Internal Capital Markets in Family Business Groups During the Global Financial Crisis

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Abstract

This study investigates how family business group members' investment decisions are affected by an exogenous shock, namely the 2008 Global Financial Crisis (GFC). Specifically, we investigate whether the internal capital markets in family business groups around the world alleviate the financial crisis-induced external financing constraints. We find that during the GFC the family group-affiliated firms on average cut investments by less than similar standalone firms. We also find that investments of group firms during the GFC become less sensitive to their own cash flows and more sensitive to the cash flows of other group members, especially those with greater financial slack, compared to the pre-crisis period. For a subsample of diversified groups, we propose an identification strategy, which shows that the post-crisis change in a group firm's investment is determined by exogenous variations in its affiliated firms' cash flows. Finally, we find that groups utilize equity primarily in the form of seasoned equity offerings (SEOs) to channel capital to affiliated firms during the GFC. The evidence highlights the important capital allocation role performed by the internal capital markets of business groups when external markets function poorly.

JEL classification: G01, G31, G32

Keywords: Internal capital markets; Family business groups; External financing constraints; Financial crisis

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1 Introduction

An internal capital market is canonically described in the literature as a channel through which capital is allocated across different divisions within a firm. Unlike external capital markets which tend to use a price-setting mechanism, internal capital markets typically rely on a centralized decision-making authority such as the CEO or controlling shareholder to allocate capital. In a corporate investment environment with high information asymmetry, such internal control can efficiently allocate resources to segments that would otherwise find it difficult to obtain capital independently from the external markets. Recognizing the important role internal capital markets perform in allocating capital within firms, prior studies have focused on examining the effectiveness of these markets in multi-segment firms, and uncover evidence of cross-subsidization among business segments (see Lamont (1997), Shin and Stulz (1998), and Billett and Mauer (2003)). Recent studies such as Duchin and Sosyura (2013) and Glaser, Lopez-De-Silanes, and Sautner (2013) examine how interactions between a CEO and divisional managers affect capital allocation activity within conglomerates.

The central issue in studying the functioning of internal capital markets using multi-segment firms is that many critical aspects of individual decisions within a firm are usually unobservable. Instead of using segment-level data of publicly listed conglomerates, we examine the internal capital markets created by independently-listed firms connected through common ownership linkages. Such collectives of firms are referred to as business groups. A clear advantage of studying business groups, where each member firm is listed, is that we can clearly observe each group member's market valuation as well as financial data on capital flows and expenditures. Hoshi, Kashyap, and Scharfstein (1991) and Almeida and Kim (2012) have utilized this approach to examine corporate investment patterns of Japanese and Korean business groups. However, no studies have examined the roles of internal capital markets in allocating business group investments on a global scale, using cross-country data.

The functioning of internal capital markets is clearly seen at times when the supply of external capital is seriously disrupted. Our study explores the effects of the recent Global Financial Crisis (GFC) during which access to external capital supply was severely constrained

and in many cases posed a systemic threat to the survival of firms. Kahle and Stulz (2013) document evidence on the overall curtailment in capital expenditures in non-financial U.S. firms during the crisis, but they do not find conclusive evidence that this change in investment activity is caused by a shock to external credit supply since highly levered firms, which should find it most difficult to increase borrowing, actually cut investment spending less than the average firm. This finding suggests that some firms may be utilizing other sources of funding to support their investment policies despite facing external capital constraints. One possible example of such firms are those associated with business groups, that can obtain financing from other member firms in the same group through a group's internal capital market. In other words, if internal capital markets exist within business groups and are actively functioning, then they should be of critical importance in times of severe negative external capital supply shocks.

It is also a widely-accepted view that defaults in subprime mortgages and banks' overexposure to this asset class is the key trigger of this economic crisis, and not precipitated by flawed corporate finance policies such as excessive leverage. Therefore, the crisis acts as an exogenous shock that mitigates endogeneity concerns in the typical study of corporate financing and investment policies.

Using a panel of 16,694 non-financial firms from 45 countries, of which 3,064 firms are identified as affiliated to family business groups, we show empirically that internal capital markets exist in business groups and facilitate the transfer of resources among group member firms. Specifically, the investments of group-affiliated firms are less sensitive to their own cash flows compared to a control group of standalone firms. Within a group, we also find that investments of individual firms are sensitive to the cash flows of other affiliates in the same group, which becomes even more pronounced during the financial crisis. This demonstrates the increased reliance on within-group capital flows when external capital is seriously constrained. We also find that within business groups, there is evidence of capital flows from firms with the most financial slack to those with the least slack, but not capital flows in the opposite direction. This evidence strongly suggests that internal

capital markets within such groups function quite rationally and support firms that appear to require additional capital. These results are robust to excluding distressed firms within business groups from the analysis, which shows that the internal capital markets function continually, and not only in times when distressed member firms require a financial rescue.

Our evidence of strong sensitivity between group firm investments and other affiliates' cash flows is unlikely to be driven entirely by unobserved inter-temporal changes in growth opportunities and the common financial performance of all firms in a given group. To show this we propose an identification strategy by exploiting differences in industry-wide responses to the GFC, focusing on a subsample of multi-industry groups. For each firm within a multi-industry group, we estimate how its GFC-induced changes in investment is determined by exogenous variations in the GFC-induced changes in cash flows of other affiliates of the same-group that are in different industries. The exogenous variations here come from alternative instrumental variables measuring aggregate changes to cash flows experienced by those affiliates that are in other industries. The results from this analysis indicate that if a group has member firms in industries less affected by the GFC, other member firms in the same group, but in industries strongly affected by the GFC, benefit by only requiring smaller reductions in their own investments. Thus, having a diversified industry portfolio helps groups better weather crisis-induced external capital market disruptions.

Next, we examine the possible channels through which capital is deployed within groups and find that group-affiliated firms raise 2.3% more equity capital than standalone firms during the GFC. To further identify the type of equity capital raised, we collect all equity offerings data from Thomson Reuters SDC database and match each transaction to the firms in our dataset. We find that the primary type of equity security offering is SEOs. In our difference-in-difference analysis of SEOs, group-affiliated firms increase SEO activity (measured as SEO proceeds scaled by total assets) by 0.08% more than standalone firms. This finding suggests that faced with the same constraints in external capital supply during the GFC, the parent group firms supply equity capital to member firms by purchasing SEOs of member firms as a form of capital support. Thus, providing further evidence to support

our previous findings that group affiliation presents financing advantages over standalone firms.

This study provides several important contributions to various strands of the corporate finance literature. First, extant studies of internal capital markets within conglomerates do not show how the functioning of these markets is affected by external market conditions. We produce evidence to show that the investments of firms benefit from the support of internal capital markets and exhibit less sensitivity to changes in external capital market conditions, which demonstrates that the importance of internal capital markets go beyond mere redeployment of assets and extends to a strategic financing advantage by providing an important alternative source of capital. Second, this study expands on the nascent research on business groups by providing new evidence on resource sharing within groups, and how ownership linkages affect individual firm's financing and investment policies. Furthermore, we show that it is also important to consider the potential benefits of group affiliation such as receiving capital support for investments, which is an important group firm advantage over standalone firms. This contributes to our general understanding of why business groups are prevalent in many countries around the world, despite a large body of evidence that controlling shareholders utilize a business group organizational form to tunnel resources and expropriate minority shareholders. Finally, we contribute to a growing volume of financial crisis studies by offering a better understanding of how firms respond to challenges in external funding and its impacts on firms' investment policies.

The rest of this paper is organized as follows. In Section 2, we review the literature in internal capital markets of conglomerates, business groups, and the GFC before developing testable hypotheses. Section 3 describes our data and empirical methods. Section 4 presents our results, and Section 5 concludes.

2 Related literature and hypothesis development

2.1 Internal capital markets of conglomerates

In the strictest definition, an internal capital market is formed when there exists capital allocation activity within a firm with multiple segments or diversified business units, each competing for capital from corporate headquarters to finance their own investment projects. Such multi-segment firms are commonly known as conglomerates. Single-segment or standalone firms, on the other hand, obtain financing only from the external capital markets.

Stein (1997) describes corporate headquarters in conglomerates as an agent endowed with control rights such that they may redistribute capital across segments according to ex-ante investment prospects. Stein's theoretical model predicts that since headquarters capture some of the private benefits of projects, they thus have the incentive to allocate more capital to segments considered "winners". This view is supported by Gertner, Scharfstein, and Stein (1994) who show that corporate headquarters possess superior information on investment prospects that the external capital markets do not, thereby reducing the amount of asymmetric information. They argue that the presence of internal capital markets allow for the efficient redeployment of resources, albeit at the cost of reducing entrepreneurial incentives of segment project managers.

While these two theoretical work suggest that segments within conglomerates may benefit from the more efficient allocation of capital internally, Scharfstein and Stein (2000) present an alternate theoretical model yielding the exact opposite conclusion. In their model, segment managers can engage in rent-seeking behavior by bargaining for higher compensation from the CEO, who has sole authority over capital allocation. They show that the CEO prefers to compensate rent-seeking managers with more capital allocation instead of cash payments. And since managers of weaker segments (i.e. segments with poorer investment prospects) are more inclined to engage in rent-seeking activity, internal capital markets function inefficiently, and distort investments.

Notwithstanding the ambivalent theoretical predictions on the efficiency of internal capi-

tal markets, a key consequence of the presence of internal capital markets is segments within conglomerates become interdependent in terms of their investments because given limited corporate resources, allocation of internal capital across segments is a zero-sum game. With a sample of large U.S. conglomerates with oil and non-oil segments , Lamont (1997) show that the adverse cash flow shock during the 1986 oil crisis led to investment cuts even in the non-oil segments. Thus, Lamont's evidence supports the interdependent segments within conglomerates viewpoint.

Billett and Mauer (2003) also show that significant cross-subsidization between segments occur in diversified U.S. conglomerates. Financially-constrained segments regardless of investment opportunities[1] that receive subsidies from other segments increase firm value. When subsidies flow from segments with better investment opportunities to financially-constrained segments with poorer investment opportunities (inefficient transfers), firm value decreases. Their findings show evidence that internal capital markets can function both efficiently and inefficiently. Nevertheless, financially-constrained segments with good investment opportunities benefit from internal capital markets because they would be unable to finance those projects if they were standalone firms.

In a comparison between the investment-cash flow sensitivities of single-segment standalone firms and multi-segment diversified conglomerates, Shin and Stulz (1998) find that investments of segments are less sensitive to their own cash flows than comparable standalone firms. This finding provides evidence of functioning internal capital markets within conglomerates. Similar to Lamont, they also find that when there are adverse cash flow shocks to a segment, other segments in the conglomerate cut back on investment regardless of investment opportunities. This finding suggests that internal capital markets function in a quasi-socialistic and possibly inefficient manner, supporting the prediction of Scharfstein and Stein (2000).

A common criticism to the preceding empirical studies is the measurement error in

[1]Billett and Mauer (2003) describe subsidies to financially-constrained segments with good investment opportunities as an efficient transfer of capital consistent with the argument that internal capital markets are efficient. Conversely, inefficient transfers are subsidies to segments with poor investment opportunities.

segment-level accounting data. Due to possible transfer pricing and asset allocation between related segments, profits may have been inflated or deflated for certain segments. To address this concern, Ozbas and Scharfstein (2010) examine only unrelated segments of conglomerates because such segments are very unlikely to reallocate profits, and compare them to similar standalone firms. They find that investments of standalone firms are more sensitive to industry Q, which is a measure for industry investment opportunities, than those of comparable unrelated segments within conglomerates. Moreover, they also show that the efficiency of internal capital markets is associated with the severity of agency problems as proxied by managerial ownership; the investments of unrelated segments are more sensitive to investment opportunities thus, more efficient, at firms with high managerial ownership.

2.2 Overview of business groups

Closely-related to the conglomerate literature is that of business groups, which has received relatively less attention. In their seminal work, La Porta, Lopez-de Silanes, and Shleifer (1999) identify firms with common ownership linkages in 27 wealthy economies. They define a business group as a collection of independent firms with a single shareholder controlling at least 20 percent of the voting rights in each firm either directly or indirectly through other firms. They find that business groups are particularly prevalent in economies with weak shareholder protection, and less-developed market institutions. Moreover, the overwhelming majority of ultimate shareholders of business groups are families.

A more comprehensive study of family business groups covering 45 countries by Masulis, Pham, and Zein (2011) further show that the availability of external financing is negatively-associated with the presence of business groups. This suggests that in addition to enhancing the ultimate shareholders' control rights over groups of firms particularly in pyramidal structures, as shown by Almeida and Wolfenzon (2006b), business groups also exist possibly to alleviate external financing constraints. This notion is shared by Khanna and Yafeh (2007) who postulate that in underdeveloped economies plagued with severe information problems, raising capital from within diversified business groups might be more expedient and less

costly than raising capital externally. Therefore, one can describe the capital markets within business groups in the likes of internal capital markets of multi-segment conglomerates.

Extant empirical evidence on the functioning of internal capital markets within business groups are predominantly country-specific, while substantive theoretical work in this area is scarce. Hoshi et al. (1991) examine a sample of Japanese business groups known as *keiretsu*[2] and find that when compared to firms unaffiliated to any *keiretsu*, the investments of group-affiliated firms are less sensitive to their own liquidities. They interpret this finding as *keiretsu* firms probably have a competitive advantage over unaffiliated firms in terms of access to lower cost of capital from the sponsoring *keiretsu* bank. In another country-specific study, Almeida and Kim (2012) compare changes in investments of Korean business group or *chaebol*[3] firms to unaffiliated firms during the 1997 Asian Financial Crisis, and find that group-affiliated firms increased investments more than unaffiliated firms in the aftermath of the crisis. They attribute this finding as the positive effect of the internal capital markets of *chaebol* mitigating adverse external capital shocks during the crisis, thus enabling *chaebol* firms to become more profitable after the crisis.

Yet, not all empirical evidence laud the positive side of business groups as an organizational form. One of the strongest criticisms is the controlling shareholder can siphon profits away from some group-affiliated firms in which he has low cash flow rights to those in which he has high cash flow rights. This is known as "tunneling" as described by Bertrand, Mehta, and Mullainathan (2002) in their study of Indian business groups. They quantify tunneling in business groups by measuring the diversion between a group-affiliated firm's reported performance and predicted performance based on industry shocks. A large diversion is indicative of tunneling, but stronger evidence is shown when the performance of firms in which the controlling shareholder has high cash flow rights is significantly sensitive to shocks

[2] *Keiretsu* is the Japanese term describing a collection of firms with strong interdependent business relationships. Firms in the same *keiretsu* are connected to a single bank which provides much of the financing for the investment projects of member firms. The protracted economic recession in Japan during the 1990s led to widespread disintegration of *keiretsu*.

[3] *Chaebol* is the Korean term for business groups. However, unlike Japanese *keiretsu*, *chaebol* do not necessarily include banks owning equity stakes in the affiliated firms. Instead, through a web of cross-shareholdings, *chaebol* firms are owned by powerful and usually politically-connected families. Today, large *chaebol* such as Samsung, Hyundai, and LG continue to play significant roles in the Korean economy.

affecting the performance of firms in which he has low cash flow rights. Indeed, Bertrand et al. find the presence of tunneling and expropriation of minority shareholders in Indian business groups. In a similar vein, Bae, Kang, and Kim (2002) show that minority shareholders of *chaebol*-affiliated firms making acquisitions experience negative abnormal bidder returns while the controlling shareholders gain, which implies that value is diverted away from bidding firms, consistent with the tunneling view. Baek, Kang, and Lee (2006) present more direct evidence of tunneling in *chaebol* when they find that controlling shareholders utilize intra-group private security offerings as a mechanism to enrich themselves through the setting of offering prices.

Given these conflicting evidence on the externality effects of business groups, the perennial question whether they are beneficial to economies remain unanswered. Almeida and Wolfenzon (2006a) present a model under an equilibrium framework to show that when business groups and conglomerates allocate capital to projects via their respective internal capital markets, these allocations regardless of efficiency actually constrain the external capital markets and thus adversely affect economy-wide capital allocation. In other words, even if internal capital markets of business groups are efficient, standalone firms with good projects will face more difficulty in raising capital, potentially leading to underinvestment. Almeida and Wolfenzon conclude strongly that business groups pose negative effects particularly for developing economies and should be discouraged by policies. On the other hand, Khanna and Palepu (2000) find that group-affiliated Indian firms show better performance than standalone firms when the groups are the most highly-diversified because those groups essentially perform the functions of market institutions that are usually lacking and weak in emerging economies. Thus, unlike group-affiliated firms, standalone ones have to contend with increased costs from information and regulation problems when dealing with external institutions. Although Khanna and Palepu suggest that large diversified business groups could add value to emerging economies when groups act as intermediaries for weak institutions, they caution that Indian business groups differ substantially in structure from business groups elsewhere in the world.

2.3 The GFC

Since the Great Depression during the late 1920s, economies around the world have not experienced as dire a financial crisis as the one occurring in 2008. Gorton (2008) presents a comprehensive account of how escalating defaults in subprime mortgages in the U.S. after a period of loose monetary and credit policies under Federal Reserve chairman, Alan Greenspan, precipitated into a worldwide financial crisis. Although the grave impact of the crisis was felt in the equity markets after the fall of Lehman Brothers and the near-bankruptcy of AIG in the last quarter of 2008, both academics and practitioners concur that the crisis was incipient as early as the beginning of 2008. Overall, equity markets in both emerging and developed countries yielded extreme negative returns. But, the U.S. and European markets were most severely hit compared to the Asian (excluding Japan) and South American markets. The figure below show the MSCI price index for 4 regions; Asia Pacific, Europe, North America, and South America. The 2-year holding period return from 2008 to 2009 for the above 4 regions are -36.2 percent, -43.4 percent, -35.8 percent, and -30.6 percent, respectively.[4]

[Insert Figure 1 about here]

The immediate consequence at the onset of the crisis was a massive contraction of credit availability. Ivashina and Scharfstein (2010) show that banks severely curtailed lending activity during the crisis. In particular, banks with lower deposit bases and more outstanding credit-lines cut the supply of new loans most. Another reason why banks cut lending is they had to shore up loan loss reserves given the spike in defaults not just in mortgages, but also across a range of loans. This drove the Federal Reserve under chairman Ben Bernanke to institute unprecedented bailout and financial aid programs, such as the US$182 billion bailout of AIG and the Troubled Asset Relief Program (TARP), to rescue corporations that

[4]Asia Pacific includes Japan, which was as hard-hit as the U.S. and Europe. Most of the other Asian economies were relatively less affected. Also, North America includes Canada, which survived the crisis unscathed, thus attenuating the negative returns of the North America MSCI price index. As such, the Asia Pacific return was comparable to that of North America.

pose a systemic risk to the economy and to boost capital supply in an effort to curb the economic recession.

Campello, Graham, and Harvey (2010) survey chief financial officers in 39 countries across Asia, Europe, and the U.S., and find that because of the deficit in external capital, financially-constrained firms were forced to cut investment spending, sell assets, and rely on their own cash reserves to weather through the crisis. However, Campello, Giambona, Graham, and Harvey (2011) show that firms were able to boost investments during the crisis if they had greater access to credit lines. These studies confirm that during the crisis, external capital was scarce and firms around the world reacted by reducing capital expenditures among other spending cuts. However, firms that had continued access to other sources of capital were actually able to boost investments, or at least not have to cut investments by as much.

At the time of writing this paper, there is a dearth of studies examining the impact of financial crises on business groups. One such study is Lins, Volpin, and Wagner (2013) who find that family business groups tend to cut investments in healthier firms and channel resources to rescue distress member firms during the GFC. A similar study by Claessens, Djankov, and Klapper (2003) show that group-affiliated East Asian firms are less likely to file for bankruptcy during the 1997 Asian Financial Crisis compared to unaffiliated firms. This result is even more significant for firms in groups that own banks. These two studies suggest the presence of coinsurance effects within business groups, and also demonstrate the competing views in the literature; coinsurance could be at the detriment of minority shareholders, but group-affiliation may alleviate financial constraints of member firms.

2.4 Testable implications

Business groups resemble multi-segment conglomerates because one can parallel the firms connected via ownership linkages to form a business group as the segments in a conglomerate. However, unlike conglomerates in which the existence of centralized capital allocation is assumed since segments do not typically access the external markets independently, and have to rely on headquarters to supply investment capital, that assumption cannot be indis-

criminately applied to business groups. Because each firm in a group is independently-listed, by definition group-affiliated firms have the ability to access the external capital markets on their own and not have to rely on within-group capital allocation.

Although extant literatures on business groups suggest that internal capital markets exist in groups as second-best substitutions for weak market institutions[5], stronger evidence is needed to prove that they are actually functioning. Unfortunately, one cannot directly observe the flow of capital between group-affiliated firms because it can take on many different forms from direct equity stakes and bond purchases, to private loans. Any attempt to proxy capital flows with observable securities issuances would surely underestimate the extent of such flows even if they exist. Borrowing from the conglomerate literature, one can infer that internal capital markets exist in business groups if the investments of group-affiliated firms are less sensitive to their own cash flows relative to a control group of standalone firms. Moreover, if the investments of group-affiliated firms are sensitive to the cash flows of *other* firms belonging to the same group, then it further substantiates the hypothesis of internal resource transfers within groups.

The second line of inquiry examines the inter-temporal investment patterns of group and non-group firms before and during the GFC. The crisis was an exogenous shock to external capital supply and present an ideal setting for investigating the impact of external financial constraints on corporate investments. Duchin, Ozbas, and Sensoy (2010) show that investments of non-financial firms declined significantly at the onset of the crisis, but firms with more cash reserves and less short-term debt were able to mitigate the adverse effects. If internal capital markets exist within business groups, then their functioning should be most critical during a period of severe external capital constraints. Plausibly, group-affiliated firms should be able to rely on the cash flows from other member firms to boost investments during the crisis despite a deficit in external capital. Standalone firms on the other hand have no such advantage. If this conjecture holds, then one would expect the investments of

[5]Bertrand and Schoar (2006) examine possible explanations for the prevalence of family-controlled firms, and suggest that strong family ties and values are solutions to weak labor markets and legal frameworks, which form the economic imperative for their existence.

group-affiliated firms to be less sensitive to their own cash flows and more sensitive to the cash flows of other member firms during the crisis compared to standalone firms.

A further auxiliary test is to infer the direction of capital flows within groups. Rationally, capital should flow from firms that are less financially-constrained to those that are more constrained. Although this does not axiomatically prove that internal capital markets of business groups are efficient, it does imply that capital allocations in groups play a supportive role and could be construed as a positive effect since financial constraints of member firms are alleviated.

3 Sample and methodology

3.1 Data

We begin with a sample of listed firms in 45 markets with clearly identified ownership structures obtained from Masulis et al. (2011), henceforth referred to as the "MPZ" dataset[6]. Through a rigorous ownership identification process, they construct the group-affiliations of 28,635 firms, and find 951 family business groups and 418 non-family groups comprising 3,007 and 1,575 firms, respectively. The MPZ dataset is the most comprehensive sample of international business groups to date. However, the ownership linkages in the sample is as of 2002, which requires updating to better-suit the tests in this study.

For tractability considerations, we do not update the group structures using the identification process in Masulis et al.[7] Moreover, manual construction of group structures on an annual basis will very likely yield marginal additional information since corporate control tends to be quite static with minimal year-to-year variations. The more expedient method

[6]Masulis et al. (2011) obtain ownership data from the Osiris and Worldscope databases provided by Bureau Van Dijk and Thomson Reuters, respectively. For firms with missing shareholder data, they manually peruse through other information sources such as LexisNexis, Factiva, and Dun and Bradstreet's Who Owns Whom to uncover the ultimate controlling shareholders.

[7]They first identify whether a firm has any shareholder controlling at least 20 percent of the voting rights or 10 percent if that shareholder is the founder, CEO, or chairman of the board, otherwise the firm is considered widely-held. They continue this process iteratively until the ultimate controlling shareholder who fall in one of the three categories, families, governments, or corporations is identified. Firms with the same ultimate shareholder are classified in a business group.

to update group structures is to track IPO and merger and acquisition (M&A) activity since business groups change when new firms are listed, acquired, de-listed or merged with other firms. Thus, we collect all reported IPOs and M&As from Thomson Reuters SDC, and Bureau Van Dijk Zephyr databases from January 2003 to December 2007. Since this study requires comparing the functioning of internal capital markets in business groups before and during the crisis, it is therefore appropriate to update the ownership linkages at the point of entering the crisis.

For each IPO, the parent listing firm is clearly reported, which allows for matching by name and SEDOL to firms in the MPZ dataset. If the parent firm is part of an existing business group, then the new IPO firm is added to the group. If however, the parent firm is a standalone firm in the MPZ dataset, then the IPO firm and the parent firm create a new business group. Since the ultimate shareholders of the parent firms are already identified, new business groups can be readily classified as family or non-family groups. For acquisitions, we trace the acquiring and target firms to the MPZ dataset. Standalone acquirers that purchase controlling voting rights (as per the definition in Masulis et al. (2011)) in the target firms create new business groups while group-affiliated acquirers expand their groups through the purchase of targets.

If the target firm is already group-affiliated in the MPZ dataset, then we remove the firm from this group to account for the "loss" of a member firm to the acquirer. Note that acquisitions with less than the defined controlling rights are not considered in this group updating process. For mergers, at least two independently-listed firms become one. If the newly-created firm has a controlling shareholder that is group-affiliated, then that firm becomes part of the group. Otherwise, the merged firm is classified as standalone. In theory, groups can also disappear when firms in the same business group merge to form a single entity, but this scenario did not occur in our sample. We repeat this process annually from the beginning of 2003 to the end of 2007 until we obtain a new dataset of affiliated and standalone firms as of 2007. We also ensure that de-listed firms are removed from the sample.

Control motivations of families are starkly different to those of governments and corporations. Faccio, Masulis, and McConnell (2006) show that politically-connected firms are more likely to receive government bailouts and obtain loans at favorable terms. Burkart, Panunzi, and Shleifer (2003) present a model to show that family firms are primitively motivated by preservation of control especially when the amenity benefits such as family reputation is high. To ensure that the heterogeneity of control motivations of business groups is not driving the results, we remove from the sample firms affiliated to business groups controlled by governments and corporations. Henceforth, "group-affiliated firms" refers to firms affiliated only to family-controlled business groups.

We obtain all the financial and accounting data from the Thomson Reuters Datastream database for the sample period 2004 to 2009. Firms with Standard Industry Classification (SIC) codes 6000–6999, negative cash, negative assets, negative book value of debt, negative common equity, and cash-to-asset ratio greater than 1 are removed from the sample. Lins et al. (2013) also remove firms with total assets less that US$10 million. This blanket threshold to exclude small firms is probably too high especially for firms in the emerging markets, and consequently, useful data might be lost. To avert this problem, we remove firms with total assets ranked in the lowest 5^{th} percentile in each country. Our final sample consists of 16,694 non-financial firms from 45 countries; 3,064 firms are affiliated to family business groups while the rest are standalones.

[Insert Table 1 about here]

Table 1 shows the breakdown of group-affiliated and standalone firms by country. The Asia-Pacific region accounts for 64.5 percent of the total number of family business group firms in the sample while Europe, North America and South America account for 19.8 percent, 8.0 percent, and 6.2 percent, respectively. Consistent with stylized facts on business groups, the prevalence of firms affiliated to family business groups in Asia is very apparent. More than 25 percent of firms in 12 out of the 16 Asian countries in the sample are group-affiliated. According to Standard and Poor's (S&P), 9 of those 12 countries are classified as emerging markets.

3.2 Empirical strategy and variables

We present two identification strategies to investigate the role of group-affiliation on corporate investment policies. The first strategy uses the GFC as an exogenous financial shock to distinguish the marginal effects of ownership structures on financing and investment decisions under different external capital market conditions. We argue that it is unlikely that firms can anticipate the GFC to the extent that they make *ex-ante changes to their ownership linkages* accordingly. Therefore, we can conduct an unbiased test of whether investment strategies of group-affiliated firms are less sensitive to a structural change in external funding conditions that those of standalone firms. Our second identification strategy exploits differences in industry-wide responses to the GFC as instruments to cash flow shocks in a subsample of diversified business groups. Using a two-stage least squares (2SLS) instrumental variable test, we are able to provide key evidence on the causal effect of group-affiliation on within-group capital flows to support member firms' investment expenditures.

3.2.1 The GFC as an exogenous shock

Our first line of inquiry examines whether investment expenditures of group-affiliated firms are less sensitive to changes in external capital market conditions caused by the GFC than standalone firms, and whether the gap in the dependency of investments upon internal cash flows between these two types of firms widens during the crisis. We apply the investment-cash flow sensitivity framework from the financial constraints literature pioneered by Fazzari, Hubbard, and Petersen (1988) and Kaplan and Zingales (1997), and specify the baseline investment-cash flow model as:

$$Invest_{i,t} = \alpha_0 + \alpha_1 CF_{i,t} + \alpha_2 Q_{i,t-1} + \boldsymbol{\Gamma' Controls} + \eta_i + \varepsilon_{i,t}, \tag{1}$$

where i indexes firm and t indexes time. $Invest$ and CF are a firm's net capital expenditures and own cash flow from operations (defined as sum of net income before extraordinary items and depreciation) scaled by beginning-of-period book value of total assets, respectively. Q

is a proxy for investment opportunities calculated as the ratio of market value of assets to book value of assets measured at the beginning of the fiscal period. Market value of assets is the sum of book value of assets and market value of common equity less the sum of deferred taxes and book value of common equity. ***Controls*** is a vector of control variables measured at the beginning of the period consisting of cash and cash equivalents, property, plant and equipment (both scaled by contemporaneous book value of assets), leverage measured as book value of debt to assets, and firm size as the natural log of market capitalization in U.S. dollars. η and ε are firm-fixed effects and error terms, respectively. To account for spurious outliers, all variables are "Winsorized" at the 99^{th} and 1^{st} percentiles. Table 2 shows the descriptive statistics of the main variables in this study.

[Insert Table 2 about here]

To investigate whether investment strategies of group-affiliated firms are less sensitive to a structural change in external funding conditions than those of standalone firms due to the former firms having additional sources of internal capital, we employ the difference-in-differences (DID) estimator to estimate the differences in investment-cash flow sensitivities between group-affiliated and standalone firms before and during the crisis. We define the dummy variable $Crisis$, which takes a value of 1 to denote observations during the crisis period from years 2008 to 2009, and 0 otherwise. Therefore, years 2004 to 2007 is the pre-crisis period. $Group$ is a dummy variable for group-affiliated firms. The DID estimates are obtained by interacting these two dummy variables with CF in equation (1). The model specification is thus

$$\begin{aligned} Invest_{i,t} = {} & \beta_0 + \beta_1 CF_{i,t} \times Group_i \times Crisis_t + \beta_2 CF_{i,t} \times Group_i + \beta_3 CF_{i,t} \times Crisis_t \\ & + \beta_4 CF_{i,t} + \beta_5 Group_i \times Crisis_t + \beta_6 Crisis_t + \beta_7 Q_{i,t-1} + \boldsymbol{\Gamma' Controls} \\ & + \eta_i + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

which strictly adheres to the methodology in Brambor, Clark, and Golder (2005) with all constitutive interaction terms included, except for $Group$, which is co-linear to firm-fixed

effects. Pre-crisis, the investment-cash flow sensitivities of group-affiliated and standalone firms are given by $(\beta_2 + \beta_4)$ and β_4, respectively. During the crisis, the investment-cash flow sensitivities of group-affiliated and unaffiliated firms are given by $(\beta_1 + \beta_2 + \beta_3 + \beta_4)$ and $(\beta_3 + \beta_4)$, respectively. Therefore, β_2 and $(\beta_1 + \beta_2)$ are the differences in sensitivities in the pre-crisis and crisis periods, respectively. And, the difference of those differences in the two periods is thus β_1. If β_1 is negative and statistically-significant, then the joint hypothesis that internal capital markets exist in family business groups and serve to alleviate constraints in external capital supply during the financial crisis holds.

It is important to highlight that the Fazzari et al. (1988) framework has been subject to many econometric criticisms. These include the endogeneity and non-monotonicity issues associated with sorting firms according to their external capital constraints (see Kaplan and Zingales (1997)), and the error-in-variable problems from using *average* Q to proxy for *marginal* investment opportunities. Our methodology overcomes the first issue as our sorting method is unlikely to be endogenous: a firm's ownership linkage status is unlikely to change in anticipation of a shock to external funding constraints such as the GFC, and the GFC itself is arguably exogenous to corporate investments. The second issue can be resolved through recent econometric advances. Most notably, Erickson and Whited (2000) propose a GMM estimation method based on high-order moments of regression variables. However, Almeida, Campello, and Galvao (2010) find that in the presence of firm-fixed effects, which our statistical model also includes, this method does not perform as well as simpler instrumental variable models with long lags of Q as instruments.

3.2.2 Instrumental variables approach

Our second line of inquiry focuses solely on group-affiliated firms to investigate how investments by each firm are affected by the cash flows of its affiliates in the same group. This would provide direct evidence on the functioning of internal capital markets within business groups, especially during weak external capital market conditions. Lee, Park, and Shin

(2009) conduct a similar study of internal capital markets in Korean *chaebol* during the 1997 Asian Financial Crisis by examining the sensitivity of investments of group-affiliated firms to the cash flows of *other* firms within the same business groups through estimating equation (2) on a subsample of group-affiliated firms. Their analysis is limited to providing evidence of an *association* of within-group investments and cash flows, but not a *causal* relationship. We develop an instrumental variable approach as our identification strategy to establish causality.

Consider a family business group with two firms, A and B. Suppose firm B experiences a shock to its operating cash flows, which affects the investment expenditures of firm A. If the earnings shock to firm B is exogenous, then we could show evidence of causality between firm B's cash flows and the investments of firm A. In extant investigation on internal capital markets of business groups, the standard econometric technique is to regress the investment expenditures of firm A on the cash flows of firm B. This test is able to establish an association of investments and cash flows within groups, but is unable to show that group affiliation is the cause of internal capital flows to support group member firms' investments because firm B's cash flows are very likely endogenous to the investments of firm A. Therefore, we need an instrument that is correlated to the investments of firm A only through the shocks to the cash flows of firm B.

We define earnings shocks of firm B as the percentage change in its median operating cash flows from the pre-crisis period (i.e. 2004–2007) to its cash flows in a crisis year, $\Delta Perf_{B,t}$ where t is the crisis year (i.e. either 2008 or 2009). We define the instrument for $\Delta Perf_{B,t}$ as the percentage change in the industry's median operating cash flows from the pre-crisis period to a crisis year (where the industry is that of which firm B operates in) less the percentage change in firm A's industry median cash flows in the same time period, $\Delta Ind_{B,t} - \Delta Ind_{A,t}$. We further enforce the following conditions in our construction of the instrumental variable to eliminate confounding effects on the validity of our instrument: (i) firm A and B must operate in different industries, (ii) the change in the industry median cash flows in which firm B operates in is calculated at the country-level, and (iii) $\Delta Ind_{B,t}$ and $\Delta Ind_{A,t}$ are calculated

based on excluding group-affiliated firms in the same industry-country as firms B and A, respectively.

We use the Standard Industry Classification (SIC) codes as the basis to define our industry groupings. However, the weakness of the SIC system is there may be substantial overlaps in operational activity across industries, especially at the higher levels (i.e. 2-digit SIC codes). Significant improvements to industry classification for U.S. firms have been proposed by Hoberg and Phillips (2010, 2013), who analyze product description texts of firms to group them together in a way that maximize within-industry similarities. This data is unfortunately unavailable for international firms. Therefore, to produce industry groups that are as distinct from one another as possible given our data constraints, we apply a simple mapping between SIC and the Hoberg and Philips (HP) data. The HP dataset[8] consists of 12,406 U.S. firms, which are grouped into 50 different industries according to the HP classification system. Each new industry is assigned a Fixed Industry Classification (FIC) code, which ranges from 1 to 50. Since each of the 12,406 firms has a 4-digit SIC code, our goal is to produce a distinct mapping of 4-digit SIC codes to FIC codes. For situations in which a single 4-digit SIC code produces several FIC codes, we take the mode of the FIC codes to yield a distinct mapping. If there are 4-digit SIC codes that are not mapped to FIC codes in the HP dataset, we use the first two digits of these SIC codes to find an equivalent mapping using the same procedure. We eventually arrive at an industry classification system based on FIC codes, which we believe would allow us to compute industry earnings shocks that are less correlated to one another such that our instrumental variable is a more valid instrument for the shocks to the operating cash flows of a firm in a FIC industry.

We estimate the following model for a subsample of diversified group-affiliated firms:

$$\Delta Invest_{i,t} = x_0 + x_1 \Delta CF_{i,t} + x_2 \Delta Q_{i,t} + x_3 \Delta Perf_{j,t} + \boldsymbol{\Gamma' \Delta Controls} + \varepsilon_{i,t}, \qquad (3)$$

where t is crisis year 2008, or 2009; firms $i \neq j$; firms i and j have different FIC codes; $\Delta CF_{i,t}$ is the percentage change in firm i's operating cash flows from the pre-crisis median

[8]This data is available for public downloads at http://alex2.umd.edu/industrydata/

operating cash flows to a crisis year cash flows; $\Delta Perf_{j,t}$ is as previously defined; $\Delta Q_{i,t}$ is the percentage change in investment opportunities for firm i from the pre-crisis median Q to a crisis year investment opportunities; $\boldsymbol{\Delta Controls}$ is a vector of percentage changes in the control variables cash reserves, leverage, firm size, and property, plant and equipment. All variables are also "Winsorized" at the 99^{th} and 1^{st} percentiles. For business groups with more than two firms, then $\Delta Perf_{j>1,t}$ is the weighted-sum (weighted by total assets) of percentage changes in the firms' median operating cash flows from the pre-crisis period to their cash flows in a crisis year. Note that these firms can have different or the same FIC codes, but they must be different from the FIC code of the subject firm i.

4 Empirical results

4.1 How different are group-affiliated and standalone firms?

We begin with an analysis of median differences in the key firm characteristics of group-affiliated and standalone firms using the Wilcoxon sign-rank test. This test is suitable as one does not need to assume the median differences are normally distributed, although it is necessary to assume the distributions are symmetric. Table 3 shows the differences in the medians of group-affiliated and standalone firms for each of the variables examined after matching the firms either by 2-digit SIC codes or size, and country of domicile.

[Insert Table 3 about here]

Group-affiliated firms make more investments than their standalone counterparts even during the crisis when external financing constraints are at the peak. Pre-crisis, the higher capital expenditures do not appear to be financed by stronger operating cash flows. Moreover, while greater growth opportunities seem to be the driver of investments pre-crisis, group-affiliated firms continue to invest more despite facing fewer investment opportunities during the crisis. One explanation why group-affiliated firms can afford to invest inefficiently during the crisis is because they exhibit higher cash flows, which are used to finance the investments. But, it is also possible that these firms receive financing from group member firms

and channel the excess funds to investment spending regardless of opportunities. Overall, group-affiliated firms hold more cash assets throughout the sample period.

Although Opler, Pinkowitz, Stulz, and Williamson (1999) find that firms with better access to the capital markets tend to hold less cash, it is unlikely that group-affiliated firms hold more cash due to poorer access because they have higher leverages, which suggests they are able to borrow more. Thus, it could be group-affiliated firms build-up their cash reserves so that they are well-positioned to support other member firms. It is also interesting to note that despite being larger in size, group-affiliated firms have less property, plant and equipment as a ratio of total assets pre-crisis; in the crisis years, property, plant and equipment becomes more possibly as a consequence of consistently higher investment spending.

Similar to the comparative study in Masulis et al. (2011), Table 3 shows that group-affiliated firms are fundamentally-different from standalone firms in various dimensions after accounting for heterogeneity in industry and size. The results here suggest that group-affiliated firms are able to invest more, possibly due to the financial support of other business group members.

4.2 Evolution of corporate investments during the GFC

We first investigate whether the investment expenditures of a group-affiliated firm is less sensitive to the internal cash flows from its operations compared to those of standalone firms. If the internal capital markets within business groups function properly, then we would expect the investment expenditures of group-affiliated firms to be less sensitive to changes in external capital market conditions as a consequence of the crisis as indication that they are able to rely on within-group funding sources. We estimate equations (1) and (2) with a DID estimator to test this hypothesis.

[Insert Table 4 about here]

Columns 1 and 2 of Table 4 show the results from a test of Equation (1). As expected, a firm's own cash flows and investment opportunities it faces are positively-correlated to

its investments, and significant at the 1 percent level. Firms that are larger, and hold more cash reserves also invest more. Consistent with the theoretical prediction in Hennessy (2004) that debt-overhang disrupts firm investments, leverage is negatively-correlated with investments. Columns 3 and 4 present the baseline results. Group-affiliated firms show a pre-crisis investment-cash flow sensitivity of 0.078, which decreases by a magnitude of 0.0428 to 0.0352 during the crisis. Standalone firms show a pre-crisis sensitivity of 0.0012, which *increases* in magnitude to 0.0208 during the crisis. These results show that with the onset of constraints in the external capital supply during the crisis, group-affiliated firms become less sensitive to their own cash flows while standalone firms become more sensitive; the absolute difference in sensitivities is 0.0428, which is the coefficient of the triple-interaction term *Crisis*Group*CF* in column 3. After controlling for firm-specific characteristics, the absolute difference in sensitivities is 0.0364.

These findings show that the investment expenditures of group-affiliated firms are less affected by external capital market conditions since despite external financing constraints during the GFC, their investments become less dependent on their own operating cash flows. This evidence is related to the arguments in Stein (1997) and Almeida and Wolfenzon (2006b) that centralized control in an internal capital market allows investment projects to proceed, despite external funding constraints. Standalone firms on the other hand, without the funding support of internal capital markets through group affiliation adopt investment policies that are expected of firms when external financing is in short supply; they cut capital expenditures. To provide further evidence that there is correlation between within-group investments and cash flows, we test the sensitivity of investment expenditures of group-affiliated firms to the cash flows of *other* firms belonging to the same business groups by performing within-group OLS regressions of the model

$$\begin{aligned} Invest_{i,t} = \delta_0 + \delta_1 CF_{i,t} \times Crisis_t + \delta_2 Group\_CF_{j,t} \times Crisis_t + \delta_3 CF_{i,t} + \delta_4 Group\_CF_{j,t} \\ + \delta_5 Crisis_t + \delta_6 Q_{i,t-1} + \boldsymbol{\Gamma' Controls} + \eta_i + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where $Group\_CF$ is the sum of the cash flows of all firms in the same business group excluding the cash flows of firm i, scaled by the beginning-of-period sum of total assets of all firms in the same group in a given year. Pre-crisis, the sensitivity of firm i's investments to the cash flow of its group affiliates is given by δ_4. During the crisis, this sensitivity is the sum of δ_2 and δ_4. Therefore, δ_2 estimates the difference in investment sensitivities to the affiliates' cash flows between the pre-crisis and during crisis periods. If resources are shared among firms within family business groups, then a firm's investments should be sensitive to the cash flows of other group member firms particularly during the crisis. Thus, δ_2 is expected to have a positive sign.

[Insert Table 5 about here]

The first two columns of Table 5 show that within business groups, each firm's investments are sensitive to the cash flows of other member firms with positive magnitudes of 0.071, and 0.0585 when control variables are included, significant at the 1 percent level. These results suggest that overall, the investment policies of group-affiliated firms are dependent on the operational performance of other member firms. Specifically, when other firms in the group are performing well, the group-affiliated firm is able to invest more. Additionally, this inter-dependence suggests the presence of functioning internal capital markets within business groups, which allows for cross-subsidization similar to that occurring in multi-segment diversified conglomerates. Shin and Park (1999) reach the same conclusion in their study of Korean *chaebol* firms. Given that group-affiliated firms share resources to support each other's investments, proper functioning of the internal capital markets should become even more important during the crisis. Columns 3 and 4 of Table 5 show the estimated coefficients of two interaction terms, *Crisis*Group_CF* and *Crisis*CF*, which measure the differences in sensitivities pre- and during crisis. Within business groups, firms become more sensitive to the cash flows of other firms during the crisis and less sensitive to their own cash flows. This further confirms that when external capital supply is constrained, investments of group-affiliated firms become more dependent on the cash flows of other member firms, thus suggesting the increased importance of the internal capital markets within business groups.

4.2.1 Capital flows within business groups

In this section, we investigate the functioning of internal capital markets in business groups by examining the directional flow of capital among member firms. Within each business group we identify two firms, one with the highest retained earnings-to-assets ratio, and the other with the lowest ratio at the beginning of the period. We denote the former type of firms as *capital-suppliers*, and the latter type as *capital-users*. If the internal capital markets of business groups function rationally, then one should expect capital to flow predominantly from the capital-supplier to the user since the former has the most financial slack to provide capital. A capital-user firm has the least financial slack and is thus the most likely candidate to require support from other member firms.

To test this conjecture, we regress the investments of the capital-user on its own cash flows, and the cash flows of the capital-supplier belonging to the same business group. The model is specified as

$$\begin{aligned} Invest\_CU_{i,t} = \theta_0 + \theta_1 CF\_CU_{i,t} + \theta_2 CF\_CS_{j,t} + \theta_3 Q\_CU_{i,t-1} + \theta_4 Q\_CS_{j,t-1} \\ + \boldsymbol{\Gamma' Controls} + \eta_i + \varepsilon_{i,t}, \end{aligned} \tag{5}$$

where variables with an underscore CU or CS denote the variable for the *capital-user* and *capital-supplier*, respectively. Only control variables for the capital-user are specified. Coefficient θ_2 measures the sensitivity of the capital-users' investments to the cash flows of capital-suppliers.

The first two columns in panel A of Table 6 show the results of estimating equation (4). The investments of capital-users are sensitive to the cash flows of capital-suppliers as hypothesized. As a further check on these findings, columns 5 and 6 in panel B Table 6 presents the results when we regress the investments of the *capital-supplier* on its own cash flows and the cash flows of the *capital-user*. Indeed, there is no statistical significance in the sensitivity of the capital suppliers' investments to the cash flows of the capital-users. The results here suggest that on average, the internal capital markets of business groups function

rationally since capital appears to flow from firms that are well-positioned to provide capital to member firms who apparently need capital.

[Insert Table 6 about here]

We further re-estimate Equation (4) by interacting CF_CU and CF_CS with the *Crisis* dummy to examine any difference in sensitivity between pre-crisis and crisis periods, and show the results in columns 3 and 4. We repeat this test with the investments of capital-suppliers as the dependent variable and show the results in columns 7 and 8. Overall, business groups utilize their internal capital markets to allocate resources to support the investments of member firms, and firms with the least financial slack are probable beneficiaries of such allocations.

4.2.2 Channels of resource transfers within groups

The capital flows within business groups can be channeled through both debt and equity instruments. To examine which is the dominant channel, we regress debt capital and equity capital on cash flow, investment opportunities, and control variables. We define debt capital as the amount of long term debt issuance less the reduction in long term debt, and equity capital as the net proceeds from the sale or issuance of common and preferred stock, both scaled by total assets. This line of inquiry also enables us to analyze the differences in ability of group-affiliated and standalone firms to raise capital conditional on severe constraints in the external capital markets. We hypothesize that given the GFC is largely attributed to a "credit crunch", capital-raising activity during this period should take the form of equity.

[Insert Table 7 about here]

In Panel A of Table 7,the coefficient of the interaction term $Group * Crisis$ shows the difference in capital-raising activity of group and standalone firms from the pre-crisis to post-crisis period. As expected, the difference between group and standalone firms in the amount of debt capital raised is not statistically significant, which suggests that both types

of firms are subject to similar constraints in raising debt. In column 4, the results show that group firms raise 2.3 percent more equity capital than standalone firms during the crisis. Next, we consider only SEOs. The SEO data is obtained from Thomson Reuters SDC, and we exclude all non-ordinary stock issuances, private placements, limited partner interests, special warrants, and IPOs. We then scale proceeds from the SEO by the total assets of the firm. We argue that by focusing on non-dilutive secondary equity issuances, we can identify how group firms receive capital support from affiliated parent firms. In columns 5 and 6, consistent with the evidence that group firms raise more equity capital, the results show that groups firms raise 0.09 percent and 0.08 percent (with controls) more capital via SEOs than standalone firms.

In Panel B of Table 7, we perform the same tests only on group firms. And, in columns 9 and 10 we include only SEOs where the issuer and investor belong to the same group. Additionally, the investing firm block purchases at least 5 percent, but strictly less than 100 percent of common stock outstanding. This allows us to isolate within-group SEO purchases. The positive and significant coefficients on the $Crsis$ variable show that within-group SEO activity increases during the crisis, and confirms our hypothesis that group firms utilize SEOs as a channel for within-group capital support. Moreover, the negative and significant coefficient on the $Size$ variable shows that smaller firms within the group raise more capital from SEOs than larger firms in the same group. Smaller firms are predominantly organized in the bottom of the business group pyramids, have greater growth opportunities, and tend to be more susceptible to external financing constraints. Therefore, smaller firms are the primary candidates to receive internal capital support from their parent firms. Our analysis here provides strong evidence of not only within-group capital support, but also capital flowing from parent firms in pyramidal groups by purchasing SEOs of group member firms.

4.2.3 Do business groups consistently support member firms?

The evidence so far shows active internal capital markets within business groups in which firms transfer resources to support the investments of group members particularly during the

crisis as evidenced by the increased investment sensitivity to the cash flow of group affiliates. However, a plausible alternative explanation is the internal capital markets only function to *rescue* member firms in distress during the crisis, and do not consistently facilitate resource exchanges to support investments. To test this conjecture, we identify distressed firms in each business group and exclude them from the sample of group-affiliated firms and again perform within-group regressions of Equation (3). For each group-affiliated firm, we calculate the 3-year equity holding period return during the crisis from 2008 to 2009 using the firm's total return index[9]. A firm is classified as distressed during the crisis if its 2-year holding period return falls in the lowest 10^{th} or 20^{th} percentiles within a country. Columns 1 to 4 (5 to 8) of Table 8 show the within-group regression results when distress firms at the lowest 10^{th} (20^{th}) percentile are excluded from the sample.

[Insert Table 8 about here]

Consistent with previous results, columns 1, 2, 5, and 6 show that the investments of firms are sensitive to the cash flow of other group members throughout the sample period. This indicates that resources are transferred among firms not just for rescue purposes, but most likely as an invariant financing policy within business groups. In columns 3, 4, 7, and 8, the two interaction terms *Crisis*Group_CF* and *Crisis*CF* are included to show that investments of firms are less sensitive to their own cash flows and more sensitive to the cash flows of group-affiliates during the crisis, which also support results in Table 5. Taken together, these findings contravene the hypothesis that group-affiliated firms only rescue distressed member firms, and confirm the interpretation that internal capital markets of business groups continually allocate resources among firms.

[9]The return index (RI) data is from the Thomson Reuters Datastream database. Each firm's RI is the theoretical share value assuming that dividends are reinvested to purchase additional shares at the closing price on the ex-dividend date. Therefore, the 2-year holding period return during the crisis is the difference in RI between 2009 and 2008, divided by the 2008 RI.

4.3 How important are internal resource transfers within groups?

As a next step, we perform our instrumental variable (IV) test of whether a firm's change in investment expenditures is caused by a change in the operating cash flows of other firms in the same group. We run regressions of equation (3) for each of the three crisis years separately. Table 9 presents the results. The variable of interest is $\Delta Perf_{j,t}$. If a change in a firm's investment level is due to a change in the cash flows of other firms within the same group, then we expect the coefficient to be positive. In columns (1) and (2), which presents the regression results for 2008, the coefficients of $\Delta Perf_{j,t}$ are positive and significant at the 5 percent level. The key interpretations of these results are firstly, within a group of connected firms, the investment expenditures of one firm is sensitive to the operating cash flows of its affiliates, and secondly, our causality test provides evidence that group-affiliation is the driver behind such internal transfers of capital to support investments. Therefore, corporate ownership linkages serve to mitigate liquidity shocks in the external capital markets brought about by financial crises such that the investment policies of group-affiliated firms are less affected by external funding constraints.

[Insert Table 9 about here]

It is not surprising we do not get significant results for 2009. As the crisis prolonged into 2009, it is reasonable to expect that internal resources within business groups would have by now been expended in 2008, which is the most severe year of the crisis period, such that we observe limits to within-group support. Overall, our IV test shows that at the peak of external funding constraints, group-affiliation leads to internal capital flows to support member firms' investment expenditures.

4.3.1 The influence of group structures on within-group support

We extend our analysis further by examining whether alternative group structures (i.e. pyramidal or horizontal) have different causal effects on capital support within business groups. Almeida and Wolfenzon (2006b) show in their theoretical model that groups utilize pyramidal structures to support capital-intensive member firms, which are usually located at the

bottom of the pyramids. This conjecture is supported by empirical evidence in Masulis et al. (2011). Based on extant findings in the literature, we should expect to observe more significant effects of internal capital flows in pyramidal groups than horizontal groups. This is because in a horizontal group structure, the controlling family shareholder has direct equity stakes in each firm in the group. Therefore, even if one of the group firms require capital support, the most usual source is direct equity injection by the controlling shareholder. Thus, the investment expenditures of firms in horizontal groups are less dependent on the changes in cash flows of other member firms. For example, the CEO of Las Vegas Sands Corporation (LVS Corp.), Sheldon Adelson, and his family collectively own a majority stake in the firm. LVS Corp. has other listed firms such as Sands China Limited, in which Sheldon Adelson has direct equity stakes in. As such, LVS Corp. is considered a horizontal family business group. And, in September and November of 2008 during the height of the crisis, Sheldon Adelson and his wife invested more than $1 billion in a secondary offering of preferred stock and warrants to tide the firm over the crisis.

We perform regressions of equation (3) with two subsamples of group-affiliated firms; those held in pyramidal structures and in horizontal structures. We only test this for 2008 since the most severe year of the crisis is when the functioning of internal capital markets in groups is most economically-crucial. Table 10 presents the results. Columns 1 and 2 are results based on a subsample of pyramidal groups, while 3 and 4 are based on horizontal groups. The analysis shows that in pyramidal group structures, the change in a firm's investment level is caused by a change in the operating cash flows of other affiliated firms. Firms in horizontal group structures on the other hand do not show such interdependence.

[Insert Table 10 about here]

4.3.2 Robustness checks

We construct two further instruments as robustness checks to our primary instrumental variable. We construct the instrument for the change of a firm's operating cash flow as the industry earnings shock, $\Delta Ind_{j,t}$. That is, without subtracting the earnings shock of the

industry in which the subject firm i operates in (recall that firms i and j must operate in different industries). We call this instrument the unadjusted industry earnings shock. Our third instrument adjusts the industry earnings shock by subtracting the market shock of the market in which firm j is domiciled. That is, $\Delta Ind_{j,t} - \Delta Mkt_{j,t}$ where $\Delta Mkt_{j,t}$ is the percentage change in the market's median operating cash flows from the pre-crisis period to a particular crisis year. We use these two additional instruments separately and perform the 2SLS IV analysis of equation (3) for each crisis year from 2007 to 2009.

Panels A and B of Table 11 show the results with the use of the unadjusted industry earnings shock instrument, and the market-adjusted industry earnings shock instrument, respectively. Consistent with the results produced using our original instrument ($\Delta Ind_{j,t} - \Delta Ind_{i,t}$), as seen in columns 1 and 2, and 5 and 6, the change in the subject firm's investment expenditures are significantly caused by the change in operating cash flows of group member firms only in year 2008.

[Insert Table 11 about here]

Hitherto, the results support the hypothesis that internal capital markets within business groups exist and provide a medium for resource exchange among group-affiliated firms such that the firms are able to increase investment spending even when they face difficulties raising capital externally. In other words, the internal capital markets of business groups play a key role of supporting investment expenditures of member firms particularly in times of financial crisis, which is a financing advantage absent in standalone firms. Group-affiliated firms can continue to pursue strategic investment policies through resource-sharing to substitute for poorly-functioning external capital market institutions. This potential financing advantage is amplified during economic recessions, in which asset prices typically decline and present opportunities to invest at discounted prices. Group-affiliated firms can leverage on within-group capital and acquire discounted assets, while comparable standalone firms most likely have to pass-up on such investment opportunities due to a lack of external capital supply. Moreover, through our use of instrumental variables, we are able to establish the causal effect of change in member firms' cash flows on the change in the another member firm's

investments brought about by group affiliation. And, this causal effect is more significant in groups with pyramidal structures.

5 Conclusion

The primary innovation and significance of this study is the capability to directly assess the impact on corporate financing and investment policy as a consequence of the interactive effect of external market conditions and internal capital markets. The extensive cross-country data with clearly-identified group-affiliated firms also shed light on the complex relationship between corporate ownership and financing decisions. Business groups controlled by families utilize the internal capital markets to share resources and provide capital to support the investments of group member firms especially during financial crises when external capital supply is constrained. This provides a financing competitive advantage for group-affiliated firms unavailable to standalone firms. We argue that since it is unlikely for firms to anticipate the GFC to the extent that they change their ownership linkages ex-ante, the crisis provides a valuable exogenous setting to examine changes in investment policy often beset with endogeneity concerns in prior studies. Another key innovation in our study is the use of instrumental variables as an identification strategy to establish causality of group-affiliation on within-group investment and financing policies. Finally, we also develop a systematic and expedient way of updating business group structures from IPOs, mergers and acquisitions, and de-listings, which provides data infrastructure capable of facilitating cross-sectional and time-series studies on group ownership structures.

The findings in this study support the conclusions of Boutin, Cestone, Fumagalli, Pica, and Serrano-Velarde (2013), which shows that French business groups that are cash rich provide liquidity to member firms that face costly external financing. Also, related to the study of internal capital markets in Indian business groups by Gopalan, Nanda, and Seru (2007) who find evidence of loan flows within groups to aid distress member firms with high bankruptcy risks, this study adds that internal capital markets function to continually support the investments of group-affiliates and not just for bail-out purposes. The important

implication of this study is the implicit guarantee of supporting member firms is perhaps the key benefit of group affiliation, providing vital supplementary capital when external markets do not operate duly.

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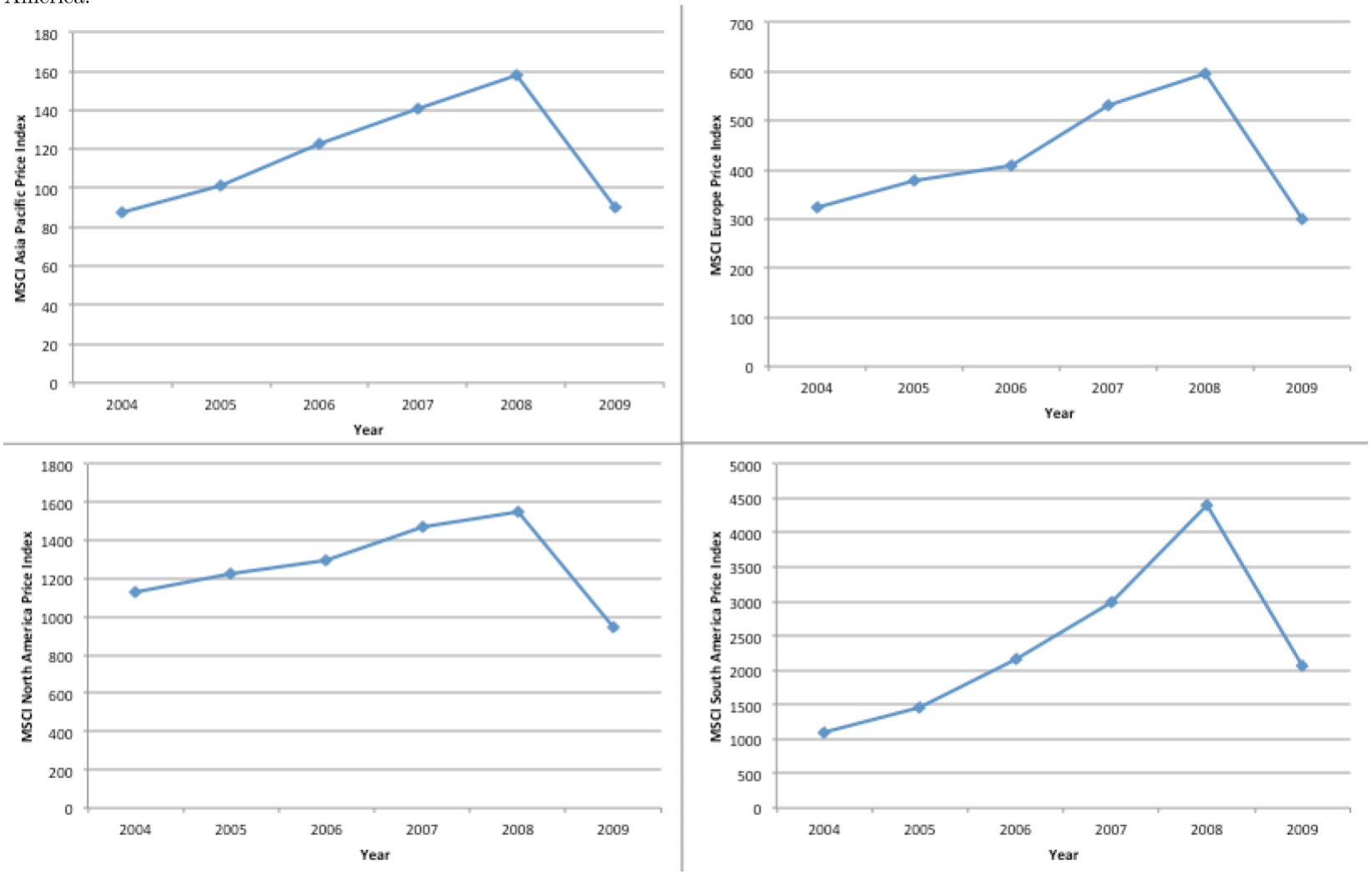
Figure 1: Annual MSCI price index

The figure shows annual MSCI price index from 2004 to 2009 for the four continental regions; Asia-Pacific, Europe, North America, and South America.



Appendix: Description of key variables

Variable	Description
Invest	Investments defined as the net capital expenditures scaled by beginning-of-period book value of assets.
CF	Own operating cash flows defined as the sum of net income before extraordinary items and depreciation & amortization scaled by beginning-of-period book value of assets.
Q	Proxy for investment opportunities measured by Tobin's q. It is the ratio of market value of assets to book value of assets. Market value of assets is the sum of book value of assets and market value of common equity less the sum of deferred taxes and book value of common equity. In empirical tests, *Q* is lagged one period relative to the dependent variable.
Cash	Cash and short term investments equivalent to cash scaled by contemporaneous book value of assets. In empirical tests, *Cash* is lagged one period relative to the dependent variable.
PPE	Property, plant and equipment scaled by contemporaneous book value of assets. In empirical tests, *PPE* is lagged one period relative to the dependent variable.
Lev	Leverage defined as the ratio of book value of debt to book value of assets. In empirical tests, *Lev* is lagged one period relative to the dependent variable.
Size	Firm size measured as the natural logarithm of market capitalization in U.S. dollars. In empirical tests, *Size* is lagged one period relative to the dependent variable.

Appendix: (continued)

Variable	**Description**
Group_CF	The sum of the operating cash flows of all firms in the same business group excluding firm i, scaled by the beginning-of-period sum of book value of assets of all firms in the same group in year t.
Crisis	Dummy variable for during crisis period. *Crisis* takes on a value of 1 if the observation is from 2008 to 2009, and 0 otherwise.
Group	Dummy variable equals to 1 if the firm is affiliated to a business group, and 0 otherwise.

Table 1: Country-level statistics

The table shows the breakdown of 16,694 non-financial firms represented in the sample as of December 2007. Firms are categorized as group-affiliated if they are identified as sharing common ownership linkages with other firms to form business groups, and standalone otherwise. The total number of group-affiliated firms is 3,064, which is about 18.4% of the sample. Observations are taken from the period 2004 to 2009, amounting to 86,857 firm-year observations. The percentage of firms in each category for each country is calculated as the number of firms in the category divided by the total number of firms in the country.

	Firms by number			Firms by percentage	
Country	Total	Group-affiliated	Standalone	Group-affiliated	Standalone
Argentina	56	23	33	41%	59%
Australia	847	83	764	10%	90%
Austria	43	4	39	9%	91%
Belgium	70	23	47	33%	67%
Brazil	202	61	141	30%	70%
Canada	851	65	786	8%	92%
Chile	117	65	52	56%	44%
Colombia	20	10	10	50%	50%
Czech Republic	9	0	9	0%	100%
Denmark	84	12	72	14%	86%
Finland	99	12	87	12%	88%
France	479	81	398	17%	83%
Germany	511	90	421	18%	82%
Greece	230	54	176	23%	77%
Hong Kong	677	169	508	25%	75%
Hungary	14	2	12	14%	86%
India	504	220	284	44%	56%
Indonesia	227	84	143	37%	63%
Ireland	38	5	33	13%	87%
Israel	125	79	46	63%	37%
Italy	159	62	97	39%	61%
Japan	2,340	160	2180	7%	93%
Korea	1,134	348	786	31%	69%

Table 1: (continued)

	Firms by number			Firms by percentage	
Country	Total	Group-affiliated	Standalone	Group-affiliated	Standalone
Malaysia	585	177	408	30%	70%
Mexico	82	24	58	29%	71%
Netherlands	97	18	79	19%	81%
New Zealand	70	5	65	7%	93%
Norway	106	37	69	35%	65%
Pakistan	70	32	38	46%	54%
Peru	70	28	42	40%	60%
Philipines	119	67	52	56%	44%
Poland	88	34	54	39%	61%
Portugal	42	8	34	19%	81%
Singapore	375	100	275	27%	73%
South Africa	164	23	141	14%	86%
Spain	80	23	57	29%	71%
Sri Lanka	98	58	40	59%	41%
Sweden	224	59	165	26%	74%
Switzerland	139	16	123	12%	88%
Taiwan	859	188	671	22%	78%
Thailand	286	115	171	40%	60%
Turkey	165	91	74	55%	45%
United Kingdon	871	66	805	8%	92%
United States	3,254	181	3073	6%	94%
Venezuela	14	2	12	14%	86%
Total	16,694	3,064	13,630		

Table 2: Descriptive statistics

The table reports summary statistics of the key variables used in subsequent empirical tests. Variables are as defined in the Appendix. Panel A reports statistics for the full sample of firms. Panels B and C report statistics for subsamples of group-affiliated and standalone firms, respectively. N is the number of firm-year observations; Sd. Dev. is the standard deviation. All variables are "Winsorized" at the 1 and 99 percentiles levels.

Variable	N	Mean	25%	Median	75%	Sd. Dev.
Panel A: All firms						
Invest	86,857	0.064	0.012	0.033	0.072	0.095
CF	86,857	0.044	0.020	0.069	0.125	0.194
Q	86,857	1.505	0.879	1.130	1.618	1.255
Cash	86,857	0.166	0.044	0.108	0.225	0.175
Lev	86,857	0.112	0.000	0.060	0.183	0.134
PPE	86,857	0.574	0.243	0.512	0.833	0.409
Size	86,857	11.725	10.272	11.530	13.028	2.024
Panel B: Group-affiliated firms						
Invest	16,148	0.067	0.015	0.038	0.082	0.091
CF	16,148	0.079	0.036	0.079	0.135	0.137
Q	16,148	1.344	0.847	1.064	1.455	1.032
Cash	16,148	0.146	0.042	0.098	0.192	0.154
Lev	16,148	0.131	0.003	0.088	0.213	0.141
PPE	16,148	0.586	0.262	0.544	0.837	0.400
Size	16,148	12.218	10.702	12.115	13.635	2.020
Panel C: Unaffiliated firms						
Invest	70,709	0.063	0.012	0.032	0.070	0.096
CF	70,709	0.036	0.015	0.067	0.123	0.204
Q	70,709	1.541	0.887	1.147	1.658	1.297
Cash	70,709	0.171	0.045	0.111	0.233	0.179
Lev	70,709	0.108	0.000	0.054	0.176	0.132
PPE	70,709	0.572	0.238	0.504	0.831	0.410
Size	70,709	11.615	10.192	11.408	12.869	2.008

Table 3: Median differences between group-affiliated and standalone firms

The table reports the differences in medians of the key variables between group-affiliated and comparable standalone firms, matched by either industry (based on 2-digit SIC codes) or firm size (natural log of market capitalization in U.S. dollars). All matched firms belong to the same country of domicile. The median differences of the variables are measured for the full sample period 2004–2009, the pre-crisis period 2004–2007, and the crisis period 2008–2009. The significance of the median differences are tested with the Wilcoxon sign-rank test. The asterisks *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. All variables are as defined in the Appendix.

	Full sample period 2004-2009		Pre crisis period 2004-2007		Crisis period 2008-2009	
Variable	Industry-matched	Size-Matched	Industry-matched	Size-Matched	Industry-matched	Size-Matched
Invest	0.004***	0.003***	0.011***	0.004***	0.004***	0.005***
CF	0.003***	0.004***	0.005***	0.007***	0.010***	0.010***
Q	0.014***	0.009***	0.031*	0.033*	-0.009***	-0.019***
Cash	0.004***	0.002***	0.005***	0.004***	0.003***	0.002***
Lev	0.019***	0.027***	0.013***	0.032***	0.010***	0.030***
PPE	-0.014	0.001**	-0.021*	-0.014***	-0.013	0.012***
Size	0.889***		0.870***		0.858***	

Table 4: Difference-in-differences test of investment-cash flow sensitivity between group-affiliated and standalone firms

The table reports results of multivariate OLS regressions with the difference-in-differences (DID) estimator. The dependent variable is the capital expenditures scaled by beginning-of-period book value of assets. All other variables are as defined in the Appendix. Columns 1 and 2 are results of OLS regressions; columns 3 and 4 are results of OLS regressions with the DID estimator. All specifications include firm-fixed effects. No. of obs. is the number of firm-year observations. Adj. R^2 is the adjusted R-squared. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4: (continued)

	Dependent variable: *Invest*			
Variable	(1)	(2)	(3)	(4)
CF	0.0181***	0.0241***	0.00120	0.00860
	(3.601)	(4.973)	(0.196)	(1.421)
Q	0.00585***	0.00425***	0.00641***	0.00480***
	(9.104)	(6.317)	(10.10)	(7.211)
*Crisis*Group*CF*			-0.0428**	-0.0364**
			(-2.509)	(-2.303)
*Crisis*Group*			0.00798***	0.00605***
			(4.326)	(3.412)
*Crisis*CF*			0.0196***	0.0138**
			(2.893)	(2.067)
*Group*CF*			0.0768***	0.0659***
			(4.899)	(4.262)
Crisis			-0.0138***	-0.0139***
			(-17.52)	(-18.53)
Control variables:				
Cash		0.0709***		0.0661***
		(12.90)		(12.20)
Lev		-0.0741***		-0.0732***
		(-13.54)		(-13.54)
PPE		-0.000753		-0.00436
		(-0.199)		(-1.160)
Size		0.00541***		0.00662***
		(7.073)		(8.738)
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	81,581	79,634	81,581	79,634
No. of firms	15,908	15,757	15,908	15,757
Adj. R^2	0.005	0.028	0.016	0.039

Table 5: Within-group test of investment sensitivity to cash flows of group affiliates

The sample in this table includes only group-affiliated firms. The dependent variable is the capital expenditures scaled by beginning-of-period book value of assets. All other variables are as defined in the Appendix. Columns 1 and 2 are results of OLS regressions; columns 3 and 4 are results of OLS regressions with the DID estimator. All specifications include firm-fixed effects. No. of obs. is the number of firm-year observations. Adj. R^2 is the adjusted R-squared. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: (continued)

	Dependent variable: *Invest*			
Variable	(1)	(2)	(3)	(4)
CF	0.0788***	0.0738***	0.0829***	0.0882***
	(6.379)	(5.665)	(11.82)	(12.24)
Q	0.00734***	0.00629***	0.00682***	0.00858***
	(6.118)	(5.170)	(7.616)	(9.455)
Group_CF	0.0710***	0.0585***	0.0415**	0.0516***
	(3.771)	(3.078)	(2.513)	(3.119)
*Crisis*CF*			-0.0258***	-0.0356***
			(-2.894)	(-3.934)
*Crisis*Group_CF*			0.0384**	0.0373**
			(2.063)	(1.999)
Crisis			-0.00654***	-0.0105***
			(-4.316)	(-6.716)
Control variables:				
Cash		-0.0367***		-0.0222***
		(-4.143)		(-2.975)
Lev		0.0928***		0.0722***
		(6.579)		(8.647)
PPE		0.0134**		0.0144***
		(1.967)		(3.297)
Size		0.0116***		0.0192***
		(7.838)		(11.36)
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	14,945	14,630	14,945	14,704
No. of firms	2,954	2,929	2,954	2,936
Adj. R^2	0.023	0.046	0.035	0.024

Table 6: Within-group test of investment-cash flow sensitivity between capital suppliers and users

In each business group, two firms are identified; the capital-user is the firm with the least retained earnings-to-assets ratio in the group, and the capital-supplier is the firm with the highest retained earnings-to-assets ratio in the group. Thus, the sample consists only of two group-affiliated firms in each business group. Panel A reports results in which the dependent variable is the investments of the capital-user (*Invest_CU*); the dependent variable in Panel B results is the investments of the capital-supplier (*Invest_CS*). Variables with an attached underscore *CU* (*_CU*) denote the variable for the capital-user; underscore *CS* (*_CS*) denote the variable for the capital-supplier. Variables are defined in the Appendix. Columns 1, 2, 5, and 6 are results of OLS regressions; columns 3, 4, 7, and 8 are results of OLS regressions with the DID estimator. All specifications include firm-fixed effects. No. of obs. is the number of firm-year observations. Adj. R^2 is the adjusted R-squared. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: (continued)

	Dependent variable: *Invest_CU*			
Variable	(1)	(2)	(3)	(4)
Panel A: The users of capital				
CF_CU	0.0147	0.0184	0.0321	0.0270
	(0.700)	(0.885)	(1.583)	(1.034)
Q_CU	0.00991***	0.00728**	0.00995***	0.00739**
	(3.093)	(2.362)	(3.568)	(2.411)
CF_CS	0.0491***	0.0410**	0.0405**	0.0388*
	(2.651)	(2.357)	(2.269)	(1.775)
Q_CS	-0.00270	-0.00256	-0.00165	-0.00214
	(-1.225)	(-1.178)	(-0.830)	(-0.998)
*Crisis*CF_CU*			-0.0312	-0.0333
			(-1.279)	(-1.375)
*Crisis*CF_CS*			-0.00319	-0.0153
			(-0.138)	(-0.593)
Crisis			-0.00402*	-0.00772***
			(-1.865)	(-2.906)
Control variables:				
Cash_CU		0.0924***		0.0890***
		(4.223)		(4.096)
Lev_CU		-0.0527***		-0.0533***
		(-3.101)		(-3.147)
PPE_CU		0.0207*		0.0185
		(1.835)		(1.636)
Size_CU		0.00899***		0.0100***
		(3.978)		(4.501)
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	5,599	5,465	6,589	5,465
No. of firms	1,642	1,618	1,730	1,618
Adj. R^2	0.019	0.047	0.022	0.055

Table 6: (continued)

	Dependent variable: *Invest_CS*			
Variable	(1)	(2)	(3)	(4)
Panel B: The suppliers of capital				
CF_CS	0.0719***	0.0620***	0.0799***	0.0672***
	(3.612)	(3.123)	(3.414)	(2.885)
Q_CS	0.00407	0.00292	0.00413	0.00286
	(1.372)	(0.988)	(1.420)	(0.985)
CF_CU	0.0110	0.0142	0.00962	0.0127
	(0.904)	(1.173)	(0.694)	(0.919)
Q_CU	-0.000559	-0.000986	-0.000153	-0.000563
	(-0.354)	(-0.610)	(-0.0985)	(-0.353)
*Crisis*CF_CS*			-0.0463*	-0.0423
			(-1.656)	(-1.471)
*Crisis*CF_CU*			0.000911	0.00104
			(0.0641)	(0.0721)
Crisis			-0.00503*	-0.00687**
			(-1.840)	(-2.393)
Control variables:				
Cash_CS		0.0308*		0.0257
		(1.896)		(1.612)
Lev_CS		-0.0574***		-0.0574***
		(-2.840)		(-2.844)
PPE_CS		0.00919		0.00571
		(0.829)		(0.508)
Size_CS		0.00815***		0.00950***
		(3.413)		(4.006)
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	5,630	5,495	5,630	5,495
No. of firms	1,585	1,565	1,585	1,565
Adj. R^2	0.017	0.030	0.023	0.038

Table 7: Capital-raising activity and channels of capital support within groups

This table reports multivariate OLS regressions in which the dependent variable is a type of capital. *Debt_Capital* is the amount of long term debt issued less the reduction in long term debt. *Equity_Capital* is the net proceeds from the issuance of common and preferred stock. *SEO* is the proceeds from the issuance of seasoned equity offerings. All three variables are scaled by the total assets of the firm. Panel A includes all firms in our sample that have non-missing capital-raised data. Panel B includes solely group-affiliated firms. The *SEO_Group* variable in Panel B includes only seasoned equity offerings that are block purchases of at least 5% but strictly less than 100% of equity issued, and investing firm belongs to the same group as the issuing firm. Thus, the *SEO_Group* variable identifies only within-group SEO activity. All specifications include firm-fixed effects. No. of obs. is the number of firm-year observations. Adj. R^2 is the adjusted R-squared. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7: (continued)

Dependent variable:	*Debt_Capital*		*Equity_Capital*		*SEO*	
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Capital raising activity of group and standalone firms in the sample						
CF		-0.00710		-0.0916***		0.000203
		(-0.504)		(-4.272)		(0.587)
Q		0.0108***		0.0354***		-8.99e-05*
		(4.549)		(9.971)		(-1.865)
*Group*Crisis*	-0.00601	-0.00358	0.00745*	0.0230***	0.000923**	0.000837**
	(-1.249)	(-0.681)	(1.804)	(5.654)	(2.454)	(2.298)
Crisis	-0.00381*	-0.00386	-0.0267***	-0.0341***	-5.54e-05	-3.85e-06
	(-1.646)	(-1.615)	(-12.34)	(-15.96)	(-0.475)	(-0.0336)
Control variables:						
Cash		-0.0179		-0.0207		-0.00109**
		(-0.958)		(-0.786)		(-2.051)
Lev		-0.426***		-0.0580***		0.00114
		(-17.34)		(-3.100)		(1.305)
PPE		0.0424***		0.0158		-2.17e-05
		(3.108)		(1.135)		(-0.0756)
Size		-0.00441		-0.0244***		-7.14e-05
		(-1.289)		(-8.329)		(-0.727)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	50,827	40,015	59,453	45,910	1,306	1,129
No. of firms	9,691	9,264	11,320	10,683	899	811
Adj. R2	0.000	0.029	0.005	0.044	0.001	0.059

Table 7: (continued)

Dependent variable:	*Equity_Capital*		*SEO_Group*	
Variable	(7)	(8)	(9)	(10)
Panel B: Equity capital raised by group firms only				
Crisis	-0.0310***	-0.00913***	0.000868*	0.000893*
	(-8.722)	(-2.970)	(1.798)	(1.931)
CF		0.0210		0.00645***
		(1.107)		(3.276)
Q		0.0269***		0.000742***
		(10.10)		(3.119)
Control variables:				
Cash		0.0754***		-0.00146
		(3.420)		(-0.575)
Lev		-0.0191		0.00954*
		(-0.770)		(1.992)
Size		-0.0219***		-0.000894**
		(-7.539)		(-2.751)
PPE		0.0344***		0.000677
		(2.959)		(0.585)
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	11,698	8,664	180	163
No. of firms	2,222	2,105	137	128
Adj. R2	0.004	0.041	0.001	0.059

Table 8: Within-group test of investment-cash flow sensitivity without distress firms

The sample consists of non-distress group-affiliated firms. Distress firms are identified as those with during crisis 3-year holding period equity returns within the lowest x^{th} percentile in each country. The during crisis period is 2007–2009. Columns 1–4 are results based on the subsample of group-affiliated firms excluding distress ones from the lowest 10^{th} percentile in each country; columns 5–8 results are based on the subsample without the lowest 20^{th} percentile. Columns 1, 2, 5, and 6 report results from OLS regressions; columns 3, 4, 7, and 8 report results from OLS regressions with the DID estimator. The dependent variable is each firm's investments, *Invest*. All variables are as defined in the Appendix. All specifications include firm-fixed effects. No. of obs. is the number of firm-year observations. Adj. R^2 is the adjusted R-squared. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Excl. distress firms 10%				Excl. distress firms 20%			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CF	0.0960***	0.0882***	0.124***	0.120***	0.0878***	0.0804***	0.118***	0.114***
	(6.217)	(5.825)	(5.912)	(5.706)	(4.241)	(3.904)	(3.938)	(3.771)
Q	0.00487**	0.00291	0.00517**	0.00359	0.00685**	0.00448	0.00733**	0.00559*
	(2.201)	(1.286)	(2.310)	(1.562)	(2.140)	(1.379)	(2.277)	(1.699)
Group_CF	0.0829***	0.0820***	0.0440	0.0352	0.0903**	0.0911**	0.0475	0.0423
	(3.219)	(3.208)	(1.388)	(1.103)	(2.426)	(2.497)	(1.107)	(0.991)
*Crisis*CF*			-0.0475**	-0.0593***			-0.0487*	-0.0590**
			(-2.507)	(-3.102)			(-1.771)	(-2.123)
*Crisis*Group_CF*			0.0666**	0.0710**			0.0811**	0.0830**
			(2.012)	(2.171)			(1.996)	(2.074)
Crisis			-0.000633	-0.00452**			-0.000258	-0.00524*
			(-0.294)	(-2.020)			(-0.0925)	(-1.867)

Table 8: (continued)

	Excl. distress firms 10%				Excl. distress firms 20%			
Control variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash		0.0420***		0.0404***		0.0492***		0.0485***
		(3.207)		(3.115)		(3.140)		(3.115)
Lev		-0.0847***		-0.0848***		-0.0873***		-0.0876***
		(-6.947)		(-6.971)		(-5.690)		(-5.775)
PPE		0.00528		0.00399		0.00770		0.00648
		(0.676)		(0.518)		(0.970)		(0.819)
Size		0.00949***		0.0116***		0.0104***		0.0128***
		(5.375)		(6.516)		(4.546)		(5.436)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	9,432	9,432	9,432	9,432	6,449	6,449	6,449	6,449
No. of firms	2,064	2,064	2,064	2,064	1,488	1,488	1,488	1,488
Adj. R^2	0.024	0.055	0.026	0.061	0.020	0.052	0.022	0.058

Table 9: Instrumental variable test of causality effects of group-affiliation on within-group capital flows

The table reports results of 2SLS IV regressions for a subsample of diversified business groups. The dependent variable is the percentage change in firm i's capital expenditures during a crisis year from the median capital expenditures during the pre-crisis period. The capital expenditures are scaled by beginning-of-period book value of assets. The variable of interest is $\Delta Perf_{j,t}$, which is the percentage change in firm j's operating cash flows during a crisis year and the median cash flows from the pre-crisis period. The instrumental variable for $\Delta Perf_{j,t}$ is the industry earnings shock to the industry in which firm j operates in less the industry earnings shock to the industry in which firm i operates in. Industry earnings shock is the percentage change in the industry's median operating cash flows during a crisis year from that industry's median operating cash flows from the pre-crisis period. Firms i and j belong to the same business group, but operate in different industries. The industries are classified according to Hoberg and Phillips (2013) 50 Fixed Industry Classification (FIC) system. All other variables are defined in the Appendix. Columns 1 and 2 show results from a cross-sectional test in year 2008, and columns 3 and 4 for 2009. No. of obs. is the number of firm-year observations. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9: (continued)

	Dependent variable: $\Delta Invest$			
	Year 2008		Year 2009	
Variable	(1)	(2)	(3)	(4)
$\Delta Perf$	0.00979**	0.00972**	0.0206	0.0256
	(2.045)	(2.046)	(0.845)	(0.890)
ΔCF	0.0852***	0.0727***	0.0983***	0.0971***
	(5.996)	(4.824)	(4.820)	(4.628)
ΔQ	0.0118***	0.00900***	0.0119*	0.0123
	(5.056)	(3.651)	(1.668)	(1.375)
Control variable				
$\Delta Cash$		-0.0197		-0.0584*
		(-1.380)		(-1.863)
ΔLev		0.0364***		0.0421**
		(2.586)		(2.002)
$\Delta Size$		0.00868***		0.00505*
		(4.231)		(1.857)
ΔPPE		0.0109		0.00894
		(1.321)		(0.997)
No. of Obs.	2,794	2,794	2,700	2,700

Table 10: Instrumental variable test of causality effects of Pyramidal vs. Horizontal group structures on within-group capital flows

The table reports results of 2SLS IV regressions on two subsamples of diversified business groups. Columns 1 and 2 are results with a subsample of group-affiliated firms organized in pyramidal group structures while columns 3 and 4 are for group firms in horizontal groups. The results are based on a cross-sectional test in year 2008. The dependent variable is the percentage change in firm i's capital expenditures during a crisis year from the median capital expenditures during the pre-crisis period. The capital expenditures are scaled by beginning-of-period book value of assets. The variable of interest is $\Delta Perf_{j,t}$, which is the percentage change in firm j's operating cash flows during a crisis year and the median cash flows from the pre-crisis period. The instrumental variable for $\Delta Perf_{j,t}$ is the industry earnings shock to the industry in which firm j operates in less the industry earnings shock to the industry in which firm i operates in. Industry earnings shock is the percentage change in the industry's median operating cash flows during a crisis year from that industry's median operating cash flows from the pre-crisis period. Firms i and j belong to the same business group, but operate in different industries. The industries are classified according to Hoberg and Phillips (2013) 50 Fixed Industry Classification (FIC) system. All other variables are defined in the Appendix. No. of obs. is the number of firm-year observations. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: $\Delta Invest$			
Variable	(1)	(2)	(3)	(4)
$\Delta Perf$	0.0131*	0.0135**	0.00225	0.00104
	(1.934)	(2.010)	(0.376)	(0.172)
ΔCF	0.106***	0.0896***	0.0663***	0.0537***
	(4.675)	(3.661)	(3.767)	(2.949)
ΔQ	0.0132***	0.0101**	0.0119***	0.00899***
	(2.993)	(2.163)	(4.102)	(3.328)
Control variables:				
$\Delta Cash$		-0.0362		0.000296
		(-1.612)		(0.0168)
ΔLev		0.0154		0.0608***
		(0.756)		(3.146)
$\Delta Size$		0.00917***		0.01000***
		(2.877)		(3.548)
ΔPPE		0.0103		0.0116
		(0.843)		(1.047)
No. of Obs.	1,425	1,425	1,369	1,369

Table 11: Alternative instrument variables for test of causality effects of group-affiliation on within-group capital flows

The table reports 2SLS IV regressions on a subsample of diversified business groups using two alternative instruments for $\Delta Perf_{j,t}$, which is the percentage change in firm j's operating cash flows during a crisis year and the median cash flows from the pre-crisis period. In Panel A, the instrument used is the unadjusted industry earnings shock to the industry in which firm j operates in. Industry earnings shock is the percentage change in the industry's median operating cash flows during a crisis year from that industry's median operating cash flows from the pre-crisis period. In Panel B, the instrument used in the market-adjusted industry earnings shock, i.e. subtracting the market shock of the market in which firm j is domiciled from the industry earnings shock to the industry in which firm j operates in. The market shock is the percentage change in the market's median operating cash flows during a crisis year from the pre-crisis period. We use these two instruments for separate cross-sectional tests in year 2008 and 2009. All other variables are defined in the Appendix. No. of obs. is the number of firm-year observations. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 11: (continued)

	Dependent variable: $\Delta Invest$			
	Year 2008		Year 2009	
Variable	(1)	(2)	(3)	(4)
Panel A: Instrument is unadjusted industry earnings shocks				
$\Delta Perf$	0.0298***	0.0274***	0.0395	0.0385
	(2.875)	(2.746)	(1.258)	(1.251)
ΔCF	0.0772***	0.0720***	0.0881***	0.0924***
	(3.842)	(3.630)	(3.187)	(3.572)
ΔQ	0.0144***	0.0126***	0.0169*	0.0160
	(3.544)	(2.956)	(1.710)	(1.555)
Control variable				
$\Delta Cash$		-0.0403*		-0.0708**
		(-1.946)		(-2.035)
ΔLev		0.0412**		0.0481*
		(2.298)		(1.882)
$\Delta Size$		0.00595*		0.00456
		(1.909)		(1.336)
ΔPPE		0.00808		0.00876
		(0.756)		(0.817)
No. of Obs.	2,794	2,794	2,700	2,700

Table 11: (continued)

	Dependent variable: $\Delta Invest$			
	Year 2008		Year 2009	
Variable	(5)	(6)	(7)	(8)
Panel B: Instrument is market-adjusted industry earnings shocks				
$\Delta Perf$	0.0165**	0.0166**	0.0143	0.0195
	(2.144)	(2.186)	(0.870)	(1.086)
ΔCF	0.0826***	0.0724***	0.102***	0.0994***
	(5.250)	(4.382)	(5.853)	(5.475)
ΔQ	0.0127***	0.0104***	0.0103**	0.0105*
	(4.441)	(3.301)	(1.997)	(1.723)
Control variable				
$\Delta Cash$		-0.0277		-0.0526**
		(-1.608)		(-2.390)
ΔLev		0.0383**		0.0393**
		(2.499)		(2.248)
$\Delta Size$		0.00761***		0.00528**
		(3.034)		(2.242)
ΔPPE		0.00981		0.00903
		(1.080)		(1.084)
No. of Obs.	2,794	2,794	2,700	2,700