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INTEGRATION, DIVERSIFICATION STRATEGIES AND PERFORMANCE: EVIDENCE FROM INDIAN BUSINESS GROUPS

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Abstract: This paper analyses a longitudinal data sample of affiliated group-firms and unaffiliated standalone firms in India to understand the effect of corporate diversification strategies on performance. This paper finds the effect of different diversification strategies such as related (which includes horizontal and vertical integration strategies) and unrelated diversification on business group performance. The empirical analysis, in the context of developing institutions, suggests that performance of business groups has an upward quadratic relationship with group diversification and such a relationship is more due to related diversification strategies of business groups.

Keywords: Business group; Corporate diversification; Integration; Related diversification; Unrelated diversification; Institutional context

1. INTRODUCTION

Business groups are the dominant form of enterprise in most emerging markets. Diversified Business groups are often seen as organizational solutions to problems arising from market failure and inadequate institutional development. Leff (1978) describes business groups as institutional innovation for overcoming and reaping the benefits from imperfect markets in the less developed countries.

The institutional context of a country depends upon its development in product, labour and capital markets; its government regulatory and mechanism for contract enforcement (Khanna and Palepu (1997)). Business groups in emerging economies try to act as soft institutions in the product, labour and capital markets.

For example, in product market, diversified business groups in emerging economies substitute for intermediaries. They have advantage over other non-group companies in building up a credible brand because they can spread the cost of maintaining it across several lines of business. As cited by Khanna and Palepu (1997), the Korean *chaebols* are famous throughout the world for extending their group identity over multiple product categories.

Capital markets in emerging economies either lack the existence of institutional mechanisms such as financial reporting, dynamic community of analysts, venture capital firms, or are not reliable. An inadequate access to information refrain investors from investing in these enterprises. In such situations, business groups which are well established produce their old track records of returns and provide investors with relevant information to get access to capital markets. Diversified business groups also use their internal funds to invest in new lines of business and lend funds to other member firms to grow their business.

Business groups in emerging markets also substitute for labour market institutions. Diversified business groups create value by training their managers by having programs for internal management development and by collaborating with top business schools across the world. Business groups can spread the fixed costs of management development across the various businesses.

Business groups use their experience in dealing with the government regulatory. The contract enforcement law in emerging economies is also not efficient. By building a reputation of honesty and reliability over time, business groups gain the trust of investors.

Thus, business groups are often seen as organizational solutions to problems arising from market failure and inadequate institutional development in capital, labour, and product markets (Khanna and Palepu (1997), Leff (1978)). In emerging economies with missing and under-developed market institutions, integration strategies and diversification is necessary to secure access to intermediate products and services, leading to the emergence of business groups with diversified business portfolios.

The integrated and diversified portfolio constitutes the backbone of the internal market for sharing scarce resources across group-firms. However, the diversification strategies have costs as well as benefits. The benefits of diversification include mitigating underinvestment problem (Myers (1977)) by forming internal capital market (Stulz (1990)), co-insurance leading to greater debt capacity (Lewellen (1971)), economies of scale and scope leading to greater operational efficiency (Khanna and Palepu (2000a)), etc. Some of the costs of diversification include over-investment problem due to free cash flow (Stulz (1990), Berger and Ofek (1995)), cross-subsidization (Berger and Ofek (1995)), managerial risk aversion (Amihud and Lev (1981)), information asymmetry between managers and headquarters (Harris, Kriebel, and Raviv (1982)), strategic cost of diversification due to sub-optimal capital structure choices (Lyandres (2007)), etc.

The benefits associated with business group membership have been the focus of a number of empirical studies. One such study is by Khanna and Palepu (2000a). Using data on all non-group and group affiliated Indian private sector firms listed on the Bombay Stock Exchange (BSE) for the year 1993, they empirically test whether group affiliates creates or destroys value as compared to unaffiliated firms. They find that as group diversification increases, the performance of group affiliates declines relative to that of unaffiliated firms until the group reaches a threshold diversification level. Beyond this threshold, marginal increases in group diversification result in incremental performance improvements. They find that affiliates of the most diversified business groups outperform unaffiliated firms. They also find no evidence of a group discount when comparing group level performance with the performance of industry-matched unaffiliated firms.

Chang and Choi (1988) using a sample of 63 affiliated firms to Korean *chaebols* and 119 unaffiliated firms for the years 1975 and 1984 find that group affiliated firms show higher profits and higher efficiency compared to non- affiliated companies. They also find that affiliates of the largest four *chaebols* outperform other affiliates of smaller *chaebols* and unaffiliated firms.

Chang and Hong (2000) in their study of Korean *chaebols* try to find the source of benefits of group affiliation. They find that group affiliated firms benefit from group membership through sharing intangible and financial resources with other member firms.

Khanna and Rivkin (2001) studied the performance of group affiliated firms in 14 emerging markets. They find that group affiliates earn higher profits in six out of 14 countries and lower profits in three. Also they find no evidence of a diversification discount in 11 of the 14 countries they examine and find evidence of diversification premium. Thus, they find that group affiliation is beneficial in most of the emerging markets.

Khanna and Palepu (2000b) also studied the benefits of group affiliation as a function of institutional context using a longitudinal sample of business groups in Chile over years 1988-1996. They find that in the early years when institutions were less developed, affiliates of the most diversified business groups outperformed focussed unaffiliated firms. As institutions developed, the benefits of diversification reduced. Thus, they conclude that the evolution of institutional context alters the value creating potential of business groups.

This paper improves upon the paper by Khanna and Palepu (2000a) by studying a longitudinal sample of group-firms (firms affiliated to diversified business groups) and standalone firms (firms not affiliated to business group). We also intend to study the performance effects of related and unrelated diversification strategies

in the Indian context. The theories relating to organizational perspective (Hoskisson (1987)) suggest that related diversification strategies which include the integration strategies such as horizontal and vertical integration tends to benefit from economies of scope. The unrelated diversification strategy benefits from economic benefits of internal markets. We hypothesize that as markets develop, the benefits of related diversification will still be realized. However, the benefits of unrelated diversification reduces. In this paper, the effects of the two strategies on performance of group-firms and group performance is examined.

Section 2 discusses the framework to develop testable empirical implications. Section 3 discusses the empirical methodology and Section 4 presents the empirical findings. Section 5 concludes.

2. HYPOTHESIS DEVELOPMENT

As per the transaction costs theory, firms may adapt their strategies based on the institutional context they are in. Emerging markets like India have poorly functioning institutions, leading to severe agency and information problems. Business groups in these markets have the potential both to offer benefits to member firms, and to destroy value. The research question is to test if business group affiliation leads to better performance.

Hypothesis 1: Business group-firms perform better than standalone firms

Theories (Kim, Hoskisson, Tihanyi, and Hong (2004)) suggest that business groups emerge as a solution to external market failures by reducing the transaction costs of economic exchange and by employing mechanisms to create and exploit market power advantages that are largely unavailable to their more focussed counterparts. Diversified business groups act as proxy for the missing market intermediary institutions in capital, labour and product markets. They create value by substituting for the missing market intermediaries and spreading the costs of maintaining the various intermediaries across several lines of business. Thus, higher the group diversification, higher should be the performance of group-firms than standalone firms. However, another set of research (Berger and Ofek (1995)) (for US conglomerates) suggest that diversified firms may be inclined to over-invest in ways to support organizational inefficiencies. In such cases, diversification will not be advantageous.

Hypothesis 2: Performance of group-firms (above the standalone firms) increases with group diversification.

Research (Khanna and Palepu (2000a)) suggests a quadratic relationship between performance and diversification. Studies observe that highly diversified groups have the opportunity to exploit between - unit synergies, reduce risks, etc. thus creating more value than less diversified groups. Low diversified and medium diversified business groups do not have the management skills, internal processes or political connections to generate benefits from diversification (Khanna and Palepu (2000a)). The costs of formation of structures and agency costs of diversification are more than the benefits of diversification for low and medium diversified business groups.

Hypothesis 3: There exists a quadratic relationship between performance of business group-firms (or business groups) and group diversification.

The literature on organizational perspective suggest that related and unrelated diversification strategies aim at different economic benefits and impose conflicting organizational requirements on firms. Related diversified firms tend to realize economies of scope, which require a structure emphasizing cooperation among divisions. Coordination between divisions is necessary to realize economies of scope through transferring skills and sharing resources among divisions (Hoskisson, Hill, and Kim (1993)). Unrelated diversified firms realize the economic benefits from internal markets, which require the structure emphasizing competition among divisions. The inner working of business groups resembles a structure with more hierarchical control and coordination among legally independent firms.

In the absence of efficiently functioning external markets, business groups with diversified business portfolios provide advantages, above independent firms, by mobilizing financial and human resources across group-firms. In building and exploiting internal markets, unrelated diversification, as opposed to related

diversification, tends to lead to major benefits such as the ability to organize resources for new market entry and providing stability and flexibility in operating internal markets (Hoskisson *et al.* (1993)). However, as markets develop, the benefits of unrelated diversification tend to reduce. Rumelt (1974) argues that related diversification affects performance more positively than unrelated diversification because resources and skills can be used in related markets. Nayyar (1993) discusses that benefits from economies of scope and from a positive reputation in an existing business are available from related, but not from unrelated diversification. Berger and Ofek (1995) also find that the value loss from diversification for U.S. conglomerates is less for related diversification.

Hypothesis 4: Related diversification is more beneficial than unrelated diversification in business groups. Performance of business group-firms (over the standalone firms) increases more with related diversification than with unrelated diversification.

In order to test the quadratic relationship of performance and related and unrelated diversification, the following hypothesis is tested.

Hypothesis 5: Performance of business group-firms (over the standalone firms) has a quadratic relationship with related and unrelated measure of diversification.

The above hypotheses are tested with firm level as well as group level data. The next section discusses the empirical methodology used to test various hypotheses.

3. EMPIRICAL METHODOLOGY

3.1. Sample

A longitudinal sample of group-firm-years (firms affiliated to the business group) of data is used for this study. The sample consists of 197 listed firms affiliated to 48 business groups for the years 2001-2007 thus 1379 group-firm years of data and 336 group-years of data.

Data was obtained from the Prowess database.[1] Data for 6083 firms belonging to 3868 privately owned Indian business groups are available in Prowess. Out of which, 1368 firms belonging to 982 groups are listed on the Bombay Stock Exchange or the National Stock Exchange of India Ltd. After removing firms in the financial services sector, observations reduce to 1208 firms belonging to 518 business groups.

Business groups which have three or more firms affiliated to it are considered. The sample becomes 728 firms belonging to 173 business groups after removing business groups having less than three firms affiliated to it. After removing firms with unavailable data, the sample reduces to 197 firms belonging to 48 business groups for the years 2001-2007. The final sample consists of 1379 group-firm years of data and 336 group-years of data for the period 2001-2007.

Our sample also contains longitudinal data on 4522 firms not affiliated to any business group collected from Prowess for the year 2001-2007.

Year 2001 is chosen as the starting year of the analysis because of change in the corporate governance environment in India. Year 2008 onwards is not considered for analysis on account of economic recession.

3.2. Measures of variables

3.2.1. Performance Measures

Tobin's *q* (Firm Level)

Tobin's *q* measure is used as one of the performance measures of firm.

$$Tobin's\ q = \frac{Total\ Market\ Value\ of\ outstanding\ securities}{Total\ Replacement\ Cost\ of\ Net\ Assets} \quad (1)$$

The above definition of Tobin's *q* is taken from Lindenberg and Ross (1981). Total Market Value of outstanding securities is measured as the sum of the market values of its equity, debt and preferred stock. Market value of equity is calculated as the product of a firm's share price at the end of the year and the number of common stock shares outstanding, market value of preferred stock as well as debt is taken at their book values. Replacement Cost of Net Assets is taken as Total Book value of firm's Assets minus Current Liabilities. The denominator measures the firm's funded investment in fixed assets plus net working capital. The replacement cost of assets as suggested in Lindenberg and Ross (1981) is not calculated

but assumed that it equals the book value of assets minus current liabilities. Tobin's *q* is calculated for end of year.

***ROA* (Firm Level)**

ROA or Return on Assets is the accounting performance measure used. It is calculated as Profit After Tax as a percentage of Average of Total Assets. The measure is directly taken from Prowess database.

***MV/S* (Firm Level)**

Market Value to Sales is another performance measure considered. The ratio of Market value of outstanding securities to total sales of the firm is calculated.

Excess Value (Group Level)

$$EV = Ln\left(\frac{\sum_{j=1}^{n}\left(\frac{MV}{S}\right)\frac{S_j}{S}}{\sum_{j=1}^{n}\left(\frac{MV}{S}\right)_j\frac{S_j}{S}}\right) \qquad (2)$$

Excess Value is a measure of the relative value of firms in a business group as compared to a portfolio of standalone firms.[2] The portfolio of standalone firms is matched based on the same three digit NIC (National Industry Classification) Code of the firm in the business group. MV is the end of the year market value of assets of the firm, S is the sales of the firm[3], $\left(\frac{MV}{S}\right)_j$ is the sales weighted median market to sales ratio of a portfolio of standalone firms in the same three digit NIC industry as firm j. The above valuation approach follows that in Berger and Ofek (1995).

3.2.2. Diversification Measures

Herfindahl index of group size: (Group level)

$$Her\ findahl\ Index = 1 - \sum_{i=0}^{n} P_i^2 \qquad (3)$$

where P_i is the share of total sales of the group, $i = 1$ to n is the number of firms in the group. Berry (1971) and McVey (1972) independently propose and apply the Herfindahl index as a measure of corporate diversification. The variable can take values between zero and one. The closer it is to zero, the more concentrated are the group's sales within a few of its firms, and hence the more focused its operations. Herfindahl index is used here as a measure of group diversification.

Entropy measure of Diversification (Group level)

Entropy measure of diversification has three measures; Entropy measure of Total Diversification (DT); Entropy measure of Related Diversification (DR) and Entropy measure of Unrelated Diversification (DU). Jacquemin and Berry (1979) propose the Entropy measure of diversification.

Entropy measure of Total Diversification (Group level)

A group operating in n industry firms is considered. Let P_i be the share of *ith* firm in the total sales of the group. Then,

$$DT - \sum_{i-1}^{n} P_i\, Ln\left(\frac{1}{P_i}\right) \qquad (4)$$

Total diversification entropy measure is the weighted average of the shares of the firms, the weight for each segment being the logarithm (base e) of the inverse of the share. The measure thus takes into account the number of industry firms in which the group operates and the relative importance of each of the firm in the total sales of the group.

Entropy measure of Related Diversification (Group level)

Related diversification measures the degree of relatedness among the various firms in which a group operates. An industry group is defined as a set of related firms. Let n industry firms of a group aggregate into m industry groups ($n \geq m$). NIC classification codes are used to define industry firms and industry group. NIC Industries at two digit level are treated as the industry groups.NIC industries at four digit level are treated as industry firms. Let DR_j be defined as related diversification arising out of operating in several firms within an industry group j.

$$DR_j = \sum_{i-1}^{k} P_i^j \, Ln\left(\frac{1}{P_i^j}\right) \quad (5)$$

where *j* is the industry group. k is number of firms in the industry group and P_i^j is the share of segment i in group j in the total sales of the group.

The total related diversification entropy measure is:-

$$DR = \Sigma_{j=1}^{m} DR_j \, P^j \quad (6)$$

where P^j is the share of *jth* group sales in the total sales of the business group.

Entropy measure of Unrelated Diversification (Group level)

The measure of unrelated diversification arises out of operating across several industry groups. DU is defined as the weighted average of all the industry group shares.

$$DU = \sum_{j-1}^{m} P_j Ln\left(\frac{1}{P_j}\right) \quad (7)$$

where P_j is the share of *jth* industry group sales in the total sales of the business group. Also,

$$DT = DU + DR \quad (8)$$

3.2.3. Control Variables

Group size (Group level)

It is the logarithm to the base e of sum of sales of all firms in a group. It is used as a control variable in our analysis.

Firm Size (Firm level)

Logarithm to the base e of total assets of the firm or Logarithm to the base e of total sales of the firm is the measure of firm size.

Age of the firm (Firm Level)

Logarithm to the base e of the difference in year of study and incorporation year of the firm is taken as the measure of age of the firm.

4. EMPIRICAL FINDINGS

4.1. Descriptive Statistics

Table 1 provides the summary statistics of the firm level variables under study. All variables are winsorized at 1 and 99 percentiles of their distribution. A longitudinal sample of 5901 firm - years of data with 1379 group-firm (firms affiliated to the business group) years and 4522 non-group-firms (firms not affiliated to the business group also referred as standalone) of data is used. Group-firms are larger than standalone firms. The average total assets of group-firms is Rs. 7010.25 million while that of a standalone is Rs. 721.02 million. Group-firms have high levels of total sales and profits than standalone firms. Looking at the performance measures, Table 1 shows that Tobin's *q* median for group-firms is 0.95 as compared to that of standalone firms being 0.81. *ROA* for group-firms is also higher than that of standalone firms (median for group-firms is 4.05 percent and that of standalone firms being 0.81 percent). Table 1 also provides the statistics of group diversification variables and of group size.

Table 5 provides the summary statistics of group level variables. The median value of *Excess Value* is 0.8394 showing that the value of business groups over and above the industry matched portfolio of standalone firms is positive. The statistics of diversification measures is also provided. The median level of diversification (Herfindahl Index) is 0.4358. The statistics of the control variables like Group Size and Inverse of average q of group is provided in Table 5.

Table 2 provides the Pearson's correlation matrix for firm level variables under study.[4] The correlation matrix indicates the degree of linear relationship between two variables. An analysis of correlation matrix indicates that Diversification (Herfindahl Index) is positively (but not strongly) correlated with *ROA* (r = 0.115, 1 percent significance level) and with Tobin's *q* (r = 0.124, 1 percent significance level). This implies that an increase in diversification increases the performance of group-firms.

Table 6 provides the Pearson's correlation matrix for group level variables under study.[5] Table 6 shows that the two diversification measures are highly correlated (r = 0.969, 1 percent significance level). The correlation

Table 1
Summary Statistics of Firm level data

Tobin's *q* of a firm is defined as market value of outstanding securities to replacement cost of net assets. Market value of outstanding securities is sum of market value of equity calculated as product of firm's share price and number of common stock shares outstanding, market value of preferred stock taken as book value and market value of debt taken as book value of debt. The replacement cost of assets is taken as book value of total assets minus the current liabilities. Tobin's *q* (expressed as times) for the year is calculated as the end of period Tobin's *q*. The other performance measures are Return on Assets (*ROA*, expressed as %) and Market Value to Sales (*MV/S*, expressed as times). Herfindahl index is measured as $1-\Sigma_{i=0}^{n} P_i^2$ where P_i is the share of total sales of the group, i= 1 to n is the number of firms in the group. Entropy measure is calculated as $DT=\Sigma_{i=1}^{n} P_i Ln\left(\frac{1}{P_i}\right)$ where n is an industry firm defined at 4 digit NIC code and P_i be the share of *ith* firm in the total sales of the group. Entropy measure of related diversification is defined as $DR=\Sigma_{j=1}^{m} DR_j P^j$ where P^j is the share of *jth* industry group sales in the total sales of the business group, where $DR_j=\Sigma_{i=1}^{k} P_i^j Ln\left(\frac{1}{P_i^j}\right)$ with j as the industry group. k is number of firms in the industry group and P_i^j is the share of firm i in industry group j in the total sales of the industry group. An industry group is defined as a set of related firms. Let n industry firms of a group aggregate into m industry groups ($n \geq m$). NIC Industries at two digit level are treated as the industry groups. NIC industries at four digit level are treated as industry firms. Entropy measure of unrelated diversification is defined as the weighted average of all the industry group shares. $DU=\Sigma_{j=1}^{m} P_j Ln\left(\frac{1}{P_j}\right)$ where P_j is the share of *jth* industry group sales in the total sales of the business group. Group size is calculated as logarithm base e of sum of sales of all firms in the business group. The unit for Total Assets, Total Sales is million rupees. The unit for Return on Assets (*ROA*) is %. All data are for years 2001 to 2007.

Variable	*Statistic*	*All*	*Business Group*	*Standalone*
Total Assets	Mean	2190.75	7010.25	721.02
	Median	406.40	2163.90	287.00
	Stdev	8350.52	16196.52	1340.87
Total Sales	Mean	2014.44	6141.87	755.77
	Median	423.80	2057.70	290.35
	Stdev	6425.37	12186.44	1353.44
ROA	Mean	2.97	4.89	2.38
	Median	2.79	4.05	0.81
	Stdev	1.36	1.43	1.36
Tobin's *q*	Mean	1.24	1.48	1.17
	Median	0.84	0.95	0.81
	Stdev	1.36	1.43	1.32
MV/S	Mean	1.56	1.44	1.60
	Median	0.74	0.83	0.70
	Stdev	3.06	2.32	3.26
ln (Age)	Mean	3.05	3.43	2.93
	Median	2.94	3.40	2.89
	Stdev	0.57	0.59	0.51
ln (Assets)	Mean	6.19	7.65	5.75
	Median	6.01	7.68	5.66
	Stdev	1.54	1.56	1.22
Ln (Sales)	Mean	6.06	7.58	5.59
	Median	6.05	7.63	5.67
	Stdev	1.77	1.63	1.54

contd. table 1

Variable	*Statistic*	*All*	*Business Group*	*Standalone*
Herfindahl Index	Mean		0.42	
	Median		0.46	
	Stdev		0.21	
Entropy total	Mean		0.77	
	Median		0.75	
	Stdev		0.44	
Related Entropy	Mean		0.12	
	Median		0.00	
	Stdev		0.24	
Unrelated Entropy	Mean		0.65	
	Median		0.65	
	Stdev		0.41	
Ln(Group Size)	Mean		7.36	
	Median		7.39	
	Stdev		1.27	
Industries	Nos.	35	28	32
Sample Size	Nos.	5901	1379	4522

matrix also shows that *Excess Value* is positively related to Group size (r = 143, 5 percent significance level). Excess value is not very strongly and significantly correlated with the diversification measures.

4.2. Performance Measures by Group Diversification

For testing if performance measures are different based on diversification level of groups, our sample of 1379 group-firm years of data is divided into three sub samples based on level of group diversification. The group-firm is under lowest diversification category if it belongs to the group whose Herfindahl index of diversification is less than 25th percentile of its distribution. The group-firm is under intermediate diversification category if it belongs to the group whose Herfindahl index of diversification is between 25th percentile and 75th percentile of its distribution and group-firm is under highest diversification category if the Herfindahl index of the group it belongs to is greater than 75th percentile of its distribution. [6] A univariate test is performed (difference in means t-test) to find if performance in the three sub samples is different. Group-level sub-sampling is also done to test if the excess value measure for the three sub-samples is different.

Table 3 shows that Tobin's *q* for group-firms is different for the subsamples under lowest diversification and highest diversification with performance (Tobin's *q*) being more for group-firms under highest diversification category (1.4499 versus 1.7144, difference is significant at 1 percent level, t statistic of -2.3512 with t critical being 1.64). Results also show that the best performers (Tobin's *q*) are the group-firms under highest diversification category. This is followed by intermediate diversification category and lowest diversification category being at the same level. (There is no difference in performance statistically between group-firms under lowest and intermediate diversification categories).[7]

Results based on another performance measure, *ROA* (expressed as percentage) shows that highest diversification category group-firms are better performers than lowest diversification category group-firms. (5.4588 versus 6.4679, for lowest and highest diversification category respectively, difference is significant at 5 percent level, t statistic of -1.7378 with t critical being 1.64). The performance measures in Table 3 amongst highest, intermediate and lowest categories (based on diversification) show that group-firms under highest diversification category are best performers followed by lowest diversification category group-firms and the third position goes to group-firms under intermediate diversification category. [8] However, results based on *MV/S* measure show that group-firms under lowest diversification category are the best performers, with second best being the ones under highest diversification category followed by intermediate diversification category

Table 2
Correlation Matrix

Tobin's *q* of a firm is defined in Table 1. The other performance measures are Return on Assets (*ROA* expressed as %) and Market Value to Sales (*MV/S*, a ratio). For calculation of Herfindahl index and Entropy measures of diversification, refer to Table 1. Group size is calculated as logarithm base e of sum of sales of all firms in the business group. Firm size is calculated as log of total assets or log of total sales. Age measure is calculated as log of age. The unit for Total Assets, Total Sales is million rupees. All data are for years 2001 to 2007.

Variable	*Ln(age)*	*Ln(assets)*	*Ln(sales)*	*ROA*	*MV/S*	*Tobin's q*	*Herfindahl Index*	*Related Entropy*	*Unrelated Entropy*	*Total Entropy*	*Group Size*
Ln(age)	1.0000										
Ln(assets)	0.3808***	1.0000									
Ln(sales)	0.3772***	0.9003***	1.0000								
ROA	0.1657***	0.2022***	0.2726***	1.0000							
MV/S	0.0287	0.1267	-0.1454***	0.0831	1.0000						
Tobin's *q*	0.1731***	0.2539***	0.2624***	0.3500***	0.5408***	1.0000					
Herfindahl Index	0.3506***	0.4496***	0.4336***	0.1152***	0.0727	0.1237***	1.0000				
Related Entropy	0.1854***	0.2903***	0.2723***	0.0699	0.0884	0.0925	0.5860***	1.0000			
Unrelated Entropy	0.3458***	0.4339***	0.4224***	0.1280***	0.0700	0.1387	0.9733***	0.4824***	1.0000		
Total Entropy	0.3498***	0.4494***	0.4333***	0.1158***	0.0745	0.1260	0.9991	0.5968***	0.9744***	1.0000	
Group Size	0.3563***	0.5019***	0.4833***	0.1376***	0.0915	0.1469	0.9434	0.5760	0.9221***	0.9446***	1.0000

Note: *** is 1% significance, ** is 5% significance, * is 10% significance

Table 3
Performance Measures by Group Diversification

Tobin's *q* of the firm is one of the performance measures. Tobin's *q* of firm is defined as market value of outstanding securities to replacement cost of net assets. Market value of outstanding securities is sum of market value of equity calculated as product of firm's share price and number of common stock shares outstanding, market value of preferred stock taken as book value and market value of debt taken as book value of debt. The replacement cost of assets is taken as book value of total assets minus the current liabilities. The other measure is *ROA* (Return on Average Total Assets expressed as %) and *MV/S* (Market Value of assets of the firm to Sales of the firm). Excess value is calculated as $EV = Ln\left(\frac{\Sigma_{j=1}^{n}\left(\frac{MV}{S}\right)\frac{S_j}{S}}{\Sigma_{j=1}^{n}\left(\frac{MV}{S}\right)_j\frac{S_j}{S}}\right)$ where j=1 to n is the firms in the business group. MV is the end of the year market value of assets of the firm, S is the sales of the firm, $(\frac{MV}{S})_j$ is the sales weighted median market to sales ratio of portfolio of standalone firms in the same three digit NIC industry as firm j. The level of diversification is determined based on Herfindahl Index measure of Diversification. If Herfindahl index is less than 0.301 (25th percentile), corporate diversification is lowest, if more than 0.581 (75th percentile), corporate diversification is highest and if in between 0.301 and 0.581, the corporate diversification is intermediate. The values are the mean values of performance and difference are difference in mean values. All data are for period 2001-2007.

Performance Measures	*Lowest Diversification*	*Intermediate Diversification*	*Highest Diversification*	*Difference*
Tobin's *q* (Firm Level)	1.4499	1.3804		0.0695 [0.7586]
	1.4499		1.7144	-0.2645*** [-2.3512]
		1.3804	1.7144	-0.3341*** [-3.3851]
ROA **(Firm Level)**	5.4558	3.8229		1.6329*** [3.0971]
	5.4558		6.4679	-1.0120** [-1.7378]
		3.8229	6.4679	-2.6449*** [-5.0270]
MV/S **(Firm Level)**	1.8637	1.2005		0.6632*** [3.2973]
	1.8637		1.4998	0.3639** [1.7225]
		1.2005	1.4998	-0.2992*** [-2.6790]
Number of firms	347	689	343	
Excess Value **(Group Level)**	0.9867	0.8578		0.1289 [1.1665]
	0.9867		0.8872	0.0995 [0.8943]
		0.8578	0.8872	-0.0294 [-0.3845]
Number of groups	84	169	83	

Note: *** is 1% significance, ** is 5% significance, * is 10% significance, [ ] are the robust t statistics

Table 4
Effect of Group Diversification on Firm Performance

The dependent variable is performance measure are Return on Assets (*ROA*, expressed as %). For calculation of Herfindahl index and Entropy measures of diversification, refer to Table 1. Group size is calculated as logarithm base e of sum of sales of all firms in the business group. All data are for years 2001 to 2007.

	ROA 1	*ROA 2*	*ROA 3*	*ROA 4*	*ROA 5*	*ROA 6*	*ROA 7*
Constant	-0.9944	-.67742	-.6176	-.63085	-.61005	-.6251	-.5435
	[-0.53]	[-0.36]	[-0.33]	[-0.33]	[-0.32]	[-0.33]	[-0.29]
Group dummy	2.4159***	-1.4219	-.3299	-1.8161	.10408	-1.8826	-.3664
	[4.34]	[-0.68]	[-0.16]	[-0.85]	[0.05]	[-0.89]	[-0.17]
Group dummy X Herfindahl index		-2.2905	-10.3650**				
		[-1.44]	[-2.15]				
Group dummy X *Herfindahl index*^{2}			10.7314*				
			[1.84]				
Group dummy X En-tropy Total				-.7800	-5.115**		
				[-0.94]	[-2.18]		
Group dummy X *Entropy Total*^{2}					2.6605***		
					[2.04]		
Group dummy X Re-lated Entropy						-2.1480*	-.07151
						[-1.69]	[-0.02]
Group dummy X *Related Entropy*^{2}							-2.7009
							[-0.65]
Group dummy X Unre-lated Entropy						-.33647	-3.8494
						[-0.41]	[-1.57]
Group dummy X *Unrelated Entropy*^{2}							2.5235*
							[1.67]
Group size		.6653**	.6565**	.6702**	.5778*	.6613**	.5532*
		[2.27]	[2.25]	[2.18]	[1.89]	[2.17]	[1.72]
Log age	1.1298***	1.2007***	1.1912***	1.1884***	1.1828***	1.1642***	1.1643***
	[2.74]	[2.87]	[2.85]	[2.82]	[2.81]	[2.76]	[2.76]
Log of assets	-0.2637	-.33548*	-.3335*	-.3353*	-.3309*	-.3313*	-.3364*
	[-1.54]	[-1.89]	[-1.88]	[-1.89]	[-1.86]	[-1.87]	[-1.90]
Number of observations	5901	5901	5901	5901	5901	5901	5901
Wald Chisq	915.56	931.83	947.93	931.26	942.34	931.97	954.16
Industry dummies	3	3	3	3	3	3	3
Year dummies	3	3	3	3	3	3	3

Note: *** is 1% significance, ** is 5% significance, * is 10% significance

Table 5
Summary Statistics of Group level data

Excess value is calculated as $EV = Ln\left(\frac{\Sigma_{j=1}^{n}\left(\frac{MV}{S}\right)\frac{S_j}{S}}{\Sigma_{j=1}^{n}\left(\frac{MV}{S}\right)_j\frac{S_j}{S}}\right)$ where j=1 to n is the firms in the business group. MV is the end of the year market value of assets of the firm, S is the sales of the firm, $(\frac{MV}{S})_j$ is the sales weighted median market to sales ratio of portfolio of standalone firms in the same three digit NIC industry as firm j. Herfindahl index is a measure of corporate diversification and is measured as $1 - \Sigma_{i=0}^{n} P_i^2$ where P_i is the share of total sales of the group, i= 1 to n is the number of firms in the group. Entropy measure is also a measure of corporate diversification calculated as $DT = \Sigma_{i=1}^{n} P_i\, Ln\left(\frac{1}{P_i}\right)$ where n is an industry firm defined at 4 digit NIC code and P_i be the share of *ith* firm in the total sales of the group. Entropy measure of related diversification is defined as $DR = \Sigma_{j=1}^{m} DR_j\, P^j$ where P^j is the share of *jth* industry group sales in the total sales of the business group, where $DR_j = \Sigma_{i=1}^{k} P_i^j\, Ln\left(\frac{1}{P_i^j}\right)$ with j as the industry group. k is number of firms in the industry group and P_i^j is the share of firm i in industry group j in the total sales of the industry group. An industry group is defined as a set of related firms. Let n industry firms of a group aggregate into m industry groups ($n \geq m$). NIC Industries at two digit level are treated as the industry groups. NIC industries at four digit level are treated as industry firms. Entropy measure of unrelated diversification is defined as the weighted average of all the industry group shares. $DU = \Sigma_{j=1}^{m} P_j Ln\left(\frac{1}{P_j}\right)$

where P_j is the share of *jth* industry group sales in the total sales of the business group. Group size is calculated as logarithm base e of sum of sales of all firms in the business group. The data for this regression analysis are longitudinal data for all business groups, 336 group-years of data (48 business groups and 7 continuous years of data). Panel data fixed effects regression is performed with year fixed effects and group fixed effects. All data are for years 2001 to 2007.

Variable	*Mean*	*Median*	*Standard Deviation*	*Number of observations*
Excess Value	0.8973	0.8394	0.7076	336
Herfindahl Index of firm size	0.3861	0.4358	0.2105	336
Entropy total	0.6700	0.6812	0.3892	336
Related Entropy	0.0986	0.0000	0.2211	336
Unrelated Entropy	0.5745	0.6288	0.3786	336
Group Size	7.0552	7.1202	1.1724	336
Number of firms	4.1042	3.0000	2.2876	336

Table 6
Correlation Matrix of Group level variables

For calculation of Herfindahl index and Entropy measures of diversification, refer to Table 1. Group size is calculated as logarithm base e of sum of sales of all firms in the business group. Inverse of *qbar* is calculated as inverse of Group average Tobin's *q*. For Tobin's *q* calculation, refer to Table 1. All data are for years 2001 to 2007.

Variable	*Inverse qbar*	*Group Size*	*Herfindahl Index*	*Related Entropy*	*Unrelated Entropy*	*Total Entropy*	*Excess Value*
Inverse *qbar*	1.0000						
Group Size	-0.3389***	1.0000					
Herfindahl Index	-0.0401	0.1397	1.0000				
Related Entropy	0.0329	0.1938	0.1551***	1.0000			
Unrelated Entropy	-0.0852	0.0920	0.8422***	-0.2446***	1.0000		
Total Entropy	-0.0572	0.1562**	0.9687***	0.2042***	0.8537***	1.0000	
Excess Value	0.0115	0.1427**	0.0179	0.1869	0.0110	0.0248	1.0000

Note: *** is 1% significance, ** is 5% significance, * is 10% significance

Table 7
Effect of Diversification on Excess Value of Business groups

Excess value is calculated as $EV = Ln\left(\frac{\Sigma_{j=1}^{n}\left(\frac{MV}{S}\right)\frac{S_j}{S}}{\Sigma_{j=1}^{n}\left(\frac{MV}{S}\right)_j\frac{S_j}{S}}\right)$ where j=1 to n is the firms in the business group. MV is the end of the year market value of assets of the firm, S is the sales of the firm, $(\frac{MV}{S})_j$ is the sales weighted median market to sales ratio of portfolio of standalone firms in the same three digit NIC industry as firm j. Herfindahl index is a measure of corporate diversification and is measured as $1 - \Sigma_{i=0}^{n} P_i^2$ where P_i is the share of total sales of the group, i= 1 to n is the number of firms in the group. Entropy measure is also a measure of corporate diversification calculated as $DR = \Sigma_{j=1}^{m} DR_j P^j$ where n is an industry firm defined at 4 digit NIC code and P_i be the share of *ith* firm in the total sales of the group. Entropy measure of related diversification is defined aswhere P^j is the share of *jth* industry group sales in the total sales of the business group, where $DR_j = \Sigma_{i=1}^{k} P_i^j Ln\left(\frac{1}{P_i^j}\right)$ with j as the industry group. k is number of firms in the industry group and P_i^j is the share of firm i in industry group j in the total sales of the industry group. An industry group is defined as a set of related firms. Let n industry firms of a group aggregate into m industry groups ($n \geq m$). NIC Industries at two digit level are treated as the industry groups. NIC industries at four digit level are treated as industry firms. Entropy measure of unrelated diversification is defined as the weighted average of all the industry group shares. $DU = \Sigma_{j=1}^{m} P_j Ln\left(\frac{1}{P_j}\right)$ where P_j is the share of *jth* industry group sales in the total sales of the business group. The data for this regression analysis are longitudinal data for all business groups, 336 group-years of data (48 business groups and 7 continuous years of data). Panel data fixed effects regression is performed with year fixed effects and group fixed effects. All data are for years 2001 to 2007.

Excess Value is the dependent variable

	1	*2*	*3*	*4*	*5*	*6*
Herfindahl Index	-1.2951**			-3.4365**		
	[-2.05]			[-2.41]		
Herfindahl index²				2.8984		
				[1.6]		
Entropy total		-.7518*			-2.6892***	
		[-1.71]			[-3.07]	
Entropy total²					1.4651***	
					[2.64]	
Related Entropy			0.8025			-5.7984***
			[1.05]			[-3.55]
Related Entropy²						7.3589***
						[3.82]
Unrelated Entropy			-0.3142			-1.2433
			[-0.67]			[-1.19]
Unrelated Entropy²						.6282
						[1.00]
Group Size	-0.2320*	-.2479*	-.2722*	-.2621*	-.2808**	-.3820**
	[-1.67]	[-1.78]	[-1.78]	[-1.68]	[-2.02]	[-1.72]
R2	0.6495	0.6475	0.6486	0.6463	0.6524	0.6595
Number of observa-tions	336	336	336	336	336	336
Year dummies	3	3	3	3	3	3

Note: *** is 1% significance, ** is 5% significance, * is 10% significance, [ ] are the robust t statistics

firms.[9] All the above results suggest that the relation between diversification and performance is not linearly increasing.

Looking at the group-level measures of performance, result shows that excess value is not different for the three categories based on diversification levels.[10] However, looking at the difference in diversification levels between groups with positive excess value (Value more than a similar industry portfolio of standalone firms) and groups with negative excess value (Value less than a similar industry portfolio of standalone firms), we find that the mean level of diversification is more for groups with positive excess value and less for groups with negative excess value. (Difference in means is significant at 1 percent level for both measures of diversification Herfindahl Index of diversification and Entropy measure of diversification). In order to find the partial effect of diversification on performance, analysis should be performed using multivariate techniques controlling for various other variables that might affect performance. In the next section, we perform multivariate techniques.

4.3. Effect of Group Diversification on Firm Performance

To test the effect of diversification on firm performance, panel data random effects regressions are performed. Random effects regression is performed because the effect of time invariant variables on performance (such as group affiliation, etc.) were required to be found. Regressions are performed with measures of performance (Tobin's *q*, *ROA*, *MV/S*) as the dependent variable and group affiliation dummy, group diversification variables and control variables as independent variables. A panel of 5901 of firm-years of data with 1379 group-firm years of data and 4522 standalone firm years of data for the period 2001-2007 is used in our analysis.

Table 4 all columns are results with *ROA* of firm as the dependent variable. Table 4 Column 1 shows that *ROA* of group-firms is greater than that of standalone firms (the coefficient of group affiliation dummy is positive 2.4159 and significant at 1 percent level). The result suggests that group-firms perform better than standalone firms.

Theories (Khanna and Palepu (1997), Khanna and Palepu (2000a)) suggest that business group affiliated firms create value because they can economize on the transaction costs of economic exchange (forming intermediaries) by distributing the costs across various lines of business. Hence, diversification effect on performance should be positive. The diversification of standalone firms is assumed to be zero because group level of corporate diversification is considered. We find that the performance (*ROA*) of group-firms does not increase or decrease with group diversification (Table 4, Columns 2 and 4 show that the coefficient on the interaction of group dummy with measure of group diversification (Herfindahl measure and Entropy measure respectively) is negative but not statistically significant).

Studies (like Khanna and Palepu (2000a)) also suggest that the relation between performance and group diversification is quadratic. We find that *ROA* (Table 4, Columns 3 and 5) reduces with the level of diversification measure (Herfindahl index and Entropy measure respectively) and increases with its squared term (*Herfindahl index*^{2} and *Entropy*^{2}). *ROA* (Table 4, Columns 3 and 5) has a quadratic relationship with diversification measures (coefficient of the linear diversification term is -10.3650 and significant at 5 percent level for Herfindahl index and -5.115 and significant at 5 percent level for Entropy measure of diversification, the coefficient for squared diversification term is 10.7314 and significant at 10 percent level for squared Herfindahl index and 2.6605 and 1 percent significant for squared Entropy measure of diversification). The threshold value beyond which performance increases with diversification is 0.4829 for Herfindahl Index of diversification (around 44 percentile of the group-firms belong to groups with more than the threshold value of group diversification) and 0.9613 for Entropy measure of diversification (around 30 percentile of the group-firms belong to groups with more than the threshold value of group diversification). Our results are similar to what Khanna and Palepu (2000a) found in his study for Indian group-firms.

We divide the entropy measure of diversification into related diversification and unrelated diversification measures. Table 4, Columns 6 and 7 show that the performance of group-firms (above the standalone firms)

reduces with related diversification (Column 6, the coefficient of related diversified dummy interaction variable is negative -2.1480 and significant at 10 percent level). Results show that related diversification is not beneficial to the business group. The results also show that performance does not depend on unrelated diversification of group-firms in a business group (Column 7, the coefficient on interaction of group dummy with unrelated diversification is insignificant). When, squared terms of related and unrelated diversification are included, results show that performance of group-firms (over and above the standalone firms) increases with squared term of unrelated diversification. The result suggests that after a threshold level of unrelated diversification, the performance of group-firms (over the standalone firms) increases with unrelated measure of diversification.[11] The results of this study suggests that the costs of diversification increase with increase in diversification and are more than the payoffs from intermediation (filling institutional voids) until a threshold level of diversification is reached. Beyond this threshold level of diversification, the payoffs from intermediation start increasing and offsetting the net costs of diversification.

The analysis with group level measure of performance as the dependent variable is performed in the next section.

4.4. Effect of Diversification on Excess Value of Business Groups

We test group level data to find the effect of diversification on Group performance (measured here as *Excess Value*). We perform panel data fixed effects regression with group and time fixed effects. The dependent variable is *Excess Value* of business group and independent variables are diversification measures and group size.[12] Table 7, Columns 1 and 2 test the direct effects of diversification on *Excess Value*. We find that *Excess Value* decreases with increase in group diversification (coefficient of the linear diversification term is -1.2951 and significant at 1 percent level for Herfindahl index and -0.7581 and significant at 10 percent level for Entropy measure of diversification). We also divide our entropy measure of diversification into related diversification and unrelated diversification. Table 7, Column 3 tests the direct effects of related and unrelated diversification. We find that the performance of groups (over a matched portfolio of standalone firms) does not depend on related and unrelated diversification.

Table 7, Columns 4, 5 and 6 test the direct and quadratic effect of diversification on excess value of the group. Column 4 shows that excess value decreases with Herfindahl index of diversification and increases (but not significantly) with squared term of Herfindahl index of diversification (coefficient of the linear diversification term is -3.44 and significant at 1 percent level for Herfindahl index, the coefficient for squared diversification term is 2.898 and not significant at 10 percent level for squared Herfindahl index). Column 5 shows that excess value decreases with entropy measure of diversification and increases with its quadratic term (coefficient of the linear diversification term is -2.69 and significant at 1 percent level for Entropy measure, the coefficient for squared diversification term is 1.465 and significant at 1 percent level for squared Entropy measure). The threshold level of diversification based on entropy measure is 0.9175 and more than 23 percentile of business groups have diversification levels more than the threshold value. The results are similar to Khanna and Palepu (2000a) results. Performance of business groups first decreases with diversification and then increases with diversification. Performance has a quadratic relationship with diversification. Column 6 result shows that performance of groups (over a matched portfolio of standalone firms) first decreases with related diversification (coefficient on linear term is -5.79 and significant at 1 percent level) and then increases beyond a threshold value of related diversification (the threshold value is 0.388 and 10 percentile of groups have related diversification higher than the threshold value). The relationship of group diversification is quadratic with unrelated diversification but the results are not significant.

5. CONCLUSION

This paper empirically tested the benefits of group affiliation over the standalone firms. The results confirm that overall group affiliation is beneficial. However, the benefits depend on level of corporate group diversification and type of diversification strategy. The

results suggest a quadratic relationship between performance of business groups (above standalone firms) and group diversification. Results show that related diversification strategies of business groups are more beneficial than unrelated diversification strategies. As institutions develop, the benefits associated with coordination activities through horizontal and vertical integration are more pronounced than the benefits associated with competitive activities of internal capital markets created by unrelated diversification strategy.

NOTES

1. Prowess is a database product of Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE). A number of studies on Indian industry have used data available from the Prowess database, maintained by CMIE. (see Khanna and Palepu (2000a), Gopalan, Nanda, and Seru (2007), etc.)
2. Log transformation is used to reduce the skewness of the distribution of excess value variable. The numerator is a weighted average of *MV/S* of all firms in the group (and not simple average) because individual firms contribution to composite *MV/S* for a group will be different and we assume it will depend on size of the firm compared to the group.
3. *Excess Value* is computed using a methodology that does not rely on the use of Tobin's *q*. This measure is preferred to a composite measure created by *ROA* because it is less likely to be affected by strategic reporting. The same approach was followed in Rajan, Servaes, and Zingales (2000).
4. The sample of 5901 firm years of data is assumed to be an independently pooled cross-sectional data for the formation of correlation matrix.
5. The sample of 336 group years of data is assumed to be an independently pooled cross-sectional data for the formation of correlation matrix.
6. Classification based on 25th and 75th percentile of Entropy measure of diversification is also made.
7. Results with classification made based on percentiles of Entropy measure of diversification gives similar results.
8. Results with classification made based on percentiles of Entropy measure of diversification finds no difference in performance levels between group-firms under highest diversification category and lowest diversification category, but are higher than group-firms under intermediate diversification category. Results are similar with classification made based on 33rd and 67th percentile of distribution of diversification variables.
9. Results with classification made based on percentiles of Entropy measure of diversification gives similar results.
10. Results with classification made based on percentiles of Entropy measure of diversification gives similar results.
11. The analysis is also done with Tobin's *q* as the dependent variable. The result can be provided on request. The result shows that performance of business group-firms (over and above the standalone firms) decreases with related diversification and unrelated diversification and increases with their squared terms. Performance decreases with related and unrelated diversification, and beyond a threshold value it increases with related and unrelated diversification. The results obtained are different from inverted 'U' shape between performance-diversification which Palich, Cardinal, and Miller (2000) study suggests. The results of Palich et al. (2000) study provide a relationship between diversification and firm performance for mostly conglomerates without the business group structure. For conglomerates (with no business group structure), the organizational costs (such as agency costs between Headquarters and divisional managers) increase with increase in diversification. However, such might not be the case with business group structure as most group-firms are headed by managers belonging to the controlling family acting as Headquarters.
11. Regressions are also performed with Institutional holdings in group-firms as additional control variable. The results remain the same as in Table 7 even with additional controls.

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