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## **Industrial Diversification and Shareholders' Value in China: The Case of Shanghai Listed Manufacturing Firms**

Henk von Eije\* and Jiong Jin\*\*

*The fast growing economy and institutional and economic reforms made the Chinese equity markets the third largest in Asia. This leads to strategies of industrial diversification within Chinese firms. Financial theory suggests that industrial diversification may have advantages in emerging markets, because conglomerates are better able to cope with market imperfections than focused firms. Moreover, diversification through investing in many shares may be costly in imperfect markets. Negative effects of diversification can be found if hubris generates too large take-over premiums or if managers consume perks related to company size. Also tunneling and propping may reduce company value. We show that Chinese diversified firms are underperforming in comparison to focused firms. The potential positive effects of industrial diversification are thus smaller than the negative effects. Besides the aforementioned aspects, myopic shareholders, management history and inadequate regulation of shareholders' interest may have contributed to the current negative diversification effects in China.*

**Keywords:** industrial diversification, firm value, panel study, China, Shanghai Stock Exchange

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### **Introduction**

In the last two decades much research has been devoted to the value effects of corporate industrial diversification. Many authors focus on US firms and find a diversification discount (Lang and Stulz, 1994; Berger and Ofek, 1995; Servaes 1996; Denis, Denis and Yost, 2002). More recently, industrial diversification is

also studied in other developed countries (Barnes and Brown, 2003; Fleming, Oliver and Skourakis, 2001) as well as in developing countries (Khanna and Palepu, 2000; Lins and Servaes, 2002; Fauver, Houston and Naranjo, 2003). The evidence of the latter studies is mixed due to differences in development and institutional context. Until now, no research is available on corporate industrial

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diversification (from now on also indicated with “diversification”) and its impact on the value of Chinese firms.

With the fast growing economy the equity markets of mainland China became the third largest in Asia after Japan and Hong-Kong. The development of these stock markets was further assisted by significant institutional and economic reforms. These developments made company managers to feel the need to cope with economic growth by increasing company size. Moreover, managers of listed firms became free to make decisions independently from the government and therefore they may have considered the need to reap the benefits of economies of scope and size. Finally, the economic reforms also induced laws that aimed at restructuring the ownership of firms. These developments made many Chinese firms to begin to diversify and to enter into mergers and acquisitions.

In these circumstances, two counteracting effects of diversification may be relevant. On the one hand investors may be harmed if the managerial bureaucracy destroys value, if managers become entrenched within larger corporations or if majority shareholders use techniques of propping and tunneling. On the other hand, value may be created if a conglomerate would be the best organizational form for coping with the imperfect markets in the emerging Chinese economy. For these reasons it is relevant to study whether or not the diversification strategies of Chinese firms adds value to the investors. This paper investigates this issue for Shanghai-listed manufacturing firms.

In our paper we find significant increases in diversification in a very short period of time (between 2001 and 2003). This is the case if we take the originally listed firms in account, but also if we include the newly listed firms. We, moreover, find that diversified firms have

significantly lower medians for Tobin’s  $q$  as well as a lower market to book value of equity. Panel regressions that take into account various controlling variables show that diversification influences firm value negatively. Finally, robustness checks that use alternative measures of diversification and alternative estimation techniques all find a negative (and quite often a significant) sign for diversification. These findings imply that conglomerate advantages -expected to exist in emerging markets- do not outweigh the disadvantages connected to diversification in China.

The paper is organized as follows. Section 2 presents the theoretical and empirical background. Section 3 summarizes the institutional background and the most important characteristics of the Chinese equity markets for our research. Section 4 describes the data, the diversification and performance measures, and the methodology. Section 5 presents the empirical results and section 6 concludes the paper and discusses possible reasons for our findings.

## Literature Review

### Theoretical and Empirical Background

Literature gives various reasons, why a strategy of diversification benefits shareholders. Firstly, modern portfolio theory based on Markowitz (1952) suggests that a diversifying conglomerate may assist investors in reducing total risk. However, further developments in risk theory (Sharpe 1964) stress that shareholders can diversify their portfolio themselves: they need no help from companies and the formation of a conglomerate does not add value to the shareholders. The question may, however, be posed whether investors in China really do have adequate possibilities for diversification. If that is not the case,

diversifying firms may add value and may be higher priced.

Secondly, conglomerates will generally be larger than firms that are not diversified. The conglomerates may therefore benefit from market power (Bernheim and Winston 1990). If this is an important factor in China, diversification and the concomitant increase in size, may benefit shareholders.

Thirdly, conglomerate financing and the internal reallocating of money across subsidiaries may have benefits. Stein (1997) proposes that a corporate headquarters may be better than an outside bank in finding winning investment opportunities. Scharfstein (1998), however, finds evidence that divisions in high potential industries tend to invest less than their stand-alone industry peers, while the reverse is true for many low potential divisions of conglomerates. Also Shin and Stulz (1996), Rajan, Servaes and Zingales (2000), and Scharfstein and Stein (2000) find that the conglomerate bureaucracy fails to allocate more funds to divisions in industries with better investment opportunities.

A fourth benefit is in particular applicable to emerging markets. In imperfect markets, like those of China, diversification can help companies to increase value (Morck and Yeung 1991; Klein 2001). Khanna and Palepu (1997; 2000) argue that the institutional context of emerging markets gives diversified groups the potential to add value. In emerging markets, the product, capital

and labor markets are rather weak and the mechanisms of market regulation are absent or ineffective. Fauver, Houston and Naranjo (2003) find evidence that the value of diversification is negatively related to the level of capital market development and international integration.<sup>1,2</sup>

There are, however, also theoretical disadvantages of diversification. A major reason is offered by agency theory. Management may prefer to control a larger company, even if diversification reduces shareholders' value (Denis, Denis and Sarin, 1997). This becomes more important if managerial remuneration is related to firm size (Jensen and Murphy, 1990; Cordeiro and Veliyath, 2003). Furthermore, Montgomery (1994) and May (1995) agree that managers try to diversify a firm in order to reduce their own employment risk. It is therefore not amazing that Desai and Jain (1999) and Megginson, Morgan, and Nail (2004) find that mergers in related industries show better long-run performance than focus-decreasing mergers.<sup>3</sup>

A further negative effect of diversification may arise from disparities of interests between major shareholders and minority shareholders. Majority shareholders and/or block shareholders may benefit from tunneling or propping. Tunneling means that majority shareholders siphon company profits to companies in which they have even larger stakes. Propping means that companies in distress are aided by their majority owners,

<sup>1</sup> The relevance of the stage of development can be observed from historical analysis too. Baker (1992), for instance, reveals that the formation of the Beatrice conglomerate increased value in the beginning of the 20<sup>th</sup> century, but that agency costs made it worthwhile to split conglomerate later. Increasing value by splitting conglomerates is, however, not easily realized in less developed financial and labor markets.

<sup>2</sup> In contrast, Lins and Servaes (2002) conclude that the benefits of diversification are not enough to offset the substantial agency costs in emerging markets: the benefits of diversification in developing countries would not differ from the empirical results found in developed countries. For such countries Lang and Stulz (1994), Capozza and Seguin (1997) and Servaes (1996) find that diversified firms tend to have a lower Tobin's q, while also Berger and Ofek (1995), Rajan, Servaes, and Zingales (2000), Denis, Denis, and Yost (2002) and Lamont and Polk (2000) reach the conclusion that diversification destroys value.

but only in return for rewards that benefit these majority owners more. Such practices may not be prohibited if corporate or country governance is relatively weak. It is therefore not amazing to observe such practices in the Chinese context (Jiang, Lee and Yue 2008; Jian and Wong 2003; Jian and Wong forthcoming).

Although the empirical literature is thus not fully conclusive, theoretical and empirical studies suggest that diversification negatively affects firm value in developed countries. However, it may increase value in emerging markets if agency costs and tunneling and propping are of minor importance. Therefore, it may be useful to study what is relevant for the large, expanding and structurally changing manufacturing sector in China.

### **Institutional Background**

There are some unique features of the Chinese equity market and publicly traded Chinese firms (see also: Qi, Wu and Zhang 2000). We focus here at the issues that are relevant for our research. Firstly, the fast growth the stock markets of mainland China and the institutional and economic reforms made company managers to feel the need to cope with economic growth. Fast company growth can be achieved quickly by mergers and acquisitions. Because managers of listed firms became relatively free to make decisions independently they –again- considered to

reap the benefits of economies of scope and size by mergers and acquisitions. Finally, the economic reforms also induced laws that aimed at restructuring the ownership of firms. These developments made many Chinese firms to begin to diversify and to enter into mergers and acquisitions. In such a situation, it is likely that some decisions are made too fast. With respect to mergers and acquisitions managers may have been motivated by hubris (Roll 1986) and they may have paid too much for the targets, while also the post merger restructuring costs may rosily have been evaluated as small.

Secondly, there are two types of shares: tradable and non-tradable. Although Chinese firms are undergoing the process of privatization, many of the listed companies are still dominated by the state. Among all the listed firms on the Shanghai Stock Exchange (SSE) about 60% of the total shares are non-tradable and held by the state, local governments or state-owned institutions. Under government ownership managers are hired to operate firms on behalf of the people. This may, first result in priorities different from those of the shareholders. Clarke (2003), for example, suggests that the government officials take urban employment levels and politically motivated job placements also in consideration.<sup>4</sup> Second, ownership by the people is a concept that might result in weak control. Under weak governance, managers may not be monitored adequately to pursue good performance. Moreover,

<sup>3</sup> There are also researchers who consider that diversification itself does not destroy value. Campa and Kedia (2002) and Mudambi (1999), for example, relate the measured value loss to the low quality of firms that participate in a conglomerate. Maksimovic and Phillips (2002) think that conglomerates invest in industries that do not have the highest productivity. Graham, Lemmon, and Wolf (2002) find that a firm loses value by acquiring an already discounted unit, but that excess value is not reduced when a firm increases its number of business segments without making an acquisition. Lang and Stulz (1994) support the finding that diversifying firms performed poorly already in the period before they diversified and they think that firms diversify because they have exhausted growth opportunities in existing activities. Evidence also shows that firms with poorer performance tend to follow a diversification strategy (Burch, Nanda, and Narayanan, 2000). Finally, Villalonga (2004) suggests that the diversification discount is just an artificial result from the measurement of segment or industry data and that with alternative databases researchers would find a significant diversification premium, especially in related diversifications.

managers, or their hidden bosses, namely the party representatives or party dominated holding companies, may satisfy their own self-interests by implementing a diversification strategy at the expense of shareholders' value. Corporate losses might also ultimately be met by the national financial budget,<sup>5</sup> while profits may be tunneled away from the shareholders (Morck, Yeung and Zhao 2005; Jian and Wong 2003; Jiang, Lee and Yue 2008). Therefore, it is essential to control for government ownership concentration when examining the value of diversification.

Thirdly, there are several types of traded shares of Chinese firms: A-shares, B-shares, C-shares, H-shares, N-shares and L-shares. A-shares are issued to domestic investors and are denominated and payable in the Chinese currency (Renminbi or Yuan). B-shares are payable in foreign currencies (US dollars on the Shanghai Stock Exchange and Hong-Kong dollars on the Shenzhen stock exchange, respectively). B-shares are mainly for foreign investors. C-shares are shares held by the Chinese state-owned companies. H-shares, N-shares and L-shares are listed at the Hong-Kong, New York and London Stock Exchanges respectively. A-shares prevail and more than 90% of total listed firms issue A-shares. However, firms that issue B or H-shares are considered to be more prestigious by investors. In the empirical part we will take care of -in particular- the B-shares.

Fourthly, several industries, such as energy, utilities, petrochemicals, transportation and communications, are

state-monopolies and highly protected. The protected firms are often subsidized. Unlike in many other countries, the Chinese government determines which companies should be privatized and listed (Karmel 1996). To some extent, state owned enterprises in the protected sectors seem to be the more favored for a listing, probably because these firms operate under direct supervision of the state council (Aharony, Lee and Wong 2000). In our empirical research we will exclude protected sectors.

Fifthly, the equity market may still be characterized as immature in comparison to the large advanced stock markets of the world. Empirical evidence, nevertheless, suggests that the Chinese equity market is weak form efficient (Long, Paine and Feng 1999; Lima and Tabak 2004) and we therefore do not hesitate to use stock market data.

Sixthly, the China Securities Regulatory Commission (CSRC) instituted various policies and laws to standardize accounting information. This means that we are able to use the financial accounting information of companies, especially if the companies are listed at the stock exchange.

Seventhly, in recent years, the CSRC has released a series of laws with the aim of restructuring the ownership of firms. Restructuring, mergers and acquisitions all tend to be more popular than ever. This suggests that we might expect differences in diversification between Chinese firms and within firms over time and that our research is not futile.

Eighthly, new regulation may be immature in the beginning and in China

<sup>4</sup> These issues are not easily measured and trade-offs are therefore also difficult to assess by supervisors. Negative effects of state ownership on performance are also indirectly corroborated by Kato and Long (2005), who find that even in listed companies CEO turnover is linked negatively to firm performance only if ownership is shifted from the state to private parties.

<sup>5</sup> It may, however, be doubted whether soft budget constraints are really that relevant in China. Already in 1998 Gao and Schaffer (1998) indicate that budgetary subsidies have fallen, that firms amongst each other also use hard budget constraints and that tax arrears are not an important source of financing in Chinese firms. They, however, also find that Chinese banks do provide poorly performing firms with new financing easily.

it is also influenced by managers of the state-owned enterprises. Clarke (2003) for example suggests that the state-sector and its interests are hijacking to the company law system, in stead of making the enterprises more efficient. As regulation is important for a good functioning of stock markets, one may wonder if such regulations also take the interests of shareholders, and in particular minority shareholders, adequately into account.

Finally, because of high levels of information asymmetry between firms and investors (see also: Ba 2004), firms may seek abnormal returns in the stock market in the short run by releasing news of mergers, acquisitions and other corporate strategic actions (Lam and Du 2004). As we are mainly interested in the long-run economic meaning of diversification, we do not apply an event study, but study the companies on an annual basis and we also take a "cooling period" into account by linking lagged diversification to current performance.

## Methodology

### Sample, Measures and Control Variables

As indicated in the previous section, we eliminate protected sectors from our sample. Moreover, firms in financial services, construction industries and commercial industries are eliminated because of differences in financial accounting requirements. This leaves us with the manufacturing firms. We use publicly listed firms because of data availability and data reliability. We use the period of 2001-2003, as it is the most recent period for which the data were

available at the time of writing. We start in 2001, because for earlier years less company data are available. We choose the firms listed at the Shanghai Stock Exchange (SSE).<sup>6</sup>

From the Worldscope database we select firms in which the manufacturing segments generate at least 10% of sales revenue. Manufacturing industries are defined by SIC codes in the range of 1000-1499 and 2000-3999. To be comparable, we require that all firms were listed at the SSE at the end of 2001. This gives us 373 firms. As we require all key data, such as market value of common equity and sales in individual segments, to be available, we ultimately are left with a sample of 328 firms and 942 firm-years. In this sample, 56% of the 328 manufacturing firms have shares held by the government, with ownership percentages ranging from 1% to 88%.

### *Diversification Measures*

Worldscope assigns the SIC code to each firm based on the description of the firm's product range or business areas. We require that a reported segment should account for at least 1% of the total sales; otherwise, the segment is ignored and its sales are then added to the dominant segment. Furthermore, we classify industrial segments based on 3-digit SIC codes and define a firm to be focused if its dominant segment accounts for more than 90% of total sales; otherwise, the firm is classified as diversified.

Different measures of diversification for individual firms are available, like the number of industrial segments, the sales-based redefined Herfindahl index and the sales-based Entropy measure. The number of industrial segments used here is based on

<sup>6</sup> The SSE was established in 1990 and is with the Shenzhen stock exchange –and of course Hong Kong– a major equity market in China. At the end of 2003, there were 807 companies listed at the SSE.

Table 1. Descriptive Statistics of Diversification Measures for the Original Sample of 2001-2003 and for all Listed Firms as well as the Changes Over Time

	Years			Change over time	
	2001	2002	2003	2002-2001	2003-2001
<b>For the original 287 firms of 2001</b>					
Total number of firms	287	287	287	0	0
Number of diversified firms	130	139	145	9	15
Percentage diversified firms	45.3	48.4	50.5	3.1	5.2
Mean number of segments	1.875	1.983	2.094	0.108***	0.220***
Mean RH index	0.208	0.223	0.23	0.014*	0.022**
Mean entropy measure	0.349	0.376	0.395	0.028**	0.046**
<b>All firms</b>					
Total number of firms	287	327	328	40	41
Number of diversified firms	130	174	178	24	48
Percentage diversified firms	45.3	53.2	54.3	7.9	9.0
Mean number of segments	1.875	2.092	2.186	0.217**	0.311***
Mean RH index	0.208	0.248	0.25	0.039*	0.042**
Mean entropy measure	0.349	0.419	0.43	0.070**	0.081**

\*\*\*, \*\*, \* denotes significance at the 0.01, 0.05 and 0.10 level based on a t-test (for the original 287 firms of 2001 based on a matched pairs test). The number of segments is based on a 3 digit industry code. The RH index represents the redefined Herfindahl index:  $RH = (1 - \sum P_i^2)$  and the entropy measure is defined as  $E = \sum P_i \cdot \ln(1/P_i)$  with  $P_i$  the weight of the sales in industry  $i$ .

a 3-digit SIC code. The Herfindahl index and the Entropy measure are both based on the weight ( $P_i$ ) of the sales of segment  $i$  in the total sales of the firm. We redefine the Herfindahl index as  $RH = (1 - \sum P_i^2)$  to make it proportional to increasing diversification. The entropy measure ( $E$ ) proposed by Jacquemin and Berry (1979) that weights each segment  $i$ 's sales ( $P_i$ ), by the natural logarithm of  $1/P_i$  is also used and this gives:  $E = \sum P_i \cdot \ln(1/P_i)$ . The minimum value of  $H$  equals zero if a firm is fully focused and the maximum value of  $H$  equals 1. The minimum value of  $E$  equals zero if a firm is fully focused, but  $E$  is not bounded from above.

It proves that 482 of the 942 firm years (51.2%) are in more than one business segment. The mean number of industrial segments is 2.058 overall and 3.068 among the 482 diversified firm-years. The mean sales-based redefined Herfindahl index

is 0.237 overall and 0.463 among the diversified firm-years, while the Entropy mean is 0.402 overall and 0.784 among the diversified firm-years. Table 1 shows that there is a diversification trend among Chinese firms.

In the period 2001 – 2003 all measures of diversification increase significantly. This is the case for the firms that were already listed in 2001 as well as if newly listed firms are included. From such significant changes over a period of only two years, we can conclude that the Chinese manufacturing firms diversified rapidly.

### Performance Measures

Many researchers calculate an industry adjusted excess value or an industry adjusted Tobin's  $q$ .<sup>7</sup> In our sample we are unable to adjust each firm for the value

<sup>7</sup>Details of the methods used to calculate excess value and Tobin's  $q$  can be found with Berger and Ofek (1995) and Lindenberg and Ross (1981).

<sup>8</sup>By using the panel study technique with fixed effects, we correct amongst others for the absence of the industry corrections.



of its industry composition because of the limited number of focused firms in several industries (even at a 2-digit level).<sup>8</sup> We, therefore, use a proxy for Tobin's  $q$  like Capozza and Seguin (1997), Khanna and Palepu (2000) and Villalonga (2004). The numerator of that proxy is the market value of total capital, calculated as market value of common equity plus book value of preferred equity and book value of debt. The denominator is the book value of total assets. The market value of common equity equals the year-end closing stock prices multiplied by the number of outstanding shares. This proxy for Tobin's  $q$  is assumed to incorporate the capitalized value of the benefits and disadvantages of diversification (Lang and Stulz, 1994). Another performance measure is the ratio of market value of common equity to the book value of common equity (MTB). This ratio excludes the effect of debt and examines the diversification impact only on shareholders' value.

However, when we examine the proxy for Tobin's  $q$  and the MTB in our primary data, we find abnormally high values for some firms. We correct these values by taking the natural logarithm of both the proxy  $q$  and the MTB. This transformation improved the properties of the distribution and the Bera-Jarque statistic (Brooks, 2003).

### *Control Variables and Related Theory*

Much of the literature argues that firm specific characteristics may affect the impact of diversification on value. The most important variables are related to market power, profitability, company quality and financial leverage.

Diversification in developing countries may be searched because of market power.

It is then wise to separate the impact of diversification from that of market power. We used the natural logarithm of firm's total assets as a proxy for firm size (LNF). Berger and Ofek (1995), Denis, Denis and Yost (2002), Campa and Kedia (2002) and Lins and Servaes (2002) also use this variable. All of these authors find the expected positive sign for this variable.

As indicated in section 3, government ownership is an important characteristic of many Chinese firms. We assumed that government patronage in the Chinese economy increases the market power of the company and strengthens the company network, both of which may benefit shareholders. We took the percentage of government ownership (GOV) separately into account, but also in interaction (GOV\*LS) with the natural logarithm of sales. For the two market power related variables we expect positive signs<sup>9</sup>.

Generally more profitable firms represent higher firm values. Like Berger and Ofek (1995), Denis, Denis and Yost (2002) and Campa and Kedia (2002) we use the ratio of EBIT to sales (EBIT) as a measure of profitability. The expected sign is positive.

Company quality is affected by the growth opportunities of the firm. We related growth opportunities to the ratio of capital expenditures to sales. Berger and Ofek (1995), Lins and Servaes (2002), Campa and Kedia (2002) and Fauver, Houston and Naranjo (2003) find positive relationships between company value and this variable. We take the natural logarithm of the capital expenditure to sales ratio (LNC). The second measure of company quality is a dummy variable (BDUM) taking the value of 1 when a company issued B-shares and zero otherwise. We, moreover, create an interaction variable (BDUM\*CE) between

<sup>9</sup> There may, however, be negative effects of government ownership too, as the cash of the companies might more easily be tunneled away by government officials and this might reduce the price investors would like to pay for the shares.

Table 2. Mean and Median of the Diversification Measures, the Performance Measures and the Control Variables for Focused and Diversified Firms as Well as the Differences in Mean and Median of the Two Types of Firms

	<i>Focused Firms</i>		<i>Diversified Firms</i>		<i>Difference (Focused minus Diversified Firms)</i>	
	Mean	Median	Mean	Median	Mean	Median
<b>RH</b>	0	0	0.463	0.47	-0.463***	-0.470***
<b>E</b>	0	0	0.784	0.693	-0.784***	-0.693***
<b>N</b>	1	1	3.068	3	-2.068***	-2***
<b>LNQ</b>	0.797	0.760	0.741	0.692	0.056**	0.068**
<b>LNM</b>	1.237	1.182	1.177	1.095	0.060	0.087*
<b>LNF</b>	7.211	7.127	7.241	7.203	-0.030	-0.076
<b>GOV</b>	0.284	0.267	0.246	0.141	0.038**	0.126
<b>GOV*LS</b>	1.901	1.715	1.634	0.780	0.267**	0.935
<b>EBIT</b>	0.096	0.106	0.085	0.107	0.011	-0.001
<b>LNC</b>	-2.453	-2.241	-2.246	-2.135	-0.207**	-0.106*
<b>BDUM</b>	0.050	0.000	0.050	0.000	0.000	0.000
<b>BDUM*CE</b>	0.006	0.000	0.004	0.000	0.002	0.000
<b>LND</b>	-0.948	-0.870	-0.888	-0.821	-0.060**	-0.049

The full 942 observations over the period 2001-2003 are grouped into two sub-samples consisting of 460 focused firm-years and 482 diversified firm-years. **RH** indicates the sales based redefined Herfindahl index  $RH = (1 - \sum P_i^2)$  with  $P_i$  the weight of the sales in industry  $i$ . **E** =  $\sum P_i * \ln(1/P_i)$  is the sales-based entropy measure. **N** is the number of segments. \*\*\*, \*\* and \* denote significant differences between focused and diversified firms at the 0.01, 0.05, and 0.10 level, respectively according to t-test for the means and the Wilcoxon/Mann-Whitney test for the medians. **LNQ** is the natural logarithm of the proxy Tobin's  $q$ . **LNM** is the natural logarithm of the ratio of market value to book value of common equity. **LNF** is firm size, measured by the natural logarithm of total assets. **GOV** is the ratio of the shares owned by state or local government related to the total number of outstanding shares. **GOV\*LS** is the GOV-ratio multiplied by the natural logarithm of sales. **EBIT** is the ratio of EBIT to sales. **LNC** is the natural logarithm of the ratio of capital expenditure to total sales. **BDUM** is a dummy that equals 1 if a firm issued B-shares. **BDUM\*CE** is BDUM multiplied by the ratio of capital expenditure to assets. **LND** is the natural logarithm of debt to total assets.

the capital expenditures to sales (CE) and the B-dummy. It is clear that the latter two variables can only be found in Chinese firms<sup>10,11</sup>. We assume that the signs of the quality variables would be positive.

We finally use leverage as a controlling variable. Leverage is highly important to control for, as one of the reasons for diversification may be found in managerial entrenchment. Additional leverage will, on the one hand, be evaluated positively by

shareholders if the company has unused tax shields and if agency costs are relevant (Jensen, 1986). The more interest and debt to be (re)paid, the more managers are forced to manage the company to their best efforts. On the other hand additional leverage increases the interest costs for the company and lowers the income for the shareholders. It may, moreover, increase direct and indirect bankruptcy cost (Warner, 1977; Altman, 1984). It is thus

<sup>10</sup> H, N and L shares are not studied here because the Shanghai Stock Exchange is the only market that we focus on.

<sup>11</sup> In contradiction to other variables, the BDUM variable remained constant for each firm in this period.

not amazing that some authors find positive signs for leverage (Klein, 2002; Campa and Kedia, 2002), while others (Denis, Denis and Yost, 2002) report a negative sign. In our analysis we use the natural logarithm of the ratio of debt to total assets (LND) as a measure of financial leverage. A positive sign for this variable suggests that debt reduces agency costs in Chinese firms and/or assists in creating tax shields. A negative sign, however, implies that Chinese firms are faced with bankruptcy costs and excessive interest burdens and an insignificant sign suggests that the Chinese companies trade-off the benefits and disadvantages of debt.

Table 2 presents summary statistics of the diversification and performance measures as well as the other characteristic variables. All 942 firm-years samples are grouped into 460 focused firm-years and 482 diversified firm-years.

By definition the diversification measures differ between focused and diversified firms. Focused firms have according to Table 2 higher value measures. The mean and the median of the logarithm of the proxy for Tobin's q (LNQ) are significantly higher in focused firms (at the 5% level). The median of the logarithm of market value to book value of equity (LNM) is higher in focused firms at the 10% level of significance.

The significant differences in control variables are related to government ownership (GOV and GOV\*LS), capital expenditure (LNC) and debt (LND).

Government ownership (also in interaction with sales) is higher in focused firms. Debt and capital expenditures are lower in focused firms. Firm size (LNF), EBIT and the quality variables (BDUM and BDUM\*CE) are not significantly different in the focused Chinese manufacturing firms.

## Results and Discussion

### Diversification and Its Impact on Value

Multiple regression analyses are carried out to test the effect of diversification on the value performance measures. For brevity, we primarily report the results from specifications using the entropy measure<sup>12</sup>. In order to correct for structural changes over time, we incorporate year dummies (YD1 and YD2). The original estimated equation model (1) is<sup>13</sup>:

$$P_i = \alpha_0 + \alpha_1.E_i + \alpha_2.LNF_i + \alpha_3.GOV_i + \alpha_4.EBIT_i + \alpha_5.LNC_i + \alpha_6.BDUM_i + \alpha_7.LND_i + \alpha_8.YD1 + \alpha_9.YD2 + \varepsilon_i \quad (1)$$

with:

- $P_i$  = The performance measure (LNQ and LNM respectively) for firm  $i$ . LNQ is the natural logarithm of the proxy Tobin's q and LNM is the natural logarithm of the ratio of market value to book value of common equity.  
 $\alpha_j$  = the coefficient for each independent

<sup>12</sup>The number of industrial segments, the redefined Herfindahl index and the Entropy measure showed coefficients of correlations amongst themselves of 0.863 or more. We therefore assumed that these measures of diversification can be interchanged. Because the redefined Herfindahl index and Entropy measures take into account the weights of the various sectors we preferred these last two measures, rather than the number of industrial segments. Because the Entropy measure is not bounded from above we first select the Entropy measure. In later sensitivity analyses we also study the effects of the other two variables.

<sup>13</sup>There is a correlation of 0.974 between the GOV $_i$  and GOV\*LS $_i$  variables and of 0.666 between the BDUM $_i$  and the BDUM\*CE $_i$  variables. For this reason we choose to use only one of these variables in the regression analysis. Because the other variables have coefficients of correlation amongst each other of less than 0.3, (except for the correlation between the year dummies YD1 and YD2) we assume absence of further multicollinearity.

- variable  $j$ .
- $E_i$  = the entropy measure of diversification for firm  $i$  (this variable may be replaced by the redefined Herfindahl index or by the number of segments in which a firm operates).
- $\text{LNF}_i$  = the natural logarithm of assets for firm  $i$ .
- $\text{GOV}_i$  = the government-owned shares percentage for firm  $i$  (this variable may be replaced by the interaction variable  $\text{GOV} \cdot \text{LNS}_i$ ).
- $\text{EBIT}_i$  = the ratio of earnings before interest and taxes to sales for firm  $i$ .
- $\text{LNC}_i$  = the natural logarithm of the ratio of capital expenditure to sales for firm  $i$ .
- $\text{BDUM}_i$  = dummy, which equals to 1 while B-shares, 0 otherwise for firm  $i$  (this variable may be replaced by the interaction variable  $\text{BDUM} \cdot \text{CE}_i$ ).
- $\text{LND}_i$  = the natural logarithm of the ratio of total debt to total assets for firm  $i$ .
- $\text{YD1}$  = dummy, which equals to 1 for 2001, 0 otherwise.
- $\text{YD2}$  = dummy, which equals to 1 for 2002, 0 otherwise.
- $\varepsilon_i$  = disturbance term for firm  $i$ .

Although ordinary regressions with firm-years are very often used in diversification research, it is not optimal, because the estimates of coefficients may be subject to omitted variable bias. With panel data, it is possible to control for omitted variables that differ between cases but are constant over time. This is particularly the case in our sample, where we are unable to correct the dependent variable for industry participation. In that case it is mandatory to work with panel regression analysis. In preliminary analyses the Hausman statistic indicates that we might best start with the fixed effects panel regressions.

A second problem in estimating the impact of diversification on firm value is

simultaneity (Martin and Sayrak 2003). Firm value may depend on the amount of diversification, but diversification may also be influenced by firm value. Because it is our intention to test whether diversification affects firms' performance, but not vice versa, we correct for interdependencies by using lagged entropy measures. In this case we can be sure that the performance of companies this year will not affect the diversification measure of the previous year. This approach, however, has three consequences. First, the number of observations is reduced with one year. Second, the  $\text{BDUM}$  variable can only be measured once, while the  $\text{GOV}$  variable doesn't show adequate variation either. This means that we have to rely on the interaction variables for incorporating the two characteristics of the Chinese economy. Third, we do not get a separate estimate of the dummy variable  $\text{YD1}$  any more.

In Table 3 we present the panel regression results for the lagged entropy variable for both value measures, namely  $\text{LNQ}$  and  $\text{LNM}$  (models A and B, respectively). The table also presents the results both without and with the  $\text{BDUM} \cdot \text{CE}$  interaction variable (sub-models 1 and 2, respectively). Table 3 indicates that the coefficients of the significant variables for which we gave a theoretical reasoning for their sign ( $\text{LNF}$ ,  $\text{GOV} \cdot \text{LNS}$  and  $\text{LNC}$ ) all have the expected sign. This is also the case for the year-dummy for 2002 ( $\text{YD2}$ ), as 2003 showed worldwide lower share prices than 2002. The F-test of all four equations is significant.

Table 3 shows that the increase in diversification in the manufacturing firms listed at the Shanghai Stock exchange reduces firm value. Though the sign is only marginally significant in the estimates of the natural logarithm of Tobin's  $q$ , it is significant on a 5% level if the natural logarithm of the market to book value of equity is estimated.

Table 3. Panel Regression Analyses with Fixed Effects, Cluster Robust Standard Errors and Lagged Correction for Independence

Independent variables	<i>Dependent variables</i>			
	Natural logarithm of Tobin's q		Natural logarithm of market to book value of equity	
	Model A-1	Model A-2	Model B-1	Model B-2
<b>Lagged entropy</b>	-0.095 (0.080)	-0.093 (0.089)	-0.124 (0.041)	-0.120 (0.049)
<b>LNF</b>	0.061 (0.500)	0.062 (0.488)	0.257 (0.011)	0.260 (0.011)
<b>GOV*LS</b>	0.204 (0.021)	0.206 (0.019)	0.239 (0.045)	0.243 (0.040)
<b>EBIT</b>	0.025 (0.622)	0.024 (0.638)	-0.012 (0.831)	-0.014 (0.805)
<b>LNC</b>	0.039 (0.001)	0.038 (0.001)	0.038 (0.008)	0.036 (0.010)
<b>BDUM*CE</b>		0.649 (0.557)		1.083 (0.375)
<b>LND</b>	-0.405 (0.000)	-0.409 (0.000)	-0.191 (0.021)	-0.198 (0.015)
<b>YD2</b>	0.167 (0.000)	0.167 (0.000)	0.225 (0.000)	0.225 (0.000)
<b>Intercept</b>	-0.460 (0.521)	-0.486 (0.497)	-1.348 (0.108)	-1.390 (0.098)
Observations	609	609	609	609
Number of groups	327	327	327	327
Within R <sup>2</sup>	0.502	0.503	0.423	0.425
Between R <sup>2</sup>	0.005	0.006	0.066	0.064
F-statistic	35.78	32.65	30.88	27.51

**Lagged entropy** refers to the entropy value of the previous year. P-values are reported in italics below each coefficient. **LNF** is firm size, measured by the natural logarithm of total assets. **GOV\*LS** is the impact of government influence through firm size measured by the natural logarithm of sales. **EBIT** is the ratio of EBIT to sales. **LNC** is the natural logarithm of the ratio of capital expenditure to total sales. **BDUM\*CE** is the multiplication of a dummy that equals 1 if a firm issued B-shares with the ratio of capital expenditure to total sales. **LND** is the natural logarithm of debt to total assets. **YD2** is a dummy, which equals 1 for 2002 and 0 otherwise. The estimated equation is equation 1, where models A1 and A2 have as dependent performance measures the natural logarithm of the proxy for Tobin's q, while models B1 and B2 explain the natural logarithm of the market to book value of equity. Models A1 and B1 do not incorporate a coefficient for **BDUM\*CE** and models A2 and B2 incorporate a coefficient for this independent variable.

Table 3 also shows that market power is an important issue in the Chinese manufacturing sector. Both the firm size variable (LNF) and the government interaction with size (GOV\*LS) influence the value measures positively. Moreover, quality proves to be an important issue too. More capital expenditures in the firm (measured by LNC) increase value. However, when quality is measured as the interaction between capital expenditures and firms that issued B-shares (BDUM\*CE), no significant relationship is found. We therefore conclude that of the institutional characteristics measured, only the government involvement in the Chinese firms adds value, but that a listing as a B-share does not.

Table 3 finally hints to the debt position of the Chinese manufacturing firms. In all four regressions the coefficient of leverage is significant and negative. This implies that if debt is used for reaping tax shields and for reducing agency costs, that the manufacturing firms are overshooting their debt-target: the disadvantages of debt originating from higher interest and bankruptcy costs are more important. A possible reason of the significant negative signs may be found in the history of the firms and their managers. Previously, Chinese managers were not threatened by bankruptcy and the losses of the firms were ultimately met by the national financial budget. If the behavior of managers on average is sticky, managers may still not care much about debt and debt related costs and consequently shareholders will be hurt.

In order to assess whether the negative findings on the impact of diversification hold for alternative measures of diversification and for alternative regression techniques, we present robustness checks in Table 4.

Firstly, Table 4 shows the coefficients of the lagged entropy variable for the four models of Table 3, but not only for the fixed effects panel regression analysis

(now without robust cluster estimates of the standard error), but also for the random effects approach. The latter approach is used because the preliminary Hausman tests might not necessarily recommend the use of fixed effects for all measures of diversification. Moreover, we also present the results of our panel with the Generalized Estimation Equations technique to fit population-averaged panel data, where we include a first order autoregressive correlation structure within firms, while retaining the other traditional regression assumptions. An autoregressive structure might be likely if one uses data from annual accounts of individual firms over time. As we do not have observations for all firms for all three years, a disadvantage of using this technique is that we are left with less observations. All three panel regression techniques are then not only executed for the entropy measure, but also for the two alternative measures of diversification, namely the redefined Herfindahl index and the number of segments (based on a three digit classification).

The results of Table 4 are consistent with Table 3 as an increase in diversification in the manufacturing firms listed at the Shanghai Stock Exchange reduces firm value in all estimates. Though not all of the coefficients are significantly different from zero, we have no indication of positive signs. We therefore conclude that the benefits of diversification that could be expected in the emerging market of China do not compensate for the diseconomies of diversification that might be caused by imperfect capital allocation and/or agency problems. From an emerging market perspective, the results are consistent with findings of Lins and Servaes (2002), but inconsistent with the conclusions of Fauver, Houston and Naranjo (2003) and of Khanna and Palepu (2000) who find that in less developed capital markets diversification creates value.

Table 4. Sensitivity Analyses for the Coefficients of Three Diversification Measures Based on Estimation Techniques That Take Into Account the Panel Structure of the Data as Well as Lagged Effects that Correct for Interdependence

Technique	<i>Dependent variables</i>			
	Natural logarithm of Tobin's q		Natural logarithm of market to book value of equity	
	Model A-1	Model A-2	Model B-1	Model B-2
<b>Lagged entropy is the independent variable</b>				
Fixed effects	-0.095 <i>(0.092)</i>	-0.093 <i>(0.100)</i>	-0.124 <i>(0.069)</i>	-0.120 <i>(0.077)</i>
Random effects	-0.056 <i>(0.082)</i>	-0.058 <i>(0.080)</i>	-0.087 <i>(0.059)</i>	-0.087 <i>(0.058)</i>
GEE (1 autoreg.)	-0.067 <i>(0.049)</i>	-0.067 <i>(0.048)</i>	-0.094 <i>(0.044)</i>	-0.094 <i>(0.044)</i>
<b>Lagged redefined Herfindahl is the independent variable</b>				
Fixed effects	-0.133 <i>(0.171)</i>	-0.130 <i>(0.171)</i>	-0.178 <i>(0.130)</i>	-0.172 <i>(0.144)</i>
Random effects	-0.080 <i>(0.161)</i>	-0.081 <i>(0.153)</i>	-0.128 <i>(0.107)</i>	-0.129 <i>(0.106)</i>
GEE (1 autoreg.)	-0.100 <i>(0.087)</i>	-0.101 <i>(0.084)</i>	-0.149 <i>(0.066)</i>	-0.149 <i>(0.066)</i>
<b>Lagged number of segments is the independent variable</b>				
Fixed effects	-0.038 <i>(0.040)</i>	-0.038 <i>(0.040)</i>	-0.045 <i>(0.046)</i>	-0.044 <i>(0.052)</i>
Random effects	-0.023 <i>(0.042)</i>	-0.023 <i>(0.041)</i>	-0.031 <i>(0.048)</i>	-0.031 <i>(0.047)</i>
GEE (1 autoregr.)	-0.023 <i>(0.048)</i>	-0.023 <i>(0.047)</i>	-0.028 <i>(0.075)</i>	-0.028 <i>(0.075)</i>

Lagged entropy refers to the entropy value of the previous year. Lagged redefined Herfindahl refers to the value of 1 minus the Herfindahl index of the previous year. The lagged number of segments refers to the number of segments in which a company sold its products during the previous year. P-values are reported in italics below each coefficient. Fixed effects give the coefficients for a fixed effects panel regression analysis (The first line representing the fixed effects estimates for the lagged entropy as independent variable and the results thus equal the coefficients of Table 3). Random effects represent the coefficients for random effects panel regression analysis. GEE (1 autoregr.) represents the generalized estimation equation coefficients where a first order autoregressive correlation structure. The estimated equation is equation 1, where models A1 and A2 have as dependent performance measures the natural logarithm of the proxy for Tobin's q, while models B1 and B2 explain the natural logarithm of the market to book value of equity. Models A1 and B1 do not incorporate a coefficient for **BDUM\*CE**, while models A2 and B2 incorporate a coefficient for this independent variable.

## Conclusions

The fast growing economy and institutional and economic reforms made the Chinese equity markets the third largest in Asia. The fast developments also generated mergers, acquisitions and industrial restructuring. Using a sample of 942 firm-years over the period 2001-2003, we document an increase in corporate industrial diversification concomitant with the reforms. The question can then be asked whether the tendency to diversify across industries benefits shareholders. A comparison between diversified and focused firms suggests that diversified firms in China indeed have lower proxies for Tobin's  $q$ 's as well as lower market-to-book ratios for equity. After introducing controlling variables in a multivariate analysis and after checking for panel effects and simultaneity, we find negative coefficient estimates of industrial diversification on firm performance. These negative coefficients are corroborated by sensitivity checks with alternative measures of diversification and with alternative panel regression techniques.

Our findings contradict the arguments of Fauver, Houston and Naranjo (2003) and of Khanna and Palepu (2000) that in less developed capital markets diversification creates value. In the partially developed Chinese capital market, firms are limited in their access to external capital and investors do not have the full range of possibilities to diversify. Our findings suggest that such benefits of firm diversification do not compensate for the disadvantages of agency costs, propping, tunneling and/or wrong allocation of financing by bureaucratic headquarters: on average industrial diversification destroys more value than it creates in manufacturing firms listed at the Shanghai Stock Exchange. The benefits of industrial diversification to investors should thus not be exaggerated in the Chinese

case.

If we relate our findings to the finance literature, we find agency costs and conflicts of interests amongst shareholders as possible explanations. Managers, or their hidden bosses (the party representatives), may satisfy their own self-interests (or the interests of the state) by implementing a diversification strategy at the expense of shareholders' value. It is, however, also possible that important shareholders are able to expropriate minority groups.

A second reason may be found in "the mood of the market". High economic growth, more managerial freedom and new regulations may have given managers the idea that mergers and/or acquisitions were imperative for coping with the environment. This may have made managers overly optimistic and it may have resulted in value destroying diversification.

A third reason may be found in the history of the firms. As indicated in section 3, Chinese managers were traditionally under full government ownership and this may have generated loose corporate governance. After relinquishing part of the peoples control by bringing a company to the stock exchange, it is not likely that new management and new managerial concepts will be directly installed. In such a historical context, management may not (yet) be under pressure to manage the company on behalf of the shareholders. Moreover, like in many other institutional settings, Chinese shareholders may not have many incentives to invigorate their control either.

A fourth possible reason may be found in investors myopia. Event studies (and this paper also) assume that investors are rational and that they are able to adequately assess corporate actions. One, may however, take the stance that the relative magnitude of mainland China requires companies to become very large, in particular if one also wants to reap strategic benefits of international diversification. In



such a case companies that diversify over industries may first generate low returns in order to be able to reap large future returns of adequate size. If that were the case, shareholder benefits might only be reaped after a certain threshold and investors might be short sighted and therefore not be able to take possible future growth options into account.

A final reason of the negative effect of diversification may be found in the current institutional context. As indicated before, many of the firms are government controlled, with concomitantly weak control. We, however, find that government ownership is beneficial to the shareholders. This does not necessarily mean strong government control, as it may only indicate that companies with governmental participation generate shareholder benefits (like additional sales to the government) that outweigh the negative consequences of weak governmental control. Moreover, not all control comes from the government, and we presented various reasons why it is likely that private corporate governance is not beneficial to all the shareholders in China. Moreover, government control is not only exercised by shareholder ownership. The government also regulates the supervision of companies. It is likely that overall supervision is not (yet) strong, that supervision does not (yet) assist the interests of shareholders, or that supervision is (still) very weak in some provinces. In this paper, we only find the increase in diversification and the negative effects of it on shareholders' value.

Besides a follow-up study of the possible reasons for our findings, we like to suggest more additional research. First, we studied a relatively small number of firms. This is partly caused by our focus on the manufacturing sector. Manufacturing firms mainly own tangible assets, and this may have made the benefits of diversification smaller than if we would have included

companies with relatively more intangible assets (see also: Morck and Yeung 2002). This means that our conclusion cannot be extended outside our manufacturing sample. Further studies that would take into account Shenzhen listed manufacturing companies (with similar negative effects expected) and with non-manufacturing companies (with possible less negative effects) might complete the picture for all listed Chinese firms.

Second, the small number of focused companies in various sectors made it impossible to correct the value ratios of individual firms for their industry composition. We, however, used panel estimates to overcome this problem and we think that our results are not likely to be biased in this respect. In fact, the panel study approach might be advisable in other research on diversification too.

Third, our empirical analysis shows that -besides industrial diversification- also other variables influence firm performance. The mergers and acquisition wave in China also resulted in an increase in firm size and debt and a decrease in capital expenditures over the period 2001- 2003. The signs of the coefficients of the concomitant control variables suggest that firm value may have been further reduced by the increase in debt and the decrease in capital expenditures. However, the increase in firm size may have benefited shareholders. Sensitivity analyses on the signs of these variables would be needed in order to fully evaluate the impact of these control variables.

Fourth, we did not study a value-increasing threshold in Chinese firms. As indicated before, investors may be myopic and not being able to assess the value of future growth options in the Chinese case. If this reasoning would hold, shareholder benefits might only be reaped after a certain threshold. Unilateral tests suggest that an increase in diversification indeed first destroys value, but that further increases

create value. We, however, also tested for non-linear relationships (not reported), but we did not find significant quadratic coefficients. This suggests that Chinese firms are not (yet) in a situation where investors consider it rational to amalgamate. We therefore think that Chinese manufacturing firms that want to create shareholder value might better refrain from diversification at this moment. An analysis of thresholds might, however, still be relevant for the future if companies persist in further industrial diversification.

As indicated, we are not able to disentangle the various components that make investors' value to depend on diversification. Here, we have to be satisfied with the fact that we find an increase in diversification and that the negative aspects of diversification in China are stronger than the positive effects. Further research on this subject -and in particular on the reasons why firms engage in diversification despite the negative impact on shareholders' value- can therefore be rewarding.

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