samsung, on the other hand, became a global leader in some product markets. Among many other reasons, Sull et al.(2003) attribute such dramatic evolution to efficiency gains associated with Samsung's structural evolution over time.

Based on around 36,500 firm year observations relating to the Indian market, spanning 23 years, we report the following main findings: 1. Business group affiliation continues to create value as compared to standalone firms even with institutional development. However, affiliation gains are relatively lower in the post-Competition Act regime. 2. The effects of structural changes on group affiliation value are more pronounced for vertically integrated groups; increase in vertical integration is valuable in the pre-Competition Act regime but reduces value in the post-Competition Act regime. 3. Increase in group deep pockets positively affect group affiliation value in both pre and post-Competition Act regimes. Thus, business groups with deep pockets continue to dominate even with market developments.

Our contribution can be better illustrated by using General Electric (GE), a benchmark for a large surviving conglomerate in a developed world. Recently, GE has been expanding aggressively through vertical integration. While acquiring an Italian parts supplier Avio, GE head of supply chain management, Ms.Collee Athans, stated that[3], "If we invest in helping to teach a supplier, we lose our flexibility to compete against them and get it somewhere else". This statement is intriguing especially in light of the widely documented Conglomerate Discount Hy-

[3]Source:The Wall Street Journal. http://online.wsj.com/news/articles/SB10001424127887324906004578288373219034986 (Accessed on November 25, 2014)

pothesis (Berger and Ofek, 1995). At the same time, it is hard to draw any positive implication of such vertical integration strategy, as GE is not only an exception of a sustained conglomerate in the US market, but also attracts survivorship bias. On the other hand, if one can use a large sample of business groups that are undergoing transition due to institutional development and if one can analyse the role of structural adaption undertaken by business groups for improving their efficiency, then attribution bias is minimal. Our paper can be viewed in this spirit and our empirical results provide robust evidence to such unverifiable conventional wisdom.

It is important to note that business group diversification strategy has been explained by researchers using several theories that include agency theory (Aggarwal and Samwick, 2003; Fulghieri and Hodrick, 2006), internal capital market theory (Stein, 1997; Rajan et al., 2000 and Wulf, 2009), debt-co-insurance effect (Lewellen, 1971), value maximization model (Maksimovic and Phillips, 2002; Bernardo and Chowdhry, 2002) and corporate refocusing theory (Matsusaka and Nanda, 2002). Our research isolates from these theories to focus mainly on the interaction between business group structure and product market competition. However, drawing on theory from both the Industrial Organization and the Corporate Finance fields, it can be argued that product market competition can capture most of the variations expected out of other theoretical underpinnings. For instance, Hart(1983) shows that product market competition unambiguously reduces managerial slack (agency theory). Schmidt(1997) shows that increase in product market competition increases failure probability of firms with high costs (value maximization model). Hence, our study complements the existing theoretical underpinnings relating to diversification strategy.

The rest of the paper is organized in six sections. This section is followed by a brief discussion on changes to the competition environment in the Indian market in Section two. The purpose of this section is to understand potential effects of competition on business group structure. Section three presents our proposed hypotheses and the related arguments based on the extant literature.

Section four describes our empirical methodology. This section also provides information relating to data and how we construct our variables of interest. The empirical results are presented in Section five. Section six concludes.

2. Indian Institutional Setting: A brief overview of the competition regulation

We provide a brief overview of the Competition Act (2002)[4]. The Act was introduced in the year 2002 to promote and sustain competition in the Indian economy. Inter alia, the Act regulates anti-competitive agreements, abuse of dominant position and business combinations. Competition advocacy became effective in 2003 and provisions regulating anti-competitive agreements & combinations became effective in 2009. The Competition Commission of India (CCI) is responsible for administering the Act.

The Act views structures or arrangements with horizontal and vertical concentration as having an "appreciable adverse effect on competition" (AAEC) and aims at targeting entities operating as complex structures with vertical and horizontal integration mechanisms. Under the Act, horizontal relationships are arrangements or agreements made between parties operating at the same level of the production process and vertical relationships are arrangements or agreements made between parties operating at different levels of the production process in the value chain. While AAEC is presumed to be present in structures with horizontal relationships, the burden of proving the presence of AAEC in structures with vertical relationship is on the CCI. The below figure illustrates horizontal and vertical relationships.

Further, the Act prohibits the abuse of dominance in a product and/or a geographical market. Market dominance can be abused either through exploitative[5] or exclusionary[6] practices. Finally, all business combinations above specified thresholds can be made effective only with the approval

[4]This overview is based on PwC(2012).
[5]E.g. predatory pricing, conditions on sales/purchase of goods and services etc.
[6]E.g. limited production, denial of market access etc.

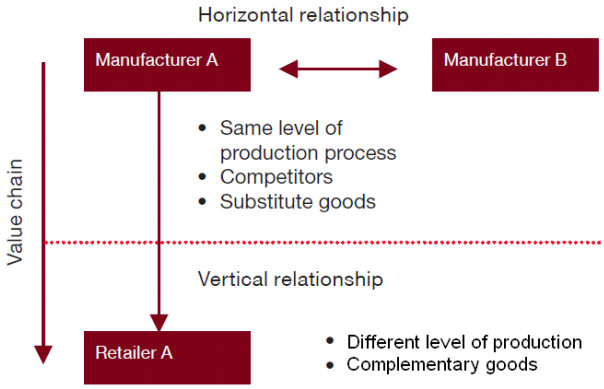

Fig. 1: Horizontal and Vertical relationships

Source : PwC (2012)

of the CCI.

2.1. How does the Competition Act Affect Business Group Structure?

A business group in India represents several firms, both listed and unlisted, that are affiliated to a controlling family or family trust with a common vision as directed by the controlling family or board of trustees. These firms are interlinked through intragroup equity investments and several other intragroup financial transactions. Given that business group affiliated firms have common group vision, they strategically structure their affiliates for increasing overall group value; either through horizontal integration or vertical integration. These expansion actions of business groups attract penalties or get closely monitored by the competition regulator. As per the Act, horizontal integration activities have the potential to corner market compared to vertical integration activities that aid firms to strategise their supply chains.

2.2. An Illustrative Example of Business Group Structural Integration

In what follows, we show how competition policy can be interpreted within the context of a business group. For illustrative purposes, we present the structural integration of TVS Iyengar group (a prominent Indian business group). Table 1 decomposes the activities of TVS Iyengar

group to depict the extent of its vertical and horizontal integration. TVS Iyengar group is vertically integrated in five major industries. Our vertical integration classification is based on the number of affiliates operating in highly unrelated industries or at 2-digit industry codes (NIC code)[7]. Likewise, we classify affiliated firms under horizontal integration based on the number of affiliates that are operating within a given 2-digit NIC code and also share the same 4-digit NIC code which have very closely related industries. Based on this classification, Table 1 shows that there are 17 firms that operate in the same NIC code 30. These 17 firms operate in the same product market as they share the same 4-digit NIC code. Likewise, under NIC code 46, there are 4 firms that are horizontally integrated.

As discussed in the previous section, affiliated firms that are horizontally integrated come under the radar of Competition Act in the post-2002 period. Table 1 shows that, within two years after the introduction of the Competition Act, TVS Iyengar group reduced its horizontal integration by merging two firms (into other close NIC 4-digit code firms) in NIC code 3091[8]. Also, Table 1 shows that in the case of NIC Code 46, TVS Iyengar group reduced its horizontal integration (from 0.156 to 0.136) due to substantial increase in sale contribution from one of 4 horizontally integrated affiliates. This highlights the changed business focus of TVS Iyengar group in NIC Code 46. Thus structural changes in TVS Iyengar group helps us to visualize the possible effects of the Competition Act.

3. Testable Hypotheses

3.1. The Definition of a Business Group

Granovetter (1995) provides a working definition of a business group (BG) as a collection of firms bound together in some formal and/or informal ways, characterized by an 'intermediate'

[7]Refer Section 4.3 for more details about NIC codes

[8]TVS Autolec and Lakshmi Auto Components were merged with other group firms operating in NIC code 30 in the year 2003.

level of binding. In the process, BGs are distinguished from strategic alliances on one hand and legally consolidated entities on the other. However, in this way, BGs can be confused with conglomerates. But Strachan (1976) makes an important distinction between conglomerates and BGs. The former involves a common parent owning subsidiaries with few or no operational ties binding the subsidiaries with each other. On the contrary, the latter is characterized by both personal and operational ties among the firms within the group. In our context, Strachan (1976) is an appropriate definition for a business group.

3.2. Business Group Affiliation and Firm Value

There is an extensive literature on both business group affiliation value and the effect of business group diversification strategies on the group value. We draw our hypotheses on group affiliation value by drawing inference from several existing papers in this area. Khanna and Palepu (1999,2000), in their seminal work propose the "institutional voids" argument to show the advantage that business groups enjoy over standalone firms to generate value. This is attributed to the fact that groups are able to substitute the weak institutions by reducing information asymmetry and transaction costs among affiliates and with outside partners (Khanna and Yafeh, 2007; Chang and Hong, 2000). The argument of institutional voids holds on the premise that business group affiliation value is conditional on the quality of the institutional environment. Hence, if the institutional environment improves, the gains of business group affiliation for the affiliated firms should reduce. As per Khanna and Palepu (2000), product market is one of the three major institutional factors and improvements in product market environment due to expected increase in competition will result in group affiliation value diminishing in the post-Competition Act regime. This extended argument leads to our first hypothesis.

H1. BG affiliation adds value compared to standalone firms when BGs operate in less competitive environments. However, increase in competition due to regulatory intervention should reduce the value of business group affiliation.

3.3. Business Group Structural Dynamics and Affiliation Value

We now draw our focus on the effects of group structural evolution on affiliates' value with increase in competition. The performance of BGs vis-à-vis standalone firms also depends on the structure of the BGs and on the fact as to how firms within the group are interrelated, i.e. either horizontally or vertically. The question then moves to what affects the profitability or performance of the differently structured BGs. As described in Section 2, structural evolution dynamics not only affect the value of business group affiliates but also competing standalone firms. We draw upon the extant literature to frame hypotheses relating to value effects associated with horizontal and vertical integration, especially when product market competition improves in the economy.

3.3.1. Business Group Affiliation Value with Horizontal Integration:

According to Feenstra et al. (2003), the benefits BGs draw from horizontal integration can be attributed to multimarket contracts and collusive behavior (see Bernheim and Whinston 1990). There is a considerable literature discussing the effect of horizontal integration based on market power. Salant et al. (1983) show that, in the absence of any efficiency in a *Cournot Nash* equilibrium, horizontal integration between firms may result in a loss for the integrated firm and can turn out to be beneficial from the perspective of the outsider stand alone firms, when merger or integration is considered as an exogenous outcome.

There are two implications of this apparent counter intuitive result. First, it provides theoretical justification to the fact that not all horizontal mergers are profitable. Second, it points out to the need of modeling profitable horizontal integration across firms in other ways. One solution is provided by Salant et al. (1983) themselves, where they show that when mergers are treated endogenously, the model takes into account the decision of firms to merge or not, in the equilibrium we get only mergers that make profit. The results suggest that horizontal integration yields benefits to the integrated firms only when a large number of firms integrate. In other words, the benefits are mainly driven by economies of scale. Likewise, Deneckere and

Davidson (1985) show that firms can benefit from horizontal integration when the products are differentiated and the firms engage in price competition rather than product competition. In our case, we are considering the effect of product competition than price competition. Hence, horizontal integration due to increase in product competition would reduce business group affiliation value. This leads us to the second hypothesis as follows.

H2: BGs that expand through horizontal integration lose value in the post-Competition Act regime.

3.3.2. Business Group Affiliation Value with Vertical Integration:

The advantages associated with vertical integration can be drawn from Williamson's (1975, 1985) transaction cost literature, which argues that firms integrate vertically when the contracting costs are high. This has been extended by Grossman and Hart (1986), who generalize the high contracting costs to the question of missing property rights. Credit market imperfections are also found to affect the organization of the firm (Acemoglu et al., 2009). They argue that vertical integration is high only when contracting costs and financial development both are high, particularly in capital intensive industries which are more susceptible to hold up problems. In this context, Khanna and Yafeh (2007) argue that vertical integration could instead be to attain monopoly power or to solve the double monopoly power problem. However, they do not rule out the possibility that exercise of monopoly power might be more prevalent in environments characterized by high contracting costs. Taking the case of South Korea, Chang (2003) argues that vertical integrations are industry specific and concentrated in large industries. In summary, in our context, vertical integration is valuable for affiliates in a less competitive environment. Hence, the value associated with vertical integration should diminish in the post Competition Act environment (when the product market competition is expected to increase). Thus, our third hypothesis is stated as:

H3: BGs that expand through vertical integration lose value in the post-Competition Act regime.

3.3.3. The Value of Deep Pockets to Business Group Affiliates:

The synergy effect in case of integration has been extended to the case of BGs, wherein it is argued that the scale and scope of BGs enables them to perform better than standalone firms especially in developing or emerging markets characterized by labour and product market imperfections (Ghatak and Kali 2000). This explanation is also consistent with the empirical observation that BGs still persist and continue to earn profit in emerging economies which have moved towards market driven transparent regulatory regimes, providing evidence contrary to the institutional voids theory. Further, Boutin et al.(2013) show that BGs exist and thrive in an institutionally developed and highly competitive economy like France. Boutin et al. (2013) highlight the role of deep pockets on the competitive advantage of group affiliated firms against standalone firms. They argue that financial dependent affiliates draw upon additional sources such as group liquidity for funding new projects. They find that business group affiliates only enter when the group has piled up large cash. Also, they enter into new sectors only when the group has a strong holding in the established sectors. Thus, group entry discourages stand alone entry, especially, if the standalone firms do not have access to similar deep pockets. They also find that the exit rate of standalone entrants is affected by the deep pocketed groups in the same product market. This implies that, increase in the entry of standalone firms does not guarantee reduction of business group affiliation value if the business group has deep pockets. This discussion leads us to our fourth hypothesis:

H4: Deep pockets at business group level are positively associated with group affiliation value and is not affected by increase in product market competition.

4. Methodology and Data

4.1. Methodology for measuring Horizontal and Vertical Integration

In this subsection, we describe our approach to measure the extent of horizontal and vertical integration of a BG. According to the Competition Act (2002), entities are horizontally (vertically) related if they are engaged in the same (different) level of production process. Agreements (formal or informal) that have an "appreciable adverse effect on competition" (AAEC) are prohibited by the act. Horizontal agreements are presumed to have AAEC whereas in the case of vertical agreements, the AAEC needs to be established by the Competition Commission of India (CCI)[9].

BGs are often both horizontally and vertically integrated in various product markets. Many groups have multiple firms operating in the same or similar product markets (i.e. firms with horizontal relationships)[10] and firms belonging to a typical business group often have sale and purchase agreements between them (i.e. firms with vertical relationships)[11]. Group firms also make use of the "group brand" and benefit from active intermediation by the group headquarters (Khanna and Palepu, 1999). Such arrangements come under the purview of the Competition Act which, inter-alia, regulates anti-competitive agreements and prescribes penalties for actions that impede competition in Indian product markets. Given this background, it is important to measure the extent of horizontal and vertical integration in a group to understand the effect of the Act on BGs in India.

[9] This paragraph is based on PwC(2012)

[10] For example, the Tata group has 5 firms that operate in NIC-2410 (Manufacture of basic iron and steel). Among these 5 firms that operate in the same NIC 4-digit level, NIC-24101 (Manufacture of pig iron) and NIC-24102 (Manufacture of sponge iron) have 1 firm each and NIC-24105 (Manufacture of hot and cold rolled steel products) has 3 firms. The 5 firms operate in the same NIC 4-digit level but operate in 3 different NIC 5-digit levels.

[11] For example, the Tata group has operations in extraction of petroleum and natural gas (NIC-06), electricity (NIC-35), manufacture of refined petroleum (NIC-19) and chemical (NIC-20) products. Inputs from all these industries can be used by the group for its firms that manufacture basic metals (NIC-24)

4.1.1. Horizontal Integration

The Horizontal Integration (HI) measure is designed to capture the extent of a group's presence in the same level of the production process. Horizontal agreements are "between enterprises or persons engaged in trade of identical or similar goods or services" (PwC, 2012). The HI for a group g having m firms is calculated as:

$$HI_{gt} = \sum_{i=1}^{m} P_i * ln(1/P_i) * P_I$$

Where,

HI_{gt}	:	HI of group g for year t
m	:	Number of firms in group g
P_i	:	(Sales of firm i)/(Total group sales in industry I). Each firm is assigned a NIC 5-digit code for industry classification. Industry I refers to the NIC 4-digit industry corresponding to firm i's 5-digit code
P_I	:	Proportion of Industry I's (NIC 4-digit) sales to total sales of the group

The HI measure is designed to capture the activity of a group in similar NIC 5-digit codes. A group that has multiple firms operating in the same NIC 4-digit code (firms can be in same or different NIC 5-digit codes under the 4-digit code) will have a higher HI as compared to a group that has most firms operating in different NIC 4-digit codes. The HI measure is based on the related entropy measure (Palepu, 1985). Appendix-A provides a simple numerical example on how Horizontal Integration is measured by considering a hypothetical BG that has seven affiliated firms operating in five 4-digit NIC industry codes. The numerical example also displays the mechanics of increase and decrease in our Horizontal Integration measure.

4.1.2. Vertical Integration

The Vertical Integration (VI) measure is designed to capture the extent of a group's presence at different levels of the production process. Vertical agreements are "between enterprises or persons at different stages/levels of production chain in different markets" (PwC, 2012). We use

data from the input output matrix to construct the VI measure. The VI for a group g operating in n industries is calculated as:

$$VI_{gt} = \sum_{d=1}^{n} \left[P_d * \sum_{d \neq u} (IC_{du} * CW_{du}) \right]$$

Where,

VI_{gt}	:	VI of group g for year t
n	:	Number of industries in which group g is present
d and u	:	Downstream and Upstream industry (i.e. inputs of industry u are used in industry d). Each industry can get inputs from all other industries in which the group is present
P_d	:	Proportion of industry d sales in total group sales
IC_{du}	:	(Value of industry u's inputs into industry d)/(Total value of all inputs into industry d). IC = Input Coefficient. For the denominator, captive consumption of inputs of an industry is excluded. Data from the input-output matrix is used to calculate IC
CW_{du}	:	(Group sales in industry u) / (Group sales in industry d). Subject to a maximum value of 1. CW = Cross Weights

For calculating the VI measure, we assume that a typical group uses a substantial amount of the outputs of its upstream firms as inputs for its downstream firms. The Cross Weights (CW) are intended to capture this relationship and the relative importance of the downstream and upstream industries. Since it is difficult to get data on the actual inputs used by a group from its upstream industries into its downstream industries, we use group-industry sales as a proxy. If the upstream industry sales are greater than the downstream industry sales, then the CW value will be greater than 1. Therefore, the CW are subject to a maximum value of 1 to incorporate the fact that the value of inputs to the downstream industry cannot exceed the sales of the downstream industry. Appendix-A provides a simple numerical example on how Vertical Integration is measured by considering a hypothetical BG that has seven affiliated firms operating in five 4-digit NIC industry codes. We also provide sensitivity analysis to gain a better perspective on understanding the dynamics of the measure.

4.2. Data for constructing VI and HI measures

The Input Output Transactions Table (IOTT) is published periodically by the Government of India [through its Central Statistics Office (CSO)]. IOTTs are available for the years 1994, 1999, 2004, 2005, 2007 and 2008. We use the latest available IOTT to calculate the industry Input Coefficients (IC). For example, IOTT-1999 is used to calculate IC for the years 1999 to 2003. Since the first available IOTT is for 1994, we use it for the years 1990 to 1993 also. IOTT-1994 and IOTT-1999 divide the Indian economy into 115 sectors (industries) and subsequent IOTTs divide the economy into 130 sectors. However, the industrial classification of firms in our dataset is based on NIC codes (2008). We map the IOTT sectors to NIC 2-digit codes based on the industry descriptions in the 2 classifications[12]. A substantial number of industries have a one-to-one correspondence between IOTT and NIC. Where one-to-one correspondence is not possible, similar industries are combined to obtain a suitable mapping.

4.3. Other main data sources

We use the Prowess database maintained by the Center for Monitoring Indian Economy (CMIE) as our primary source for firm level variables. As Siegel and Choudhury (2012) observe, data from Prowess has been used in several studies in the finance and strategy literature and is generally accepted as the most reliable database for Indian companies. Prowess provides both accounting and stock market data. BG affiliation and industry classification data are also obtained from Prowess. Khanna and Palepu (2000) document that the ownership and industry classification provided by Prowess is fairly accurate. Prowess assigns a 5 digit National Industrial Classification (NIC) Code to all companies and this is used for industry classification in this study. The NIC Code for economic activity (published by the Government of India) is based on the International Standard Industrial Classification (ISIC) of Economic Activities developed by the United Nations.

[12]The concordance between the 115 and the 130 sector Input Output Transactions Table (IOTT) versions is available from the Central Statistics Office (CSO)

4.4. Sample description

The sample period for the study is the 23 year period from 1990 to 2012. Though Prowess has data on Indian companies from the year 1988, the coverage is very sparse pre-1990. This study focusses on an exogenous shock i.e. the enactment of the Competition Act ("Act") and the resultant effects on the value and strategy of group affiliated firms. Since the Act was passed in the year 2002, we exclude observations of that year from the sample and split the remaining sample into 2 regimes - Regime-1 (1990 to 2001) and Regime-2 (2003 to 2012). Regime-1 is the pre-competition reform period and Regime-2 is the post-competition reform period.

The sample consists of all non-financial firms affiliated with Indian BGs and un-affiliated Indian firms (otherwise known as standalone firms). We exclude government firms, foreign firms, and firms affiliated to foreign BGs from our sample. Further, BGs with less than 3 companies are excluded from the sample for that year[13]. Following Khanna and Palepu (2000), we assume that there is no diversification at the firm level for both BG affiliated and standalone firms. In other words, we assume that each firm has substantial operations in only one industry[14]. All nominal variables are deflated using the Consumer Price Index (Year 2001=100) to remove the effect of inflation.

[13]This is consistent with extant literature. Gopalan et al. (2007) consider only those groups with at least 3 firms. Kandel et al. (2013) define a business group as "having at least three publicly-traded companies". Chittoor et al. (2014) note that "...a BG exists by definition when at least two firms are affiliated with it...". Masulis et al. (2011) consider only those groups with at least 2 listed firms. Morck (2009) defines a group as "as two or more listed firms under a common controlling shareholder". Kali and Sarkar (2011) consider only those groups with at least 2 firms. As noted above, most studies define a group as having at least 2 listed firms. We define a group as having at least 3 firms (whether listed or unlisted). Small groups with only 2 firms can neither be considered as business groups nor as standalones. Hence they are excluded. A BG with only one firm cannot be classified as a group by definition. It is possible that a group classified as such in CMIE Prowess has more than one firm but Prowess has data for only one firm in the group. In such cases, it is likely that the other affiliated firms of the group are very small.

[14]Prowess classifies firms having substantial operations in more than one industry as "Diversified" firms. Such firms are few in number (<1.5% of the observations in the preliminary sample) and have been excluded from the final sample.

4.5. Variables construction

We construct variables at two levels, namely firm and BG level. At the firm level, our main variable of interest is firm value measured by *Tobin's Q* ratio (Q). We use other firm level variables, namely *Firm sales*, *Firm Depreciation/Sales ratio*, *Firm Leverage*, and *Firm age* to control for firm size, investment opportunities, capital structure and maturity respectively. At the BG level, we use *HI* and *VI* as two important characteristics of business groups. HI(VI) measures the extent of Horizontal(Vertical) Integration of a group. These measures were described in detail in Section 4.1. 'Deep pockets' of a group is measured by the inverse of the Kaplan and Zingales Index (KZ) (Lamont et al., 2001) and the Whited and Wu Index (WW) (Whited and Wu,2006). The KZ and WW indices measure the degree of financial constraints. We invert the KZ and WW indices by muliplying the index values by '-1' so that the KZ Inverse (KZI) and the WW Inverse (WWI) measures the degree of deep pockets (i.e. a group with a low (high) value of KZ/WW has low (high) financial constraints; correspondingly a group with a low (high) value of KZI/WWI has low (high) deep pockets). The KZI/WWI is measured for each firm in a group and a weighted average KZI/WWI (using firm total assets as the weights) is constructed at the group level[15]. We provide detailed definitions of variables in Appendix-B. All variables that are measured as ratios are winsorized at 1% and 99% to minimize the impact of outliers.

5. Results and Discussion

5.1. Business Group Affiliation and Firm Value

Our first hypothesis predicts that Business Group (BG) affiliated firms are more valuable compared to Standalone (SA) firms in less competitive environments. To gain a better understanding of the sample, we present univariate descriptive statistics in Table 2 in terms of the number of BG and SA observations along with firm level descriptive statistics. Firm value (measured in terms of *Tobin's Q*) is significantly higher for BG firms as compared to SA firms. This is

[15]We thank the guest editor for suggesting the usage of financial constraints index to measure Deep Pockets.

consistent with the literature that BG affiliation is more valuable (Khanna and Palepu, 1999 and 2000). However, as per the Institutional Voids theory proposed by Khanna and Palepu (1997), such value premium associated with BG affiliation should come down when markets develop with improvements in the institutional environment. At the univariate level, Table 2 tests this hypothesis by dividing the sample period into pre and post-Competition Act periods. The results indicate that, group affiliation value persists with a similar average value spread between BG and SA firms. The Q ratio spread between BGs and SAs drops marginally from 0.17 in Regime-1 to 0.14 in Regime-2. This suggests that BG model persists even with institutional development. This is consistent with the evidence the BGs dominate even in countries with highly developed institutions (Boutin et al., 2013). Table 2 further shows that BG firms are larger, older and have higher leverage compared to SA firms. Also, while the average growth opportunities (*Depreciation to Sales*) was higher for SA firms in Regime-1, there was no significant difference between BG and SA firms in Regime-2.

Table 3 presents the distribution of number of firms in a group and total group assets (i.e. for the sub-sample of only BG firms) to understand whether our sample is biased towards large business groups. The frequency distribution of number of firms in a group is given in Panel B and the frequency distribution of total group assets is given in Panel C. Our data analysis shows that, the distribution of business groups based on both number of firms and group size is even across different levels. 16% of the group-year observations have only 3 firms per group and 15% of the group-year observations consists of groups with less than Rs.1 Billion in group assets. Hence, we do not face the large group bias in our sample.

Table 4 reports results based on panel regression[16]. The following regression specifications, run on both BG and SA firms, is used to test Hypothesis-1.

[16]We use Random Effects Generalized Least Squares (GLS-RE) panel estimation for all regression specifications. Industry dummies are included in all models to control for industry effects. t-statistics are based on heteroskedasticity-robust standard errors adjusted for clustering at the firm level. All variables that have an interaction term in the regression model are mean centered to avoid multicollinearity issues.

Model-M1:

$$Q_{jt} = constant + \beta_1 * (BG\ dummy)_j + \beta_2 * ln(firm\ sales)_{jt} + \beta_3 * (firm\ depreciation/sales)_{jt} + \beta_4 * (firm\ leverage)_{jt} + \beta_5 * ln(firm\ age)_{jt} + \varepsilon_{jt} \quad (1)$$

The subscript j denotes a firm and the subscript t denotes a year. *BG dummy* is the business group dummy which equals 1 for BG firms and 0 for SA firms. β_1 is expected to be positive indicating that group affiliated firms are valued more than corresponding standalone firms. In line with the extant literature, control variables are included for firm size, leverage and age. Depreciation/sales is a proxy for investment opportunities. Since investment opportunities influence firm value, this is included as a control variable (Fich and Shivdasani, 2006). Firm sales and firm age are transformed to their natural log forms on account of their wide dispersion and to control for possible heteroskedasticity. Detailed variable definitions are presented as a separate table in Appendix-B. The control variables in Model-M1 (i.e. firm sales to firm age) are used in all subsequent firm value models. For the sake of brevity, they are referred to as "control variables" henceforth.

Model-M2:

$$Q_{jt} = constant + \beta_1 * (BG\ dummy)_j + \beta_2 * (BG\ dummy * Regime2\ dummy)_j + \beta_3 * (Regime2\ dummy) + firm\ level\ control\ variables + \varepsilon_{jt} \quad (2)$$

Model-M2, in addition to the variables in Model-M1, includes the Regime-2 dummy and its interaction term with the BG dummy. The Regime-2 dummy takes a value of 0 for the pre-competition reform period (1990 to 2001) and a value of 1 for the post-competition reform period (2003 to 2012). In Model-M2, β_1 is expected to be positive and β_2 is expected to be negative indicating that group affiliated firms are valued more than corresponding SA firms and that this value spread decreased in Regime-2 due to institutional developments.

Columns (1) and (2) in Table 4 present the results for Models M1 and M2. The results for Model-M1 report a positive and significant coefficient for the BG dummy. This suggests that, on average, business group affiliation in India is valuable. While the BG dummy coefficient is

also positive and significant in Model-M2, the coefficient of Regime 2 and BG dummy interaction term is negative and significant - indicating that the value spread between BG and SA firms reduced in Regime-2. However, the sum of the two coefficients is positive indicating that BG firms are valued more than SA firms in Regime-2 as well. As predicted by the Institutional Voids Hypothesis, institutional development (in the form of the Competition Act) diminishes the value of BGs compared to SAs when competition increases.

Columns (3) to (6) in Table 4 provide further evidence of competition decreasing BG affiliation value. Using the industry Herfindahl-Hirschman Index (HHI), we classify industries into those with high and low competition. Industries with HHI lower than (greater than or equal to) the median HHI are classified as industries with high (low) competition. Columns (3) and (4) present the results of Model-M1 and M2 for firms in industries with high competition and columns (5) and (6) present corresponding results for firms in industries with low competition. We see that the reduction in BG affiliation value in Regime-2 is mainly driven by firms in industries with high competition. The BG affiliation value in industries with low competition remains the same across both regimes. This further confirms that business group affiliation value is high in low competition environments.

As a robustness test, we replicate the regressions of Table 4 in Table 5 by using Return on Assets (RoA) as the dependent variable in place of Q. The RoA results are similar to the Q results in terms of increased competition reducing the BG affiliation value. However, the results are not as clear as the Q regressions. It is pertinent to note that Q is a market based measure and RoA is an accounting measure of firm performance. It may be possible that the effects of the Competition Act are reflected better in Q (being a market measure) rather than an accounting measure like RoA. Hence, going forward, we use only Q as the dependent variable.

Taken together, the results suggest that BG affiliation value persists in less competitive

environments and decreases when competition increases; thus providing evidence in support of Hypothesis-1. In subsequent sections, we try to uncover the drivers behind this behaviour.

5.2. Business Group Structural Dynamics and Affiliation Value

We now turn our attention to understand the effect of within BG structural variations over time and its influence on affiliated firms' value. Table 6 reports univariate statistics of mean Q ratios based on the extent of group integration and the corresponding level of deep pockets in both Regime 1 and 2. For each variable (i.e. for HI,VI,KZI and WWI), *Low* category is for values below the respective medians and *High* category is for values above or equal to the respective medians. Panel A presents the mean Firm Q and Panel B presents the mean Group Q for the various categories. Group Q is calculated at the group level and is the weighted average Firm Q (using firm market capitalisation as weights). For instance, in Regime-1, mean Firm Q of 0.97 (1.06) for Low HI category (High HI category) indicates that firms belonging to groups with High HI were more valuable.

In Panel A, the HI row indicates that horizontal integration was valuable in Regime-1 but did not add any value in the post-Competition Act period. This provides preliminary evidence in support of Hypothesis-2, which states that BGs that expand through horizontal integration lose value in the post-Competition Act regime. The VI row shows that VI did not add value in Regime-1 but firms belonging to groups with high VI in Regime-2 were valued higher. The mean Firm Q for KZI and WWI rows (that measure group deep pockets) show unequivocally that firms belonging to groups with high deep pockets were valued higher in both regimes and thus provide strong preliminary support for Hypothesis-4 which states that group deep pockets increase affiliated firm value in both regimes. The high t-statistics in the KZI and WWI rows indicate that the mean differences are statistically highly significant. The Group Q univariate results in Panel B are largely similar to the Firm Q results in Panel A.

5.2.1. Business Group Affiliation Value with Horizontal and Vertical Integration

The following regression specifications, run on only BG firms are used to test Hypotheses 2 and 3:

Model-H1:

$$Q_{jt} = constant + \beta_1 * \Delta HI_{gt} + \beta_2 * (\Delta HI_{gt} * Regime2\ dummy) + \beta_3 * Regime2\ dummy + control\ variables + \varepsilon_{jt} \quad (3)$$

Model-H2:

$$Q_{jt} = constant + \beta_1 * \Delta VI_{gt} + \beta_2 * (\Delta VI_{gt} * Regime2\ dummy) + \beta_3 * Regime2\ dummy + control\ variables + \varepsilon_{jt} \quad (4)$$

Model-H3:

$$Q_{jt} = constant + \beta_1 * \Delta HI_{gt} + \beta_2 * (\Delta HI_{gt} * Regime2\ dummy) + \beta_3 * \Delta VI_{gt} + \beta_4 * (\Delta VI_{gt} * Regime2\ dummy) + \beta_5 * Regime2\ dummy + control\ variables + \varepsilon_{jt} \quad (5)$$

$\Delta HI_{gt}(\Delta VI_{gt})$ is the annual change in the Horizontal(Vertical) Integration measure of a group g in year t. The 'control variables' are the same as used earlier in Model-M1. We use the annual changes in HI and VI as we are interested to capture the effect of the change in these group structural variables on firm value. Models H1 and H2 are designed to separately capture the effect of HI and VI respectively whereas Model-H3 is designed to capture the combined effect. Our focus is on the ΔHI and ΔVI interaction terms with the Regime-2 dummy. According to Hypotheses 2 and 3, the estimated coefficients on both these interaction terms should be negative indicating that firms affiliated to groups that expand either through horizontal or vertical integration in Regime-2 lose value. The equations presented above are for firm level regressions. Since HI and VI are measured at the group level, we also run identical regressions at the group

level by constructing group variables using weighted averages of the respective firm variables.

Table 7 reports regression results to understand how variations in BG structural integration process affects BG affiliated firms' value in both Regime 1 and 2. Panel A presents the firm level regressions results and Panel B presents the group level regressions results.

The estimated coefficients of ΔHI and its interaction with Regime-2 dummy are insignificant in all specifications indicating that changes in HI had no significant impact on both Firm and Group Q in both regimes. This indicates that, after controlling for vertical integration and other group level factors, change in horizontal integration does not affect firm/group value. Now, we turn our attention to vertical integration. The estimated coefficients of ΔVI and its interaction term with the Regime-2 dummy are positive and negative respectively (in both firm and group level regressions). The results on vertical integration supports the hypothesis that increase in vertical integration is valuable in the pre-Competition Act regime. However, continuation of expansion through vertical integration reduces affiliation value with improvement in the competition environment (i.e. in Regime-2).

Taken together, the results presented in Table 7 suggest that the effects of structural changes on group affiliation value are more pronounced for vertically integrated groups.

5.2.2. The Value of Deep Pockets to Business Group Affiliates

The following regression specifications, run on only BG firms are used to test Hypothesis-4:

Model-V1:

$$Q_{jt} = constant + \beta_1 * \Delta DP_{gt} + \beta_5 * (\Delta DP_{gt} * Regime2\ dummy) + \beta_4 * Regime2\ dummy + control\ variables + \varepsilon_{jt} \quad (6)$$

Model-V2:

$$Q_{jt} = constant + \beta_1 * \Delta DP_{gt} + \beta_2 * \Delta HI_{gt} + \beta_3 * \Delta VI_{gt} + \beta_4 * Regime2\ dummy + \beta_5 * (\Delta DP_{gt} * Regime2\ dummy) + \beta_6 * (\Delta DP_{gt} * \Delta HI_{gt}) + \beta_7 * (\Delta HI_{gt} * Regime2\ dummy) + \beta_8 * (\Delta DP_{gt} * \Delta HI_{gt} * Regime2\ dummy) + control\ variables + \varepsilon_{jt} \quad (7)$$

Model-V3:

$$Q_{jt} = constant + \beta_1 * \Delta DP_{gt} + \beta_2 * \Delta HI_{gt} + \beta_3 * \Delta VI_{gt} + \beta_4 * Regime2\ dummy + \beta_5 * (\Delta DP_{gt} * Regime2\ dummy) + \beta_6 * (\Delta DP_{gt} * \Delta VI_{gt}) + \beta_7 * (\Delta VI_{gt} * Regime2\ dummy) + \beta_8 * (\Delta DP_{gt} * \Delta VI_{gt} * Regime2\ dummy) + control\ variables + \varepsilon_{jt} \quad (8)$$

ΔDP_{gt} is the annual change in the deep pockets of a group g in year t. As mentioned in Section 4.5, group deep pockets are measured by KZ Inverse (KZI) and WW Inverse (WWI). The 'control variables' are the same as used earlier in Model-M1. We use the annual changes in DP as we are interested to capture the effect of the change in this group structural variable on firm value. Model-V1 includes only the ΔDP variable and its interaction term with the Regime-2 dummy. Since changes in HI and VI also affect value, we include them in the next two specifications (i.e. Models V2 and V3) to control for their impact. Our focus is on the ΔDP variable and its interaction terms. According to Hypothesis-4, the estimated coefficient on ΔDP is expected to the positive and the estimated coefficient on its interaction term with Regime-2 dummy is expected to be zero (i.e. insignificantly different from zero). Hypothesis-4 does not make any other predictions with respect to the other interaction terms. As before, the equations presented above are for firm level regressions. Since deep pockets are measured at the group level, we also run identical regressions at the group level by constructing group variables using weighted averages of the respective firm variables.

Table 8 reports regression results to understand how variation in BG deep pockets affects BG affiliated firms' value in both Regime 1 and 2. Panel A presents the firm level regressions

results and Panel B presents the group level regressions results. In both Panels A and B, the first three columns present results using KZI as the measure of group deep pockets and the next three columns present results using WWI as the measure of group deep pockets. In all regression specifications, the estimated coefficient on ΔDP is highly significant and positive whereas the coefficient on its interaction term with Regime-2 dummy is insignificant. This offers strong support for Hypothesis-4 and suggests that there is a positive relationship between changes in group deep pockets and firm/group value. Further, this effect is the same in both regimes.

Similar to the VI results of Table 7, there is some evidence that groups which expanded through vertical integration created value in Regime-1 but lost value in Regime-2. However, this is not consistent across all the specifications. All other interaction terms are mostly insignificant and hence we are unable to draw any further conclusions. Taken together, the results presented in Table 8 offer very strong support for Hypothesis-4. Additionally, the insignificance of the other coefficients suggests that the deep pockets effect dominates the horizontal and vertical integration effects.

5.3. Robustness tests

In our regression specifications, we included the variable Depreciation/Sales as a measure of investment opportunities. As a robustness test, we used RD expenses/Sales and Capital Expenditures/Sales to measure investment opportunities in place of Depreciation/Sales and repeated all our regression tests. Those results (unreported) were qualitatively similar to the reported results. We also tried to include insider ownership stake as a control variable. However, this data is available only from the year 2001 and hence we were unable to include it in our regression specifications. However, we ran our regression specifications only for Regime-2 (i.e. for the years 2002 to 2012) with and without the insider ownership variables and found qualitatively similar results for both sets.

6. Conclusion

Business group is a dominant organizational structure to conduct business in many countries. This age old model has attracted serious attention of researchers only in the last two decades. The literature on conglomerates or complex business structures generally concludes that they are inefficient in competitive and well-developed markets. They generally prosper in markets that are less developed. Our research is mainly motivated by Boutin et al.(2013) on business groups in France, which is a competitive and well developed market. They show that business group affiliated firms dominate product markets by aggressively investing and creating entry barriers to standalone firms. They find that it is mainly due to their access to deep pockets provided by business group internal capital markets. We extend this line of thought and contribute to our understanding on how business groups evolve and conduct business efficiently. In the process, we investigate the role of business group structure in contributing towards business group affiliation value.

We argue that our unique setting of observing exogenous change in competitive environment through a new Competition Act in India lets us observe business groups transition from low to high competitive environment. Likewise, our approach of examining how business groups change their structure, through changes in their horizontal and vertical integration, helps in understanding the strategic moves of business groups to sustain group value. We test these conjectures using 36,500 firm year observations, spanning 23 years of business group evolution history in India. We find that business group affiliated firms, on average, lose affiliation value with increase in product market competition. The value gain that business group affiliated firms enjoy, by expanding through anti-competitive complex structures like horizontal and vertical integration, diminishes with improvements in the competition environment. However, consistent with Boutin et al. (2013), business groups with deep pockets continue to sustain and flourish even with increased competition. Overall, our results support that conjecture that institutional

development do not make business groups extinct.

Appendix-A: Illustrative examples for Horizontal and Vertical Integration measures

Horizontal Integration illustration

Consider a group with 7 firms operating in 5 different NIC 4-digit industries. The below table shows the HI calculation for this group

Firm ID	**Firm sales**	**Firm NIC5d**	**Firm NIC4d**	**Group NIC4d sales**	**PI**	$P_i * ln(1/P_i)$	$P_i * ln(1/P_i) * PI$
1	1000	20114	2011	2100	0.07	0.35	0.02
2	1100	20119	2011			0.34	0.02
3	100	20219	2021	100	0.00	-	-
4	9000	23912	2391	9500	0.31	0.05	0.02
5	500	23912	2391			0.15	0.05
6	5000	23932	2393	5000	0.16	-	-
7	14000	24101	2410	14000	0.46	-	-
	30700			**30700**			**0.11**

Note that since the group has only one firm in NIC4d 2021, 2393 and 2410, the sales of these industries do not directly contribute to the HI measure. However, any change in the sales of these 3 industries will impact the HI through a change in the PI of other NIC4d industries. For example, if the sales of Firm 3 are changed to 10000 from 100, then the HI becomes 0.08 indicating a reduction in the group's horizontal integration. However, a sales change in NIC4d industries in which the group has multiple firms, impacts the HI directly. For example, if the sales of Firm 1 are changed to 5000 from the baseline case, the HI increases to 0.14 indicating that the group has increased its horizontal integration in NIC 2011.

Vertical Integration illustration

Consider a group operating in 3 industries. Group sales, Cross Weights (CW) and Input Coefficients (IC) for the 3 industries are given below

In the CW and IC tables, the row (column) entries are the downstream (upstream) industries.

Industry wise group sales			**Cross Weights (CW)**				**Input coefficients (IC)**			
Industry	Group sales	P_d		A	B	C		A	B	C
A	1000	0.59	A		0.20	0.50	A		0.52	0.10
B	200	0.12	B	1.00		1.00	B	0.24		0.15
C	500	0.29	C	1.00	0.40		C	0.46	0.09	
Total	1700									

For example, $CW_{AB} = 200/1000 = 0.20$ whereas, CW_{CA} is constrained[17] to 1 as $1000/500 = 2$. In the IC table, $IC_{AB} = 0.52$ indicates that 52% of industry A's total inputs come from industry B.

The table below shows the final step in the VI calculation

$IC_{du} * CW_{du}$				$\sum$ (row)	P_d	$P_d * \sum_{d \neq u} (IC_{du} * CW_{du})$
	A	B	C			
A		0.10	0.05	0.15	0.59	0.09
B	0.24		0.15	0.40	0.12	0.05
C	0.46	0.04		0.50	0.29	0.15
					VI=	0.28

Some sensitivity analysis will help us to understand the VI measure better. If the sales of A is changed to 10000 (instead of 1000 in the baseline case), then VI becomes 0.05. This drastic reduction in VI is on account of industry A being much larger than the other two industries in the group and hence firms in industry A can get only minimal inputs from other member firms. If the sales of B is changed to 1000 (instead of 200 in the baseline case), then VI becomes 0.47. This indicates an increase in vertical integration as the increased output of B can be used as inputs in both A and C.

[17] As explained earlier, the CW are subject to a maximum value of 1 to incorporate the fact that the value of inputs to the downstream industry cannot exceed the sales of the downstream industry.

Appendix-B: List of variables and their definitions

Variable name	Variable definition
Panel A: Firm level variables	
Age	Number of years since incorporation of a firm.
Business Group (BG) dummy	A dummy variable taking a value of 1 for group affiliated firms and 0 for unaffiliated firms. Groups with less than 3 companies (Gopalan et al., 2007) or with total deflated sales of less than one billion rupees (100 crores) in a year are excluded from the sample for that year. Pure financial groups (groups with more than 90% of their assets in financial industries) are also excluded from the sample.
Depreciation to Sales	Ratio of firm's depreciation expense to its net total sales. Observations with zero and negative values are excluded.
Leverage	Ratio of firm's debt to total assets.
Q ratio	[Market value of Equity + Book value of Preference shares + Book value of Debt] / Total Assets.
Regime2 dummy	A dummy variable taking a value of 0 for the pre-competition reform period (1990 to 2001) and a value of 1 for the post-competition reform period (2003 to 2012)
Return on Assets (RoA)	(Operating profit)/(Average Total Assets)
Sales	Total sales of the firm. Observations with zero and negative values are excluded.

Variable name	Variable definition
Panel B: Group level variables	
Horizontal Integration (HI)	The HI measure is designed to capture the extent of a group's presence in the same level of the production process. The HI for a group g having m firms is calculated as $HI_{gt} = \sum_{i=1}^{m} P_i * ln(1/P_i) * P_I$. HI_{gt} is HI of group g for year t, m is the number of firms in group g, P_i is (Sales of firm i)/(Total group sales in industry I) (Each firm is assigned a NIC 5-digit code for industry classification. Industry I refers to the NIC 4-digit industry corresponding to firm i's 5-digit code) and P_I is Proportion of Industry I's (NIC 4-digit) sales to total sales of the group. The HI measure is based on the related entropy measure (Palepu, 1985). Diversified and financial firms are excluded. Please refer to "Methodology" section and Appendix-A for more details.
KZ Inverse (KZI)	The Kaplan and Zingales Index (KZ) measures the degree of financial constraints (Lamont et al., 2001). We invert the KZ Index by muliplying the index values by "-1" so that the KZ Inverse (KZI) measures the degree of deep pockets (i.e. a group with a low (high) value of KZ has low (high) financial constraints; correspondingly a group with a low (high) value of KZI has low (high) deep pockets). The KZI is measured for each firm in a group and a weighted average KZI (using firm total assets as the weights) is constructed at the group level. Based on Lamont et al. (2001), KZ for a firm i for year t is calculated as $KZ_{it} = -1.002 * [(Income\ before\ extraordinary\ items + Depreciation\ and\ Amortisation)/PPE_{t-1}] + 0.283 * Q_t + 3.139 * [(Long\ Term\ Debt\ including\ current\ portion)_t/(Long\ Term\ Debt\ including\ current\ portion + Net\ worth)_t] - 39.368 * [(Preference\ and\ Common\ divideds)_t/PPE_{t-1}] - 1.315 * [(Cash\ and\ Short-term\ Investments)_t/PPE_{t-1}]$; where, PPE is Property, Plant and Equipment.
Vertical Integration (HI)	The VI measure is designed to capture the extent of a group's presence at different levels of the production process. The VI for a group g operating in n industries is calculated as $VI_{gt} = \sum_{d=1}^{n} \left[P_d * \sum_{d \neq u} (IC_{du} * CW_{du}) \right]$. VI_{gt} is VI of group g for year t, n is the number of industries in which group g is present, d and u are Downstream and Upstream industry (i.e. inputs of industry u are used in industry d) (each industry can get inputs from all other industries in which the group is present), P_d is the Proportion of industry d sales in total group sales, IC_{du} is (Value of industry u's inputs into industry d)/(Total value of all inputs into industry d) (IC = Input Coefficient. For the denominator, captive consumption of inputs of an industry is excluded. Data from the input-output matrix is used to calculate IC) and CW_{du} is (Group sales in industry u) / (Group sales in industry d) (Subject to a maximum value of 1. CW = Cross Weights). Diversified and financial firms are excluded. Please refer to "Methodology" section and Appendix-A for more details.

Variable name	Variable definition
WW Inverse (WWI)	The Whited and Wu Index (WW) measures the degree of financial constraints (Whited and Wu, 2006). We invert the WW Index by muliplying the index values by "-1" so that the WW (WWI) measures the degree of deep pockets (i.e. a group with a low (high) value of WW has low (high) financial constraints; correspondingly a group with a low (high) value of WWI has low (high) deep pockets). The WWI is measured for each firm in a group and a weighted average WWI (using firm total assets as the weights) is constructed at the group level. Based on Whited and Wu (2006), WW for a firm i for year t is calculated as $WW_{it} = -0.091 * [(Income\ before\ extraordinary\ items + Depreciation\ and\ Amortisation)/TA_{t-1}] - 0.062 * DIVPOS_{it} + 0.021 * [(Long\ Term\ Debt)/TA_{t-1}] - 0.044 * [log(TA_{it})] + 0.102 * ISG_{it} - 0.035 * SG_{it}$; where, TA = Total Assets, DIVPOS is a dummy variable that takes a value of 1 if the firm pays preference or common dividends in year t and zero otherwise, ISG is the 3-digit industry annual sales growth and SG is the firm's annual sales growth. All amounts are deflated to 2001 rupees.

Notes:
1. Data for all variables are from the Prowess database.
2. All group level variables are calculated considering both listed and unlisted firms in the group.
3. Sales data are annualised and "smoothened" for calculating the HI and VI measure. More than 90% of Indian firms follow a 12 month reporting period from April to March [called financial year (FY) in India]. Sales of firms that follow a different reporting period or duration are recalculated so that they are aligned to each financial year. For example, consider a firm that follows the calendar year (CY) for reporting purposes. The sales for FY2010 (Apr2009 to Mar2010 period) for that firm is arrived at by adding the 9 month pro-rated sales from Apr2009 to Dec2009 (from CY2009 data) and the 3 month pro-rated sales from Jan2010 to Mar2010 (from CY2010 data). This approach ensures that the sales of all firms are for the same period and are comparable to each other.

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Table 1: TVS Iyengar Group: Horizontal and Vertical integration

Year 2000 - Total 30 firms						
Vertical Integration (VI). VI=0.069						
NIC (2 digit)	22 (Rubber manufacturing)	24 (Metals manufacturing)	26 (Electronic products manufacturing)	30 (Manufacture of other transport equipment)	46 (Wholesale trade, except automobiles)	Total
Share in group sales	3%	3%	3%	62%	28%	99%
Contribution to VI (absolute)	0.005	0.006	0.013	0.042	0.001	0.066
Contribution to VI (%)	7%	9%	18%	61%	1%	97%
No. of firms	3	1	1	17	4	26
Horizontal Integration (HI). HI=1.494						
NIC (4 digit)				3091 (Manufacture of motorcycles)	4659 (Wholesale trade of other machinery)	Total
Share in group sales				62%	28%	89%
Contribution to HI (absolute)				1.320	0.156	1.476
Contribution to HI (%)				88%	10%	99%
No. of firms				17	3	20
Year 2004 - Total 33 firms						
Vertical Integration (VI). VI=0.059						
NIC (2 digit)	22 (Rubber manufacturing)	24 (Metals manufacturing)	26 (Electronic products manufacturing)	30 (Manufacture of other transport equipment)	46 (Wholesale trade, except automobiles)	Total
Share in group sales	2%	4%	2%	64%	26%	99%
Contribution to VI (absolute)	0.002	0.010	0.007	0.038	0.001	0.057
Contribution to VI (%)	4%	17%	12%	63%	1%	97%
No. of firms	2	2	1	15	6	26
Horizontal Integration (HI). HI=1.392						
NIC (4 digit)				3091 (Manufacture of motorcycles)	4659 (Wholesale trade of other machinery)	Total
Share in group sales				64%	26%	90%
Contribution to HI (absolute)				1.249	0.136	1.385
Contribution to HI (%)				90%	10%	99%
No. of firms				15	4	19

This table presents the important industries of TVS Iyengar Group and the contribution of those industries to group sales, VI and HI for the years 2000 (pre Competition Act) and 2004 (post Competition Act). VI measure is based on the number of affiliates operating in highly unrelated industries or at 2-digit industry (NIC) codes. HI measure is based on the number of affiliates that are operating within a given 2-digit NIC code and also share the same 4-digit NIC code or very closely related industries. For instance, the TVS group had 30 firms in the year 2000 with a VI and HI of 0.069 and 1.494 respectively. The VI panel for the year 2000 shows the details of 26 (of those 30) firms which together add up to 99% of group sales and 0.066 of VI (i.e. 97% of total VI). Similarly, the HI panel for the year 2000 shows the details of 20 (of those 30) firms which together add up to 89% of group sales and 1.476 of HI (i.e. 99% of total HI). Compared to the year 2000, HI reduced in 2004 due to the merger of 2 firms (into other close NIC 4-digit code firms) in NIC code 3091 and due to substantial increase in sale contribution from one of 4 horizontally integrated affiliates in NIC code 4659.

Table 2: Descriptive Statistics of Group and Standalone Firms

	Regime-1 (1990-2001)			Regime-2 (2003-2012)		
	BG firms	**SA firms**	**t-stat**	**BG firms**	**SA firms**	**t-stat**
Number of firms	1142	2391		973	1738	
Number of firm-year observations	8276	10038		7207	11038	
Number of groups	423			411		
Number of group-years	3812			3623		
Q-Ratio	1.03	0.86	15.84	1.09	0.95	9.63
Firm Sales (Rs.mn)	3,086	507	29.81	8,153	1,245	17.51
Firm Depreciation/Sales	0.08	0.11	4.61	0.10	0.10	0.20
Firm Leverage	0.43	0.39	11.87	0.37	0.34	7.36
Firm Age (Years)	25.32	14.59	42.37	33.72	23.22	39.06

This table presents means for BG and SA firms. The data is presented for the 2 regimes separately. Q ratio is [Market value of Equity + Book value of Preference shares + Book value of Debt] / Total Assets, Firm Sales is the net total sales of the firm, Firm Depreciation/Sales is the ratio of firm's depreciation expense to its net total sales, Firm Leverage is the ratio of firm's debt to total assets and Firm Age is the number of years since incorporation of the firm. Q ratio is as at the end of the firm's financial year. In all cases, observations with zero and negative values are excluded. The t-statistics are for the t-test for difference in means between BG and SA firms. All nominal variables are deflated using the Consumer Price Index (Year 2001=100) to remove the effect of inflation. See Appendix-B for detailed variable definitions.

Table 3: Distribution of number of firms in a group and total group assets

Panel A: Summary Statistics				
	Mean	**Median**	**Minimum**	**Maximum**
No. of firms in the group	12	7	3	241
Total group assets (in Rs.mn)	21,754	4,387	1	2,147,930

Panel B: Frequency distribution of number of firms in a group		
No. of firms in the group (Class Interval)	**No. of group-year obs**	**% of total**
3	1170	16%
4-5	1629	22%
6-7	1194	16%
8-10	1148	15%
11-15	835	11%
16-20	474	6%
21-30	357	5%
>30	628	8%
TOTAL	**7435**	

Panel C: Frequency distribution of total group assets		
Total group assets (Rs.bn) (Class Interval)	**No. of group-year obs**	**% of total**
<=1	1113	15%
>1 & <= 5	2813	38%
> 5 & <= 10	1196	16%
> 10 & <= 15	616	8%
> 15 & <= 20	330	4%
> 20	1338	18%
TOTAL	**7406**	

This table presents the summary statistics and frequency distribution of number of firms in a group and total group assets. Number of firms in a group is the count of listed and unlisted firms in a group. Total group assets is the sum of total assets of all firms (listed and unlisted firms) in a group. Group assets amounts are deflated using the Consumer Price Index (Year 2001=100) to remove the effect of inflation. Panel A presents the summary statistics for the two measures. Panel B presents the frequency distribution of the number of firms in a group and the percentage of total. Panel C presents the frequency distribution of total group assets and the percentage of total.

Table 4: Panel regression results: Models M1 and M2 (Q)

(Dependent variable : Q ratio)

	Overall Sample		Sub-sample of firms in industries with high competition		low competition	
Variable name	**M1**	**M2**	**M1**	**M2**	**M1**	**M2**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
BG dummy	0.165***	0.240***	0.137***	0.242***	0.200***	0.235***
	[7.35]	[10.00]	[5.21]	[8.03]	[6.52]	[6.89]
BG dummy * R2 dummy		-0.054**		-0.102***		0.017
		[2.04]		[3.19]		[0.43]
R2 dummy		0.211***		0.225***		0.175***
		[12.37]		[10.58]		[6.85]
Firm sales (log)	-0.002	-0.005	-0.005	-0.008	0.000	-0.004
	[0.23]	[0.58]	[0.43]	[0.74]	[0.01]	[0.33]
Firm depr/sales	-0.031	-0.040*	0.023	0.015	-0.064**	-0.073***
	[1.46]	[1.90]	[0.69]	[0.46]	[2.37]	[2.75]
Firm leverage	0.668***	0.677***	0.709***	0.709***	0.605***	0.625***
	[16.22]	[16.89]	[12.76]	[13.25]	[10.24]	[10.69]
Firm age (log)	-0.108***	-0.225***	-0.099***	-0.221***	-0.115***	-0.210***
	[7.40]	[15.45]	[5.07]	[11.07]	[5.92]	[11.07]
Constant	1.128***	1.326***	1.066***	1.263***	1.147***	1.309***
	[21.43]	[25.03]	[12.93]	[15.39]	[17.65]	[20.09]
Chi-square	554	815	257	396	283	419
No. of observations	36559	36559	19160	19160	17399	17399
p-value	0.00	0.00	0.00	0.00	0.00	0.00

This table presents the results of Random Effects Generalized Least Squares (GLS-RE) panel estimation for Models M1 and M2. The dependent variable is the Q ratio and the regression is run on the sample of group affiliated and unaffiliated firms. Columns 1 and 2 present the results for the overall sample whereas columns 3 and 4 (5 and 6) present the results for the sub-sample of firms in industries with high (low) competition. Industries with Herfindahl-Hirschman Index (HHI) lower than (greater than or equal to) the median HHI are classified as industries with high (low) competition. Q ratio is [Market value of Equity + Book value of Preference shares + Book value of Debt] / Total Assets, the business group (BG) dummy takes a value of 1 for group affiliated firms and 0 for unaffiliated firms, Firm Sales is the net total sales of the firm, Firm Depreciation/Sales (Depr / Sales) is the ratio of firm's depreciation expense to its net total sales, Firm Leverage is the ratio of firm's debt to total assets, and Firm Age is the number of years since incorporation of the firm. All dependent variables are lagged by one year. Firm Sales and Firm Age are transformed into natural log forms on account of their wide dispersion and to control for possible heteroskedasticity. Regime2(R2) dummy takes a value of 0 for the pre-competition reform period (1990 to 2001) and a value of 1 for the post-competition reform period (2003 to 2012). See Appendix-B for detailed variable definitions. Industry dummies are included in all regressions. t-statistics presented in brackets are based on robust standard errors to correct for heteroskedasticity and adjusted for clustering at the firm level. All nominal variables are deflated using the Consumer Price Index (Year 2001=100) to remove the effect of inflation. *p<0.10 ; **p<0.05 ; ***p<0.01.

Table 5: Panel regression results: Models M1 and M2 (RoA)

(Dependent variable : RoA)

	Overall Sample		Sub-sample of firms in industries with high competition		low competition	
Variable name	**M1**	**M2**	**M1**	**M2**	**M1**	**M2**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
BG dummy	0.003	0.010***	-0.001	0.005	0.004	0.013***
	[1.20]	[3.14]	[0.17]	[1.15]	[0.98]	[2.82]
BG dummy * R2 dummy		-0.018***		-0.014***		-0.023***
		[4.93]		[2.85]		[4.40]
R2 dummy		0.000		-0.003		0.001
		[0.18]		[0.76]		[0.21]
Firm sales (log)	0.015***	0.015***	0.016***	0.016***	0.014***	0.014***
	[19.83]	[20.42]	[17.72]	[18.10]	[13.82]	[14.40]
Firm depr/sales	0.002	0.003	0.007**	0.008**	-0.002	-0.001
	[0.79]	[1.15]	[2.02]	[2.24]	[0.72]	[0.37]
Firm leverage	-0.050***	-0.051***	-0.050***	-0.050***	-0.050***	-0.053***
	[12.08]	[12.49]	[9.24]	[9.41]	[8.31]	[8.84]
Firm age (log)	-0.032***	-0.028***	-0.032***	-0.027***	-0.029***	-0.024***
	[17.43]	[14.99]	[13.64]	[11.85]	[11.44]	[9.47]
Constant	0.100***	0.090***	0.090***	0.079***	0.095***	0.084***
	[15.97]	[14.27]	[9.65]	[8.53]	[12.02]	[10.60]
Chi-square	1085	1182	696	731	628	680
No. of observations	29941	29941	15951	15951	13989	13989
p-value	0.00	0.00	0.00	0.00	0.00	0.00

This table presents the results of Random Effects Generalized Least Squares (GLS-RE) panel estimation for Models M1 and M2. The dependent variable is the Return on Assets (RoA) and the regression is run on the sample of group affiliated and unaffiliated firms. Columns 1 and 2 present the results for the overall sample whereas columns 3 and 4 (5 and 6) present the results for the sub-sample of firms in industries with high (low) competition. Industries with Herfindahl-Hirschman Index (HHI) lower than (greater than or equal to) the median HHI are classified as industries with high (low) competition. RoA is defined as (Operating profit)/(Average Total Assets), the business group (BG) dummy takes a value of 1 for group affiliated firms and 0 for unaffiliated firms, Firm Sales is the net total sales of the firm, Firm Depreciation/Sales (Depr / Sales) is the ratio of firm's depreciation expense to its net total sales, Firm Leverage is the ratio of firm's debt to total assets, and Firm Age is the number of years since incorporation of the firm. Firm Sales and Firm Age are transformed into natural log forms on account of their wide dispersion and to control for possible heteroskedasticity. Regime2(R2) dummy takes a value of 0 for the pre-competition reform period (1990 to 2001) and a value of 1 for the post-competition reform period (2003 to 2012). See Appendix-B for detailed variable definitions. Industry dummies are included in all regressions. t-statistics presented in brackets are based on robust standard errors to correct for heteroskedasticity and adjusted for clustering at the firm level. All nominal variables are deflated using the Consumer Price Index (Year 2001=100) to remove the effect of inflation. *p<0.10 ; **p<0.05 ; ***p<0.01.

Table 6: Means and t-test for Q across various group level measures

	Regime-1 (1990-2001)			Regime-2 (2003-2012)		
	Low	**High**	**t-stat**	**Low**	**High**	**t-stat**
Panel A: Firm Q						
HI	0.97	1.06	4.41***	1.11	1.14	1.15
VI	1.05	1.03	1.38	1.10	1.15	2.26**
KZI	0.94	1.11	9.57***	0.98	1.27	12.78***
WWI	0.92	1.09	9.66***	0.95	1.23	12.23***
Panel B: Group Q						
HI	1.07	1.11	1.26	1.24	1.28	1.17
VI	1.10	1.10	0.06	1.20	1.33	3.36***
KZI	0.96	1.21	8.77***	1.03	1.43	10.79***
WWI	0.96	1.20	8.76***	0.97	1.44	13.86***

This table presents the mean Group Q and Firm Q for low and high categories of various group level measures. In Panel A, Firm Q is [(Market value of Equity + Book value of Preference shares + Book value of Debt) / Total Assets] and in Panel B, Group Q is the weighted average Firm Q (using firm market capitalisation as weights). The t-statistics under column "t-stat" are for the t-test for difference in Q means between the low and high categories in the same regime. HI(VI) is the measure of Horizontal(Vertical) Integration of a group and KZI (KZ Inverse) & WWI (WW Inverse) measure the Deep Pockets of a group. Low category is for values below the respective medians and High category is for values above or equal to the respective medians. See Appendix-B for detailed variable definitions. *p<0.10 ; **p<0.05 ; ***p<0.01.

Table 7: Panel regression results: Models H1 to H3

(Dependent variable : Q ratio)

	Panel A: Firm level regressions			Panel B: Group level regressions		
Variable name	**H1**	**H2**	**H3**	**H1**	**H2**	**H3**
ΔHI	-0.018		0.001	-0.106		-0.078
	[0.23]		[0.01]	[0.80]		[0.58]
ΔHI *R2	0.056		0.037	0.137		0.110
	[0.50]		[0.32]	[0.78]		[0.62]
ΔVI		1.365**	1.365**		3.010***	2.968***
		[2.22]	[2.19]		[2.92]	[2.83]
ΔVI *R2		-1.526*	-1.525*		-3.586**	-3.543**
		[1.83]	[1.81]		[2.50]	[2.44]
R2	0.161***	0.163***	0.163***	0.231***	0.235***	0.235***
	[6.40]	[6.45]	[6.45]	[5.36]	[5.45]	[5.46]
Sales (log)	0.021	0.021	0.021	0.011***	0.011***	0.011***
	[0.89]	[0.90]	[0.90]	[4.63]	[4.63]	[4.63]
Depr/Sales	0.009	0.009	0.009	-0.166	-0.163	-0.162
	[0.21]	[0.20]	[0.21]	[0.35]	[0.34]	[0.34]
Leverage	0.560***	0.560***	0.560***	0.081	0.079	0.079
	[6.88]	[6.86]	[6.86]	[0.50]	[0.49]	[0.48]
Age (log)	-0.228***	-0.227***	-0.227***	-0.234***	-0.236***	-0.235***
	[7.42]	[7.40]	[7.39]	[5.46]	[5.48]	[5.48]
Constant	1.477***	1.475***	1.473***	1.608***	1.610***	1.609***
	[8.59]	[8.57]	[8.56]	[10.10]	[10.07]	[10.07]
Chi-square	198	208	208	57	64	66
No. of observations	12095	12095	12095	5265	5265	5265
p-value	0.00	0.00	0.00	0.00	0.00	0.00

This table presents the results of Random Effects Generalized Least Squares (GLS-RE) panel estimation for Models H1, H2 and H3. The dependent variable is the Q ratio and the regression is run on a subsample of only group affiliated firms in Panel A and on group level data in Panel B. In Panel A, Firm Q is [(Market value of Equity + Book value of Preference shares + Book value of Debt) / Total Assets], Firm Sales is the net total sales of the firm, Firm Depreciation/Sales (Depr/Sales) is the ratio of firm's depreciation expense to its net total sales, Firm Leverage is the ratio of firm's debt to total assets, and Firm Age is the number of years since incorporation of the firm. In Panel B, Group Q is the weighted average Firm Q (using firm market capitalisation as weights), Group Sales is the total net sales of all firms in the group, Group Depreciation/Sales is the weighted average Firm Depreciation/Sales using Firm Sales as weights, Group Leverage is the weighted average Firm Leverage using Firm Total Assets as weights and Group Age is the number of years since incorporation of the oldest firm in the group. ΔHI, ΔVI and R2 dummy variables are the same in both panels. ΔHI(ΔVI) is the annual change in the Horizontal(Vertical) Integration measure of a group. Regime2(R2) dummy takes a value of 0 for the pre-competition reform period (1990 to 2001) and a value of 1 for the post-competition reform period (2003 to 2012). Sales and Age are transformed into natural log forms on account of their wide dispersion and to control for possible heteroskedasticity. See Appendix-B for detailed variable definitions. Industry dummies are included in firm level regressions (Panel A). t-statistics presented in brackets are based on robust standard errors to correct for heteroskedasticity and adjusted for clustering at the firm level. All nominal variables are deflated using the Consumer Price Index (Year 2001=100) to remove the effect of inflation. *p<0.10 ; **p<0.05 ; ***p<0.01.

Table 8: Panel regression results: Models V1 to V3

(Dependent variable : Q ratio)

	Panel A: Firm level regressions						Panel B: Group level regressions					
DP measured by →	**KZI**			**WWI**			**KZI**			**WWI**		
Variable name	**V1**	**V2**	**V3**	**V1**	**V2**	**V3**	**V1**	**V2**	**V3**	**V1**	**V2**	**V3**
ΔDP	0.005***	0.008***	0.008***	0.516***	0.590***	0.560***	0.008**	0.016***	0.015***	0.497**	0.566**	0.556**
	[2.72]	[4.35]	[4.27]	[3.94]	[3.77]	[3.79]	[2.20]	[3.43]	[4.46]	[2.57]	[2.34]	[2.36]
ΔHI		-0.011	0.049		-0.032	0.030		-0.127	0.028		-0.136	-0.022
		[0.14]	[0.80]		[0.41]	[0.51]		[0.93]	[0.28]		[1.01]	[0.23]
ΔVI		0.525	1.067*		0.501	1.303**		1.184	2.746**		0.919	3.017***
		[1.24]	[1.71]		[1.22]	[2.19]		[1.50]	[2.50]		[1.22]	[2.88]
R2	0.162***	0.165***	0.165***	0.165***	0.166***	0.165***	0.225***	0.248***	0.252***	0.215***	0.241***	0.241***
	[6.61]	[6.23]	[6.23]	[6.97]	[6.47]	[6.42]	[5.48]	[5.38]	[5.48]	[5.46]	[5.42]	[5.43]
ΔDP * R2	0.002	0.000	0.000	0.026	0.322	0.331	-0.001	-0.006	-0.005	-0.376	-0.072	-0.143
	[0.78]	[0.12]	[0.16]	[0.13]	[1.27]	[1.34]	[0.20]	[1.12]	[1.05]	[1.27]	[0.18]	[0.37]
ΔDP * ΔHI		0.026			-1.841			0.112			-1.715	
		[1.05]			[1.45]			[1.64]			[1.04]	
ΔDP * ΔVI			0.004			11.300			0.691***			11.674
			[0.02]			[1.42]			[2.70]			[0.75]
ΔHI * R2		0.103			0.103			0.238			0.170	
		[0.87]			[0.89]			[1.26]			[0.91]	
ΔVI * R2			-0.861			-1.390*			-2.601			-3.396**
			[0.99]			[1.69]			[1.63]			[2.33]
ΔDP * ΔHI * R2		-0.022			2.924			-0.103			4.309*	
		[0.81]			[1.45]			[1.48]			[1.69]	
ΔDP * ΔVI * R2			-0.071			-7.616			-0.844***			-15.881
			[0.35]			[0.72]			[3.20]			[0.84]
Chi-square	233	224	225	272	247	254	69	96	130	79	76	82
No. of observations	12454	11366	11366	13122	11792	11792	5564	4687	4687	6142	5029	5029
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

This table presents the results of Random Effects Generalized Least Squares (GLS-RE) panel estimation for Models V1 to V3. The dependent variable is the Q ratio and the regression is run on a subsample of only group affiliated firms in Panel A and on group level data in Panel B. In Panel A, Firm Q is [(Market value of Equity + Book value of Preference shares + Book value of Debt) / Total Assets] and in Panel B, Group Q is the weighted average Firm Q (using firm market capitalisation as weights). DP stands for Deep Pockets of a group and is measured by 2 indices - KZ Inverse (KZI) and WW Inverse (WWI). In both Panels A and B, the first three columns present results using KZI and the next three columns present results using WWI. ΔDP, ΔHI, ΔVI and R2 dummy variables are the same in both panels. ΔDP is the annual change in the deep pockets measure of a group (KZI or WWI). ΔHI(ΔVI) is the annual change in the Horizontal(Vertical) Integration measure of a group. Regime2(R2) dummy takes a value of 0 for the pre-competition reform period (1990 to 2001) and a value of 1 for the post-competition reform period (2003 to 2012). Control variables and other aspects are the same as in Table 7. To save space, we have not reported the estimated coefficients on the control variables and the constant term. See Appendix-B for detailed variable definitions. *p<0.10 ; **p<0.05 ; ***p<0.01.