Journal of Corporate Finance 22 (2013) 166–192

Contents lists available at SciVerse ScienceDirect

Journal of Corporate Finance

journal homepage: www.elsevier.com/locate/jcorpfin

Business groups in China ☆

Jia He [a,b,c], Xinyang Mao [d], Oliver M. Rui [e,*], Xiaolei Zha [f]

[a] Shenzhen University, Shenzhen, China
[b] Sichuan University, Chengdu, China
[c] Chinese University of Hong Kong, Hong Kong
[d] Shanghai University of Finance and Economics, Shanghai, China
[e] China Europe International Business School, Shanghai, China
[f] Bosera Asset Management Co. Ltd., Nankai University, China

ARTICLE INFO

Article history:
Received 30 November 2012
Received in revised form 1 May 2013
Accepted 2 May 2013
Available online 11 May 2013

JEL classification:
G32
G34

Keywords:
Business groups
Financial constraints
Risk sharing
Ultimate owner
Institutional environment

ABSTRACT

We investigate whether business groups in China act as internal capital markets, in an environment that is characterized by a high level of government intervention, a weak legal system, and an underdeveloped financial market. We study how institutional factors, such as the ultimate owner and level of market development, shape the role of these business groups. We find that business groups help member firms overcome constraints in raising external capital, and that the internal capital market within a business group is more likely to be an alternative financing channel among state-owned firms than among private firms. We also find that the internal capital market is more likely to help those affiliated firms which are private, local government owned relative to those owned by central government, or located in regions with a well-developed institutional environment. We present evidence of the role of business groups in risk sharing among affiliated firms, but find that business group affiliation has no impact on firm accounting performance. This study sheds new light on the theory of the firm and its boundaries, and provides a better understanding of China's rapidly growing economy.

1. Introduction

A striking feature of most emerging economies is the prominent role played by business groups. Khanna and Rivkin (2001) define a business group as "a set of firms which, though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated action." Granovetter (2005), Khanna and Yafeh (2007), and Morck et al. (2005) review the literature on business groups. Khanna and Palepu (2000a) argue that business groups serve as an organizational response to the weak institutional context of emerging economies. Financial transactions can be particularly costly in emerging economies because of weak investor protection, contract enforcement, communication, and information disclosure. A business group serves as an internal financial market through which capital can be allocated among affiliated firms, which can lead to economic benefits, especially when external financing is scarce and uncertain. Bena and Ortiz-Molina (2013) suggest that business groups in the form of pyramids provide a financing advantage in setting up new firms when the pledgeability of cash flows from outside financiers is limited. Khanna and Palepu (2000a) find that affiliates of the most highly diversified Indian business groups outperform stand-alone firms, indicating that internal capital markets within Indian groups effectively mimic the

* Corresponding author. Tel.: +86 21 28905618; fax: +86 21 28905620.
E-mail address: oliver@ceibs.edu (O.M. Rui).

0929-1199/$ – see front matter © 2013 The Authors. Published by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jcorpfin.2013.05.001

functions provided by financial markets in advanced economies. Based on evidence from postwar Japan as well as two emerging markets, Korea and Thailand, Khanna and Yafeh (2005)[1] contend that risk sharing is another important function of business groups. However, such groups also have a dark side. The business group structure can be a value destroyer. For example, through tunneling among group members in a pyramid structure, one large and influential firm may be propped up at the expense of other "weak" members in the group (La Porta et al., 1999; Morck et al., 2005). The empirical results of business groups are mixed,[2] and thus consensus has not yet been reached concerning the net advantages that might result from affiliation with a business group. This study of business groups in China aims to contribute to the unresolved debate regarding the role of business groups.

China seems a natural candidate for analyzing the internal capital market role of business groups. First, these groups contribute close to 60% of the nation's industrial output (China Development Research Center of the State Council, 2000; National Bureau of Statistics of China, 2000). By 2006, there were 2856 officially recognized business groups in China with 27,950 directly owned first tier subsidiaries, employing around 30 million people (State Statistical Bureau, 2002A–2007A). Whereas many prior studies confine their analysis to the largest business groups, such as the big six keiretsus in Japan and top 30 chaebols in South Korea (Chang and Choi, 1988; Chang and Hong, 2000; Prowse, 1992), our study encompasses business groups of all sizes. We include all publicly traded group affiliates in China. The rich financial data of these listed firms yield relatively unbiased results. Second, investor protection in China is among the worst worldwide. Allen et al. (2005) compare overall investor protection (defined as the sum of overall creditor rights, shareholder rights, rule of law, and government corruption) in mainland China relative to the countries included in La Porta et al. (1998), and find that China, along with Mexico and Indonesia, ranks the lowest in overall investor protection. In countries with weak investor protection, arm's-length contracting and market monitoring is very costly, if not impossible. In addition, external capital can be expensive and scarce or even unavailable. In such context, a business group may have extensive governance functions, creating an internal capital market and ensuring close monitoring of management decisions. Third, China has maintained a state-dominated financial system in which government at various levels controls the allocation of financial resources in both the banking sector and securities market. Government-guided financial resource allocation usually favors a few large-scale state-owned enterprises that are important to the economic development of the country and the specific region. State-owned firms may also face the problem of soft budget constraints. It is difficult for most non-state enterprises to secure financing through the state-controlled financial system. Thus, they suffer from serious financial repression. In such a context, a business group is likely to serve as an internal capital market to mitigate the financial constraints faced by private firms. Finally, the benefits of a business group might be totally different between emerging markets and developed economies, given that the optimal corporate structure depends on the institutional environment. One prominent characteristic of China is the very uneven distribution of economic and legal development across the country. Natural and human capital resources account for some of the differences in development across regions. Political connections with the country's leadership elite are also very important, and great variation in regional per capita income and education levels contribute to the vast differences in development across the country. We believe that the differences in regional market development have profound effects on the role of business groups.

We address the following issues in this research: (1) whether group-affiliated firms are less likely to face financial constraints than stand-alone ones; (2) whether a member of a business group is more likely to share risk than an independent firm; (3) whether group-affiliated firms tend to outperform unaffiliated ones; and (4) how the ultimate owner, institutional factors, and level of market development shape the role of business groups in China.

Our results show that in China, business group-affiliated firms have a lower level of investment–cash flow sensitivity than their stand-alone counterparts, and that the internal capital market role of business groups is more significant among state-owned firms and those in regions with a well-developed market. Group-affiliated firms also bear less risk than stand-alone ones in terms of operating volatility, bankruptcy, or the possibility of financial distress, and this effect is more prominent among privately owned firms and those located in regions with a less developed market. Regarding performance, the positive signs are consistent with our expectation that group-affiliated firms tend to outperform unaffiliated ones in terms of ROA and ROE, although the statistical significance of these results is relatively weak compared to that of the results of the financial constraint and risk-sharing tests.

We perform a battery of robustness checks, and investigate whether the inclusion of financial institutions or foreign listed shares (H-shares in our sample) in a business group affects our results. We also examine the impact of a group's level of diversification on our results. In addition to investment–cash flow sensitivity, we adopt an alternative measure of financial constraints using the generalized method of moments (GMM) framework of Whited and Wu (2006). Finally, we employ the Heckman (1979) two-stage test to address the problem of potential self-selection bias among business groups.

This study is associated with several strands of the literature. First, we contribute to the business group literature by using Chinese data. We investigate the role of a business group as an internal capital market and in risk sharing and firm performance. More importantly, we examine how ownership type and institutional factors shape the role of a business group. Second, the results of this study contribute to the internal capital market literature.[3] We find that business groups in China act as internal capital markets and mitigate the financial constraints faced by group affiliates, especially state-owned firms and those located in regions or provinces with well-developed markets. Third, this research also contributes to the literature on investment–cash flow sensitivity (Fazzari et al., 1988). A general finding of the literature is the importance of internal funds as the main source of capital

[1] The risk-sharing role of business groups is also discussed in Gopalan et al. (2007) and Marisetty and Subrahmanyam (2010).

[2] See Buysschaert et al. (2004), Campbell and Keys (2002), Chang and Choi (1988), Choi and Cowing (1999), Ferris et al. (2003), Khanna and Palepu (2000b), Lee and Lee (2002), Lee et al. (2000), and Lee et al. (2001).

[3] See Hoshi et al. (1991), Rajan et al. (2000), Scharfstein and Stein (2000), Shin and Stulz (1998), Stein (1997), and Williamson (1985).

investment. The higher is the cost of external funding or the more difficult it is to get external funds, the more likely it is that a firm will rely on its own funds. Our results show that group affiliates have a lower level of investment–cash flow sensitivity, implying fewer financial constraints and more dependence on internal capital markets. Affiliation with a business group is a substitute for costly external financing in China. Finally, this study complements the Chinese corporate finance and business group research. Several papers have investigated business groups in China.[4] One major challenge to Chinese business group research, however, is the definition of a business group. For historical reasons, many large group corporations were formed under the direction of the central or local governments. These corporations typically have a broad scope, with many subsidiaries in distinct industries, and act more like conglomerates in the United States. Some research is based on these corporations. Other studies identify business groups based on parent–subsidiary ownership structure. One concern is that some parent companies are not listed on exchanges, so their financial information is not available. Therefore, prior Chinese business group research suffers from the problems of different group definitions and a lack of financial information. However, we include all business group-affiliated firms whose stock is publicly traded. Our analysis provides useful information about firm structure that is otherwise difficult to obtain.

The practical implications of our results are numerous, especially for the policy experiments related to business groups that are currently underway in China. Allen et al. (2005) argue that China is an important counterexample to the findings in the law, finance, and growth literatures. China is one of the fastest growing economies in the world, although neither its legal nor its financial system is well developed. Thus, it is argued that the role of different factors in contributing to the growth process is not well understood. We contend that the business group may serve as an alternative channel for firms to grow, especially those in regions or provinces with less developed markets.

The remainder of the paper is organized as follows. In Section 2, we briefly introduce the background of Chinese business groups and their institutional structure. In Section 3, we develop our hypotheses and discuss our methodologies. In Section 4, we describe the dataset. In Section 5, we present the empirical results, and in Section 6, the results of the robustness checks. We conclude the paper in Section 7.

2. Business groups and institutional factors in China

2.1. Business groups in China

The formation of Chinese business groups originates with China's market-oriented reform. In the mid-1980s, the Chinese government started to promote business groups because it believed that such groups could absorb new technology, deliver stable financial performance, and achieve international competitiveness. By the early 1990s, there were more than 7000 known groups in China, with total assets amounting to 1.12 trillion Yuan (135.70 billion U.S. dollars).[5] As mentioned in the Introduction, some of these groups do not exactly fit the definition of a business group proposed by Khanna and Rivkin (2001), as they are not legally independent from each other and act more like the conglomerates in the United States. As for the others, although they are business groups with legally independent member affiliates, underdeveloped corporate disclosure practices have prevented comprehensive analysis of their operational and financial performance. This is why prior research mostly uses a relatively small sample and the analysis is limited to some simple financial measures.[6]

In the early 1990s, China's capital market developed substantially. Two stock exchanges were established and corporations could have their shares listed and traded publicly. Some group affiliates also began to be listed. Unlike conglomerates in the United States, in which individual lines of business typically are not observable, each exchange-listed group-affiliated firm in China is a distinct legal entity that publishes its own financial statements, has its own board of directors, and is responsible to its own shareholders. Hence, we can clearly identify firms that are group affiliated by their corporate structure. The financial information pertaining to these firms is audited and disclosed regularly, which yields rich financial data for analysis. Fig. 1 demonstrates the corporate structure of a business group, Fosun Group, which has three affiliated domestic listed firms and two listed firms in Hong Kong. Based on our definition, the three domestic listed firms are group affiliated.[7] The structure of business groups varies across countries, with differences in both formal ownership links, including the ownership roles of banks, families, the state, and other companies, and the nature and strength of informal social networks (Morck et al., 2005). For example, Korean chaebols are characterized by private family ownership with limited bank involvement, whereas Japanese keiretsus are characterized by multiple corporate owners, often centered on a lead bank (Gedajlovic and Shapiro, 2002). In this paper, we include all publicly traded affiliated firms so that we can obtain the necessary data to gain a clear picture about each business group.[8]

[4] See Carney et al. (2009), Fan et al. (2008), Guest and Sutherland (2010), Keister (1998), and Smyth (2000).

[5] Please refer to State Commission on Reforming the Economic System, 1993. Also, as mentioned by Keister (1998), Chinese business groups can be divided into two types: small groups (often private firms) and large groups (primarily state-owned firms that resemble Japanese keiretsus).

[6] For example, Keister (1998) includes only China's 40 largest business groups and 535 member firms in the 1988–90 period.

[7] We include only those firms that are listed on the Shanghai and Shenzhen exchange, and do not include those firms with shares traded in other markets, such as Hong Kong (H-shares) and the United States.

[8] For example, Carney et al. (2009) use the data of 476 publicly listed firms in 1999 and those of 467 matched firms in 2004 to find support for a temporal hypothesis that affiliation with a business group improves performance, but that the value of group affiliation declines over time. Guest and Sutherland (2010) identify China's most important business groups (the 100 plus "national champion" trial groups) and investigate the performance of their listed subsidiaries. They find that the listed subsidiaries of these national champions outperform non-affiliated firms.

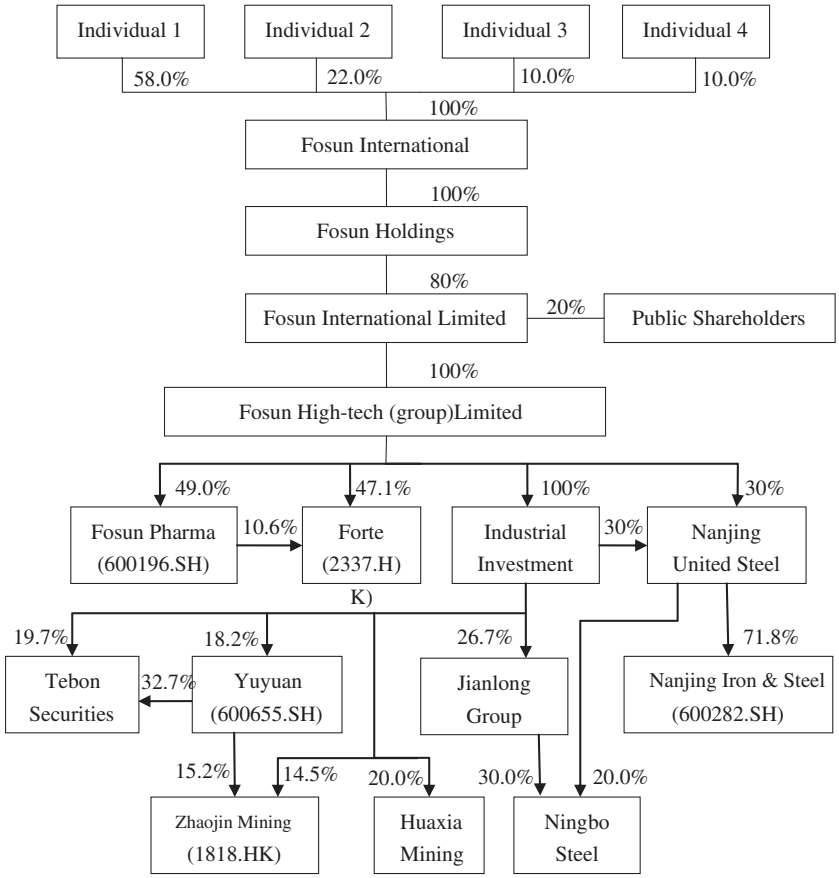

Fig. 1. The structure of Fosun Group.
Source: Company History and Reorganization of Fosun Group.

2.2. Institutional factors in China

China has maintained a state-dominated financial system in which the government at various levels controls the allocation of financial resources in both the banking sector and securities market. The banking system in China comprises the central bank, four large state-owned commercial banks, three policy banks, ten national joint-stock commercial banks, about 90 regional commercial banks, and about 3000 urban and 42,000 rural credit cooperatives. There are also branches or representative offices of foreign banks with limited activities. Overall, the four state-owned commercial banks dominate the market. The stock market in China is also controlled by the government. An initial public offering (IPO) quota system was adopted in China in 1993. The State Planning Commission determines the quantity of equity to be issued each year, and the China Securities Regulatory Commission (CSRC) then divides this quota up among the provinces and ministries. A company seeking to go public has to be selected by a provincial government or ministry with a quota before asking the CSRC for approval. Local authorities often split the issuing proceeds to allow more firms to be listed within the quota limit. In 1996, the quota system was changed from restricting the quantity of equity to restricting the number of firms to be listed. Government-guided financial resource allocation usually favors a few large-scale state-owned enterprises that are important to the economic development of the country or the specific region. Smaller state-owned and most non-state enterprises find it difficult to secure financing from the state-controlled financial system. Thus, they suffer from serious financial repression.

One institutional characteristic of the stock market in China is that listed companies are sponsored and controlled by government-related entities. Most listed companies are business units that have been carved out of state-owned enterprises (SOEs). As a controlling shareholder, the state often has multiple and conflicting objectives. On the one hand, the state wishes its firms to become as competitive and efficient as privately owned enterprises. This inevitably involves the closing of money-losing operations and the laying off of surplus employees. On the other hand, the state has responsibility to maintain the level of employment because laying off workers from state-controlled firms places a huge burden on the state in the short run and thus may not be politically and economically feasible, even though such layoffs may create net positive social benefits over the long run. In contrast, private firms have a strong incentive to improve performance and little interest in providing social stability. As a result, we expect to see that business groups play different roles in SOEs and private firms. Bai et al. (2006) argue that the central

and local governments in China have divergent interests in continuing to operate inefficient SOEs. Local governments capture only a fraction of the external benefits of social stability due to labor migration and regional interdependence in the financial system. However, the central government internalizes all of the external effects of social stability and has a strong incentive to maintain social stability. Thus, we also expect to see business groups play different roles in local and central SOEs.

Research shows that institutional factors can affect financial market development and economic growth. These factors include prevailing economic conditions, the way firms are governed, institutional and regulatory frameworks, and the legal environment (investor protection, legal enforcement). One characteristic of China's reform is the very uneven distribution of economic and legal development across the country. Natural and human capital resources account for some of the regional differences in development, but political connections with the country's leadership elite are also very important. We believe that the differences in regional development have profound effects on the role of business groups. To examine this, we explicitly account for market development using a set of indexes designed to capture differences in economic, political, legal, and institutional factors across regions. The advantage of conducting an inter-region study within one country is that we can capture the effect of institutions on the role of business groups without contamination due to country differences in accounting rules, taxation, and bankruptcy laws. However, we admit that there are differences in industry composition, population, education level, infrastructure, etc. between regions. This could be a potential weakness of our study if we do not control for them, as it is possible that some of them, such as industry composition or infrastructure, may influence a firm's risk level and performance along with the role of business groups. The local and central governments adopt different policies to balance the uneven development across regions. In addition, we use the fixed effect OLS regression and the m-index to capture differences in economic, political, legal, and institutional factors across regions. We believe the omitted variable issue in capturing the regional difference should not significantly affect our results.

3. Hypothesis development and methodology

3.1. Business groups and financial constraints

In a perfect market without asymmetric information or financial constraints, a firm's cash flow should not affect its capital investment. The joint effect of asymmetric information, managerial agency problems, and transaction costs can cause a disparity between the cost of internal and external funds. Under such financial constraints, investment decisions depend on the availability of internal funds. Business groups can be seen as organizational forms that mitigate the asymmetric information and contract enforcement problems that arise in accessing external financial resources. Business groups allow the formation of internal capital markets that can partially replace the capital allocation function of external markets. A group can pool funds from different affiliates and reallocate them to the most profitable uses. Business groups can create value by allowing affiliated firms to allocate capital and managerial resources more efficiently within the same group in an environment in which the external capital and labor markets are underdeveloped. An internal market can contain superior information about investment opportunities (Williamson, 1975), allow the renegotiation of debts in the case of financial distress, and provide efficient monitoring. It can also provide credible information about group members, which reduces the risk of opportunism and lowers contract enforcement, searching, and screening costs. Studies show that investment is strongly and positively related to firms' cash flow, measured as net income plus depreciation, after controlling for proxies for investment opportunities. In addition, investment–cash flow sensitivity is greater among firms a priori classified as being more financially constrained. For instance, Fazzari et al. (1988) find that investment is positively related to firms' cash flow, and that the coefficient is larger among firms with low dividend payouts relative to those with high payouts. Hoshi et al. (1991) find that investment is less sensitive to cash flow among firms that are members of a keiretsu and are presumed to be less financially constrained. Prowse (1992) also finds that a Japanese firm's strong link to an industrial group leads to reductions in agency and monitoring costs as well as liquidity constraints. Shin and Park (1999) find that firms affiliated with Korean chaebols have greater access to investment capital than stand-alone, independent firms. Based on the above evidence, we propose the following internal market hypothesis:

Hypothesis 1. Group-affiliated firms in China are less likely to face financial constraints (low level of investment–cash flow sensitivity) than independent ones, ceteris paribus.

To investigate the effect of business group affiliation on investment–cash flow sensitivity, we use the same approach as those of Fazzari et al. (1988) and Hoshi et al. (1991). They regress investment on Tobin's Q, cash flow, lagged cash flow, and other control variables and interpret differences in the investment–cash flow relationship between different groups of firms as evidence of financial constraints. We adopt the following basic panel specification:

$$\frac{I_{it}}{K_{it-1}} = \alpha + \beta_1 Q_{it-1} + \beta_2 \frac{CF_{it}}{I_{it-1}} + \beta_3 \frac{CF_{it-1}}{I_{it-2}} + \beta_4 \left(\frac{CF_{it}}{I_{it-1}} + \frac{CF_{it-1}}{I_{it-2}}\right) * BG_{it} + \beta_5 Cash_{it-1} + \beta_6 Sales_{it-1} + \beta_7 Lev_{it-1} + u_{it} \quad (1)$$

where I represents investment in plant and equipment during period t; K is the beginning-of-period gross book value of net property, plant, and equipment; CF represents the current period cash flow to the firm as measured by net income plus depreciation plus the change in deferred taxes; and Q represents Tobin's Q. BG is a dummy variable that equals 1 if the firm is affiliated with a business group in period t, and 0 if it stands alone. We include the fixed effects for each firm and each year to

account for unobserved relationships between investment and the independent variables, and to capture business-cycle influences. Cash holding (*Cash*) is defined as the ratio of the sum of cash and marketable securities to the beginning-of-period total book value of assets to capture the effect of corporate liquidity on investment. The net sales-to-total assets ratio (*Sales*) is included to control for production or output effect on investment.[9] The importance of controlling for firm leverage (*Lev*) is suggested by Lang et al. (1996), who document a negative relationship between investment and leverage.

In this specification of the model, β_2 and β_3 measure investment–cash flow sensitivity among stand-alone firms, and $\beta_2 + \beta_3 + \beta_4$ represents the cash flow coefficients of group-affiliated firms. Therefore, if β_4 differs significantly from zero, then we can conclude that there is a difference in cash flow sensitivity between group affiliates and stand-alone companies. Furthermore, according to Hypothesis 1, we expect β_4 to be negative, which implies that group affiliates face fewer financial constraints.

3.2. Business groups and risk sharing

Business groups can also benefit member firms by facilitating risk sharing through the transfer of resources from a well-performing affiliate to a poorly performing one during times of financial distress. Prowse (1992) argues that group affiliates assist member firms that are suffering from adverse economic conditions to ensure the group's long-term survival, while Shin and Park (1999) hold that financial cross guarantees link the members of a business group and provide the basis for an internal capital market. Thus, a failing member has recourse to other sources of funding, which can insulate it from the discipline of the marketplace. Friedman et al. (2003) provide evidence that the controlling shareholders of a business group prop up affiliated firms during a crisis, using their private funds or group-wide savings. Chang and Hong (2000) find that profitable affiliates prop up or cross-subsidize poorly performing affiliates using various forms of intra-group transactions, including cash injections, debt guarantees, and/or equity investments. Khanna and Yafeh (2005) find evidence of the risk-sharing role of business groups in several emerging economies including Brazil, Korea, Taiwan, Thailand, and India. Thus, we propose the following hypothesis of the risk-sharing role played by business groups:

Hypothesis 2. Group-affiliated firms in China are more likely to share risk than independent ones.

We adopt two proxies for risk sharing: operating profit volatility and likelihood of bankruptcy or financial distress. To implement the test, we develop the following two hypotheses.

Hypothesis 2a. Group-affiliated firms in China are more likely to have a lower level of operating profit volatility than independent ones.

The mutual insurance among group-affiliated firms leads to their smoother operating performance. We compare the volatility of operating profitability of group affiliates with that of otherwise comparable unaffiliated companies using the following specification:

$$StdOp_i = \alpha + \beta_1 Size_i + \beta_2 Op_i + \beta_3 BG_i + u_i. \tag{2}$$

StdOp is the standard deviation of each firm's operating profit, and *OP* is the firm's average operating profit. The standard deviation of profit is calculated based on the number of time series observations available. Thus, different firms may have periods of different length. We adopt weighted regression, where the number of observations per firm is used as the weight. *BG* is a dummy variable to denote group affiliation. If Hypothesis 2a holds, then we expect a negative β_3, which implies that group affiliation plays a role in smoothing operating performance.

Hypothesis 2b. Group-affiliated firms in China are less likely to face bankruptcy or financial distress than independent ones.

Khanna and Yafeh (2005) show that Indian business groups smooth liquidity across firms through intra-group loans. Kim and Hoskisson (1996) argue that business groups represent a risk-sharing mechanism through which distressed firms receive assistance from member firms. If group support is effective in preventing firm default, then group-affiliated firms are likely to have a lower incidence of bankruptcy or likelihood of financial distress than stand-alone firms. Based on the bankruptcy prediction literature, we use financial ratios that are intended to capture firm profitability, liquidity, and market value as controls. We run the following pooled multivariate logistic regression:

$$Logit\ \ p(Bankruptcy_{it} = 1) = \alpha + \gamma\, Firm\ \ Financials_{it} + \beta BG_{it} + industry + time + u_{it}. \tag{3}$$

[9] Hoshi et al. (1991) argue that it is an "accelerator effect," which is important in the empirical investment literature despite the lack of compelling theoretical support. They refer to Jorgenson (1971), saying that real output emerges as the single most important determinant of investment. Schiantarelli and Georgoutsos (1987) note that when firms have a monopoly, power lagged production should be related to current investment. Given that we do not have precise data on firms' financial goods inventories, following Hoshi et al. (1991), we use sales, which is scaled by total assets, in the role of production variable.

Bankruptcy is a dummy that equals 1 if a firm is designated for special treatment (ST) or particular transfer (PT) by the regulatory authorities in the year concerned, and 0 otherwise.[10] According to the rules governing ST designation, if an ST firm cannot turn its business around and make a profit in two years, then it will be delisted. The firm's financial ratios we use are: Net Income/Total Assets, Working Capital/Total Assets, and Market Value of Equity/Total Liabilities. We also include Size, and Leverage, as measured by Debt/Total Assets. If the risk-sharing function of business affiliation is effective, then β should be significantly negative.

3.3. Business groups and firm performance

Business groups can exert both a positive and a negative impact on firm performance; hence, it is not clear whether they should be cast as "paragons or parasites" (Khanna and Yafeh, 2007). As discussed above, an internal capital market provides funding and an insurance advantage to group affiliates. Business groups can also attain sufficient scope and scale to internalize soft market infrastructure and offer services such as management training, finance, technology, marketing, and logistics services to their affiliates (Fisman and Khanna, 2004). However, business group affiliation can create severe agency problems, and thus destroy firm value. The complex structure of business groups is conducive to self-dealing transactions and makes it difficult for outside investors to monitor these transactions. As a result, group-affiliated firms have more opportunities and tools than unaffiliated firms to divert firm resources through related party transactions at the expense of minority shareholders. These agency problems can be exacerbated in an environment of weak disclosure requirements, poor corporate governance, and lax law enforcement, and in an inefficient market for corporate control. In summary, business groups can expropriate minority shareholders, engage in rent-seeking behavior, exert market power, and act as internal capital markets to subsidize poorly performing affiliates or new ventures. Therefore, it is hard to draw a clear-cut conclusion regarding the net advantage of group affiliation for the operation and performance of members of business groups.

The results of research that gauges the relative performance of group-affiliated firms are mixed. Prowse (1992) reports that the return on assets is lower among Japanese keiretsu firms than among non-keiretsu firms, and Lins and Servaes (1999) find that keiretsu-affiliated Japanese firms experience a value loss due to conglomerating. In contrast, Chang and Choi (1988) find that the firms affiliated with a diversified group in Korea are more profitable, and Khanna and Palepu (2000a, 2000b) find that in India and Chile, the firms of the most diversified business groups outperform all other firms. Khanna and Rivkin (2001) determine that group affiliation is positively associated with performance in some countries whereas its effect is either negative or insignificant in others.

Thus, ex ante, it is unclear whether members of business groups outperform independent firms. If the net advantage of business group affiliation is positive, then we would expect to find that group-affiliated firms tend to outperform unaffiliated ones. However, if the net advantage of such affiliation is negative, then we would expect to find that group-affiliated firms tend to underperform unaffiliated ones. Therefore, our hypothesis is nondirectional, and we address this issue empirically:

Hypothesis 3. The performance of group-affiliated firms in China is systematically different from that of independent ones.

To address Hypothesis 3 econometrically, we run the following regression model to investigate the relationship between firm performance and business group affiliation after controlling for a number of other firm characteristics including firm size, cash flow, beta risk, and capital structure,

$$Performance_{it} - \alpha + \beta_1 BG_{it} + \beta_2 \frac{CF_{it}}{I_{it-1}} + \beta_3 Size_{it} + \beta_4 Beta_{it} + \beta_5 \frac{LTD_{it}}{K_{it-1}} + \beta_6 \frac{STD_{it}}{K_{it-1}} + u_{it}. \quad (4)$$

We use the stock market (Tobin's Q) and accounting measures (ROA and ROE) of performance to determine the effects of group affiliation. We define Tobin's Q as the ratio of a firm's market value to book value. ROA is the ratio of a firm's net income to the beginning-of-period total assets. ROE is defined as the ratio of a firm's net income to the beginning-of-period book equity value. Size is defined as a firm's logarithmic total assets. Beta is a firm's stock beta coefficient on market index during the past 100 weeks. LTD is long-term debt, and STD is short-term debt. Other variable definitions are the same as the previous specifications. Our focus is on the estimate of β_1. Its sign and magnitude imply the net advantage of affiliation to a business group in China.

3.4. Business groups and institutional factors

In Section 2, we explain that the Chinese state-dominated financial system favors state-owned firms. Private firms receive low priority from either the banking sector or equity markets in getting external funding for their investment projects. Therefore, if a private firm is group affiliated, then it is likely to show a greater marginal effect than a state-owned firm, ceteris paribus. Business

[10] The special treatment (ST) system was introduced by the China Securities and Regulatory Commission in 1998. Under this system, a listed company is labeled an ST firm if it has experienced financial losses for two consecutive fiscal years or is technically insolvent. If it cannot return to profit-making status within two years after being labeled an ST firm, then it is labeled a particular transfer (PT) firm, the shares of which can only be traded on Friday, or may even face de-listing.

groups are likely to serve as internal capital markets for group members, mitigating the financial constraints faced by private firms in China by providing insurance and cross funding to them. Hence, we posit the following hypothesis:

Hypothesis 4. The role played by business groups in China as internal capital markets and in risk sharing and firm performance is more pronounced among private than among non-private firms.

To test this hypothesis, we first identify each firm's ultimate controller. We design a dummy variable that equals 1 if the ultimate controller is an individual, and 0 if the firm is ultimately controlled by the central or a local government or government agency. We adopt the following two approaches to investigate ownership effects. First, we partition our sample into two subsamples based on ownership type, and then compare the coefficients between these subsamples. Second, we include an interaction term between the group-affiliation and ownership dummies to capture the incremental effect of ownership type on the role played by business groups.

Developments in the financial market play a role in reducing the cost of external financing and in reducing asymmetric information problems. We expect that financial market development will reduce the disparity between the costs of external and internal financing and thereby mitigate financial constraints. Laeven (2003) finds that financial liberalization relaxes financing constraints on firms, especially small ones, while Love (2003) provides evidence that financial development influences growth by reducing financial constraints. One important feature of the Chinese economy is that decentralization has led to great heterogeneity across localities in terms of the level of market development and institutional quality. Based on this, we propose the following hypothesis:

Hypothesis 5. The role played by business groups in China as internal capital markets and in risk sharing and firm performance is more significant among firms that are located in regions or provinces with a lower level of market development than among those located in regions or provinces with a higher level of market development.

To determine whether the effects of business groups differ under different market environments, we use an index of market intermediaries and legal environment. The index covers the development score for each province and major municipality (Fan and Wang, 2001). Compiled by China's National Economic Research Institute (NERI), it includes a number of subindexes of the percentages of lawyers and certified public accountants to the total population, market order, legal enforcement efficiency, intellectual property rights protection, and consumer rights protection. We partition the sample into two groups based on the index, one below and the other above the median. We run regressions for each specification using the two subsamples to test Hypothesis 5.

4. Data sources and sample selection

4.1. Group identification

Our sample includes all firms listed on either the Shanghai or the Shenzhen Stock Exchange. The information on each firm's group affiliation is from an annual survey conducted by the China Securities Regulatory Commission (CSRC). The survey covers the period from the beginning of the Chinese capital market to 2006. It is to some extent a mandatory or administrative requirement for listed firms to report their group affiliation information to the CSRC, including ownership structure, ultimate controlling shareholder, and other related listed firms within the same group. Unfortunately, we have no access to the dataset after 2006.

Based on the dataset from the CSRC, we identify a firm's group-affiliation in each year if its ultimate controlling entity had more than one firm in that year. Therefore, we can identify each firm's group affiliation and the affiliation and disaffiliation years. Thus, we have the full picture of a specific group's evolution.

Because comprehensive cash flow information of Chinese listed firms is available from 1998 onward, we restrict our sample period to begin in 1998, even though we have group information that year before.

Table 1, together with Figs. 2 and 3, illustrates the distribution of the business groups and affiliated listed firms over time. Column 2 in Panel A shows that the number of groups increased from 41 in 1998 to 141 in 2006. Of the 100 new groups created in nine years, most formed after 2000. The average number of firms in each group is slightly more than three, as shown in column 3, and the median numbers given in column 4 show that most groups have three listed firms each year. In our group sample, the smallest groups have at least two listed firms, while the number of affiliated listed firms for the largest groups varies from 11 in 1998 to 14 in 2006. We count the numbers of group-affiliated and unaffiliated firms and report the numbers of newly affiliated and disaffiliated firms each year in Panel B. For example, in 1998, there were 931 listed firms on the Shanghai and Shenzhen Stock Exchange, of which 778 were classified as stand-alone firms and 153 as group-affiliated ones. Among them, five firms are added in that year. From column 4, we find that most group-affiliated firms joined a business group between 2000 and 2005. Column 5 shows that group-affiliated firms were less likely to become disaffiliated from a group in the early years. In 2002, three group-affiliated firms disaffiliated from their groups, and seven to eight firms did so in each of the following three years. This number more than doubled to 19 in 2006. This may explain to some extent why the average number of firms in each group dropped in 2006, as shown in Fig. 2. More intuitively, Fig. 3 shows the proportion of group-affiliated versus unaffiliated firms over time. The proportion of group-affiliated firms grew continuously from more than 15% in 1998 to more than 30% in 2005 and

Table 1
Basic statistics of the business groups and the affiliated listed firms. This table shows the basic statistics of the business groups and the affiliated listed firms in our sample from 1998 to 2006. In Panel A, we count the number of existent groups in each year and report the average, median, minimum, and maximum numbers of affiliated firms each year. In Panel B, we compare the number of group- versus non-group-affiliated firms, as well as the number of firms that join and leave the groups each year.

Panel A: Business group information in each year

[1]	[2]	[3]	[4]	[5]	[6]
Year	No. of groups	Avg no. of firms	Median no. of firm	Min no. of firms	Max no. of firms
1998	41	3.4634	3	2	11
1999	42	3.7381	3	2	12
2000	51	3.6863	3	2	12
2001	67	3.7164	3	2	13
2002	80	3.7625	3	2	14
2003	99	3.6768	3	2	14
2004	113	3.6903	3	2	14
2005	124	3.6935	3	2	14
2006	141	3.4894	3	2	14
Total	141	3.4894	3	2	14

Panel B: Number of group- versus non-group-affiliated firms in each year

[1]	[2]	[3]	[4]	[5]	[6]
Year	Non-group-affiliated	Group-affiliated	Initiation	Exit	Total
1998	778	153	5	.	931
1999	848	183	19	.	1031
2000	934	240	35	.	1174
2001	964	289	35	.	1253
2002	968	350	50	3	1318
2003	973	404	48	7	1377
2004	1028	445	38	7	1473
2005	997	478	38	8	1475
2006	1047	479	19	19	1526

remained above 30% in 2006, although it dropped slightly compared with the numbers in previous years. The drop is driven by some firms disaffiliating from their groups.

4.2. Financial information

We get all financial information from the GTA Research Service Centre. The definition and calculation of each variable have been discussed in Section 3. Here we illustrate how to construct Tobin's Q. The traditional definition of Tobin's Q is the ratio of a firm's market value to book value. However, some shares were not tradable in China before 2006. Even though these shares had nominal market prices, like other trading shares, they were not tradable in the market. To address this issue, we calculate a firm's market value by summing up the following three components: the market value of the trading shares, the book value of the non-trading shares,[11] and the book value of the firm's total liability. We divide the sum by the firm's total assets to proxy the firm's Tobin's Q. In addition, some firms in our sample have H-shares listed on the Hong Kong Stock Exchange. These should be included when calculating a firm's market value. We get the market value of H-share stock from the Thomson Financial database.

4.3. Ownership dummy and proxy for institutional factors

We construct a firm ownership dummy by identifying the ultimate controlling shareholder. The dummy variable equals 1 if the controlling party is an individual person, employee shareholder, foreign company, or collective enterprise, and 0 if the controlling shareholder is the central or a local government, or a central or local State Assets Supervision and Administration Commission (SASAC).

As noted in Section 3, we use the m-index developed by Fan and Wang (2001) to construct an institutional dummy. We partition our sample into two groups: one with a higher-than-median m-index (high m-index region) and the other with a lower-than-median m-index (low m-index region). If a firm's headquarters is located in a high m-index region, then the firm's institutional dummy takes a value of 1; if it is located in a low m-index region, then the firm's institutional dummy takes a value of 0.

As reported in Table 1, the numbers of listed firms in China's stock market, both stand-alone and group-affiliated, are increasing due to new IPOs over time. There were 1526 listed firms by the end of 2006. Our main empirical design is panel data regression. We want to keep our panel data structure balanced. In other words, for each firm in our sample, there should be nine

[11] We first calculate the proportion of a firm's non-trading shares of its total shares, and then we apply that ratio to the firm's total book equity value (net asset value) to get the estimated book value of the non-trading shares.

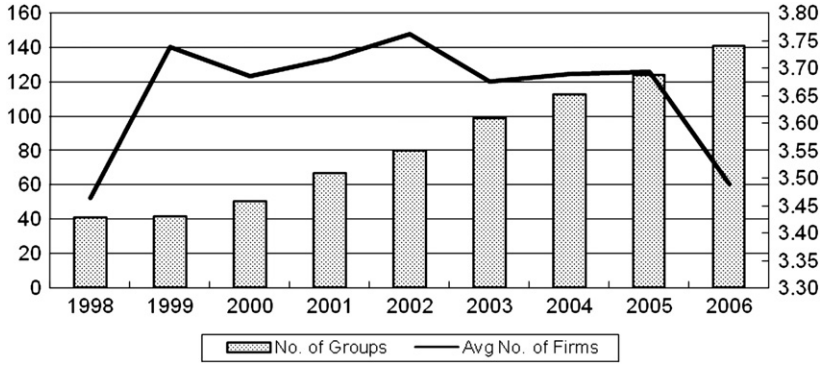

Fig. 2. Number of groups and average number of firms in each group.

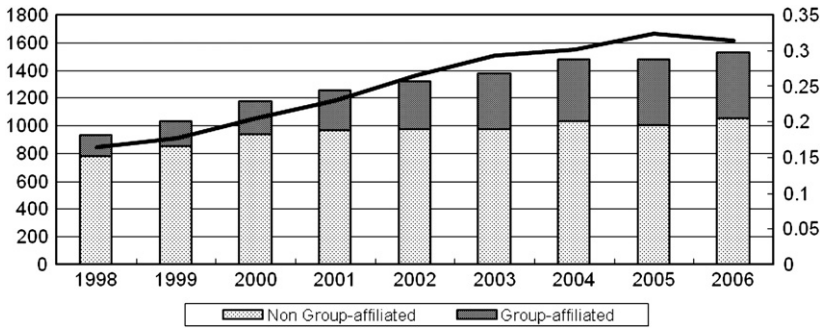

Fig. 3. Proportion of group-affiliated and non-group-affiliated firms.

annual observations from 1998 to 2006. Our basic sample size is reduced to 931, which is the total number of stocks in 1998. After we delete 4 financial firms, 927 firms are left. In addition, because many firms are listed in both A- and B-share markets, our basic sample has double-counted them, with 784 firms left after consolidation. Finally, we delete those firms with missing observations. Thus, our final sample size includes 629 non-financial firms with 9 annual observations from 1998 to 2006. In our ownership and market development tests, the sample sizes change slightly according to the data availability of ownership and market development.[12] We use fixed-effects OLS with a year dummy for the following empirical analysis.

Table 2 shows the descriptive statistics. Panel A summarizes the key variables of the group-affiliated and unaffiliated firms in each year, including investment, cash flow, Tobin's Q, cash holdings, sales, and leverage. We find that some variables have a higher standard deviation in some years than in others. This could be caused by outliers. Therefore, we calculate the median and perform the median difference test when we compare those variables between the group-affiliated and unaffiliated firms. The results are shown in Panel B. We find that group-affiliated firms have a higher degree of investment, cash flow, cash holding, sales, and leverage and a lower Tobin's Q than unaffiliated ones. However, the significance of the relation varies from year to year. We report the correlation results in Panel C. First, we investigate the correlation between investment and Tobin's Q (lagged). They are positively correlated as documented in the prior literature, and the year-by-year analysis shows that the correlation is marginally significant. We are more interested in the difference in the correlation of investment with cash flow between the group-affiliated and unaffiliated firms. However, the result is not stable. Group-affiliated firms generally show a more positive correlation between investment and cash flow than unaffiliated firms do; however, year-by-year analysis shows that from 1998 to 2001 and in 2004, the investment of group affiliates is less positively correlated with their cash flow. This suggests that it is critical to include other control variables and the time effect in the following regression analysis.

5. Empirical results

5.1. Business groups and financial constraints

Table 3 shows the results for the baseline estimation for Hypothesis 1. We first run several regressions using the whole sample and subsamples without any interaction term. The results are shown in Panel A. Columns 1 to 4 report the investment–cash flow

[12] The main test sample is for financial constraint regression. For other test samples, the number of firms may vary as some firm ownership structure or institutional factors are missing, or other financial items used in one specific regression (e.g., the performance test) are missing.

Table 2
Descriptive statistics. This table presents the descriptive statistics of several key variables of the group- and non-group-affiliated firms in each year from 1998 to 2006. Investment and Cash Flow are scaled by beginning-of-period capital stock, Cash Holding and Sales are scaled by beginning-of-period total assets, Tobin's Q is measured as the market-to-book ratio, and Leverage is measured as the total liabilities-to-total assets ratio. Panel A presents the observation number, mean, median, and standard deviation of each variable. Panel B lists the median difference between the group- and non-group-affiliated firms in each year, as well as the *p*-values. Panel C analyzes the correlation between Investment and lagged Tobin's Q, and Investment and Cash Flow for the group- and non-group-affiliated samples.

Panel A: Basic statistics

		Investment			Cash flow			Tobin's Q			Cash holding			Sales			Leverage		
Year	N	Mean	Median	Std dev	Mean	Median	Std dev	Mean	Median	Std dev	Mean	Median	Std dev	Mean	Median	Std dev	Mean	Median	Std dev
Non-group-affiliated																			
1998	527	0.4774	0.1720	0.9212	0.8082	0.3754	3.8491	1.5245	1.4463	0.4104	0.1211	0.0873	0.1201	0.6287	0.4750	0.5696	0.4164	0.4119	0.1773
1999	515	0.3358	0.1031	0.9074	0.5614	0.2917	2.9262	1.6397	1.5130	0.5957	0.1363	0.1056	0.1305	0.5702	0.4579	0.4544	0.4343	0.4139	0.2118
2000	487	0.4100	0.1180	2.9701	0.6434	0.2599	4.9846	2.0744	1.9057	0.7740	0.1749	0.1223	0.1846	0.6223	0.4670	0.6495	0.4566	0.4355	0.2341
2001	467	0.3336	0.1351	0.8647	0.4093	0.2108	2.6224	1.7843	1.6104	0.6851	0.1682	0.1324	0.1392	0.5581	0.4459	0.4916	0.4953	0.4589	0.3951
2002	436	0.3501	0.1418	1.4027	0.2945	0.1893	3.0203	1.5573	1.3719	0.5744	0.1523	0.1185	0.1283	0.5838	0.4586	0.5816	0.5088	0.5007	0.2662
2003	412	0.2806	0.1698	0.4352	0.3492	0.1881	1.7901	1.3794	1.2577	0.4367	0.1561	0.1260	0.1534	0.6661	0.4763	0.7092	0.5415	0.5247	0.3089
2004	395	0.2838	0.1216	0.9320	0.4423	0.1880	1.7454	1.2666	1.1598	0.5245	0.1355	0.1052	0.1156	0.6705	0.5260	0.5645	0.5928	0.5444	0.8413
2005	378	0.2619	0.1163	0.7749	0.3056	0.1657	1.4085	1.1922	1.0883	0.5662	0.1226	0.0932	0.1251	0.6642	0.5033	0.6069	0.6562	0.5784	0.9060
2006	377	0.5488	0.1152	4.3085	0.4261	0.1902	1.8992	1.5518	1.2596	2.9650	0.1360	0.1001	0.1837	0.7202	0.5281	0.6929	0.6330	0.5726	0.6147
All	3994	0.3671	0.1310	1.8737	0.4864	0.2228	3.0099	1.5710	1.3804	1.0955	0.1451	0.1088	0.1450	0.6272	0.4742	0.5928	0.5164	0.4861	0.4917
Group-affiliated																			
1998	102	0.3968	0.1833	0.5922	1.2492	0.3672	7.1218	1.4126	1.2494	0.5466	0.1822	0.1262	0.1885	0.6897	0.5633	0.5421	0.4287	0.4309	0.1713
1999	114	0.2810	0.1549	0.4526	1.9742	0.3175	15.2969	1.4739	1.3403	0.6433	0.1664	0.1449	0.1126	0.6206	0.5720	0.3476	0.4580	0.4694	0.1787
2000	142	0.5490	0.1397	2.3660	1.7546	0.3135	12.8001	1.9817	1.7651	0.9382	0.1941	0.1483	0.1738	0.6146	0.5426	0.3792	0.4690	0.4718	0.1778
2001	162	0.3260	0.1806	0.5968	0.5444	0.2388	1.5680	1.7677	1.5815	0.6874	0.2096	0.1622	0.1687	0.6464	0.5272	0.5746	0.5041	0.4959	0.3616
2002	193	0.3804	0.1717	1.0531	0.5102	0.2560	1.5890	1.5517	1.3700	0.5420	0.1919	0.1636	0.1382	0.7404	0.5806	0.6156	0.5273	0.4903	0.4027
2003	217	0.2985	0.1746	0.4209	0.2900	0.2532	0.9451	1.3750	1.2615	0.4194	0.1903	0.1484	0.1382	0.7832	0.6290	0.6096	0.5294	0.5119	0.3469
2004	234	0.2665	0.1715	0.3505	0.4869	0.2057	1.8368	1.2330	1.1626	0.3318	0.1618	0.1436	0.1109	0.8322	0.6577	0.7843	0.5508	0.5355	0.3495
2005	251	0.2586	0.1155	0.9414	0.5699	0.1691	2.9223	1.1636	1.0882	0.3507	0.1520	0.1201	0.1267	0.8550	0.6238	1.1411	0.5861	0.5576	0.4665
2006	252	0.3032	0.1038	1.7597	0.5981	0.1885	2.0516	8.3506	1.2750	109.4605	0.1559	0.1182	0.1539	0.8753	0.6758	0.9119	4.1210	0.5657	55.2263
All	1667	0.3270	0.1494	1.1477	0.7552	0.2336	6.0087	2.4971	1.2776	42.5625	0.1756	0.1409	0.1452	0.7653	0.6081	0.7599	1.0650	0.5121	21.4773

Panel B: Median difference analysis

	Investment		Cash flow		Tobin's Q		Cash holding		Sales		Leverage	
	Diff	*p*-Value	Diff	*p*-Value	Diff	*p*-Value	Diff	*p*-Value	Diff	*p*-Value	Diff	*p*-Value
1998	−0.0113	0.9860	0.0082	0.9566	0.1969	0.0001	−0.0389	0.0003	−0.0883	0.1873	−0.0190	0.3170
1999	−0.0518	0.0546	−0.0258	0.4966	0.1727	0.0001	−0.0393	0.0006	−0.1141	0.0072	−0.0555	0.0477
2000	−0.0217	0.2510	−0.0536	0.0943	0.1406	0.0075	−0.0260	0.0126	−0.0756	0.0839	−0.0363	0.1323
2001	−0.0455	0.1945	−0.0280	0.0243	0.0289	0.3452	−0.0298	0.0006	−0.0813	0.0123	−0.0370	0.2188
2002	−0.0299	0.1691	−0.0667	0.0001	0.0019	0.6789	−0.0451	0.0000	−0.1220	0.0001	0.0104	0.9520
2003	−0.0048	0.2868	−0.0651	0.0375	−0.0038	0.8897	−0.0224	0.0001	−0.1527	0.0001	0.0128	0.3767
2004	−0.0499	0.0327	−0.0177	0.2911	−0.0028	0.5419	−0.0384	0.0003	−0.1317	0.0005	0.0089	0.8158
2005	0.0008	0.5907	−0.0034	0.4694	0.0001	0.8132	−0.0269	0.0016	−0.1205	0.0002	0.0208	0.1210
2006	0.0114	0.4764	0.0017	0.2115	−0.0154	0.3897	−0.0181	0.0167	−0.1477	0.0004	0.0069	0.4977
All	−0.0184	0.02821	−0.0108	0.1055	0.1028	<0.0001	−0.0321	<0.0001	−0.1339	<0.0001	−0.0260	<0.0001

Panel C: Correlation analysis

	Investment vs. Tobin's Q (lagged)			Investment vs. cash flow					
				Non-group-affiliated			Group-affiliated		
	N	Corr	*p*-Value	N	Corr	*p*-Value	N	Corr	*p*-Value
1998	.	.	.	527	0.3314	<.0001	102	−0.0094	0.9256
1999	629	0.2571	<.0001	515	0.6310	<.0001	114	0.1396	0.1385
2000	629	0.0738	0.0643	487	0.9605	<.0001	142	0.9428	<.0001
2001	629	0.0672	0.0924	467	0.3824	<.0001	162	0.2467	0.0016
2002	629	0.0116	0.7709	436	0.4018	<.0001	193	0.6791	<.0001
2003	629	−0.0065	0.8712	412	−0.0939	0.0560	217	−0.2292	0.0007
2004	629	0.0288	0.4702	395	0.1845	0.0002	234	0.1068	0.103
2005	629	0.0093	0.8165	378	0.1749	0.0006	251	0.7010	<.0001
2006	629	−0.0062	0.8763	377	0.2440	<.0001	252	0.6165	<.0001
All	5661	0.0309	0.0282	3994	0.4653	<.0001	1667	0.4753	<.0001

sensitivity for the full sample. Then we conduct a similar estimation for the group-affiliated and unaffiliated subsamples, as shown in columns 5 to 12, respectively. We find that the group-affiliated firms have a significantly lower level of investment–cash flow sensitivity (around 0.12) than the unaffiliated ones (around 0.44), which implies that group affiliates face fewer financial constraints than unaffiliated firms. Then we introduce an interaction term between cash flow and group dummy into the regression as in specification (1). The interaction term coefficients in both columns 2 and 3 of Panel B (without and with cash holding, sales, and leverage as the control variables) are negative and statistically significant, being consistent with the findings in Panel A. Therefore, business groups in China do indeed serve as internal capital markets and play a very important role in mitigating the financial constraints faced by member firms.

We then examine the impact of ownership type on the role of internal capital market played by business groups. In Panel A in Table 4, we look at all group-affiliated firms[13] and then separate them into state-owned and private ones. As shown in columns 1 and 2, the state-owned group affiliates face fewer financial constraints than the private group firms do. Their investment–cash flow sensitivities are 0.11 and 0.37, respectively. We then separate the unaffiliated from the affiliated firms in each category. A comparison of columns 3 and 4 reveals that if a private firm is affiliated with a group, then it has a higher level of investment–cash flow sensitivity than if it is not. It is a little surprising to find that group affiliation does not ease the financial constraints of private firms. In contrast, among the state-owned firms, those which are group affiliated are less likely to be financially constrained than unaffiliated ones, as shown in columns 5 and 6. The results suggest that a business group serves as an internal capital market for state-owned affiliated firms. However, the single subsample comparison may not be able to directly capture the effect of switching in group affiliation because we are using panel data. Therefore, in Panel B of Table 4, we add two interaction terms to the basic regression specification in Panel A. The coefficient of the interaction term between cash flow and group dummy is significantly negative, whereas the coefficient of the three-way interaction among cash flow, group dummy, and ownership dummy (1 if private) is significantly negative. We interpret the result to mean that if a firm is a group affiliate, then its investment will be less sensitive to its cash flow. However, the role of internal capital market played by a business group is more pronounced among private business groups, which is consistent with Hypothesis 4. In order to distinguish the different roles played by business group in central and local government SOEs, we further construct two dummies for central and local government SOEs, respectively. The comparison of coefficients for three-way interaction among cash flow, group dummy, and central/local government ownership dummies (columns 3 and 4) reveals that the role of internal capital market played by a business group is more significant for the firms owned by local governments. In column 5, we run the regression in the state-owned subsample, and the coefficient of the three-way interaction among cash flow, group dummy, and central government ownership dummy has the expected signs, though it is not statistically significant.

In Table 5, we see how institutional factors shape the role of internal capital market played by a business group. Again, we first separate all group-affiliated firms into two subsamples: firms in regions with a lower level of market development (average m-index from 1999 to 2002 is below the median level), and firms in regions with a higher level of market development (average m-index from 1999 to 2002 is above the median level). In columns 1 and 2, the results show that the level of investment–cash flow sensitivity is lower among group-affiliated firms located in regions with a higher level of market development (0.11 versus 0.38). Then we divide all firms into two groups based on the m-index and further partition each into group-affiliated and unaffiliated subsamples. We find that among firms in regions with a low level of market development, group affiliates face more financial constraints (investment–cash flow sensitivity = 0.64), whereas among firms in regions with a higher level of market development, group affiliates face fewer financial constraints (investment–cash flow sensitivity = 0.12). We then include an interaction term among cash flow, group dummy, and m-index dummy (1 if the m-index is above the median level) in Panel B. The coefficients of the interaction term are both negative but not statistically significant, as shown in column 2. A group affiliate in a highly developed region tends to have fewer financial constraints than one in a poorly developed region. This finding is not consistent with Hypothesis 5. That is, business groups in China do not make up for an underdeveloped institutional environment, as suggested by Khanna and Palepu (2000b). La Porta et al. (1999) and Morck et al. (2005) argue that tunneling among group members in a pyramid structure can allow one firm to be propped up at the expense of other "weak" members in the group. A poor institutional environment not only makes external capital markets inefficient but it can also discount the role of business groups as internal capital markets. Although business groups can bring greater financial freedom to member firms in a weak institutional environment, the degree of such freedom is limited by the poor environment. This finding indicates that developed institutions are necessary for the operational efficiency of internal capital markets.

5.2. Business groups and risk sharing

We investigate the risk-sharing role of business groups by estimating specifications (2) and (3), which are discussed in Section 3. The dependent variable of regression (2) is profit volatility (*StdOp*), which is measured as the standard deviation of a firm's yearly operating profit over the sample period. We also include control variables profit (*Op*), size (*Size*), and industry dummies. Profit is defined as the average yearly operating profit over the sample period. Size is defined as the average yearly total assets over the same period from 1998 to 2006. In contrast to the other specifications, it is a cross-sectional rather than a panel structure. However, as described in Section 3, we identify a group dummy for each firm year. Some firms are group affiliated for the whole sample period from 1998 to 2006, whereas others are affiliated only for certain years over the sample period. Therefore,

[13] All group-affiliated firms include firms that were in a business group for at least one year between 1998 and 2006.

Table 3
Business groups and financial constraints. This table shows the role of internal capital market as played by a business group. The sample period is from 1998 to 2006. The dependent variable is Investment, scaled by beginning-of-period capital stock. Cash Flow is scaled by beginning-of-period capital stock, Cash Holding and Sales are scaled by beginning-of-period total assets, Leverage is measured as the total liabilities-to-total assets ratio, and Tobin's Q is measured as the market-to-book ratio (we use its lagged value in the regression). Panel A reports the results of the fixed-effects OLS model for the whole sample and subsamples. Columns 1 to 4 show the results for the whole sample, columns 5 to 8 show those of only the stand-alone firms, and columns 9 to 12 show those of only the firms that are affiliated with a business group. Panel B adds the interaction term between Cash Flow and the business group dummy. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: Subsample comparison

	All Sample				Non-group-affiliated				Group-affiliated			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Tobin's Q	0.1212*		0.1034*	0.1273**	0.1072		0.2227**	0.2255**	0.1402**		0.0831*	0.0940*
	(0.062)		(0.058)	(0.063)	(0.101)		(0.088)	(0.103)	(0.056)		(0.050)	(0.050)
Cash flow		0.1707***	0.1708***	0.1674***		0.4185***	0.4208***	0.4172***		0.0604***	0.0601***	0.0585***
		(0.008)	(0.008)	(0.008)		(0.016)	(0.016)	(0.016)		(0.005)	(0.005)	(0.005)
Cash flow (−1)		0.0289***	0.0286***	0.0279***		0.0231	0.0218	0.0205		0.0610***	0.0608***	0.0606***
		(0.008)	(0.008)	(0.008)		(0.016)	(0.016)	(0.015)		(0.005)	(0.005)	(0.005)
Cash holding				1.3590***				2.0882***				0.5678***
				(0.214)				(0.331)				(0.182)
Sales				−0.1358**				−0.3058**				−0.0551
				(0.063)				(0.122)				(0.044)
Leverage				−0.0663				−0.0301				−0.0528
				(0.078)				(0.104)				(0.105)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of stock	629	629	629	629	354	354	354	354	275	275	275	275
R-square	0.00259	0.181	0.182	0.188	0.00228	0.270	0.273	0.281	0.00710	0.266	0.268	0.274

Panel B: Interaction analysis

	[1]	[2]	[3]
Cash flow	0.2720***	0.2722***	0.2689***
	(0.010)	(0.010)	(0.010)
Cash flow (−1)	0.1171***	0.1168***	0.1161***
	(0.009)	(0.009)	(0.009)
(Cash flow + cash flow (−1)) * *BG*	−0.1313***	−0.1315***	−0.1314***
	(0.008)	(0.008)	(0.008)
Tobin's Q		0.1114**	0.1231**
		(0.056)	(0.061)
Cash holding			1.3533***
			(0.208)
Sales			−0.1600***
			(0.061)
Leverage			−0.0276
			(0.076)
Time effect	Yes	Yes	Yes
Number of stock	629	629	629
R-square	0.230	0.232	0.238

we introduce three types of group dummies to distinguish them. The first dummy variable is *BG*_1, which equals 1 if a firm is in a group throughout the whole sample period; that is, nine years, and 0 otherwise. The second one is *BG*_2, which equals 1 if a firm stays in a group for less than nine years, and 0 otherwise. We use *BG* to denote group affiliation in general, which equals 1 once the firm has been in a group, and 0 otherwise; that is, *BG* includes both *BG*_1 and *BG*_2. The estimation is conducted by OLS weighted by the number of observations of each firm in calculating its average financial items and profit volatility.

Panel A in Table 6 presents the estimation results. Column 1 shows that although the coefficient of *BG* is positive, it is not statistically significant. However, in column 2, we can see that the effect of *BG*_1 is significantly negative, which means that a firm that is group affiliated throughout the whole sample period has a lower level of profit volatility, ceteris paribus. Group affiliation has a negative effect on the standard deviation of operating profitability. When using the group dummy *BG*_1, we find a significantly positive coefficient. If *BG*_2 takes a value of 1, then a firm has experienced a switch from being group affiliated to unaffiliated or vice versa. Regime switching itself could result in a higher level of profit volatility.

Panel B shows the estimation results of the above regressions using the state-owned and private subsamples. The coefficient of *BG* is not significant for state-owned firms, whereas it is significantly positive for private ones. We then partition *BG* into *BG*_1 and *BG*_2. The coefficient of *BG*_1 is significantly negative for both state-owned and private firms, and the magnitude is relatively higher for private ones. If we use *BG*_2 as the group dummy, then the effects are significantly positive for both state-owned and private firms. We conclude that the role of business groups in reducing profit volatility is more pronounced among private group affiliates, which supports Hypothesis 4. This could be because maintaining listing status is more valuable among private firms. The

Table 4
Business groups, financial constraints, and ownership type. This table shows the effect of ownership type on the role of internal capital market as played by a business group. The sample period is from 1998 to 2006. The dependent variable is Investment, scaled by beginning-of-period capital stock. Cash Flow is scaled by beginning-of-period capital stock, Cash Holding and Sales are scaled by beginning-of-period total assets, Leverage is measured as the total liabilities-to-total assets ratio, and Tobin's Q is measured as the market-to-book ratio (we use its lagged value in the regression). Panel A reports the results of the comparison of the fixed-effects OLS model for the different subsamples. In columns 1 and 2, we divide all group-affiliated firms into state-owned and private. In columns 3 and 4, we divide all private firms into non-group and group examples. In columns 5 and 6, we divide all state-owned firms into non-group and group examples. Panel B shows the results of the interaction analysis. We construct an ownership dummy that takes a value of 1 if a firm is private, and 0 otherwise. This then interacts with Cash Flow and the business group dummy (column 2). We also construct central and local government ownership-type dummies, respectively, to distinguish the different roles played by business groups in local and central SOEs in columns 3 to 5, with column 5 using only the SOE subsample. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: Subsample comparison

	All group-affiliated		Private		State-owned	
	State-owned	Private	Non-group	Group	Non-group	Group
	[1]	[2]	[3]	[4]	[5]	[6]
Cash flow	0.0618***	0.1523***	0.0314**	0.0485***	0.5086***	0.3053***
	(0.005)	(0.033)	(0.015)	(0.014)	(0.019)	(0.012)
Cash flow (−1)	0.0478***	0.2215***	0.0330**	0.0719***	−0.0347**	0.0437***
	(0.005)	(0.024)	(0.014)	(0.014)	(0.018)	(0.012)
Tobin's Q	0.1136**	0.0189	0.1651**	−0.0523	−0.1536	0.0454
	(0.050)	(0.148)	(0.076)	(0.370)	(0.128)	(0.039)
Cash holding	0.5782***	0.3632	1.2408***	−0.6339	2.3279***	0.8622***
	(0.184)	(0.531)	(0.272)	(1.138)	(0.386)	(0.145)
Sales	−0.0332	−0.0126	−0.0118	0.2374	−0.2192*	−0.0501
	(0.040)	(0.225)	(0.113)	(0.593)	(0.117)	(0.042)
Leverage	−0.1111	0.1602	−0.0766	0.1395	−0.6426*	−0.1437**
	(0.103)	(0.325)	(0.062)	(0.747)	(0.331)	(0.073)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Number of stock	193	64	157	65	350	197
R-square	0.353	0.302	0.0487	0.344	0.316	0.345

Panel B: Interaction analysis

	[1]	[2]	[3]	[4]	[5]
Cash flow	0.2689***	0.2609***	0.2589***	0.2596***	0.4840***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.015)
Cash flow (−1)	0.1161***	0.1244***	0.1231***	0.1238***	−0.0150
	(0.009)	(0.009)	(0.009)	(0.009)	(0.013)
(Cash flow + cash flow (−1)) * *BG*	−0.1314***	−0.0403*	−0.1335***	−0.1319***	−0.0993***
	(0.008)	(0.021)	(0.008)	(0.008)	(0.031)
(Cash flow + cash flow (−1)) * *BG** dummy (1 = private)		−0.0961***			
		(0.021)			
(Cash flow + cash flow (−1)) * *BG** dummy (1 = central govt.)			0.1264***		0.0536
			(0.027)		(0.040)
(Cash flow + cash flow (−1)) * *BG** dummy (1 = local govt.)				0.0516*	
				(0.031)	
Tobin's Q	0.1231**	0.0879	0.0945	0.0988	−0.0412
	(0.061)	(0.062)	(0.062)	(0.062)	(0.076)
Cash holding	1.3533***	1.4630***	1.4643***	1.4806***	1.8542***
	(0.208)	(0.212)	(0.212)	(0.212)	(0.252)
Sales	−0.1600***	−0.1570***	−0.1565**	−0.1576***	−0.1334**
	(0.061)	(0.061)	(0.061)	(0.061)	(0.066)
Leverage	−0.0276	−0.0062	−0.0108	−0.0118	−0.2458
	(0.076)	(0.075)	(0.075)	(0.076)	(0.167)
Time effect	Yes	Yes	Yes	Yes	Yes
Number of stock	629	605	605	605	437
R-square	0.238	0.239	0.241	0.236	0.314

switching of group affiliation heightens profit volatility for both types of firms. We then continue with interaction analysis using *BG*_1 and private/central and local government owned dummies, respectively. The result is consistent with our expectation that the role of business groups in reducing profit volatility is more pronounced among private group affiliates, as well as among local government owned ones relative to central government owned ones.

Panel C shows how institutional factors shape the role of business groups in reducing profit volatility. The coefficient of *BG*_1 is significantly negative for firms located in low m-index regions, whereas it is negative but insignificant for firms in high m-index regions. This implies that the role of business group affiliation in reducing profit volatility is more pronounced in regions or provinces with a lower level of market or institutional development. This finding is consistent with Hypothesis 5. For group dummy *BG*_2, which is more likely to proxy group affiliation switching, the effects are significantly positive in both subsamples. The interaction analysis in column 7 also confirms the above finding.

Table 5
Business groups, financial constraints, and level of market development. This table shows the effect of the level of market development on the role of internal capital market played by a business group. The sample period is from 1998 to 2006. We use the m-index as the benchmark (high if above median level and low if below median level). The dependent variable is Investment, scaled by beginning-of-period capital stock. Cash Flow is scaled by beginning-of-period capital stock, Cash Holding and Sales are scaled by beginning-of-period total assets, Leverage is measured as the total liabilities-to-total assets ratio, and Tobin's Q is measured as the market-to-book ratio (we use its lagged value in the regression). Panel A reports the comparison of the fixed-effects OLS model for the different subsamples. In columns 1 and 2, we divide all group-affiliated firms into firms in low- and high-level market development regions, respectively. In columns 3 and 4, we divide all firms from low-level market development regions into non-group and group examples, respectively. In columns 5 and 6, we divide all firms from high-level market development regions into non-group and group examples, respectively. Panel B shows the results of the interaction analysis. We construct an ownership dummy that takes a value of 1 if a firm is located in a high-level market development region, and 0 otherwise. This then interacts with Cash Flow and the business group dummy. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: Subsample comparison

	All group-affiliated		Low m-index		High m-index	
	Low	High	Non-group	Group	Non-group	Group
	[1]	[2]	[3]	[4]	[5]	[6]
Cash flow	0.0413	0.0591***	0.1334***	0.5319***	0.3965***	0.0583***
	(0.073)	(0.006)	(0.029)	(0.129)	(0.018)	(0.007)
Cash flow (−1)	0.3376***	0.0602***	0.0025	0.1060	0.0144	0.0628***
	(0.075)	(0.006)	(0.012)	(0.106)	(0.017)	(0.007)
Tobin's Q	0.2088**	0.0650	0.1980***	0.0229	0.2390**	0.0593
	(0.089)	(0.059)	(0.062)	(0.090)	(0.119)	(0.088)
Cash holding	0.4526*	0.5277**	0.4584**	0.2015	2.3085***	0.5749*
	(0.274)	(0.219)	(0.196)	(0.254)	(0.396)	(0.321)
Sales	0.0432	−0.0729	0.0099	−0.0754	−0.2750**	−0.1086
	(0.103)	(0.050)	(0.067)	(0.097)	(0.130)	(0.099)
Leverage	0.1251	−0.0320	−0.1307**	−0.1476	−0.0132	−0.0517
	(0.230)	(0.121)	(0.063)	(0.255)	(0.129)	(0.162)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Number of stock	54	212	132	54	359	212
R-square	0.159	0.288	0.0602	0.0456	0.271	0.303

Panel B: Interaction analysis

	[1]	[2]
Cash flow	0.2688***	0.2688***
	(0.010)	(0.010)
Cash flow (−1)	0.1162***	0.1162***
	(0.010)	(0.010)
(Cash flow + cash flow (−1)) ∗ *BG*	−0.1315***	−0.1158
	(0.009)	(0.117)
(Cash flow + cash flow (−1)) ∗ *BG** dummy (high m-index)		−0.0157
		(0.117)
Tobin's Q	0.1288**	0.1286**
	(0.064)	(0.064)
Cash holding	1.4047***	1.4044***
	(0.219)	(0.219)
Sales	−0.1664***	−0.1666***
	(0.064)	(0.064)
Leverage	−0.0309	−0.0307
	(0.078)	(0.078)
Time effect	Yes	Yes
Number of stock	592	592
R-square	0.238	0.238

We use the probability of a firm falling into bankruptcy or financial distress as an alternative proxy. The results of regression model (3) are shown in Table 7. For the whole sample regression, group affiliation reduces the likelihood of bankruptcy or financial distress significantly (with a coefficient of around −0.30) after we control for other financial measures and time and industry effects. For the subsamples of ownership type and market development, although the coefficients are still negative, they are not statistically significant. For the interaction analysis, we do not find any statistically significant result.

5.3. Business groups and firm performance

We investigate the relationship between business group affiliation and firm performance based on specification (4) and report the results in Table 8. We use ROA as the performance measure in Panel A. Generally, the group dummy coefficients in either the whole sample or subsample regressions are not statistically significant, except for the low m-index subsample (with a significant coefficient of around 0.02). This suggests that being affiliated with a group tends to enhance a firm's ROA in a less developed

Table 6
Business groups and profit volatility. This table presents the results of the relation between group affiliation and volatility of operating profitability. We adopt weighted OLS regression where the number of observations per firm is used as the weight. The dependent variable is the standard deviation of each firm's yearly operating profit in the sample period from 1998 to 2006. Explanatory variables include profit (*Op*), defined as the average yearly operating profit over the sample period, size (*Size*), defined as the average yearly total asset over the sample period, and a business group dummy. We adopt three distinct group dummies: *BG* with a value of 1 once the firm is in a group, and 0 otherwise; *BG*_1 with a value of 1 if a firm is in a group for the whole sample period (nine years), and 0 otherwise; and *BG*_2 with a value of 1 if a firm stays in a group for less than nine years, and 0 otherwise. Panel A shows the basic results. In Panel B, we show the regression results for the different ownership subsamples (columns 1 to 6), as well as the interaction analysis (columns 7 to 10), and in Panel C, we show the regression results for the different market development subsamples (columns 1 to 6), as well as the interaction analysis (column 7). Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: Interaction analysis

	[1]	[2]	[3]
Op	0.4817***	0.4825***	0.4820***
	(0.0024)	(0.0024)	(0.0024)
Size	0.2712***	0.2819***	0.2689***
	(0.0216)	(0.0216)	(0.0215)
BG	0.0158		
	(0.0380)		
*BG*_1		−0.2423***	
		(0.0565)	
*BG*_2			0.1646***
			(0.0436)
Industry effect	Yes	Yes	Yes
Observations	10,531	10,531	10,531
R-square	0.847	0.847	0.847

Panel B: Business groups, profit volatility, and ownership type

	State-owned (subsample)			Private (subsample)			Interaction analysis			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Op	0.3698***	0.3704***	0.3703***	−0.9489***	−0.9495***	−0.9457***	0.3347***	0.3328***	0.3335***	0.3692***
	(0.0063)	(0.0063)	(0.0063)	(0.0186)	(0.0186)	(0.0186)	(0.0058)	(0.0058)	(0.0058)	(0.0063)
Size	0.5054***	0.5099***	0.5059***	0.8799***	0.9048***	0.8723***	0.4826***	0.4917***	0.4902***	0.5159***
	(0.0284)	(0.0284)	(0.0283)	(0.0236)	(0.0231)	(0.0235)	(0.0225)	(0.0226)	(0.0226)	(0.0286)
BG	0.0301			0.1593***						
	(0.0450)			(0.0353)						
*BG*_1		−0.1087*			−0.5186***		−0.1004*	−0.3618***	−0.0339	−0.2251**
		(0.0591)			(0.1082)		(0.0553)	(0.0800)	(0.0666)	(0.0908)
*BG*_2			0.1369**			0.2246***				
			(0.0546)			(0.0360)				
*BG*_1* dummy (1 = private)							−0.5787***			
							(0.2124)			
*BG*_1* dummy (1 = central govt.)								0.3971***		0.1939*
								(0.1036)		(0.1148)
*BG*_1* dummy (1 = local govt.)									−0.2738**	
									(0.1065)	
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6966	6966	6966	2876	2876	2876	9842	9842	9842	6966
R-square	0.901	0.901	0.901	0.600	0.601	0.603	0.873	0.873	0.873	0.901

Panel C: Business groups, profit volatility, and level of market development

	Low m-index			High m-index			Interaction analysis
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Op	0.6703***	0.6724***	0.6709***	0.3162***	0.3157***	0.3176***	0.3369***
	(0.0153)	(0.0153)	(0.0153)	(0.0065)	(0.0065)	(0.0065)	(0.0057)
Size	−0.0373	−0.0385	−0.0373	0.5460***	0.5636***	0.5517***	0.4698***
	(0.0327)	(0.0326)	(0.0327)	(0.0279)	(0.0279)	(0.0276)	(0.0224)
BG	−0.0458			0.1566***			
	(0.0464)			(0.0467)			
*BG*_1		−0.3499***			−0.0575		−0.6048***
		(0.0750)			(0.0671)		(0.1070)
*BG*_2			0.1097**			0.2445***	
			(0.0520)			(0.0537)	
*BG*_1* dummy (high m-index)							0.5741***
							(0.1195)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2794	2794	2794	6898	6898	6898	9692
R-square	0.591	0.594	0.592	0.893	0.892	0.893	0.877

Table 7
Business groups and bankruptcy probability. This table presents the results of the role of business group affiliation in affecting a firm's bankruptcy or financial distress probability. The sample period is from 1998 to 2006. The dependent variable is a dummy that equals 1 if a firm is designated a special treatment or particular transfer (ST or PT) firm by the regulatory authorities in the year concerned. We run a pooled multivariate logistic regression on a business group dummy, controlling for Net Income/Total Assets, Working Capital/Total Assets, and Market Value of Equity/Total Liabilities, as well as Industry and Time Effects. Column 1 shows the whole sample regression results and columns 2 to 5 show the results for the state-owned, private, low level of market development region, and high level of market development region subsamples, respectively. Columns 6 to 10 presents the results for interaction analysis. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

	All	State-owned	Private	Low m-index	High m-index	Interaction analysis				
	[1]	[2]	[3]	4]	[5]	[6]	[7]	[8]	[9]	[10]
Net income/TA	−1.4572***	−3.3208***	−0.9877**	−2.7439**	−1.4816***	−1.6769***	−1.6949***	−1.6896***	−3.3244***	−1.5501***
	(0.3910)	(0.7813)	(0.4441)	(1.0691)	(0.4481)	(0.4164)	(0.4172)	(0.4167)	(0.7819)	(0.4070)
Working capital/TA	−1.1939***	−1.3037***	−1.4381***	−2.0695***	−1.1212***	−1.2581***	−1.2613***	−1.2709***	−1.3176***	−1.2834***
	(0.1892)	(0.3592)	(0.2861)	(0.5094)	(0.2244)	(0.1946)	(0.1954)	(0.1951)	(0.3610)	(0.1973)
MV/TL	−0.0807***	−0.1798***	−0.0128	−0.1167	−0.0673**	−0.0698**	−0.0693**	−0.0696**	−0.1802***	−0.0692**
	(0.0306)	(0.0610)	(0.0207)	(0.0931)	(0.0300)	(0.0294)	(0.0293)	(0.0294)	(0.0611)	(0.0292)
Size	−0.8346***	−0.9737***	−0.6109***	−0.7440***	−0.8971***	−0.8389***	−0.8404***	−0.8372***	−0.9714***	−0.8281***
	(0.0794)	(0.1199)	(0.1225)	(0.1833)	(0.0952)	(0.0828)	(0.0828)	(0.0828)	(0.1201)	(0.0826)
Leverage	−0.0036	−0.3273	0.0001	−0.6917*	−0.0031	−0.0038	−0.0037	−0.0037	−0.3303	−0.0032
	(0.0055)	(0.2329)	(0.0079)	(0.3661)	(0.0082)	(0.0065)	(0.0065)	(0.0065)	(0.2328)	(0.0065)
BG	−0.3004*	−0.1874	−0.4019	−0.3470	−0.3188	−0.3534	−0.2519	−0.1967	−0.2724	−0.1574
	(0.1826)	(0.2362)	(0.3232)	(0.3589)	(0.2190)	(0.2189)	(0.2297)	(0.2182)	(0.3312)	(0.3240)
*BG*_1* dummy (1 = private)						0.2949				
						(0.3682)				
*BG*_1* dummy (1 = central govt.)							−0.0456		0.1586	
							(0.3512)		(0.4210)	
*BG*_1* dummy (1 = local govt.)								−0.2221		
								(0.3661)		
*BG** dummy (high m-index)										−0.1973
										(0.3715)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6435	4410	1728	1566	4455	6138	6138	6138	4410	6021
R-square	0.181	0.199	0.164	0.192	0.200	0.187	0.187	0.187	0.200	0.185

Table 8
Business groups and firm performance. This table presents the results of the role of business group affiliation in affecting a firm's operating performance. The sample period is from 1998 to 2006. The dependent variable is a firm's operating performance measured as ROA (in Panel A) and ROE (in Panel B) and a firm's value measured as Tobin's Q. We run a fixed-effects OLS regression on the business group dummy after controlling for Cash Flow, Size, Beta, Long-term debt, and Short-term debt. Column 1 shows the whole sample regression results and columns 2 to 5 show the results for the state-owned, private, low level of market development region, and high level of market development region subsamples, respectively. Columns 6 to 10 present the results for interaction analysis. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

	All	State-owned	Private	Low m-index	High m-index	Interaction analysis				
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Panel A: ROA as the performance measure										
BG	0.0032	0.0085	−0.0046	0.0219**	−0.0084	0.0077	0.0043	−0.0019	0.0109	0.0212
	(0.007)	(0.006)	(0.017)	(0.010)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.013)
BG* dummy (1 = private)						−0.0118				
						(0.014)				
BG* dummy (1 = central govt.)							−0.0031		−0.0078	
							(0.015)		(0.012)	
BG* dummy (1 = local govt.)								0.0135		
								(0.013)		
BG* dummy (high m-index)										−0.0243
										(0.015)
Long-term Debt	−0.0001	0.0004**	−0.0031***	0.0034	−0.0001	−0.0000	−0.0000	−0.0000	0.0004**	−0.0001
	(0.000)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Short-term Debt	0.0001	−0.0004**	0.0033***	−0.0100***	0.0001	0.0000	0.0000	0.0000	−0.0004**	0.0001
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash Flow	0.0011***	0.0014***	0.0146***	0.0789***	0.0010***	0.0022***	0.0022***	0.0022***	0.0013***	0.0011***
	(0.000)	(0.000)	(0.001)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	0.0339***	0.0151***	0.0525***	0.0200***	0.0340***	0.0351***	0.0353***	0.0352***	0.0152***	0.0343***
	(0.004)	(0.004)	(0.008)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Beta	−0.0536***	−0.0292***	−0.0939***	−0.0472***	−0.0567***	−0.0509***	−0.0507***	−0.0507***	−0.0283***	−0.0562***
	(0.006)	(0.005)	(0.017)	(0.010)	(0.008)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
Time Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of stock	634	431	181	158	462	617	617	617	435	620
R-square	0.105	0.108	0.186	0.386	0.0959	0.112	0.111	0.111	0.101	0.103
Panel B: ROE as the performance measure										
BG	0.1879	0.0250	0.3358	0.0834	0.2495	0.0566	0.1014	−0.0093	0.0697	0.2406
	(0.401)	(0.048)	(0.988)	(0.077)	(0.541)	(0.385)	(0.360)	(0.401)	(0.059)	(0.780)
BG* dummy (1 = private)						−0.0082				
						(0.624)				
BG* dummy (1 = central govt.)							−0.1942		−0.1209	
							(0.696)		(0.093)	

*BG** dummy (1 = local govt.)								0.1558		
								(0.607)		
*BG** dummy (high m-index)										−0.0674
										(0.885)
Long-term Debt	−0.0752***	−0.0015	−0.1380***	−0.2444***	−0.0711***	−0.0563***	−0.0563***	−0.0563***	−0.0030**	−0.0751***
	(0.010)	(0.001)	(0.039)	(0.018)	(0.011)	(0.007)	(0.007)	(0.007)	(0.001)	(0.010)
Short-term Debt	0.0731***	−0.0087***	0.2000***	−0.0877***	0.0698***	0.0647***	0.0647***	0.0647***	−0.0080***	0.0731***
	(0.008)	(0.001)	(0.022)	(0.012)	(0.009)	(0.006)	(0.006)	(0.006)	(0.001)	(0.008)
Cash Flow	0.6350***	1.0101***	1.3022***	1.1100***	0.6463***	0.9825***	0.9825***	0.9826***	1.0132***	0.6350***
	(0.012)	(0.002)	(0.072)	(0.028)	(0.013)	(0.011)	(0.011)	(0.011)	(0.002)	(0.012)
Size	−0.2268	0.0123	0.5750	0.0359	0.2412	0.3013*	0.3041*	0.3008*	0.0145	−0.2334
	(0.217)	(0.029)	(0.462)	(0.041)	(0.305)	(0.171)	(0.171)	(0.171)	(0.028)	(0.222)
Beta	−0.3411	−0.0913**	0.3442	−0.3517***	−0.0375	−0.1321	−0.1300	−0.1318	−0.0832**	−0.3499
	(0.366)	(0.042)	(0.995)	(0.073)	(0.491)	(0.287)	(0.287)	(0.287)	(0.041)	(0.375)
Time Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of stock	634	431	181	158	462	617	617	617	435	620
R-square	0.489	0.995	0.388	0.650	0.506	0.734	0.734	0.734	0.993	0.489
Panel C: Tobin's Q as the performance measure										
BG	3.0859*	−0.0393	4.2753	−0.2180	4.9565**	1.8343	2.9432	4.8455**	−0.0152	−1.2209
	(1.654)	(0.032)	(5.111)	(0.206)	(2.216)	(2.078)	(1.942)	(2.164)	(0.040)	(3.218)
*BG** dummy (1 = private)						3.7559				
						(3.368)				
*BG** dummy (1 = central govt.)							0.8403		−0.0676	
							(3.752)		(0.063)	
*BG** dummy (1 = local govt.)								−4.1918		
								(3.275)		
*BG** dummy (high m-index)										5.7884
										(3.649)
Long-term Debt	0.0649*	−0.0014*	0.3000	0.0738	0.0866*	0.0625	0.0629	0.0630	−0.0016*	0.0656*
	(0.039)	(0.001)	(0.204)	(0.047)	(0.045)	(0.040)	(0.040)	(0.040)	(0.001)	(0.040)
Short-term Debt	−0.0369	0.0010	−0.0014	−0.0383	−0.0493	−0.0345	−0.0347	−0.0349	0.0012	−0.0374
	(0.033)	(0.001)	(0.115)	(0.032)	(0.039)	(0.034)	(0.034)	(0.034)	(0.001)	(0.034)
Cash Flow	0.0457	−0.0010	0.6599*	0.2084***	0.0617	0.0079	0.0082	0.0078	−0.0010	0.0464
	(0.048)	(0.001)	(0.374)	(0.075)	(0.055)	(0.059)	(0.059)	(0.059)	(0.001)	(0.048)
Size	−19.8734***	−0.3626***	−44.6730***	−2.0835***	−26.6915***	−20.4377***	−20.5160***	−20.4864***	−0.3608***	−20.2677***
	(0.896)	(0.019)	(2.394)	(0.110)	(1.209)	(0.924)	(0.924)	(0.922)	(0.019)	(0.914)
Beta	−0.0674	−0.1255***	4.1735	0.1201	−0.2014	−0.1358	−0.1784	−0.1748	−0.1256***	0.0684
	(1.514)	(0.028)	(5.151)	(0.197)	(2.008)	(1.549)	(1.550)	(1.549)	(0.028)	(1.547)
Time Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of stock	634	431	181	158	462	617	617	617	435	620
R-square	0.0224	0.371	0.0663	0.145	0.0274	0.0232	0.0228	0.0231	0.370	0.0234

environment. The result is similar when we use ROE (Panel B) as the performance measure. Although all of the business group dummy coefficients are positive, they are not statistically significant, which means that affiliated firms barely outperform nonaffiliated ones in cases of operating results. In addition, ownership and the level of market development have weak effects on the role of business group in a firm's accounting performance.

We report the results of using Tobin's Q as the proxy for the stock market performance in Panel C. We find that the group dummy coefficient is significant in the whole sample and in the high m-index subsample. This indicates that the market perceives a higher valuation for the affiliated firms.

Overall, our findings confirm the internal capital market and risk-sharing hypotheses but do not provide wholly direct strong evidence of the influence of business group affiliation on firm performance. Regarding the internal capital market role of business groups, it is more pronounced among private firms, firms owned by local governments, and those operating in highly developed regions. These findings are consistent with Hypothesis 4 but inconsistent with Hypothesis 5. However, we find some evidence that supports Hypotheses 4 and 5 regarding the risk-sharing role of business groups. We check the robustness of our empirical results in the next section.

6. Robustness tests

6.1. More business group characteristics

As described in the Data sources and sample selection section, the group information is obtained from two sources: the data of the survey conducted by the CSRC and hand-collected data. From the former, we have more information about a specific group, such as whether financial institutions are affiliated with a group, whether there are H-share stocks of a group listed on the Hong Kong Stock Exchange, and the number of distinct industries that a group covers. Therefore, we examine the robustness of our results after taking into account these characteristics.[14]

First, we consider the effect of financial institution affiliation on a business group.[15] Because the Chinese external capital and arm's-length banking loans markets are under- and unevenly developed, the affiliation of financial institutions with a business group tends to improve the group's financial flexibility. We construct a dummy variable, FIN, to denote whether financial institutions are affiliated with a business group. Then we add an interaction term among cash flow, group dummy, and financial institution dummy in the regression as shown in column 2, Panel A, Table 9. We find a statistically significant negative coefficient for this interaction term, the magnitude of which is larger than that of the interaction term between just cash flow and group dummy. This implies that the firms of business groups with financial institution affiliates tend to face fewer financial constraints, and that financial institutions are an important factor in the role played by business groups as internal capital markets.

Second, we take the role of H-shares into account. Hong Kong has consistently been rated one of the best financial markets in terms of investor protection, with strong laws and law enforcement institutions. Allen et al. (2005) rank it as one of the best in overall investor protection along with the United Kingdom, the United States, and Singapore, among others. Hong Kong-registered public firms are also subject to the higher quality International Financial Reporting Standards, stringent external auditing, and constant monitoring by a free media and financial intermediaries (e.g., underwriters, analysts, and institutional investors). Consistent with La Porta et al.'s (1997, 1998) theory that countries with strong investor protection are associated with larger and broader external financial markets, Allen et al. (2005) find that Hong Kong ranks at the top whereas mainland China is ranked at the bottom in terms of the size and breadth of external financial markets. Hong Kong's institutional framework, legal system, and free market fundamentals could influence to some extent the business group effect if the group has H-shares listed on the Hong Kong Stock Exchange. To investigate this hypothesis, we construct an H-shares dummy that takes a value of 1 if the group has H-shares listed on the Hong Kong Stock Exchange, and 0 otherwise. As with the financial institution dummy, we focus on the three-way interaction term among cash flow, group dummy, and H-shares dummy. The estimated coefficient is positive, as we expect, but insignificant, as shown in column 3.

Third, we consider the impact of the level of firm diversification. The more diversified a group is, the more likely it is that the group will use its cross-industry internal capital market to finance member firms in need. If a business group has businesses in different industries, then one member firm's financial constraints induced by shocks in a specific industry may well be mitigated by member firms in other industries, which have not suffered shocks. We use the ratio of the number of industries in which a group is involved to the number of listed subsidiaries a group has to proxy the level of diversification. For example, if a group has five listed firms belonging to the same industry, then the industry coverage is 1/5. We scale by the number of listed firms because it is hard for a business group with many firms in the same industry to mitigate the financial constraints faced by affiliated members, which tend to perform similarly and suffer from common industry shocks. Cash flow is interacted with group dummy and level of diversification, and the results are shown in column 4. The coefficient of the three-way interaction is significantly negative, which suggests that in a well-diversified business group, financial constraints are more likely to be mitigated, consistent with our expectation. The value of diversification level is 0 if a firm is not affiliated with any group, so it becomes redundant to include the interaction between cash flow and group dummy. We rerun the regression after deleting the interaction between cash flow and group dummy, and the results are reported in column 5. The negative coefficient of the three-way interaction term

[14] As we do not have additional information in the hand-collected data, we do not include it when doing additional tests. Hence, for the main test, the sample size shrinks from 629 to 569.

[15] Financial institutions include banks, securities companies, fund management companies, insurance companies, trust companies, and so forth.

Table 9
Robustness tests for more group characteristics. This table presents the results of robustness tests taking into account the following firm characteristics: financial institution affiliation (FIN), H-share effect (H), the level of diversification (Indus), and group cash flow. In Panel A, Column 1 shows the results of the basic regression without these additional characteristics, while column 2 shows those with financial institution affiliation considered by adding an interaction term with Cash Flow and the group and financial institution dummies. Column 3 shows the results after adding an interaction term with Cash Flow and the group and H-share dummies to investigate the H-share effect. Columns 4 and 5 shows the results with the diversification effect considered, which is proxied by the ratio of the number of industries in which the business group is involved to the number of listed firms within the group. Because the diversification level can indicate a firm's group affiliation status, we exclude the interaction between Cash Flow and the group dummy in column 5. In Panel B, we consider the group cash flow effect, in terms of either a single variable or interaction term with firm Cash Flow. We use a fixed-effects OLS model with the same sample period and control variables used in Table 3. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: The role of financial institutions, H-shares, and industry coverage in business groups

	[1]	[2]	[3]	[4]	[5]
Cash flow	0.3969***	0.3972***	0.3965***	0.3958***	0.3956***
	(0.0123)	(0.0123)	(0.0123)	(0.0123)	(0.0121)
Cash flow * *BG*	−0.1468***	−0.0815**	−0.1825***	−0.0067	
	(0.0293)	(0.0374)	(0.0518)	(0.0785)	
Cash flow * *BG* * FIN		−0.1559***			
		(0.0553)			
Cash flow * *BG* * H			0.0506		
			(0.0605)		
Cash flow * *BG* * Indus				−0.2282*	−0.2376***
				(0.1186)	(0.0443)
Tobin's Q	0.1562**	0.1542**	0.1572**	0.1544**	0.1543**
	(0.0644)	(0.0644)	(0.0644)	(0.0644)	(0.0644)
Cash holding	1.4031***	1.4403***	1.3958***	1.4110***	1.4111***
	(0.2140)	(0.2142)	(0.2142)	(0.2139)	(0.2139)
Sales	−0.1415**	−0.1430**	−0.1400**	−0.1420**	−0.1420**
	(0.0628)	(0.0627)	(0.0628)	(0.0627)	(0.0627)
Leverage	−0.0064	−0.0029	−0.0074	−0.0053	−0.0054
	(0.0786)	(0.0786)	(0.0787)	(0.0786)	(0.0786)
Time effect	Yes	Yes	Yes	Yes	Yes
No. of shares	569	569	569	569	569
R-square	0.260	0.260	0.261	0.262	0.262

Panel B: The role of group cash flow in business groups

	[1]	[2]	[3]	[4]
Cash flow	0.1815***		0.1818***	0.2559***
	(0.0069)		(0.0069)	(0.0082)
Group cash flow		0.0108	−0.0228	0.0614**
		(0.0283)	(0.0263)	(0.0261)
Cash flow * group *CF*				−0.0643***
				(0.0040)
Tobin's Q	0.1317**	0.1676**	0.1341**	0.1575**
	(0.0631)	(0.0680)	(0.0632)	(0.0615)
Cash holding	1.3727***	1.8262***	1.3782***	1.6253***
	(0.2139)	(0.2296)	(0.2140)	(0.2087)
Sales	−0.1282**	−0.1053	−0.1284**	−0.1455**
	(0.0629)	(0.0676)	(0.0629)	(0.0612)
Leverage	−0.0639	−0.1438*	−0.0649	−0.0524
	(0.0778)	(0.0837)	(0.0779)	(0.0757)
Time effect	Yes	Yes	Yes	Yes
No. of shares	629	629	629	629
R-square	0.187	0.0196	0.187	0.231

becomes more significant, which strengthens our argument that the level of firm diversification within a business group is an important factor in shaping the internal capital market.

We use the group dummy to proxy a firm's affiliation status in all of the above tests. We can calculate the group cash flow for any specific group by combining the cash flows of all of the member firms and scaling the total (group) cash flow by the total group capital stock at the beginning of the period (group cash flow is assigned a value of 0 if a firm is not group affiliated).[16] Then we can investigate whether the investment of a firm, if it is in a group, is associated with the group cash flow, besides its own cash flow. The results are shown in Panel B of Table 9. Column 1 shows the results of the regression of investment on a firm's own cash flow. The coefficient is significantly positive. We replace own cash flow by group cash flow in column 2, but the results are not significant. Then we include both own cash flow and group cash flow in the regression, but the effect of group cash flow is still

[16] In fact, it is just an approximation of the total cash flow of the group, because we include only a group's listed firms and ignore its members that are not publicly traded.

weak. Column 4 shows the results after adding an interaction term between own cash flow and group cash flow. The coefficient is negative and significant, whereas the coefficient of group cash flow becomes positive and significant. We interpret the results to mean that a firm's investment is positively related to the cash flow of the group with which it is affiliated, as well as its own cash flow. Sufficient group cash flow can weaken the dependency of firm investment on the firm's own cash flow. This finding provides additional evidence of the role played by a business group as an internal capital market for member firms.

6.2. Alternative financial constraint measures

The literature provides alternative ways to measure a firm's financial constraints, which include the financial constraint index developed by Whited (1992, 1998) and Whited and Wu (2006). Their method estimates a nonlinear investment Euler equation using a generalized method of moments (GMM) framework to construct a linear representation of several key financial terms to estimate a firm's financial constraint index.

Based on Eq. (10) in Whited and Wu (2006), the basic nonlinear investment Euler equation to be estimated is as follows[17]:

$$M_{t,t+1}\Lambda_{i,t+1}\left\{\begin{array}{l}\dfrac{Y_{i,t+1}-\mu C_{i,t+1}}{K_{i,t+1}}\left[\alpha_0-\displaystyle\sum_{m=2}^{M}\frac{m-1}{m}\alpha_m\left(\frac{I_{i,t+1}}{K_{i,t+1}}\right)^m\right]\\ \quad+(1-\delta_i)\left[\displaystyle\sum_{m=2}^{M}\alpha_m\left(\frac{I_{i,t+1}}{K_{i,t+1}}\right)^{m-1}+1\right]\end{array}\right\}$$
$$=\sum_{m=2}^{M}\alpha_m\left(\frac{I_{i,t}}{K_{i,t}}\right)^{m-1}+1+e_{i,t+1}.$$

$Y_{i,t}$ is output, and $C_{i,t}$ is the variable cost: the sum of "cost of goods sold" and "selling and administrative expenses." $I_{i,t}$ is capital investment, and $K_{i,t}$ is capital stock. $M_{t,t+1}$ is the reduced-form specification for the stochastic discount factor, and we use the CAPM model: $M_{t,t+1} = r_f + \beta(r_m - rf)$. $\Lambda_{i,t+1}$, as introduced by Whited and Wu (2006), takes the form of $\Lambda_{i,t+1} = \frac{1+\lambda_{i,t+1}}{1+\lambda_{i,t}}$. The $\lambda_{i,t+1}$ is unobservable, and we deem it a function of several observable firm characteristics, such that $\lambda_{i,t+1} = \beta_0 + \beta X$. Both $M_{t,t+1}$ and $\lambda_{i,t+1}$ are substituted into the above main equation, and the parameters μ and α_m, as well as β_0 and β in $\lambda_{i,t+1}$'s representation, are estimated jointly using the GMM to estimate the conditional moment conditions of the form

$$E_{t-1}\left[z_{i,t-1}\otimes\left(e_{i,t+1}-e_{i,t}\right)\right].$$

The instruments include all Euler equation variables as well inventories, depreciation, current assets, current liabilities, and tax payments, all of which are scaled by total assets. As demonstrated by Whited and Wu (2006), the fitted value of $\lambda_{i,t+1}$ is the index of a firm's financial constraints. The higher is $\lambda_{i,t+1}$, the greater is the effect of financial constraints.

To address the issue in this paper, we estimate the Euler equation using the GMM with the highest order M of α_m as 3, and five key financial items to represent the specification of $\lambda_{i,t+1}$: TLTD, the ratio of long-term debt to total assets; SG, firm sales growth; LNTA, the natural log of total assets; *CF*, the ratio of cash flow to total assets; and ISG, the firm's industry sales growth.

The GMM estimation results are shown in Table 10. Panel A shows the estimated coefficients and standard errors of the parameters. Then we use the estimated coefficients to get the fitted value of $\lambda_{i,t+1}$ for each firm year, which proxies the extent of financial constraints. Panel B presents the statistics of the index of financial constraints of our sample. We find that the index is lower for group-affiliated than for stand-alone firms (3.0256 versus 3.0320, respectively), and the difference (−0.0064) is significant. Panel C shows the results when we take the index of financial constraints as the dependent variable, and the group dummy as well as the ownership and institutional dummies as regressors to run a fixed-effects OLS regression. The results are generally consistent with the above tests. Group affiliates have a lower financial constraint index, and this relationship is more significant among the firms owned by local governments relative to the ones owned by central government and those located in regions or provinces with a high level of market development. However, for private firms, group affiliates show a relatively higher financial constraint index, which is not consistent with the result above.

6.3. Endogeneity and sample-selection issues

The OLS regressions, as noted in prior studies (e.g., Khanna, 2000), are prone to selection bias and a potential endogeneity problem, as the group-affiliation sample may be selected based on some unobservable factors and these factors could influence the variation in financial constraints across firms. This potentiality creates a bias in the estimation of the coefficients of cash flow–investment sensitivity and the interaction term between cash flow and group dummy. We use the Heckman (1979) two-stage method to take into account self-selection bias. In the first stage, we estimate a probit model of group affiliation (dummy) on a set of variables that tend to influence a firm's group affiliation choice. Then we include the Lambda (inverse Mills' ratio) based on the probit estimate in the previous regression specifications to control for potential self-selection bias.

[17] The details of the estimation procedure can be found in Whited (1992, 1998) and Whited and Wu (2006).

Table 10
Robustness tests using an alternative measure. This table presents the results when we use the alternative financial constraint measure of Whited and Wu (WW) (2006). Panel A reports the GMM estimate of the Euler equation with a highest order of 3, using the following variables to fit financial constraints: TLTD, the ratio of the long-term debt to total assets; SG, firm sales growth; LNTA, the natural log of total assets; *CF*, the ratio of cash flow to total assets; and ISG, the firm's industry sales growth. Panel B shows the basic statistics of the constructed financial constraint index for the full sample and group-affiliated and stand-alone subsamples based on the results of Panel A. In Panel C, we regress the WW financial constraint index on the business group dummy, as well as its interaction terms with ownership type and market development level, respectively. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: GMM estimation results

	μ	a_2	a_3	β_0	TLTD	SG	LNTA	*CF*	ISG
Coefficient (10^{-2})	1.5898	5.3710	−0.0017	340.3968	0.3805	1.1819	−1.7561	−0.1666	−0.7813
Standard err (10^{-2})	0.0936	0.5537	0.0002	0.0031	0.0036	1.2429	0.0631	0.0076	0.2908
Observations	4122								
J-test	748.5118	*p* value: ≈1.0000							
L-test	731.5006	*p* value: ≈1.0000							

Panel B: Descriptive statistics for the WW financial constraint index

WW FC-index	All	Group-affiliated	Stand-alone	Mean diff
Mean	3.0299	3.0256	3.0320	−0.0064***
Median	3.0314	3.0271	3.0333	(0.0013)
Std dev	0.0358	0.0383	0.0344	
Observations	4032	1276	2756	

Panel C: The role of business groups in financial constraints

	[1]	[2]	[3]	[4]	[5]	[6]
BG	−0.0062***	−0.0090***	−0.0069**	−0.0026	−0.0122***	0.0028
	(0.0023)	(0.0028)	(0.0027)	(0.0030)	(0.0038)	(0.0049)
*BG** dummy (1 = private)		0.0081*				
		(0.0046)				
*BG** dummy (1 = central govt.)			0.0021		0.0068	
			(0.0049)		(0.0058)	
*BG** dummy (1 = local govt.)				−0.0092**		
				(0.0045)		
*BG** dummy (1 = high m-index)						−0.0122**
						(0.0054)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
No. of shares	448	439	439	439	340	422
R-square	0.0381	0.0378	0.0384	0.0393	0.0304	0.0370

We use two sets of variables to estimate a firm's group affiliation choice. The first includes the same variables that are used as control ones in the above regressions: cash holding, sales, and leverage. To capture the potential determination of group affiliation choice, we also include long-term debt, short-term debt, sales growth, and earnings performance (ROA). Both sets of variables include the lagged group dummy to try to capture the reinforcement effect. The results of the first-stage estimation are shown in Panel A in Table 11. Because of the different sample sizes, we estimate the probit model separately for the two samples. Columns 1 and 2 show the results based on the basic sample (including ownership information), and columns 3 and 4 show the results based on the sample including market development level information.

Then, based on the estimation using the two sets of variables, we get two Lambdas (inverse Mills' ratio): Lambda 1 (from columns 1 and 3 in Panel A) and Lambda 2 (from columns 2 and 4 in the same panel). We include these two Lambdas or the interaction between them and cash flow to control for potential self-selection bias. This does not weaken our previous results, as shown in Panel B (using Lambda 1) and Panel C (using Lambda 2), although the interaction term between cash flow and Lambda is significantly negative, which partially reflects the effect of group affiliation choice on cash flow–investment sensitivity.

7. Conclusion

Business groups are ubiquitous in emerging markets. They are an endogenous response to the economic and institutional environment and may play a positive role by making up for underdeveloped economic institutions. The evidence of the wealth effects of business groups is mixed. In this paper, we investigate whether business groups in China act as internal capital markets, in an environment that is characterized by a high level of government intervention, a weak legal system, and an underdeveloped financial market. We study how institutional factors, such as the ultimate owner and level of market development, shape the role of these business groups. We find that business groups help member firms overcome constraints in raising external capital, and that the internal capital market within a business group is more likely to be an alternative financing channel among state-owned than among private firms. This is because most business groups in China were formed through a state-controlled process of reorganization. Hence, they are bound to help each other. We also find that the internal capital market is more likely to help those

Table 11
Robustness tests for potential self-selection bias. This table reports the results of robustness testing after controlling for potential self-selection bias using the Heckman (1979) two-stage method. In Panel A, we obtain the Lambda (inverse Mills' ratio) from the first-stage probit model of a firm's group affiliation choice. We include the following two sets of explanatory variables in the first-stage probit model. The first set of variables is the same as that in the previous regressions, used as control variables: Cash Holding, Sales, and Leverage (Lambda 1), while the second set also includes Long-term Debt, Short-term Debt, Sales Growth, and ROA (Lambda 2). Both sets include the lagged group dummy to capture the reinforcement effect. Columns 1 and 2 show the results based on the basic sample (including ownership information) and columns 3 and 4 show the results based on the sample including market development level information. In Panels B and C, we add the estimated Lambda (Lambda 1 and Lambda 2, respectively) to control for self-selection bias. Standard errors are in parentheses and values significantly different from zero at the 10%, 5%, and 1% levels are marked with *, **, and ***, respectively.

Panel A: First-stage estimation to get Lambda (inverse Mills' ratio)

	[1]	[2]	[3]	[4]
Lagged group dummy	3.8377***	3.8292***	3.8054***	3.8006***
	(0.0945)	(0.0948)	(0.0951)	(0.0952)
Cash holding	0.4403**	0.4485*	0.4402**	0.4348*
	(0.2214)	(0.2379)	(0.2237)	(0.2403)
Sales	0.1198**	0.1326**	0.1195**	0.1317**
	(0.0504)	(0.0554)	(0.0511)	(0.0562)
Leverage	0.0191	0.0695	0.0250	0.0698
	(0.0759)	(0.1373)	(0.0734)	(0.1374)
Long-term debt		−0.2093		−0.2363
		(0.4009)		(0.4162)
Short-term debt		0.0415		0.0649
		(0.3128)		(0.3174)
Sales growth		−0.0587		−0.0555
		(0.0397)		(0.0390)
ROA		0.4445		0.4661
		(0.4715)		(0.4734)
Time effect	Yes	Yes	Yes	Yes
Observations	5032	5003	4736	4724
Number of shares	629	627	592	591
Log likelihood	−802.3	−799.1	−769.1	−766.5

Panel B: Regression controlling for self-selection bias (Lambda 1)

	[1]	[2]	[3]	[4]	[5]	[6]
Cash flow	0.3912***	0.3842***	0.3808***	0.3710***	0.3913***	0.3848***
	(0.0120)	(0.0124)	(0.0121)	(0.0125)	(0.0124)	(0.0128)
Cash flow * *BG*	−0.2952***	−0.2847***	−0.0868**	−0.0579	−0.2646	−0.2352
	(0.0142)	(0.0149)	(0.0342)	(0.0353)	(0.2088)	(0.2080)
Tobin's Q	0.1414**	0.1458**	0.1116*	0.1163*	0.1477**	0.1519**
	(0.0603)	(0.0602)	(0.0607)	(0.0607)	(0.0631)	(0.0631)
Cash holding	1.4231***	1.4537***	1.5399***	1.5901***	1.4770***	1.5056***
	(0.2042)	(0.2046)	(0.2084)	(0.2086)	(0.2147)	(0.2152)
Sales	−0.1456**	−0.1482**	−0.1348**	−0.1381**	−0.1522**	−0.1551**
	(0.0600)	(0.0600)	(0.0599)	(0.0598)	(0.0625)	(0.0624)
Leverage	−0.0013	−0.0022	0.0168	0.0163	−0.0044	−0.0052
	(0.0743)	(0.0743)	(0.0742)	(0.0741)	(0.0769)	(0.0769)
Lambda 1	0.0232		0.0043		0.0243	
	(0.0534)		(0.0545)		(0.0564)	
Cash flow * Lambda 1		−0.0550**		−0.0797***		−0.0499*
		(0.0253)		(0.0254)		(0.0262)
Cash Flow * *BG** dummy (1 = private)			−0.2102***	−0.2252***		
			(0.0335)	(0.0337)		
Cash Flow * *BG** dummy (high m-index)					−0.0309	−0.0505
					(0.2086)	(0.2077)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Number of shares	629	629	605	605	592	592
R-square	0.261	0.261	0.259	0.259	0.261	0.262

Panel C: Regression controlling for self-selection bias (Lambda 2)

	[1]	[2]	[3]	[4]	[5]	[6]
Cash flow	0.3732***	0.3639***	0.3808***	0.3691***	0.3732***	0.3640***
	(0.0119)	(0.0122)	(0.0121)	(0.0124)	(0.0122)	(0.0126)
Cash flow * *BG*	−0.2776***	−0.2634***	−0.0869**	−0.0494	−0.2512	−0.2097
	(0.0140)	(0.0146)	(0.0342)	(0.0352)	(0.2050)	(0.2041)
Tobin's Q	0.1219**	0.1251**	0.1116*	0.1140*	0.1271**	0.1300**
	(0.0595)	(0.0594)	(0.0607)	(0.0606)	(0.0620)	(0.0620)
Cash holding	1.4990***	1.5438***	1.5400***	1.6048***	1.5412***	1.5873***
	(0.2018)	(0.2021)	(0.2084)	(0.2084)	(0.2111)	(0.2114)

Table 11 (*continued*)

Panel C: Regression controlling for self-selection bias (Lambda 2)

	[1]	[2]	[3]	[4]	[5]	[6]
Sales	−0.1360**	−0.1391**	−0.1349**	−0.1383**	−0.1424**	−0.1461**
	(0.0591)	(0.0590)	(0.0599)	(0.0598)	(0.0614)	(0.0613)
Leverage	0.0073	0.0026	0.0168	0.0114	0.0043	−0.0006
	(0.0732)	(0.0731)	(0.0742)	(0.0740)	(0.0756)	(0.0755)
Lambda 2	0.0233		0.0051		0.0249	
	(0.0527)		(0.0546)		(0.0555)	
Cash flow * lambda 2		−0.0831***		−0.1093***		−0.0821***
		(0.0257)		(0.0262)		(0.0263)
Cash flow * BG^* dummy (1 = private)			−0.2102***	−0.2306***		
			(0.0335)	(0.0337)		
Cash flow * BG^* dummy (high m-index)					−0.0266	−0.0540
					(0.2048)	(0.2038)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Number of shares	627	627	605	605	591	591
R-square	0.253	0.254	0.259	0.260	0.253	0.254

affiliated firms which are private, local government owned relative to those owned by central government, or located in regions with a well-developed institutional environment. We present evidence of the role of business groups in risk sharing among affiliated firms, but find that business group affiliation has no impact on firm performance. This study sheds new light on the theory of the firm and its boundaries, and provides a better understanding of China's rapidly growing economy.

Acknowledgments

Oliver M. Rui acknowledges financial support from the Chinese University of Hong Kong (Project No. 6902327 and Project No. 2070410) and financial support from CEIBS. Jia He is grateful to Sichuan University for providing research funding (No. SKG201008).

References

Allen, Franklin, Qian, Jun, Qian, Meijun, 2005. Law, finance, and economic growth in China. J. Financ. Econ. 77, 57–116.
Bai, Chong-En, Lu, Jiangyong, Tao, Zhigang, 2006. The multitask theory of state enterprise reform: empirical evidence from China. Am. Econ. Rev. 96, 353–357.
Bena, Jan, Ortiz-Molina, Hernán, 2013. Pyramidal ownership and the creation of new firms. J. Financ. Econ. http://dx.doi.org/10.1016/j.jfineco.2013.01.009.
Buysschaert, A., Deloof, M., Jegers, M., 2004. Equity sales in Belgian corporate groups: expropriation of minority shareholders. J. Corp. Finance 10, 81–103.
Campbell II, Terry, Keys, Phyllis Y., 2002. Corporate governance in South Korea: the chaebol experience. J. Corp. Finance 8, 373–391.
Carney, Michael, Shapiro, Daniel, Tang, Yao, 2009. Business group performance in China: ownership and temporal considerations. Manag. Organ. Rev. 5, 167–193.
Chang, Sea J., Choi, Unghwan, 1988. Strategy, structure and performance of Korean business groups: a transactions cost approach. J. Ind. Econ. 37, 141–158.
Chang, Sea J., Hong, Jaebum, 2000. Economic performance of group-affiliated companies in Korea: intragroup resource sharing and internal business transactions. Acad. Manag. J. 43, 429–448.
China Development Research Center of the State Council, 2000. China Economic Yearbook. Economic Yearbook Press, Beijing, China (in Chinese).
Choi, Jeong-Pyo, Cowing, Thomas G., 1999. Firm behavior and group affiliation: the strategic role of corporate grouping for Korean firms. J. Asian Econ. 10, 195–209.
Fan, Gang, Wang, X., 2001. NERI Index of Marketization of Chinese Provinces. Economic Science Press, Beijing (in Chinese).
Fan, Joseph P.H., Li, Jin, Zheng, Guojian, 2008. Internal Capital Market in Emerging Markets: Expropriation and Mitigating Financing Constraints. The Chinese University of Hong Kong.
Fazzari, Steven M., Hubbard, R.G., Petersen, Bruce C., Blinder, Alan S., Poterba, James M., 1988. Financing constraints and corporate investment. Brookings Pap.Econ. Act. 1988, 141–206.
Ferris, S.P., Kim, K.A., Kitsabunnarat, P., 2003. The costs (and benefits?) of diversified business groups: the case of Korean chaebols. J. Bank. Finance 27, 251–273.
Fisman, R., Khanna, T., 2004. Facilitating development: the role of business groups. World Dev. 32 (4), 609–628.
Friedman, Eric, Johnson, Simon, Mitton, Todd, 2003. Propping and tunneling. J. Comp. Econ. 31, 732–750.
Gedajlovic, E., Shapiro, D., 2002. Ownership structure and firm profitability in Japan. Acad. Manag. J. 45 (3), 565–575.
Gopalan, Radhakrishnan, Nanda, Vikram, Seru, Amit, 2007. Affiliated firms and financial support: evidence from Indian business groups. J. Financ. Econ. 86, 759–795.
Granovetter, Mark, 2005. Business groups and social organization. In: Smelser, Neil, Swedberg, Richard (Eds.), The Handbook of Economic Sociology. Princeton University Press and Russell Sage Foundation, New York.
Guest, Paul, Sutherland, Dylan, 2010. The impact of business group affiliation on performance: evidence from China's "national champions". Camb. J. Econ. 34, 617–631.
Heckman, J., 1979. Sample selection bias as a specification error. Econometrica 47, 153–161.
Hoshi, Takeo, Kashyap, Anil, Scharfstein, David, 1991. Corporate structure, liquidity, and investment: evidence from Japanese industrial groups. Q. J. Econ. 106, 33–60.
Jorgenson, Dale, 1971. Econometric studies of investment behaviour: a survey. J. Econ. Lit. 9, 1111–1147.
Keister, Lisa A., 1998. Engineering growth: business group structure and firm performance in China's transition economy. Am. J. Sociol. 104, 404–440.
Khanna, Tarun, 2000. Business groups and social welfare in emerging markets: existing evidence and unanswered questions. Eur. Econ. Rev. 44, 748–761.
Khanna, Tarun, Palepu, Krishna, 2000. The future of business groups in emerging markets: long-run evidence from Chile. Acad. Manag. J. 43, 268–285.
Khanna, Tarun, Palepu, Krishna, 2000. Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups. J. Finance 55, 867–891.
Khanna, Tarun, Rivkin, Jan W., 2001. Estimating the performance effects of business groups in emerging markets. Strateg. Manag. J. 22, 45–74.
Khanna, Tarun, Yafeh, Yishay, 2005. Business groups and risk sharing around the world. J. Bus. 78, 301–340.

Khanna, Tarun, Yafeh, Yishay, 2007. Business groups in emerging markets: paragons or parasites? J. Econ. Lit. 45, 331–372.
Kim, H., Hoskisson, H., 1996. Japanese governance systems: a critical review. Adv. Int. Comp. Manag. 11, 165–190.
La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, Vishny, Robert W., 1997. Legal determinants of external finance. J. Finance 52, 1131–1150.
La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, Vishny, Robert W., 1998. Law and finance. J. Polit. Econ. 106, 1113–1155.
La Porta, Rafael L., Lopez-de-Silanes, Florencio, Shleifer, Andrei, 1999. Corporate ownership around the world. J. Finance 54, 471–517.
Laeven, L., 2003. Does financial liberalization reduce financing constraints? Financ. Manag. 32 (1), 5–34.
Lang, Larry, Ofek, Eli, Stulz, Rene M., 1996. Leverage, investment, and firm growth. J. Financ. Econ. 40, 3–29.
Lee, K., Lee, D., 2002. The dark side of internal capital allocation: the case of Korean chaebols. Seoul J. Econ. 15, 321–368.
Lee, Keun, Ryu, Keunkwan, Yoon, Jung M., 2000. Productive Efficiency of Chaebols and Non-chaebol Firms in Korea: Stochastic Production Frontier Estimation Using Panel Data. Seoul National University.
Lee, Keonbeom, Peng, Mike, Lee, Keun, 2001. Institutions and Changing Performance of Corporate Groups: The Case of the Chaebols in Korea. Korea Institute of Finance.
Lins, K.V., Servaes, H., 1999. International evidence on the value of corporate diversification. J. Finance 54, 2215–2239.
Love, I., 2003. Financial development and financing constraints: international evidence from the structural investment model. Rev. Financ. Stud. 16, 765–791.
Marisetty, Vijaya B., Subrahmanyam, Marti G., 2010. Group affiliation and the performance of initial public offerings in the Indian stock market. J. Financ. Mark. 13 (1), 1–39.
Morck, Randall, Wolfenzon, Daniel, Yeung, Bernard, 2005. Corporate governance, economic entrenchment, and growth. J. Econ. Lit. 43 (3), 655–720.
National Bureau of Statistics of China, 2000. China Statistical Yearbook. Statistics Press, Beijing, China (in Chinese).
Prowse, Stephen D., 1992. The structure of corporate ownership in Japan. J. Finance 47, 1121–1140.
Rajan, Raghuram, Servaes, Henri, Zingales, Luigi, 2000. The cost of diversity: the diversification discount and inefficient investment. J. Finance 55, 35–80.
Scharfstein, David S., Stein, Jeremy C., 2000. The dark side of internal capital markets: divisional rent-seeking and inefficient investment. J. Finance 55, 2537–2564.
Schiantarelli, F., Georgoutsos, D., 1987. Monopolistic competition and the Q theory of investment. Eur. Econ. Rev. 34 (1990), 1061–1078.
Shin, Hyun-Han, Park, Young S., 1999. Financing constraints and internal capital markets: evidence from Korean "chaebols". J. Corp. Finance 5, 169–191.
Shin, Hyun-Han, Stulz, Rene M., 1998. Are internal capital markets efficient? Q. J. Econ. 113, 531–552.
Smyth, Russell, 2000. Should China be promoting large-scale enterprises and enterprise groups? World Dev. 28, 721–737.
State Commission on Reforming the Economic System, 1993. Yearbook of China's Economic Systems Reform. Reform Press, Beijing.
State Statistical Bureau, 2002–2007. China's Big Business Group Yearbook, Beijing. China Tongji Press (in Chinese).
Stein, Jeremy C., 1997. Internal capital markets and the competition for corporate resources. J. Finance 52, 111–133.
Whited, Toni M., 1992. Debt, liquidity constraints, and corporate investment: evidence from panel data. J. Finance 47, 1425–1460.
Whited, Toni M., 1998. Why do investment Euler equations fail? J. Bus. Econ. Stat. 16, 479–488.
Whited, Toni M., Wu, Guojun, 2006. Financial constraints risk. Rev. Financ. Stud. 19, 531–559.
Williamson, Oliver E., 1975. Markets and Hierarchies: Analysis and Antitrust Implications. Free Press, New York.
Williamson, Oliver E., 1985. The Economic Institutions of Capitalism. Free Press, New York.