Where Do Internal Capital Markets Matter? Evidence from Business Groups' Responses to the Global Financial Crisis*

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Abstract

Using family business groups' responses to the Global Financial Crisis as our setting, we show that the scale and responsiveness of internal capital markets differ across external capital market environments. In underdeveloped capital markets, groups actively reallocate resources to high-growth affiliates during the crisis, helping them maintain investment, increase product market shares and generate superior stock returns. In contrast, groups' ICMs remain relatively dormant in developed markets and they lose market shares after the crisis. Our results suggest that firms with ICM access exploit market disruptions to generate long-term competitive advantages, but only when their rivals face chronic external financing frictions.

JEL classification: G01, G31, G32

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"We believe that crisis is our opportunity for our future growth." - Hyun-Suk Kim, CEO and President, Samsung Electronics.[1]

1 Introduction

The 2008 Global Financial Crisis (GFC) created serious disruptions in the available supply of external capital to corporations around the world. However, across national economies, the response of corporate investment to this external financing shock varied dramatically. During the depth of the crisis (in 2008 and 2009), countries with developed capital markets generally experienced significant declines in aggregate fixed capital formation (e.g. 18% in the US and UK), but fixed capital formation actually increased in many countries with less developed (emerging) capital markets.[2] A notable feature of this second group of countries is the prevalence of publicly listed firms connected to business groups.

Existing theories suggest that this correlation may not be a coincidence. A distinctive feature of business groups is that they operate internal capital markets (ICMs). Since the seminal work of Stein (1997), it has been well established that such structures can efficiently channel funds toward profitable projects in the presence of external financing constraints. Kim (2004), and Almeida and Wolfenzon (2006a, 2006b) further explain why ICMs play a prominent role in emerging markets. In particular, Almeida and Wolfenzon (2006a) argue that weak investor protection prevents controlling shareholders from credibly pledging a sufficient fraction of their firms' cash flows to raising external finance, forcing them to form and utilize ICMs to reallocate capital in such financing environments.

[1] "A rare look inside Samsung's secretive ideas lab", *CNN.com*, September 17, 2019.

[2] Aggregate fixed capital formation data are obtained from the World Bank's Wolrd Development Indicators database and representing the total value of acquisitions and investments in capital goods in an economy.

The above theories imply that the benefits of ICMs critically depend on external capital market development. However, this implication has not been directly tested, as prior studies on ICMs tend to focus on specific countries. For example, using U.S. conglomerates as their setting, Gopalan and Xie (2011), Matvos and Seru (2014), and Kuppuswamy and Villalonga (2016) show that ICM activities increase when external capital market conditions deteriorate. Other studies focus on the effects of business group ICMs and their responses to financial crises in South Korea (Almeida, Kim, & Kim, 2015; Lee, Park, & Shin, 2009), Chile (Buchuk, Larrain, Prem, & Urza, 2019), and Italy (Santioni, Schiantarelli, & Strahan, 2019). These diverse empirical settings make it difficult to generalize and compare any conclusions reached regarding the value of ICMs across countries.[3]

Utilizing the responses of family business groups to the GFC in 45 countries as a laboratory, our study provides the first systematic evidence on the role that ICMs play in different external financing environments. Our setting has two important advantages. First, family business groups are a globally prevalent ICM structure that exists on a scale and scope necessary for us to study their effects in both emerging and developed capital markets (Claessens, Djankov, & Lang, 2000; Faccio & Lang, 2002; Masulis, Pham, & Zein, 2011). Business groups also provide a better empirical setting to study ICMs than single-firm conglomerates. The borders of individual divisions (segments) in a conglomerate are often fuzzy and inconsistently defined, and their growth opportunities and capital re-allocation transactions cannot be directly observed. In contrast, individual group firms have independently audited financial statements and publicly traded stock prices, allowing

[3]See Morck, Wolfenzon, and Yeung (2005) for a detailed discussion of the historical path dependency of firms' ownership structures around the world.

us to track their funding needs, market values and implicit growth opportunities. Second, our focus on the GFC addresses the difficulty of inferring ICM activity in a "steady state" equilibrium. This follows past studies that attempt to cleanly identify the roles of ICMs through exogenous and significant disruptions to external financing conditions.[4] Given the global scope of our experimental setting, we further require a disruption that is universal in nature. The GFC satisfies these criteria, allowing us to establish how heterogeneity in external capital market development at the country level influences the scale and responsiveness of ICMs.

With this empirical setting, we examine whether the ICM responses of family business groups to the GFC differ across countries according to their levels of capital market development. The basis of our analysis follows the argument raised in Almeida et al. (2015) that a crisis *temporarily* widens the gap between a firm's desired investment level and its financing capacity, creating an advantage for group firms over standalone firms as groups can use their ICMs to reallocate capital from resource-rich affiliates to resource-poor affiliates with promising growth opportunities. Building on this argument, we further propose that, precisely at the point of a crisis, the incentive to maintain their investment programs is greater for groups in emerging markets than those in developed markets because the *long-term strategic benefits* of such actions differ across these markets.

We specifically consider the possibility that group firms' investment strengthens their product market positions relative to standalone competitors. This is based on the notion in Bolton and Scharfstein (1990) that superior access to capital allow firms to drive out financially constrained rivals. In emerging markets, the chronic lack of access to external

[4]See Khanna and Tice (2002); Lamont (1997), and Campello (2002) in addition to those cited earlier.

capital, both during crises and normal times, may prevent standalone firms from effectively responding to competitive threats. Therefore, the GFC represents an opportunity for groups to capture a long-lasting advantage over standalone rivals, in the knowledge that any gains in competitive positions are difficult to be clawed back by their rivals in the post-crisis period. In contrast, for groups in developed capital markets, any crisis-period ICM advantages can be short-lived because it is feasible for standalone firms to recover any ground they lose to groups affiliates when capital market conditions return to normal.[5] With significant uncertainty over long-term competitive benefits, groups in developed markets may lack sufficient incentives to use their ICMs to keep investing during a crisis.

We test the above arguments using a carefully constructed dataset of business groups assembled from multiple ownership data sources. Our sample includes 45 countries from around the world, categorized into developed and emerging markets according to the MSCI market classification. As a baseline approach to documenting within-group ICM activity, we estimate the correlation between a group firm's corporate investment (CAPEX) and the availability of capital from *other firms* within the same group. In developed markets, we do not observe an increase in this correlation during the crisis period, where as in emerging markets, it more than doubles from the level observed during the non-crisis years.

It is possible that these results do not reflect the contrasting effects of ICMs across different market environments, but arise simply because of unobservable features of the relationships between group affiliates. For instance, the cash flows of certain group firms may lag the investments of other group affiliates because of their up/down stream

[5]It is also possible that standalone firms face a lower temporary financing gap in developed capital markets, because they can access other alternative sources of liquidity, such as lines of credit and additional public equity capital from a deeper pool of institutional investors

industry relationships. Industry linkages may intensify during the GFC, creating the false appearance of an aggregate increase in group ICM activity, especially in emerging markets where industry composition tends to be concentrated.

We take several alternative approaches to examine this and other related possibilities. First, we rule out an industry linkage explanation using a falsification test, similar to the approach used by Duchin and Sosyura (2013) and Duchin, Goldberg, and Sosyura (2017). For each sample group, we construct an equivalent pseudo business group from industry-matched standalone firms in the same country. If the observed intra-group correlation pattern are simply driven by the typical industries of business groups becoming more or less inter-dependent in the crisis period, then we should also observe this same pattern in the industry-matched pseudo business group sample. However, the analysis uncovers no such evidence.

Second, we examine a direct measure of within-group internal capital transfers. We exploit the fact that in the majority of our corporate disclosure environments, firms are required to report the value of their investments in other affiliated firms (IAF). These changes in IAF values (after adjusting for accounting-related changes) can serve as a measure of the extent to which individual group firms invest capital in other group affiliates, rather than investing it in their own operations or paying it out as dividends to their shareholders. During the GFC, we find that in emerging markets a group firm's CAPEX becomes markedly more dependent on the aggregate IAF of its other affiliated firms – a result primarily driven by positive IAF values (resource injections) rather than negative IAF values (resource withdrawals). When conducting the same analysis on groups in developed markets no such change can be detected. This IAF evidence is further

corroborated by an analysis involving actual within-group transactions. We show that in emerging markets the participation by one group firm in other affiliates' equity issues rises during the crisis period.

Third, we estimate an instrumental variable (IV) regression that utilizes the crisis-period experiences of non-group industry peers to generate an instrument for group internal resources. Drawing from the analysis in Gopalan and Xie (2011) of (single-firm) conglomerates, we exploit the fact that, in a multi-industry business group, the industries of some member firms may suffer severe cash flow shocks during the GFC, while the industries of others remain relatively untouched. By capturing this *difference* in industry-level cash-flow shocks, we can construct an instrument that arguably satisfies the exclusion criterion. The unanticipated nature of the GFC is a crucial to this argument, allowing us to rule out the possibility that groups preemptively modify their industry composition to better withstand the crisis. The results of our IV regressions indicate that a group firm experiences smaller reductions in its investments if the cash flows of other group affiliates are relatively more stable *because* their industries are *less* severely affected by the crisis, and thus, they are in a better position to supply internal capital to their hard hit affiliates. Again, this result only holds for groups in emerging markets and not for groups in developed markets.

Having established that group ICM activity intensifies during the crisis only in emerging markets, we next examine the general direction of resource transfers within a group to infer ICM allocative efficiency. For groups in emerging markets, we find that ICM transfers tends to run from resource-rich affiliates to resource-poor affiliates with valuable growth opportunities. As a type of placebo test, we also replicate this analysis for groups in

developed markets, and find that no such patterns exist.

Group ICM reallocations in emerging markets should result in a superior ability to sustain their investment levels during the crisis compared to standalone firms. While for developed markets, the lack of ICM activity, may mean that their investment levels followed similar patterns to standalone firms. Echoing our evidence on ICM intensity, we show that firms controlled by family groups in emerging markets display a distinct financing advantage: their investment cutback is lower than that of matched standalone firms by a factor equivalent to about 15 percent of the average pre-crisis CAPEX/assets level. In developed markets, family group firm investment levels are indistinguishable from standalone firms.

Our last analysis focuses on the long-term strategic benefits of maintaining groups' investment. In emerging markets, business group affiliates are able to gain significant market shares from their standalone industry rivals in the aftermath of the GFC. They do this without incurring excessive costs as we find that the stock returns of group affiliates do not underperform the returns of their matched peers during the crisis, and in fact, recover more strongly after the crisis. Interestingly, in developed markets where no group ICM activity can be detected, groups lose market shares to their standalone rivals. These results are entirely consistent with the well-established theoretical notion in Bolton and Scharfstein (1990) that financing advantages lead to long-term product market success. It also echoes the aforementioned statement of Samsung's CEO that crises are viewed as opportunities.

All along our analysis, we exploit the heterogeneity in group structures afforded by our comprehensive group dataset to strengthen the ICM-based interpretation of our

evidence. In particular, internal capital reallocation is only feasible in an organizational structure where control is centralized. Consistent with this assumption, we find that the crisis-induced increase in group ICM activity is concentrated among pyramidal groups, of which member firms are bound by a strong hierarchical control. For the same reason, our results cannot be replicated for non-family groups, which do not have a single ultimate controlling shareholder and therefore lack the same level of coordination and authority in capital allocation decisions as observed in family-group firms.

Overall, our study adds important new insights to the literature discussing the dark and bright sides of internal capital markets, especially in the context that prior studies have not established how ICM activity and benefits vary with external market development. By directly comparing ICMs across different markets, using a common shock at single point in time, our analysis expands on the recent country-specific studies showing that business groups play a positive financing role in their economy by shielding member firms from external crises. Almeida et al. (2015) find that Korean *chaebols* tend to pump additional equity capital into affiliates with favorable growth opportunities during the 1997 Asian Financial Crisis (AFC). Santioni et al. (2019) show that when Italian banks are in distress, group firms' survivability critically depends on funding from their ICMs. Buchuk et al. (2019) also documents that Chilean business groups respond to the 2008 crisis by using intra-group lending to alleviate capital constraints of high-growth members. The common advantage of these studies is in their use of country-specific transactions data to identify providers and receivers of ICM capital transfers. Our study's advantage lies in our ability to provide a comprehensive cross-country comparison of group ICM activity. We show that group do not consistently provide financing benefits around the world, and that the

use of ICMs to sustain investment during a crisis appears to be motivated by the long-run strategic outcomes of such actions.

By establishing that strong family control is an important pre-condition under which group ICMs operate, our study also contributes to the debate on the merits of group-building activities by wealthy families. Some prior studies suggest that the costs associated with family control are substantial and rise with a crisis (Johnson, Boone, Breach, & Friedman, 2000; Lemmon & Lins, 2003). In particular, Lins, Volpin, and Wagner (2013) show that survival concerns of family-controlled firms explain their significant investment cuts during the GFC. In a subsample analysis, they also show that *family* controlled business groups cut investment by more than *non-family* controlled groups. Their evidence suggests that the net effect of family group affiliation is negative: in the crisis, survival concerns outweigh ICM financing advantages. This appears to be opposite to the finding in Almeida et al. (2015) that Korean *chaebols* (most of which are family-controlled) do not cut investment as much as standalone firms.

Our analysis reconciles these two seemingly conflicting findings. We note that Lins et al. (2013) do not condition their analysis on market development and do not match group firms in their comparison across group types. When we replicate the Lins et al. (2013) approach using our sample and matching methodology, we find that family group firms cut investment by more than non-family group firms only in developed markets, but this difference is reversed in emerging markets. Thus, the notion that family survival concerns dampen any advantages of group ICMs is not always supported, especially when conditioning on external capital market development. In emerging markets, the financing benefits of family groups' ICMs are substantial, and appear to outweigh the

costs associated with family control.

More broadly, our study contributes to the literature on the segregation of world equity markets. Despite decades of strong domestic economic growth and financial globalization reforms, countries classified as "emerging markets" are still generally under-represented in international investors' portfolios (Bekaert & Harvey, 2017), and they continue to lag developed markets in many trading and institutional characteristics (Bekaert, Harvey, Lundblad, & Siegel, 2011; Carrieri, Chaieb, & Errunza, 2013). According to Almeida and Wolfenzon (2006a), business group entrenchment may partly explain these persistent differences. They argue that group ICMs actually play the role of restricting external capital market development in certain countries. Our empirical results support their theory by showing that family business groups in emerging markets indeed exploit financial crises to gain long-term strategic advantages over their standalone rivals.

2 Empirical Setting

2.1 Construction of business group sample

Our empirical analysis requires the identification of business group affiliated firms from around the world in 2007, the year immediately before the onset of the GFC. We rely on the business group data assembled by Masulis et al. (2011) for 45 countries as of 2002, and expanded to 2007 by Masulis, Pham, and Zein (2020). The advantage of this dataset is its broad cross sectional coverage of firms internationally and across regions. On average, ultimate controlling shareholders can be identified in 96 percent of firms in each country. This is achieved through a comprehensive procedure that combines

standard ownership databases (Bureau van Dijk Osiris, Factset Lionshares, Thomson Reuters Global Ownership), hand-collected firm ownership data (from LexisNexis, Factiva, Bloomberg, Dun and Bradstreet's Who Owns Whom, stock exchanges and securities regulators), and major transactions data (IPOs, M&A, etc.).[6] A key advantage of this dataset is the broad coverage of many developed and emerging market countries across five continents.

It is important to emphasize that the same level of ultimate ownership identification cannot be achieved by relying solely on standard ownership databases. For example, Lins et al. (2013) rely on ownership information from Bureau van Dijk's (BvD) suite of products (Osiris, Orbis, Amadeus, etc.), but we find that together these databases provide only a partial picture of business group ownership linkages. Out of the universe of 52,251 listed (and delisted) firms covered by the BvD databases in 2007, only about three quarters of these firms have any ownership data reported. Among them, only about 21 percent have ultimate owner information, as the databases only consider ownership chains connected by shareholdings of at least 25 percent and they do not consistently amalgamate related blockholdings.[7] A comparison of our business group sample to that in Lins et al. (2013) illustrates the severity of this problem. When we restrict our sample to the same 35 country sample used in their study, our procedure leads to more than double the number of group affiliated firms.

In Masulis et al. (2011), a business group is defined as two or more publicly-listed firms controlled by the same ultimate controlling shareholder. The control chain linking each

[6]See Masulis et al. (2011) and Masulis et al. (2020) for more detailed descriptions of these data sources.

[7]For example, in the Osiris database, most firms in the Samsung business group cannot be ultimately traced to the Lee Kun-hee family as control is achieved through various fragmented blocks of less than 25 percent held directly or through affiliated firms.

firm to the ultimate controlling shareholder is established based on the largest ownership stake that is equivalent to having at least 20 percent of the voting rights in the firm (or 10 percent if the shareholder has some operating control as a founder, CEO, or board chair). Masulis et al. (2020) expand the Masulis et al. (2011) dataset by tracking how each group evolves over time from 2003 through 2007. In summary, they use firms' major transactions data to capture new groups formed and existing groups expanded through IPOs (or spin-offs) of group affiliates and through partial acquisitions of new firms, as well as cases of groups divesting (liquidating) existing member firms. Masulis et al. (2020) then cross-check the snapshot of their business groups against data from the ownership databases, Orbis, Worldscope, Global Ownership, and Lionshares.

For our study, we exclude financial firms from our analysis (with Standard Industry Classification (SIC) codes 6000-6999), given their unique status during the crisis. In the context of a sample of large international firms, there can be significant financial data and reporting anomalies. We drop firms having negative cash holdings, negative total assets, negative book value of debt, negative common equity, cash-to-asset ratios exceeding 1, and total assets ranked in the lowest 5^{th} percentile in each country. After applying the above sample selection criteria, we obtain a sample of 2,530 family-group affiliated firms. Most of our analysis is conducted with this group sample, but where a comparison to firms with no group affiliation is required, we rely on a comparison sample of 12,444 standalone firms selected using the same criteria. These are non-financial firms from the same set of countries where their ultimate owner information can be ascertained, so that we can confirm their status as strictly unaffiliated with any type of business group. There are also 1,541 firms affiliated with non-family groups that are controlled by governments, financial

institutions or widely held corporations. Our analysis focuses on family group firms, but also consistently compare them to non-family group firms.

2.2 Classification of capital market development

We argue that capital market development reflects underlying cross-country differences in financing frictions. This link is well established in the literature, as prior studies have shown that market development is correlated with inbound portfolio investment flows (Chan, Covrig, & Ng, 2005), market trading and valuation (Bekaert et al., 2011; Carrieri et al., 2013), and legal institutions (Djankov, La Porta, de Silanes, & Shleifer, 2008), all of which affect a firm's financing ability. Specifically, we use the MSCI index classification system to classify our sample countries into developed and emerging markets. The first cohort includes 23 "Developed Markets" that MSCI includes in the MSCI World Index. The second cohort comprises other sample countries that MSCI designates as "Emerging Markets" and "Frontier Markets".

There are several important advantages of using the MSCI classification. First, it incorporates a wide range of criteria to capture the level of development of each market, including (1) sustainability of economic development, (2) size and liquidity of listed firms, and (3) market accessibility to international investors. [8] The application of these criteria is also vetted by the international investment community as MSCI extensively seek their feedback on index decisions. Second, the classification is widely adopted by international portfolio investors (with around US$10 trillion of institutional funds benchmarked against

[8] This is arguably a more sophisticated approach than using only the relative size of a country's stock market. For example, if our sample countries are grouped according to aggregate stock market capitalization scaled by GDP (with data from Djankov et al. (2008)), then Germany and Italy are below the median (and would be designated "emerging markets"). If they are grouped according to the number of listed firms per capital, then France, Germany, and the Netherlands are below the median.

MSCI indices), resulting in significant differences in foreign fund flows into each type of markets (Burnham, Gakidis, & Wurgler, 2018; Ferreira & Matos, 2008). Such foreign investments can impact a firm's financing capacity directly, or indirectly through the role that foreign institutions play in improving corporate governance (Aggarwal, Erel, Ferreira, & Matos, 2011). Third, there appears to be a clear and persistent divide between MSCI's "Developed Markets" versus other markets. In the past three decades, there have been only four re-classifications affecting the developed markets list, involving Portugal (promotion in 1997), Greece (promotion in 2001 and demotion in 2013), and Israel (promotion in 2010).[9]

2.3 Global financial crisis

Several features of the 2008 financial crisis make it an attractive laboratory to study the functioning of business groups' internal capital markets. First, external capital markets experience severe disruptions across much of the globe, as the crisis is transmitted to both emerging and developed markets. (Bekaert, Ehrmann, Fratzscher, & Mehl, 2014). Second, as the onset of the crisis is both sudden and unanticipated, it is unlikely that firms make ex-ante changes to their ownership structure in anticipation. Third, unlike the 1997 Asian Financial Crisis, where business groups are often cited as a key trigger (see S. J. Chang, 2006), groups are not implicated as a cause of the GFC.[10] In fact, the source

[9] In fact, the emerging/developed markets divide appears to be consistently recognized by all recognized index providers. For example, as of 2007, the list of emerging markets in our sample agrees with both the S&P/IFC classification and the FTSE Russell classification.

[10] Many prior studies rely on the AFC setting (Almeida et al., 2015; Johnson et al., 2000; Lemmon & Lins, 2003). A general challenge they face is that business groups may actually be a major reason why the initial shock became such a prolonged and severe crisis. In particular, Korean *chaebols* are widely perceived as receiving special treatment in their economy. Before the crisis, they received substantial government support, while after the crisis, the Korean government, under pressure from the International Monetary Fund (IMF), specifically targeted *chaebols* for reforms (S. J. Chang & Hong, 2000; Lee et al., 2009).

of the crisis was centered in the United States, where family groups are not a dominant organizational form. Fourth, the crisis itself does not appear to be triggered by a large drop in corporate investment (the outcome variable). Even the demand for loans does not fall by a substantial amount (X. S. Chang, Chen, Dasgupta, & Masulis, 2019). In fact, practitioners, regulators and academics generally agree that the overexposure of banks to subprime mortgage defaults in this market is the primary trigger of the crisis, rather than excessive corporate investment or debt financing.

The immediate consequence of the crisis at its onset is a severe contraction in credit availability. Ivashina and Scharfstein (2010) show that banks, particularly the ones with diminished deposit bases and larger outstanding credit lines, severely curtail the supply of new loans from late 2008. The equity issuance market is also adversely affected, with the aggregate SEO proceeds of non-financial firms contracting from US$320 billion in 2007 to US$241 billion in 2008 (figures calculated using SDC Platinum data). Overall, this disruption to the supply of external financing results in dramatic reductions in corporate investment, especially for financially constrained firms (Campello, Graham, & Harvey, 2010).

In Figure 1, we show the global nature of the GFC. Across different world regions, we observe a consistent decline of about 50 percent in aggregate stock market value, as approximated by the regional MSCI indices. The plot also shows sharp falls during the second half of 2008 across all major stock indices, indicating the unexpected nature of the crisis.

[Insert Figure 1 here]

2.4 Descriptive statistics

Table 1 shows the breakdown of (family and non-family) group firms and standalone firms by country. Groups are clearly more prevalent in emerging markets. On average, family (non-family) group firms account for 30% (14%) of the sample firms in each emerging market, compared to 14% (9%) in each developed market.

The final column in Table 1 reports the change in average capital expenditures scaled by book value of total assets over the pre-GFC (2006-2007) to post-GFC (2008-2009) period for the median firm in each sample country. There is an almost universal decline in capital expenditures by the median firm in each sample country around the GFC, although the extent of the decline varies substantially across countries.[11] Broadly speaking, corporate investment by firms in emerging markets appear to be less adversely affected by the crisis than those in developed markets. This is in stark contrast to the market price effect discussed above where countries appear to be equally impacted by the crisis.[12]

[Insert Table 1 here]

[11] These aggregate country-level changes are based on the capital expenditures of the median publicly listed firm, which is distinct from country-level fixed capital formation statistics presented earlier (which are based on all public and private firms).

[12] Bekaert et al. (2014) show that firms in emerging markets are more widely affected by crisis contagion than those in developed markets.

3 Group Internal Capital Market Activity During the Crisis

3.1 Correlation between own investments and funds generated by other group affiliates

To compare groups' ICM response to the GFC across countries with different levels of market development, we first examine the sensitivity of a group firm's investment to funds generated by other affiliates of the same group. We estimate the following model on the group firm sample:

$$Invest_{i,t} = \gamma_0 + \gamma_1 GFC_t \times GroupCF_{j,t} + \gamma_2 GFC_t \times OwnCF_{i,t} + \gamma_3 GFC_t + \gamma_4 GroupCF_{j,t} + \gamma_5 OwnCF_{i,t} + \gamma_6 \mathbf{Controls} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where $Invest$ is a firm's corporate investment measured by its capital expenditure scaled by beginning-of-period book value of total assets. GFC is an indicator for the 2008–2009 period, following the definition employed by other studies of this financial crisis (see for example, Campello et al., 2010; Kahle & Stulz, 2013; Lins, Servaes, & Tamayo, 2017; Lins et al., 2013). $GroupCF$ is the sum of the cash flows (scaled by the sum of beginning-of-period total assets) of all firms in the same group *excluding those of the subject firm* i. This measures the pool of additional capital accumulated by other firms in a given year that firm i can potentially access. The main coefficient of interest in the above model is γ_1, which reflects the *difference* in the sensitivity of firm i's investments to funds generated by other affiliated firms in the same group in the crisis period relative to non-crisis period.

It is important to emphasize that the above model's objective is not to establish

a group firm's financial constraints by estimating the sensitivity of its investment to *its own* cash flows – an approach that can be distorted by measurement errors and unobservable confounders (see Erickson & Whited, 2000). Instead, our approach is closer to previous studies on single-firm conglomerates that use the correlation between a segment's investment with other segments' cash flows to infer the intensity of ICM activity. A general issue with this approach is that the estimated relationship may simply reflect the nature of a conglomerate and not any within-conglomerate internal capital reallocation. For example, a high correlation between segment cash flows can also arise when conglomerates have porous segment boundaries and highly inter-related industry segments. Conversely, a low correlation may exist in conglomerates that have inherently high investment adjustment costs.

Our setting addresses this issue by focusing on the change in the correlation of same-group firms induced by the 2008-2009 crisis. We argue that, because the crisis is unanticipated and its effects are severe, this change is unlikely to reflect the underlying structure of a given group. Another important empirical design feature is that, in a business group, member firms are separately listed and independently audited business units so that their boundaries are clearly defined. This is in stark contrast to the boundaries between segments of a single-firm conglomerate which can be more easily redrawn as a restructuring response to a crisis.

As individual group firms can differ across many dimensions, the regression in Equation 1 includes firm fixed effects (η_i) to control for time-invariant cross sectional differences and (**Controls**) to capture several other observable time-varying firm level characteristics that may explain the evolution of firm investment over the crisis period. First, we proxy

for a group firm's existing investment opportunities using its market-to-book asset ratio (MB), calculated as the market value of total assets (market value of equity plus the book value of debt) scaled by the book value of total assets. Second, we include cash holdings scaled by contemporaneous book value of total assets ($Cash$), since having a cash buffer can help shield a firm's investment plans from external capital constraints. Third, a firm's pre-crisis indebtedness may worsen its ability to respond to the crisis, so we control for leverage ($Leverage$), measured as the book value of debt scaled by contemporaneous book value of total assets. Fourth, we control for firm size ($Size$), measured by the log of book value of total assets in US dollars. And finally, we control for a firm's existing capital stock measured by property, plant and equipment (PPE) scaled by contemporaneous book value of total assets.

The results are presented in Table 2. In Column 1, Equation 1 is estimated for all cuontries. The positive and significant coefficient of the interaction $GFC \times GroupCF$ indicates that the sensitivity of a group firm's CAPEX to funds generated by other group members is higher during the GFC, doubling from the level observed in the non-crisis years. This increase cannot be explained by an across-the-board rise/fall in group profitability. In fact, the coefficient of $GFC \times OwnCF$ is negative and significant, indicating that a group firm's CAPEX actually becomes less sensitive to its own cash flows during the GFC. Thus, if the crisis leads an average group firm to require more external resources to finance its investment, then these resources appear to come from other group affiliates.

This effect is not consistently observed across countries. In Columns 2 and 5, we split the analysis into emerging and developed capital markets, expecting that group ICM response is more observable when in the former. This is indeed what we find, as the

coefficient of $GFC \times GroupCF$ is only significant in the emerging market subsample, and is twice as large as the one obtained from the developed market subsample.

A strong hierarchical control structure is an important condition underpinning ICM functionality. In Columns 3 and 4, we further split the emerging market analysis into pyramidal versus horizontal groups, and find that our previous results hold only for the former cohort. This is consistent with the fact that firms in a pyramidal chain have much stronger and more direct connections than those jointly controlled (in a horizontal structure) by a family. It is also possible that a direct pyramidal connection between two firms makes it more conducive to transfer resources relative to a horizontal structure, as suggested by Almeida and Wolfenzon (2006a) and Gopalan, Nanda, and Seru (2014). We repeat this split analysis for developed markets but do not find the same results.

[Insert Table 2 here]

3.2 Non-family groups

We re-estimate Equation 1 using the sample of non-family groups. The results reported in Columns 2, 4, and 6 of Table 3 show that there is not a significant increase in the sensitivity of firm-level CAPEX to group-level cash flows for non-family group firms. This is again consistent with the theoretical notion that the operation of an ICM is predicated on the existence of a central authority, who can capture the benefits of ICM activity. Non-family group firms are often loosely connected and lacking a strong central controller, which means it can be difficult to coordinate capital re-allocations across affiliated firms, especially during crisis periods. Further, the incentives to conduct ICM transfers in non-family groups may be too weak, since no single large shareholder exists who is able

to internalize the value-creating benefits of these actions.

[Insert Table 3 here]

3.3 Does intra-group correlation reflect ICM activity?

The estimates of Equation 1 indicate that the GFC makes the investment of one group firm more dependent on the resources contemporaneously generated by other firms in the same group. This evidence may be consistent with alternative non-ICM explanations. First, a change in internal group activity may simply indicate that one group firm invests more (less) because it receives benefits (or bear costs) associated with other group firms' performance. This particularly applies to group firms that operate across related business activities, so that in an economy-wide crisis, increased co-movement in cash flows can arise. For example, the cash flows of certain group firms may lag the investments of other group affiliates because of their up/down stream industry relationship, which is driven by the structure of industry specific inputs and outputs. Second, it is possible that the investment of one group firm may be driving the performance of another member, so that the direction of causality is reversed. For example, a group firm may invest in a project that requires the purchase of raw materials from another group member. Third, there could be unobservable group-specific characteristics, such as controlling families' skills and connections, that leads to a rise (or fall) in both firm affiliates' performance and investment in the crisis period. Our next several tests address these alternative explanations.

3.4 Placebo group analysis

If the documented within-group correlation only arises because of the industry structure of a group, then we should observe the same correlation using a set of standalone firms that mirror this same industry structure, but that have no actual ownership linkages. Specifically, for a given group in our sample, we construct a similar pseudo-group by randomly assigning a standalone firm from the same country, operating in the same industry, and of similar size to represent each actual member firm of the focal firm's group. We then re-estimate the model specified in Equation 1 for this sample of pseudo groups.

The results reported in Column 1 of Table 2 show that the investment of a focal pseudo group firm is not sensitive to the funds generated by its pseudo group members, and that this sensitivity does not change during the GFC. The same results are observed for emerging markets (Column 3), where we document a crisis-period increase in within-group correlation for actual groups. This analysis casts doubt on the possibility that the previous results are primarily driven by general industry relationships between firms within a group. It also does not support a related possibility that the cash flows of all firms in an economy become more correlated during the GFC (due to a common demand shock). If this possibility is responsible for our results, then our pseudo group test should also show a significant increase in correlation, but we do not observe this pattern in the data.

3.5 A direct measure of group ICM activity: investment in affiliates

Another way to show more clearly ICM response to the GFC is through a direct measure of within-group investment. To develop this measure, we consider the three ways in which

a group can use its resource pool: (1) paying out earnings as dividends, ii) retaining earnings in the member firms where they are generated, or iii) reinvesting them into other group firms (as debt and/or equity investment). We argue that the third choice represents ICM activity, and can be captured using the *change* in the value of a group firm's external investment in other group affiliates

Specifically, we take take advantage of the disclosure rule set out in International Accounting Standard 28 (IAS 28), *Investments in Associates and Joint Ventures*, which requires firms to disclose the fair value of investments in affiliated firms (IAF) where they are deemed to have a significant influence. A "significant influence" is presumed when a company has greater than 20 percent ownership of an affiliated firm (or lower when there are other indicators of control, such as board representation). This accounting definition of an associated company corresponds quite closely with the methodology (described earlier) that we use to identify control links between firms within a business group. For example, if a group firm controls another firm in a pyramidal chain, the parent firm's reported IAF must include the value of its investment in the subsidiary.

The *Investments in Associates and Joint Ventures* data are obtained from Worldscope and are available for 2,343 out of the 2,530 family group firms in our sample. There is one issue: the reported data only represent the book value of the stock of a firm's IAF. To infer the year-to-year flow of investments made by a reporting firm in its affiliates, we compute annual changes in this book value and then make adjustments for two accounting factors that are unrelated to real capital movements. First, each year the *Investments in Associates and Joint Ventures* value of a reporting (parent) firm must recognize its share of the income of each of its affiliated firms less any dividends paid. We thus need to subtract

from this value the reported net increase in retained earnings of the affiliates. Second, under the equity method of accounting, investments in affiliates can be written down to below their cost only if there is objective evidence that the value of the assets has been permanently impaired. We do not have precise data on the impairment charges applied on investments in affiliates and instead estimate these using the average impairment rate for all investment assets.

Our IAF measure is thus defined by the following equation:

$$IAF_i = IAF_{i,t} - IAF_{i,t-1} - \Delta RES_{i,t} + (IR_{i,t} \times IAF_{i,t-1}), \tag{2}$$

where $IR_{i,t}$ is our approximation of the IAF impairment rate, computed using the ratio of the impairment charges on all investment assets in year t to the prior end-of-year value of these investment assets. $\Delta RES_{i,t}$ represents firm i's share of any change in the retained earnings of its affiliates, computed by aggregating across affiliates the product of the percentage ownership held by firm i in each affiliate and the retained earnings of that affiliate.

With this IAF measure, we test whether a group firm's CAPEX becomes more sensitive to internal capital transfers during the 2008 financial crisis. Under our assumption that the crisis is unanticipated, an increased sensitivity would indicate that groups intensify their internal capital market activities in response to greater external financing difficulties. We re-estimate the model in Equation 1, replacing the group cash flow variable ($GroupCF$) with $GroupIAF_i$ computed at the group level, which represents the IAF flow of the other affiliated firms in the same group as firm i (after excluding the IAF of firm i). The results are reported in Table 4. Consistent with our expectation, we find that a group firm's

CAPEX becomes more sensitive to the IAF of the other group affiliates as demonstrated by the positive and significant coefficient of $GFC \times GroupIAF$ (see Column 1). In columns 2 and 6, we confirm that this relationship is significant only for firms in emerging markets. Compared to an average non-crisis year, a one standard deviation increase in the group's IAF measure increases the focal firm's CAPEX/assets ratio by 2.3 percentage points more during the crisis years. The same results are not obtained for family group firms in developed markets (Column 6), and for non-family group firms in both types of markets (Columns 5 and 7).

[Insert Table 4 here]

Another issue in the construction of $GroupIAF_i$ is that it may reflect within-group investments into firms other than the focal firm i, and may not influence firm i's investment. As a robustness check, we compute a more precise IAF measure using only group firms that are part of a pyramidal ownership structure. For each firm i, we construct $ParentIAF_i$ using only the reported IAF value of its direct parent firm. As firm i is a partially owned subsidiary of its parent firm (or an affiliated firm under the IAS 28 definition), the $ParentIAF_i$ measure more cleanly captures the investment made by the parent firm into firm i than the $GroupIAF_i$ measure. This alternative definition yields an economically stronger increase in intra-group support in the crisis: the coefficient of $GFC \times ParentIAF$ (in Column 3 of Table 4) is significantly larger for the parent-firm-based IAF measure than the group-level IAF measure.

The above IAF results can be interpreted as reflecting the contribution of an *increase* in intra-group investments to the investments made by a group firm during the crisis. However, another interpretation is that *decreases* in intra-group support (a group withdrawing

resources causing a negative IAF value) cause group firms to suffer even greater declines in corporate investment during the crisis. This latter pattern, which is also consistent with an increase in CAPEX-IAF sensitivity, can arise when a controlling family cuts back its support for the investment activity of growing affiliates to focus on the overall group's survival so as to preserve their aggregate private benefits of control, as suggested by Lins et al. (2013).

To distinguish between the above two explanations and to determine which one has greater explanatory power, we construct an indicator variable, $PositiveIAF$, that is equal to one when IAF has a positive value and zero when IAF has a negative (or zero) value. In Column 4, we interact this indicator with our IAF variable. The positive coefficient on $GFC \times IAF \times PositiveIAF$ show that the previous IAF results mainly hold for cases where there is a positive IAF value. The results from this test offer a much more direct interpretation: in emerging markets, group firms making high levels of corporate investment in the crisis years tend to belong to groups that invest (rather than withdraw) internal group resources in these affiliates.

It is important to note that firms may not report *Investments in Associates and Joint Ventures* if their accounts are not prepared in accordance with International Financial Reporting Standards (IFRS). Some country-specific accounting standards (such as US GAAP) may still mandate similar disclosures, but under different methodologies. To ensure the biases arising from varying reporting standards do not influence our results, we take two approaches. First, in a robustness analysis, we only included in our analysis firms that comply with IFRS reporting guidelines (this turns out to be approximately 40 percent of firms). Our results remain unchanged when we impose this restriction. Second,

we remove group firms that do not report any Investments in Affiliates. A zero value suggests that the firm is not complying with the IFRS guidelines as they must recognize their share of profits in affiliated firms. Our results are also robust to this alternative construction.

3.6 Instrumental variable regression

This identification strategy focuses on a source of variation in the funds generated by other group affiliates that are plausibly exogenous to the investments of a focal group firm. We exploit the fact that in a multi-industry group, the GFC may have very different effects across industries. Using such differences in industry-level cash flow responses to the crisis to form an instrument, we investigate how cash-flow shocks to some firms within a group can cause investments in other group affiliates to change. This strategy is similar to that of Gopalan and Xie (2011), who examine the effects of industry-specific shocks on internal capital reallocation of single-firm conglomerates.

To capture the dynamics explained above, our IV test works with investment changes (rather than levels). To illustrate, consider two firms A and B, which operate in two unrelated industries, construction and pharmaceutical, respectively. As a starting point, assume that A and B are standalone firms. Because these firms are in unrelated industries, there is no reason that during the crisis, the *change* in firm A's investments should be explained by the change in aggregate *industry-level* profitability of firm B's industry. In other words, assuming that the pharmaceutical industry is less affected by the crisis compared to the construction industry, there is no reason to expect that the *size* of the investment cuts firm A (a construction firm) chooses to make during the crisis should not

be directly influenced by the relative immunity of the pharmaceutical industry.

Now consider the case where A and B are in the same group. The crisis-induced *change* in the cash flows of firm B's industry can serve as an instrument for the cash-flow *change* of firm B, because it incorporates the specific conditions of Firm B's industry (the relevance condition). As for the exclusion restriction, as we argue above, the aggregate profitability change in firm B's industry determined outside of the business group and is unlikely to directly influence how firm A formulates its investment response to the crisis in any way other than through the the support it can potentially receive through accessing the resources of firm B (i.e. the ICM support channel). We estimate whether a change in firm B's cash flows *causes* a change in the investment of Firm A over the GFC period, using the following specification.

$$\Delta Invest_A = x_0 + x_1 \Delta CF_A + x_2 \Delta CF_B + x_3' \Delta \mathbf{Controls}, \tag{3}$$

where $\Delta Invest_A$ is the change in Firm A's median investment rate from the pre-GFC period (2004–2007) to the post-GFC period (2008–2010). $\Delta CF_A (\Delta CF_B)$ is the corresponding change in Firm A's (Firm B's) median cash flows. Δ**Controls** is a vector of equivalent changes in the control variables. The instrument for ΔCF_B is ΔInd_B, where ΔInd_B is defined as the change in median cash flows of other same-industry firms from the pre-GFC period to post-GFC period, computed using all standalone firms operating in firm B's industry. If the group has firms in several different industries, we use the weighted average (by total assets of each group affiliate to that of the overall group) of the industry changes in median cash flows of all the other industries in which the group has affiliated members.

One caveat concerning our IV setting is that a group may have multiple industries,

but they could be highly related. While our definition of a diversified group ensures that firms must come from completely different (one-digit SIC) industries, it remains possible that there is some commonality in these industries' responses to the GFC. To address this issue, we construct an alternative instrument for ΔCF_B which is $\Delta Ind_B - \Delta Ind_A$ where ΔInd_A is defined as the percentage change in median operating cash flows in Firm A's industry from the pre-GFC period to post-GFC period. By excluding the industry conditions of Firm A from the instrument, we attempt to capture the average cash flow shock to Firm B's industry over and above the shock to Firm A's industry. This provides a potentially stronger alternative method for meeting the exclusion restriction.

To operationalize the above identification strategy, we only focus on business groups where member firms operate in at least two different one-digit SIC industries. We use one-digit SIC industry groups to ensure that industries are as differentiated as possible and the group is truly diversified. For each group firm, the number of other firms in the same group can be more than one, unlike the above example, in which case we construct the instrument using the (asset) weighted average of the industry-level cash flow measures for each firm in a group-industry, where the weights are based on the relative total asset size of each member firm in the focal group.

We report both the first and second stage estimates of the IV regression in Table 5. Panel A (columns 1 and 2) shows that the coefficients of both the main and alternative instruments are positive and significant, indicating that they satisfy the relevance criterion. In other words, there is commonality between a group firm and its non-group (standalone) industry peers in their crisis-period cash flow changes. In the second stage (Panel B), the instrumented group cash flows variable is also positive and statistically significant.

However, these results are only obtained for family groups in emerging market (columns 3 and 4) and not for those in developed markets (columns 7 and 8). In columns 5 and 6 , we repeat the analysis for non-family groups, but again do not find any evidence of a crisis-period increase in their ICM activity.[13]

[Insert Table 5 here]

4 Direction of Internal Capital Market Flows

The focus of the previous section is to establish evidence of increases in group ICM activity in emerging markets. We now turn our attention to the direction of within-group ICM transfers to demonstrate the extent to which groups perform a valuable capital reallocation function during the crisis. This analysis is guided by the theoretical framework of Almeida et al. (2015). They argue that a financial crisis widens the gap between financing capacity and desired investment level for some group firms (especially those with high marginal productivity of capital), while at the same time, other member firms have excess liquidity relative to their investment needs. This implies that capital should flow from highly liquid member firms to highly productive firms.

4.1 Direction of investment in affiliates

To investigate whether groups make efficient internal capital reallocation consistent with the above argument, we again rely on our proxy for ICM flow – investment in affiliates

[13]We also repeat this analysis on separate subsamples of pyramidal and horizontal business groups. Consistent with our earlier analysis, the results (reported in Appendix Table A1) show that the effect of the instrumented group cash flows on the focal firm's investments is significantly stronger for firms in pyramidal groups.

(IAF). We classify firms within a group into those with high and low marginal productivity of capital based on whether their pre-crisis market-to-book value of assets ratio (measured in 2007) is above or below the median market-to-book ratio of their group affiliates. We then estimate two regression models that expand on Equation 1. Equation 4 aims to determine if the investments of high market-to-book ratio members (*Invest_HiMB*) are particularly sensitive to the IAF of low market-to-book ratio members (*IAF_LoMB*) during the crisis, while Equation 5 investigates if the investments of low market-to-book ratio members (*Invest_LoMB*) are more sensitive to the IAF of high market-to-book ratio members (*IAF_HiMB*).

$$Invest\_HiMB_{i,t} = \theta_0 + \theta_1 GFC_t + \theta_2 OwnCF_{i,t} + \theta_3 IAF\_LoMB_{i,t} + \theta_4 GFC_t \times OwnCF_{i,t} + \theta_5 GFC_t \times IAF\_LoMB_{i,t} + \theta_6' \mathbf{Controls} + \eta_i + \varepsilon_{i,t} \quad (4)$$

$$Invest\_LoMB_{i,t} = \lambda_0 + \lambda_1 GFC_t + \lambda_2 OwnCF_{i,t} + \lambda_3 IAF\_HiMB_{i,t} + \lambda_4 GFC_t \times OwnCF_{i,t} + \lambda_5 GFC_t \times IAF\_HiMB_{i,t} + \lambda_6' \mathbf{Controls} + \eta_i + \varepsilon_{i,t} \quad (5)$$

Our primary coefficients of interest in Equations 4 and 5 are the interaction terms $GFC \times IAF\_LoMB$ and $GFC \times IAF\_HiMB$, respectively. The coefficient estimates for Equations 4 and 5 are reported in Table 6. For the full sample (see Columns 1 and 2), we find that the investments of high MB firms become more correlated with the reported intra-group investments of low MB affiliates, but the same relation does not hold between the investments of low MB firms and the IAF of high MB firms.[14]

[14] As mentioned earlier, IAF changes in a pyramid structure more precisely capture the investment by one group firm in another affiliate. We repeat the analysis in Table 6 using only the sample of family-group firms that are pyramidally owned and focus on their parent-firm based IAF measures

This set of correlations is entirely driven by group firms in emerging markets. In developed markets, we continue to find no within-group correlation, even when we examine specific (High- and Low-MB) cohorts of group firms.

[Insert Table 6 here]

4.2 Direction of equity-transfer transactions between group firms

In addition to IAF, we further demonstrate the direction of ICM activity during the GFC using observable intra-group transactions conducted through the equity market. An important way in which ICM operates is to allow group firms to cross-pledge each other's assets or income when they raise new equity capital. Specifically, one firm may make large equity investments in another affiliate to help the latter raise additional external capital needed for its investments. Using the SDC Platinum database, we identify intra-group equity transfers as cases where the cornerstone investor in a public equity issue or a private placement by a group firm is another firm in the same group. We construct an indicator variable (*Equity Transfer Indicator*) for whether a group firm conducts an SEO that is supported by other group members through the purchase of at least 5 percent of the SEO proceeds.

We specifically explore the following question. Conditional on an intra-group equity transfer taking place in a group during the crisis period, which member firm tends to be the recipient of the funding? To do this, we regress *Equity Transfer Indicator* on two key firm characteristics, operating cash flows ($OwnCF$) and market-to-book ratio (MB), and

(IAF_Parent_LoMB and IAF_Parent_HiMB). The results reported in columns 2 and 5 of Table 6 substantiate our earlier conclusion that during the GFC, capital transfers from low MB firms support the investment by high MB firms.

their interactions with the crisis indicator.

The results reported in Table 7 show that the incidences of large equity investments between firms within a group generally rise during the crisis years (Column 1). The change is 1.5 percentage points for groups in emerging markets (Column 2), from the pre-crisis base rate of 5.4 percent, but is essentially zero for groups in developed markets (Column 3). We then interact the GFC indicator with the focal firm's own cash flows and MB measures. The negative $OwnCF \times GFC$ coefficient and positive $MB \times GFC$ coefficient indicates that during the crisis years intra-group equity capital support becomes less dependent on the operating performance of the capital raising affiliate, but more dependent on its growth opportunities. These results are similar to those documented in Table 6 using IAF, suggesting that intra-group capital support is concentrated among member firms with relatively higher marginal productivity of capital.

[Insert Table 7 here]

5 Crisis-period and Post-crisis Outcomes of Family Group Affiliation

5.1 Investment

In this section, we compare the experiences of family group firms during and after the GFC to those of other firms. The results in the previous section imply group ICM flows during the GFC is efficient: going from one part of the group with excess resources to another part with high value investment opportunities. This implies that family group firms should exhibit a greater ability to maintain their investment levels in the GFC,

compared to standalone firms, which face restricted access to external capital markets to fund their investment programs.

However, there is an alternative possibility. Lins et al. (2013) argue that family-controlled groups may have strong survival concerns (to preserve families' long-term private benefits of control), which can instead create an incentive to reduce corporate investment. This means that a group needs to trade off the advantage of using ICM against this cost. We argue that the external market development plays a key role in determining the outcome of this tradeoff.

We examine these possibilities by analyzing the *crisis-induced change* in corporate investment levels of family group firms in emerging and developed markets relative to two distinct comparison cohorts: matched standalone firms and matched non-family group firms. The first cohort does not have access to an ICM, while the second has no family control. We do this separately for emerging and developed markets.

Accounting for unobservable differences is a significant challenge. Thus, our strategy may not be able to fully establish the causal effect of a family-group structure on alleviating external funding constraints. However, if the 2008-2009 crisis can be assumed to be largely unanticipated, such that the industry structures of groups and strategies of firms across an economy do not endogenously evolve in the pre-crisis period, then the analysis can still provide persuasive evidence on whether family-group firms on average exhibit a different investment response to a severe capital market shock than do other firms. This is important because of the somewhat mixed evidence in previous studies that perform similar comparisons. Almeida et al. (2015) find that Korean *Chaebols* cut investments by a lesser extent than non-*Chaebol* firms during the Asian Financial Crisis, whereas Lins et

al. (2013) find a greater investment cut during the 2008-2009 crisis by family group firms compared to non-family group firms for a multi-country sample.

However, the empirical settings in both studies have a limited ability to adequately control for differences across firm types. Because Almeida et al. (2015) focuses on South Korea, where *Chaebols* dominate, their analysis cannot completely rule out the potential impact of some observed differences in firm characteristics. For example, one key difference is firm size. Larger firms are more diversified and have greater asset pledgeability that may make it easier to access external capital. Almeida et al. (2015) show that *Chaebol* firms are indeed much larger than their non-*Chaebol* counterparts, a difference which persists even after matching them with their closest peers. Lins et al. (2013) compare the investment response of family group firms to non-family group firms using a relatively small cross-country sample of business groups. They do not match these firm types against each other, possibly because of their limited samples.

A scrutiny of our data confirms that the difficulty in matching is a critical issue, but one that can be alleviated by our comprehensive sample. In Table A4 in the Appendix, we report that in 31 out of our 45 sample countries, group firms are on average significantly larger than standalone firms (based on a Mann-Whitney median test).In these countries, the median family group firm tends to be about a 14 percentage points larger than a standalone firm in terms of their log market capitalization. It is important to note that when removing the logarithmic scaling and comparing differences in the raw market capitalization of the median treated and non-treated firms in each country, family group firms are more than *four and a half times* larger than standalone firms, for the median country. These comparisons suggest that carefully selecting counterfactual firms in the

economy is an important first step in reaching any robust conclusions regarding the impact of family group affiliation during the crisis period.

To address the covariate imbalance problems described above, we rely on the difference-in-differences matching estimator (DID-ME) developed by Abadie and Imbens (2006, 2011) to select appropriate matched firms and use them as a benchmark to document the change in investment of family group firms around the GFC. We use this matching estimator because it allows us to match on both categorical variables (such as country and one digit SIC industry) and on continuous variables that might affect investment such as $Size$, $OwnCF$, MB, $Cash$, Lev, and PPE defined earlier. Matching on continuous variables is based on a nearest neighbour approach, where we allow each group firm to be matched (with replacement) to one standalone firm or non-family group firm. To account for observable systematic differences, we employ the Abadie and Imbens (2006, 2011).[15]

Given the very large discrepancies in firm size between family group firms, standalone firms and non-family group firms, we analyze the extent to which our matching procedure is able to close this gap. Table A4 shows matching is able to eliminate size differences in 17 out of the 30 countries where family group firms were previously shown to be systematically larger. Significant size differences continue to exist in the remaining 13 markets[16]. One important advantage of our-cross country sample, is that we have an objective criterion on which we can exclude countries where matching is unable to eliminate significant size differences. We discuss this robustness analysis below.

Table 8 presents the results from our matching estimator analysis. Rows F and S first

[15]Similar to Almeida et al. (2015), we argue that this approach is superior to a standard linear regression analysis in detecting differences in crisis-period investment levels, as the latter may mask the fact that there is inadequate covariate overlap between family-group firms and other types of firms.

[16]In many of these markets, groups are relatively important such as Italy, Indonesia, Singapore, South Korea and Turkey

present a comparison between the pre-to-post crisis change (2007-2009) in investment for family group (treated) firms and unmatched standalone (non-treated). The comparison shows that pre-crisis investment levels are significantly higher among family group firms both before and after the crisis. Row *Diff. (F - S)* in Table 8 also shows that the relative change in investment levels between the two groups (i.e the difference-in-difference) is not statistically significant before matching is applied. This breakdown highlights that the differences in investment levels between treated and untreated firms is especially obvious in emerging markets.

Next, we focus on establishing the average treatment effect on the treated (ATT) of having group affiliation. We also estimate treatment effects for firms in emerging and developed markets separately. The results show that the differences in pre-crisis investment levels that were apparent before matching are eliminated, suggesting that our matching procedure effectively equalizes pre-crisis investment levels across treated and control groups.

We next focus on the changes in corporate investment across the crisis period. For the full sample of countries, the change in investment from 2007 to 2009 experienced by the treated group is not significantly different from the change experienced by the control group. However, the results become more informative when we separate firms into emerging and developed markets.

In the emerging markets sample, treated firms' investments fall from 7.9 percent to 5.7 percent of total assets, while the equivalent change for the standalone control firms is a fall from 8.3 percent to 5.2 percent. The average treatment effect on the treated (ATT), which reflects the extent of the decline in these investment measures in treated firms

relative to control firms, is positive and statistically significant at the 5 percent level. The difference-in-difference coefficient of 0.011 or 1.1 percent, indicates that group affiliation moderates the decline in corporate investment by around 15 percent (given a mean CAPEX to total assets ratio of 0.077 for emerging market countries). The equivalent statistic for the developed markets sample suggests that group affiliation has no measurable impact on the corporate investments of these firms. The findings above correspond very closely to our previous analysis of internal capital market activity. In particular, the fact that internal capital market activity was most pronounced in emerging markets, suggests that this activity played an important role in moderating corporate investment cuts experienced by firms in these markets.

Our previous discussion of covariate imbalances between treated and control groups highlights the fact that the conclusions drawn from the above analysis could be confounded by the effects of firm size. To deal with this concern, we re-estimate our matching estimator analysis after removing firms from countries where significant size gaps between family group firms and standalone firms remain after matching. The results from this analysis are qualitatively similar to those reported in our main analysis (reported in the Appendix Table A2), and they suggest that firm size differences appear unable to explain our findings of family group firms' investments being less adversely affected by the financial crisis.

We next proceed to a comparison of the investment changes of family group firms (treated) and non-family group firms (control). Lins et al. (2013) conduct this same comparison with two key differences. First, they do not attempt to match firm characteristics across the two types of business groups. Second, their sample is considerably smaller than ours as they rely on standard databases to identify business group affiliates, whereas our

sample is based on a more intensive identification procedure described in section 2.1.[17] Based on the Mann-Whitney tests of medians, our matching estimator is not able to close the gap in firm size between treated and control firms in 17 out of our 45 sample countries. This further highlights how different these firm types can be.[18]

In Table 8 we essentially replicate the analysis in Lins et al. (2013) by comparing the unconditional change in investment levels for all family (treated) and non-family group firms (untreated) in our sample. Consistent with Lins et al. (2013), we find that without any matching, non-family group firms indeed cut their investment by less than family group firms. Row *Diff. (F - NF)* shows that this difference-in-difference is statistically significant with a magnitude of 0.011 or 1.1 percent of total assets. However, this pattern can be attributed to the fact that non-family groups often consist of extremely large firms, such as those that are government controlled, or widely-held conglomerates that control many other public firms (e.g. *keiretsu*) that tend to be the largest firms in an economy. This pattern is also particularly apparent in emerging markets.

Next, we employ the matching estimator approach to more carefully compare family group firms to their matched non-family group peers. We find that the (ATT) based on our sample of 45 countries is not significantly different from zero, implying that any difference in investments by family and non-family group firms does not survive matching on country, industry, firm size and other covariates described above.

[17]In matching family group firms to their non-family group counterparts, we note that the pool of potential matches from which we can select control firms is quite shallow in some countries.This pool becomes even more limited when we impose an industry matching requirement. Thus, the gap in firm size between treated and control firms can sometimes be wider than that between treated and non-treated firms. This feature of our matching procedure can be seen in Table A4

[18]Countries with large firm size gaps are: Brazil, France, United Kingdom, Indonesia, Israel, India, Italy, Mexico, Sri Lanka, Norway, Philippines, Pakistan, Portugal, Sweden, Singapore, Taiwan and the United States. In a robustness test, we remove firms from countries with imperfect median firm size matches from our analysis and find our results remain qualitatively unchanged.

More importantly, after breaking the sample into firms from developed and emerging markets, we find that in emerging markets, family group firm investment levels are significantly more resilient in the financial crisis than non-family group firms. Table 8 shows that family group affiliates in emerging markets cut their investments by 2.2 percent of total assets compared to their matched non-family group counterparts who cut their investment by 2.6 percent of total assets. The ATT is positive (3.1 percent) and statistically significant. To ensure that the results are not specific to our chosen definition of the financial crisis period, (or that they are not influenced by idiosyncratic dips or spikes in investments around the crisis), we repeat our analysis using variables for the pre-crisis period calculated using the average of the year-end 2006 and 2007 investment levels, and compare this to the average of the 2008 and 2009 investment levels. This construction is identical to that in Lins et al. (2013) and thus provides direct comparability to their study. The results are reported in Table 8 and are quantitatively the same as those from using 2007 and 2009 investment levels.

Overall, our analysis based on using a matching estimator suggests that family group affiliation moderated the effects of a contraction in external finance as well as the widespread investment declines experienced by firms generally during the global financial crisis. Importantly, a comparison between family and non-family groups, which Lins et al. (2013) use to evaluate the effect of family group affiliation during the GFC is highly sensitive to whether firms are matched on basic characteristics. Our matching approach indicates that, unlike the Lins et al. (2013) conclusion, group financing advantages actually intensify rather than dissipate during the financial crisis period, especially in emerging economies where capital market disruptions can have more serious impacts on capital availability.

[Insert Table 8 here]

5.2 Robustness Analysis

As an alternative to the above matching procedure, we estimate the difference in investment response to the GFC for group and standalone firms using regression analysis. We estimate the following OLS model over the 2004–2010 period.

$$Invest_{i,t} = \beta_0 + \beta_1 GFC_t + \beta_2 Group_j \times GFC_t + \beta_3 OwnCF_{i,t} + \beta_4' \mathbf{Controls} + \eta_i + \varepsilon_{i,t}, \tag{6}$$

where $Group$ is an indicator variable for firms affiliated with a family group. The interaction term $Group \times GFC$ provides an estimate of the change in group firm investment from before to after the crisis, relative to standalone firms. $OwnCF$ represents the operating cash flows of the focal firm, defined as the sum of net income before extraordinary items, plus depreciation and amortization, scaled by beginning-of-period book value of total assets.

The estimates for Equation 6 are reported in Appendix Table A3. The GFC coefficient indicates that the crisis led to an average reduction in the ratio of capital expenditures to total assets of 0.9 percentage points for standalone firms. The coefficient of the interaction of $Group \times GFC$ indicates that, holding all covariates constant, group affiliation mitigates the extent of the investment decline by 0.2 percentage points, or about one quarter of the decline experienced by standalone firms in the GFC.

In column 1 of Appendix Table A3, we estimate Equation 6 using only firms in emerging markets and find that the moderating influence attributable to group affiliation

more than doubles. These results affirm the previous conclusion that group ICMs play a more active and important role in emerging markets.

We also use this regression framework to investigate the possibility raised by Lins et al. (2013): that family groups may have an incentive to cut investments in order to concentrate resources on rescuing hard-hit members so as to preserve overall family control. The model in column 2 compares firms that belong to hard-hit groups, but are themselves not hard hit, to standalone firms in the same economy. To identify groups with hard-hit member firms, we use the definition in Lins et al. (2013): those with stock returns in the bottom 5^{th} percentile of our sample from August 2008 until March 2009. When a group firm satisfies this criterion, the entire group is designated as a hard-hit group. The results in column 2 show that our previous findings continue to hold. This suggests that while group survival concerns may be important, they do not completely eliminate the ICM-related financing advantages that group firms hold over standalone firms.[19]

We conduct one final falsification test that replicates our results using two placebo GFC periods; 2006–2007, and 2010–2011. In addition to providing further support for the causal effect of group affiliation on investment, using 2006–2007 as a placebo GFC period also enables us to determine whether the investments of both the treated and control groups diverged prior to the crisis. Such a divergence would violate the parallel trends assumption that is required for the validity of the difference-in-difference analysis. The results are reported in columns 3, 4, 7, and 8 of Table A3. They show that there is no significant difference in investment levels between group and standalone firms when we falsely use 2006 and 2007 as our crisis years. This evidence also supports the parallel trends

[19]Notwithstanding the endogeneity of the being hard-hit in the first place, we find that most family business groups around the world do not have member firms hard hit by the crisis

assumption. There is also no significant reduction in investment cash flow sensitivity observed during the 2006–2007 period for group firms. Alternatively using the later 2010–2011 period as the placebo crisis period leads to similar insignificant results.

6 Post-Crisis Performance

Our analysis thus far points to a significant rise in internal capital transfers among family business group members during the 2008 financial crisis, especially for group firms with greater investment needs. However, the efficiency of these allocations remains unclear. It is possible that by maintaining relatively high levels of corporate investments during the crisis, groups over-extend their own financing capabilities and over-estimate the speed of post-crisis economic recovery.

It is a significant empirical challenge to establish whether certain observed corporate investment patterns are optimal. We can, however, provide some auxiliary evidence on the post-crisis performance of family group firms relative to both standalone firms (that do not have access to an internal capital market), and to other types of business groups. There are two distinct performance implications that can arise from group internal capital market support.

If groups in emerging markets use ICMs to build advantages over their rivals, then we should observe that group firms emerge from the crisis in a stronger competitive position relative to standalone firms, despite an immediate crisis-induced negative demand shock. If however, group transfers of capital actually facilitate over-investments in projects that should be discontinued, then post-crisis we should observe inferior performance in group firms relative to standalone peers.

We also assess whether the benefits of family group ICMs are dampened by the family's desire to cut back on investment to preserve control, by comparing investments in family group firms with non-family group firms. The latter group of firms also has access to an ICM, but they should not suffer from any negative consequences of family control, if any exist in the crisis period. Another distinction between these two group types is that non-family groups do not have a centralized decision making authority that can sufficiently internalize the benefits derived from internal capital market re-allocations. This provides a contrasting reason why family control of groups might in fact be advantageous, rather than detrimental during the crisis period.

We examine whether the intensification of ICM activity and accompanying investment resilience of groups provides groups with competitive advantages in the product market. Our premise for groups intensifying ICM activity in emerging markets is that it afford them a strategic advantage to outperform rivals. In particular, the crisis opens up a window of opportunity where their ICM advantage widens, allowing them to strengthen their competitive position. However, it might also be possible that groups' response is a manifestation of over investment. If this is the case, then family group firms should emerge from the crisis in a relatively weaker position compared to standalone firms.

We use two measures to infer post-crisis performance outcomes. Our main measure captures the strategic benefits of a firm's investment decisions. This is measured by the change in a firm's product market share, where market share is computed using annual sales of the focal firm over the total annual sales of all publicly listed firms in the same one-digit SIC industry. We hypothesize that while competitors are unable to maintain their investment programs, family group firms can rely on their internal capital markets to

provide continued support for their investments in the face of capital market disruptions, which then subsequently strengthens their competitive positions. It is important to recognize that increases in product market share may require incurring excessive costs. To evaluate whether this is the case, our second performance measure is post-crisis stock returns. Specifically, we examine buy-and-hold stock returns for the three years following the financial crisis period, controlling for standard risk factors. For robustness, we also expand this window to include the crisis period.

To deal with the lack of covariate overlap between family group, standalone and non-family group firms, we initially conduct this analysis using the Abadie and Imbens (2006, 2011) matching estimator. Similar to our earlier analysis, each family group firm is matched to a standalone or non-family group firm based on country, industry and standard risk factors that are likely to influence stock returns (and potentially their market share) as at the end of 2007 (just before the onset of the GFC) . These include firm size, beta, book-to-market ratio, momentum, and liquidity. In Table 9, we report the average treatment effect on the treated (ATT) derived from the above comparisons for separate samples of emerging market and developed market firms for various time horizons.

[Insert Table 9 here]

The ATT estimates reported in Panel A Table 9 indicate that for the initial two-year period from the onset of the crisis (year beginning 2008 until year-end 2009), the market share of family group firms in emerging markets increases by 7.2 percent more than standalone firms. In developed markets, family group firms appear to lose market share to stand alone firms by the same magnitude. These results are consistent with ICM activity and investment levels intensifying for groups in emerging markets. The results indicate

that one important strategic benefit of this pattern is a stronger competitive position post-crisis.

An alternative explanation for above patterns is that business groups simply have "deeper pockets" and strong survival concerns. In this case, their increasing market share may arise because other firms are less likely to survive the crisis period. To test whether this possibility is driving our results, we also look at how a group's market share changes from the beginning of 2010 (to allow for crisis-induced firm failures) until the end of 2012. If a group's ability to maintain its investment programs helps them increase their market share, this should manifest itself over the longer term through a stronger post-crisis recovery. The results indicate that groups realize a significant gain in market share (in both developed and emerging markets) over this extended time horizon.

Panel B Table 9 reports the ATT statistics for the family groups and non-family groups comparison. Across both emerging and developed markets, and for all of our time horizons, the post-crisis market share gains for family group firms are significantly higher than for non-family group firms. These results suggests that the greater ICM activity in the crisis period for family group firms that we previously documented is associated with an increasing product market dominance.

We next check to see if these reported increases of product market share occur at the expense of stock returns. The results across both our comparison groups indicate that family business groups do not appear to consistently underperform standalone firms or non-family group firms. In fact, over the longer term, there is some evidence that family group firm stocks tend to outperform their peers, especially in emerging markets.

Overall, family group firms appear to strengthen their strategic positions and exhibit

a more robust recovery in shareholder value following the crisis. Further, on average, group affiliation during the crisis period did not lead to any underperformance relative to either standalone firms or non-family business group firms. In fact, for firms in emerging markets, we find that group firms outperform standalone firms. This evidence casts doubt on the possibility that families expropriated from their group affiliates to ensure the group's survival or that group member reliance on internal capital markets during the crisis somehow led them to make sub-optimal investments.

7 Conclusion

Using a unique dataset of family business groups from across the globe, we provide new evidence that internal capital market activity within family-controlled business groups significantly intensifies during the 2008–2009 Global Financial Crisis. Investments of family-group affiliated firms become more reliant on the capital of other group affiliates, especially in groups with affiliated firms showing strong growth prospects.

A key feature of our study is an analysis of the extent to which group affiliated firms reinvest some of their own capital and profits in other affiliates of the same group. From mandatory disclosures of investments in affiliated firms, we construct a measure of investment in group affiliates and show that this measure helps to explain variations in group firm investment when capital markets are disrupted. We also analyze the transactions that facilitate the movement of equity between group affiliated firms. Importantly, we are able to show that intra-group equity transfers rise significantly during the crisis period.

These results suggest that an important mechanism for overcoming external financing constraints in one part of a family business group is for other resource-rich affiliates to

provide these funds. We further show that such capital reallocation activity is unlikely to be part of a zero-sum game for affiliated firms, nor is it symptomatic of over-investment by groups. ICM activity appears to contribute to a significant amelioration in the typical decline in corporate investment levels experienced during the financial crisis and group-affiliated firms on average have better stock returns and experience greater gains in their product market shares post-crisis, compared to both their standalone competitors and firms affiliated with non-family business groups.

The main implication of our study is that access to an internal capital market provides an important competitive advantage for group affiliated firms by acting as an insurance policy against external capital market disruptions that could otherwise adversely delay or reduce profitable investment opportunities. This is not to say that we find that internal capital markets deliver an overall net benefit to all group member firms. In fact, some of our evidence indicates that certain types of group affiliated firms tend to be suppliers of capital during the 2008 crisis, and perhaps make disproportionate contributions to a group's overall welfare. Whether these same firms achieve attractive long-run returns on their equity investments in other group affiliates is an intriguing question for future research. However, at least in the short-run, these intra-group equity investments are on average clearly profitable.

References

Abadie, A., & Imbens, G. W. (2006). Large Sample Properties of Matching Estimators for Average Treatment Effects. *Econometrica*, *74*(1), 235–267.

Abadie, A., & Imbens, G. W. (2011). Bias-Corrected Matching Estimators for Average Treatment Effects. *Journal of Business and Economic Statistics*, *29*(1), 1–11.

Aggarwal, R., Erel, I., Ferreira, M., & Matos, P. (2011). Does governance travel around the world? evidence from institutional investors. *Journal of Financial Economics*, *100*(1), 154-181.

Almeida, H., Kim, C. S., & Kim, H. B. (2015). Internal Capital Markets in Business Groups : Evidence from the Asian Financial Crisis. *Journal of Finance*, *70*(6), 2539–2586.

Almeida, H., & Wolfenzon, D. (2006a). Should Business Groups be Dismantled? The Equilibrium Costs of Efficient Internal Capital Markets. *Journal of Financial Economics*, *79*(1), 99–144.

Almeida, H., & Wolfenzon, D. (2006b). A Theory of Pyramidal Ownership and Family Business Groups. *Journal of Finance*, *61*(6), 2637–2680.

Bekaert, G., Ehrmann, M., Fratzscher, M., & Mehl, A. (2014). The global crisis and equity market contagion. *Journal of Finance*, *69*(6), 2597-2649.

Bekaert, G., & Harvey, C. R. (2017). *Emerging Equity Markets in a Globalizing World.*

Bekaert, G., Harvey, C. R., Lundblad, C. T., & Siegel, S. (2011). What Segments Equity Markets? *The Review of Financial Studies*, *24*(12), 3841–3890.

Bolton, P., & Scharfstein, D. S. (1990). A Theory of Predation Based on Agency Problems in Financial Contracting. *American Economic Review*, *80*(1), 93–106.

Buchuk, D., Larrain, B., Prem, M., & Urza, F. I. (2019). How do Internal Capital Markets Work? Evidence from the Great Recession. *Review of Finance*.

Burnham, T. C., Gakidis, H., & Wurgler, J. (2018). Investing in the presence of massive flows: The case of msci country reclassifications. *Financial Analysts Journal*, *74*(1), 77-87.

Campello, M. (2002). Internal Capital Markets in Financial Conglomerates: Evidence from Small Bank Responses to Monetary Policy. *Journal of Finance*, *57*(6), 2773–2805.

Campello, M., Graham, J. R., & Harvey, C. R. (2010). The Real Effects of Financial Constraints: Evidence from a Financial Crisis. *Journal of Financial Economics*,

97(3), 470–487.

Carrieri, F., Chaieb, I., & Errunza, V. (2013). Do implicit barriers matter for globalization? *Review of Financial Studies*, *26*(7), 1694-1739.

Chan, K., Covrig, V., & Ng, L. (2005). What determines the domestic bias and foreign bias? evidence from mutual fund equity allocations worldwide. *Journal of Finance*, *60*(3), 1495-1534.

Chang, S. J. (2006). *Business groups in East Asia: Financial crisis, restructuring, and new growth.* Oxford University Press on Demand.

Chang, S. J., & Hong, J. (2000). Economic Performance of Group-Affiliated Companies in Korea: Intragroup Resource Sharing and Internal Business Transactions. *The Academy of Management Journal*, *43*(3), 429–448.

Chang, X. S., Chen, Y., Dasgupta, S., & Masulis, R. W. a. (2019). *External Financing of Last Resort? Bank Lines of Credit as a Source of Long-Term Finance.*

Claessens, S., Djankov, S., & Lang, L. H. P. (2000). The Separation of Ownership and Control in East Asian Corporations. *Journal of Financial Economics*, *58*, 81–112.

Djankov, S., La Porta, R., de Silanes, F. L., & Shleifer, A. (2008). The law and economics of self-dealing. *Journal of Financial Economics*, *88*(3), 430 - 465. (Darden - JFE Conference Volume: Capital Raising in Emerging Economies)

Duchin, R., Goldberg, A., & Sosyura, D. (2017). Spillovers inside conglomerates: Incentives and capital. *Review of Financial Studies*, *30*(5), 1696-1743.

Duchin, R., & Sosyura, D. (2013). Divisional Managers and Internal Capital Markets. *Journal of Finance*, *68*(2), 387–429.

Erickson, T., & Whited, T. M. (2000). Measurement Error and the Relationship between Investment and q. *Journal of Political Economy*, *108*(5), 1027–1057.

Faccio, M., & Lang, L. (2002). The ultimate ownership of western european corporations. *Journal of Financial Economics*, *65*(3), 365-395.

Ferreira, M., & Matos, P. (2008). The Colors of Investors' Money: The Role of Institutional Investors Around the World. *Journal of Financial Economics*, *88*(3), 499-533.

Gopalan, R., Nanda, V., & Seru, A. (2014). Internal Capital Market and Dividend Policies: Evidence From Business Groups. *Review of Financial Studies*, *27*(4), 1102–1142.

Gopalan, R., & Xie, K. (2011). Conglomerates and Industry Distress. *The Review of Financial Studies*, *24*(11), 3642–3687.

Ivashina, V., & Scharfstein, D. (2010). Bank Lending During the Financial Crisis of 2008. *Journal of Financial Economics*, *97*(3), 319–338.

Johnson, S., Boone, P., Breach, A., & Friedman, E. (2000). Corporate Governance in the Asian Financial Crisis. *Journal of Financial Economics*, *58*(1-2), 141–186.

Kahle, K. M., & Stulz, R. M. (2013). Access to Capital, Investment, and the Financial Crisis. *Journal of Financial Economics*, *110*(2), 280–299.

Khanna, N., & Tice, S. (2002). The Bright Side of Internal Capital Markets. *Journal of Finance*, *56*(4), 1489–1528.

Kim, S.-J. (2004). Bailout and conglomeration. *Journal of Financial Economics*, *71*(2), 315 - 347.

Kuppuswamy, V., & Villalonga, B. (2016). Does diversification create value in the presence of external financing constraints? evidence from the 20072009 financial crisis. *Management Science*, *62*(4), 905-923.

Lamont, O. (1997). Cash Flow and Investment: Evidence from Internal Capital Markets. *Journal of Finance*, *52*(1), 83–109.

Lee, S., Park, K., & Shin, H.-H. (2009). Disappearing Internal Capital Markets: Evidence from Diversified Business Groups in Korea. *Journal of Banking & Finance*, *33*(2), 326–334.

Lemmon, M. L., & Lins, K. V. (2003). Ownership Structure, Corporate Governance, and Firm Value: Evidence from the East Asian Financial Crisis. *Journal of Finance*, *58*(4), 1445–1468.

Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis . *Journal of Finance*, *72*(4), 1785–1824.

Lins, K. V., Volpin, P., & Wagner, H. F. (2013). Does Family Control Matter? International Evidence from the 2008-2009 Financial Crisis. *Review of Financial Studies*, *26*(10), 2583–2619.

Masulis, R. W., Pham, P. K., & Zein, J. (2011). Family Business Groups around the World: Financing Advantages, Control Motivations, and Organizational Choices. *Review of Financial Studies*, *24*(11), 3556–3600.

Masulis, R. W., Pham, P. K., & Zein, J. (2020). Family Business Group Expansion through IPOs: The Role of Internal Capital Markets in Financing Growth while Preserving Control. *Management Science*, *forthcoming*.

Matvos, G., & Seru, A. (2014). Resource allocation within firms and financial market dislocation: Evidence from diversified conglomerates. *Review of Financial Studies*, *27*(4), 1143-1189.

Morck, R., Wolfenzon, D., & Yeung, B. (2005, 09). Corporate governance, economic entrenchment, and growth. *Journal of Economic Literature*, *43*(3), 655-720.

Santioni, R., Schiantarelli, F., & Strahan, P. (2019). Internal capital markets in times of crisis: The benefit of group affiliation in italy. *Review of Finance*.

Stein, J. C. (1997). Internal Capital Markets and the Competition for Corporate Resources. *Journal of Finance*, *52*(1), 111–133.

Figure 1: Monthly MSCI Return Index by Region

This figure shows the monthly MSCI return index from January 2004 to December 2010 for five regions; Asia, Asia excluding Japan, Europe, Latin America, and the U.S. The plots show sharp declines in the return indexes around late 2008, demonstrating the severe and unexpected nature of the 2008 GFC.

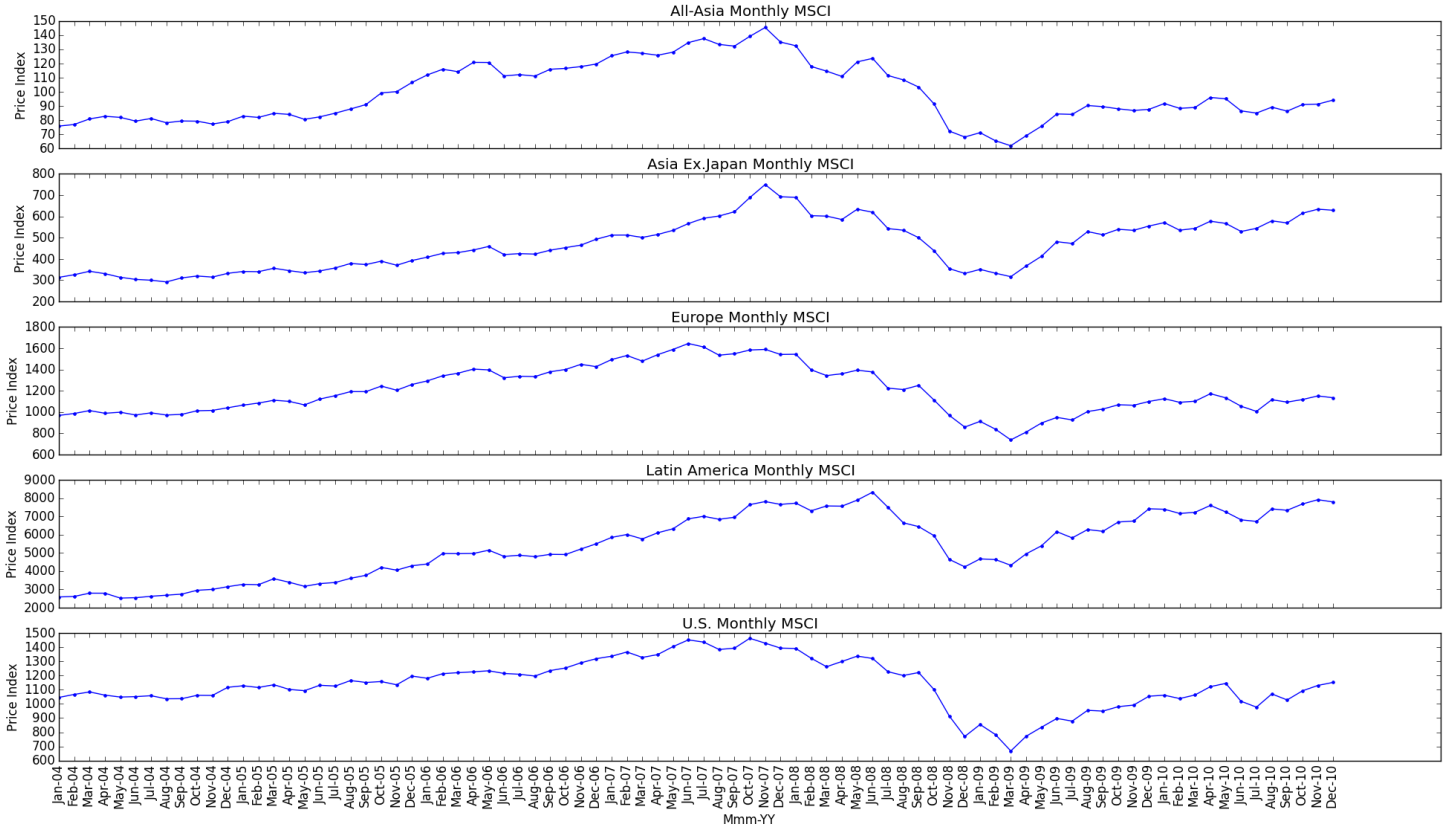

Table 1: Country-Level Statistics

This table reports country-level descriptive statistics on the prevalence of firms affiliated with business groups and the change in corporate investment levels experienced by the median firm in each country. Firms are categorized as *Family Group* (*Non-Family Group*) if they are publicly-listed members of family-controlled (non-family controlled) business groups in 2007. The final column reports the change in average capital expenditures scaled by book value of total assets from the pre-GFC (2006–2007) to post-GFC (2008–2009) period of the median firm in each sample country.

	Firms by Number			Firms by Percentage		
Country	Total	Family Group	Non-Family Group	Family Group	Non-Family Group	Change in Avg. Investment
Panel A: Emerging Markets						
Argentina	63	16	11	25%	17%	2%
Brazil	178	46	27	26%	15%	3%
Chile	140	59	26	42%	19%	−12%
Colombia	15	6	2	40%	13%	−1%
Czech Republic	16	–	9	0%	56%	−1%
Hungary	18	1	4	6%	22%	−12%
India	512	199	36	39%	7%	−9%
Indonesia	224	78	9	35%	4%	−5%
Israel	119	65	4	55%	3%	−19%
Korea	1,095	322	25	29%	2%	−11%
Malaysia	606	159	58	26%	10%	−7%
Mexico	82	21	5	26%	6%	−18%
Pakistan	87	30	22	34%	25%	−35%
Peru	81	19	13	23%	16%	−1%
Philippines	119	61	10	51%	8%	−11%
Poland	97	29	14	30%	14%	−30%
South Africa	184	18	36	10%	20%	−5%
Sri Lanka	92	47	8	51%	9%	−27%
Taiwan	858	182	15	21%	2%	−29%
Thailand	299	107	28	36%	9%	−24%
Turkey	178	81	24	46%	13%	−35%
Venezuela	18	1	4	6%	22%	28%

Table 1—*Continued*

Country	Firms by Number			Firms by Percentage		
	Total	Family Group	Non-Family Group	Family Group	Non-Family Group	Change in Avg. Investment
Panel B: Developed Markets						
Australia	816	43	35	5%	4%	−20%
Austria	57	3	18	5%	32%	−16%
Belgium	71	18	6	25%	8%	−15%
Canada	762	50	13	7%	2%	−30%
Denmark	88	9	7	10%	8%	−12%
Finland	100	9	6	9%	6%	−23%
France	470	63	65	13%	14%	−16%
Germany	507	70	65	14%	13%	−15%
Greece	225	40	13	18%	6%	−28%
Hong Kong	625	129	13	21%	2%	−26%
Ireland	35	5	–	14%	0%	−13%
Italy	160	50	11	31%	7%	−15%
Japan	2,909	134	632	5%	22%	−4%
Netherlands	101	15	11	15%	11%	−20%
New Zealand	65	4	1	6%	2%	−11%
Norway	107	28	9	26%	8%	−30%
Portugal	37	5	3	14%	8%	−1%
Singapore	367	74	26	20%	7%	−14%
Spain	103	20	25	19%	24%	−10%
Sweden	222	56	7	25%	3%	−22%
Switzerland	159	15	24	9%	15%	−10%
United Kingdom	811	39	34	5%	4%	−20%
United States	2,637	104	127	4%	5%	−21%
Total	16,515	2,530	1,541			

Table 2: Relation between Group Firm Investments and Cash Flows of Affiliated Firms

This table reports results of OLS regression estimates of the investment sensitivity of family group firms to the cash flows of other group members. The dependent variable is a firm's capital expenditures scaled by beginning-of-period book value of total assets. The key explanatory variable is the interaction term, $GFC \times GroupCF$, where *GFC* is an indicator variable that equals 1 if the observation falls in either year 2008 or 2009, and 0 otherwise; and *GroupCF*, is the sum of the operating cash flows of all firms in the same business group excluding the subject firm, scaled by the beginning-of-period sum of book value of total assets of all other firms in the same group. *OwnCF* is the sum of a firm's net income before extraordinary items, and depreciation and amortization scaled by beginning-of-period book value of total assets. The control variables (not reported) *MB, Cash, Leverage, PPE,* and *Size* are lagged by one year and are defined in the Appendix. All results use robust standard errors clustered by firm. The t-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All Markets	Emerging Markets			Developed Markets		
	Family Groups	Family Groups	Pyramidal Fam. Groups	Horizontal Fam. Groups	Family Groups	Pyramidal Fam. Groups	Horizontal Fam. Groups
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GFC × GroupCF	0·032**	0·042*	0·074***	0·074	0·024	0·007	0·008
	(2·103)	(1·850)	(3·210)	(0·567)	(1·253)	(0·318)	(0·145)
GFC × OwnCF	−0·041***	−0·056***	−0·045***	−0·115**	−0·046***	−0·032***	−0·030
	(−4·647)	(−4·170)	(−3·037)	(−2·579)	(−4·101)	(−2·608)	(−0·676)
GFC	−0·001	0·003	−0·001	0·007	−0·004**	−0·002	−0·013***
	(−0·771)	(1·333)	(−0·308)	(1·243)	(−2·418)	(−0·785)	(−2·765)
GroupCF	0·018**	0·021*	0·034***	0·064	0·014	0·019	0·023
	(2·241)	(1·767)	(2·582)	(1·590)	(1·284)	(1·471)	(1·257)
OwnCF	0·129***	0·204***	0·205***	0·194***	0·077***	0·091***	0·094**
	(20·855)	(20·211)	(16·771)	(4·992)	(10·479)	(10·242)	(2·527)
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,729	9,439	7,923	1,516	6,290	4,987	1,303
Adj. R^2	0.052	0.076	0.078	0.078	0.040	0.050	0.068

Table 3: Placebo Family Groups and Non-Family Groups

This table reports results of OLS regression estimates of the investment sensitivity of *placebo* family group firms and non-family group firms to the cash flows of other group members. The dependent variable is a firm's capital expenditures scaled by beginning-of-period book value of total assets. The key explanatory variable is the interaction term, $GFC \times GroupCF$, where *GFC* is an indicator variable that equals 1 if the observation falls in either year 2008 or 2009, and 0 otherwise; and *GroupCF*, is the sum of the operating cash flows of all firms in the same business group excluding the subject firm, scaled by the beginning-of-period sum of book value of total assets of all other firms in the same group. *OwnCF* is the sum of a firm's net income before extraordinary items, and depreciation and amortization scaled by beginning-of-period book value of total assets. The control variables (not reported) *MB, Cash, Leverage, PPE,* and *Size* are lagged by one year and are defined in the Appendix. All results use robust standard errors clustered by firm. The t-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All Markets		Emerging Markets		Developed Markets	
	Placebo Fam. Groups	Non-Family Groups	Placebo Fam. Groups	Non-Family Groups	Placebo Fam. Groups	Non-Family Groups
	(1)	(2)	(3)	(4)	(5)	(6)
GFC × GroupCF	−0·015	−0·005	0·066	−0·014	−0·033	0·002
	(−0·863)	(−0·230)	(1·538)	(−0·309)	(−1·407)	(0·119)
GFC × OwnCF	0·012**	0·032***	−0·026	0·045*	0·013	0·033**
	(1·970)	(2·636)	(−1·497)	(1·943)	(0·845)	(2·178)
GFC	−0·009***	0·002	−0·008***	−0·000	−0·008***	0·002
	(−6·720)	(1·451)	(−2·766)	(−0·071)	(−5·123)	(1·503)
GroupCF	0·002	0·041*	0·004	0·006	0·002	0·047*
	(0·592)	(1·889)	(0·352)	(0·138)	(0·535)	(1·919)
OwnCF	0·002	0·026**	0·123***	0·031	−0·012	0·022
	(0·421)	(2·034)	(9·445)	(1·216)	(−1·078)	(1·470)
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,729	9,576	9,439	2,207	6,290	7,369
Adj. R^2	0.020	0.045	0.064	0.055	0.020	0.049

Table 4: Affiliated Firm Contributions to a Group's ICM

This table reports results of OLS regression estimates of the investment sensitivity of group firms on the fair value of investments made by other group firms into within-group affiliates. The dependent variable is capital expenditures scaled by beginning-of-period book value of total assets. The explanatory variables in this table are *GFC* defined as an indicator variable taking the value of 1 if the observation falls in either year 2008 or 2009, and 0 otherwise; and *GroupIAF*, which is computed as the change in the book value of debt and equity investments less the net increase in retained earnings and adjusted for impairments (IAF) a particular group firm receives from its affiliated firms. *ParentIAF* is the IAF a particular group firm receives directly from its parent firm. *PositiveIAF* is an indicator variable taking the value of 1 if *GroupIAF* is positive, and 0 otherwise. The control variables (not reported) *MB*, *Cash*, *Leverage*, *PPE*, and *Size* are lagged by one year and are defined in the the Appendix. The t-statistics are reported in parentheses. All results use robust standard errors clustered by firm. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All Markets	Emerging Markets				Developed Markets	
	Family Groups	Family Groups	Pyramidal Fam. Groups	Positive Transfers	Non-Family Groups	Family Groups	Non-Family Groups
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GFC × GroupIAF	0·022***	0·023**		−0·005	0·000	0·017	−0·000
	(2·685)	(2·053)		(−0·281)	(0·142)	(1·412)	(−1·198)
GFC × ParentIAF			0·116**				
			(2·530)				
GFC × GroupIAF × PositiveIAF				0·046**			
				(2·009)			
GFC × OwnCF	−0·040***	−0·055***	−0·046*	−0·054***	0·048**	−0·050***	0·024
	(−4·389)	(−4·062)	(−1·750)	(−4·085)	(2·050)	(−4·115)	(1·500)
GFC	0·000	0·005**	−0·001	0·001	0·004	−0·004**	0·008***
	(0·050)	(2·426)	(−0·238)	(0·542)	(0·810)	(−2·064)	(2·841)
GroupIAF	0·001	0·003		−0·011	0·000*	−0·001	0·000***
	(0·154)	(0·444)		(−0·853)	(1·862)	(−0·280)	(3·002)
ParentIAF			−0·062**				
			(−2·523)				
OwnCF	0·130***	0·206***	0·117***	0·205***	0·035	0·073***	0·022
	(19·912)	(19·845)	(6·152)	(20·338)	(1·293)	(9·275)	(1·298)
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,397	8,896	2,975	9,441	1,999	5,501	6,398
Adj. R^2	0.050	0.077	0.073	0.076	0.057	0.035	0.059

Table 5: Instrumental Variable Regression Results

This table reports results of IV regression estimates for a sample of diversified business groups (those with member firms operating in at least two different one digit SIC industries). All variables are constructed as the median percentage change from their pre-GFC (2004–2007) to their post-GFC (2008–2010) levels. The dependent variable is the median percentage change in a subject group firm's capital expenditures scaled by beginning-of-period book value of total assets from the pre-GFC to post-GFC period ($\Delta Invest_A$). $\Delta OwnCF$ represents the equivalent change in own operating cash flows scaled by beginning-of-period book value of total assets of the subject firm. $\Delta Group\_CF$ represents the equivalent change in the sum of operating cash flows scaled by beginning-of-period book value of total assets of other group members. $\Delta Group\_Ind\_CF$ is the IV, which represents the median percentage change in industry-level operating cash flows scaled by beginning-of-period book value of total assets of other group members. The control variables (not reported) include ΔMB, $\Delta Cash$, $\Delta Leverage$, ΔPPE, and $\Delta Size$ and are defined in the Appendix. Columns 1, 3, 5 and 7 report results of using $\Delta Group\_Ind\_CF$ as the IV. Columns 2, 4, 6 and 8 report results of using an alternative IV constructed as the difference between $\Delta Group\_Ind\_CF$ and the median percentage change in industry-level operating cash flows of the subject firm scaled by beginning-of-period book value of total assets, ΔInd_CF. All results use robust standard errors. The z-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All Markets		Emerging Markets				Developed Markets	
	Family Groups		Family Groups		Non-Family Groups		Family Groups	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: First-Stage Estimates								
ΔGroup_Ind_CF (instrument)	0·110***		0·127***		0·034		0·034	
	(3·146)		(3·062)		(0·600)		(0·539)	
ΔGroup_Ind_CF − ΔInd_CF		0·132***		0·125**		0·474		0·108
(alt. instrument)		(3·182)		(2·515)		(0·984)		(1·474)
ΔOwnCF	0·002***	0·002***	0·002***	0·002***	0·175***	−0·429	0·002	0·002
	(3·871)	(3·884)	(3·811)	(3·821)	(5·973)	(−0·792)	(1·081)	(1·095)
Panel B: Second Stage Estimates								
ΔGroup_CF (instrumented)	2·307**	1·951**	2·685**	2·844**	6·971	0·610	1·344	0·319
	(2·431)	(2·271)	(2·418)	(2·032)	(0·544)	(0·821)	(0·332)	(0·259)
ΔOwnCF	−0·004*	−0·003	−0·005*	−0·005	−1·190	0·291	−0·000	0·002
	(−1·646)	(−1·489)	(−1·739)	(−1·571)	(−0·510)	(1·198)	(−0·009)	(0·471)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,269	2,269	1,375	1,375	288	288	894	894

Table 6: Direction of ICM Flows within Groups

This table reports results of OLS regression estimates of examining the direction of internal capital transfers within a family business group. The dependent variable for results shown in columns 1, 3, and 5 is the capital expenditures of high-MB group firms scaled by beginning-of-period book value of total assets. The dependent variable for results shown in columns 2, 4, and 6 is the capital expenditures of low-MB group firms scaled by beginning-of-period book value of total assets. The key explanatory variables are *IAF_HiMB (IAF_LoMB)*, computed as the change in the book value of debt and equity investments made by a High-MB (Low-MB) group firm in its affiliated firms less the net increase in retained earnings, adjusted for impairments. The control variables (not reported) *MB, Cash, Leverage, PPE,* and *Size* are defined in the Appendix. All results use robust standard errors clustered by firm. The t-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All Markets		Emerging Markets		Developed Markets	
	High-MB Firms	Low-MB Firms	High-MB Firms	Low-MB Firms	High-MB Firms	Low-MB Firms
	(1)	(2)	(3)	(4)	(5)	(6)
GFC × IAF_LoMB	0·023**		0·044***		−0·009	
	(2·245)		(3·418)		(−0·735)	
GFC × IAF_HiMB		0·013		0·007		0·017
		(1·473)		(0·513)		(1·388)
IAF_LoMB	−0·007		−0·010		−0·001	
	(−1·623)		(−1·193)		(−0·297)	
IAF_HiMB		0·003		0·006		0·001
		(0·593)		(0·618)		(0·160)
OwnCF	0·078***	0·115***	0·107***	0·169***	0·030	0·068*
	(4·226)	(3·914)	(4·158)	(4·435)	(1·483)	(1·648)
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,396	5,702	2,865	3,443	1,531	2,259
Adj. R^2	0.082	0.057	0.103	0.074	0.065	0.046

Table 7: Group Equity Transfer

This table reports results of OLS regression estimates of the likelihood of a family group firm conducting a SEO supported by other group affiliates. The dependent variable *Equity Transfer Indicator* is an indicator variable, which takes the value of 1 if a particular group firm conducts a SEO and at least 5% of the proceeds is purchased by other group affiliates, and 0 otherwise. The key explanatory variables are *GFC*, $GFC \times OwnCF$, and $GFC \times MB$, where *GFC* is an indicator variable that equals 1 if the observation falls in either year 2008 or 2009, and 0 otherwise; *OwnCF* is the sum of a firm's net income before extraordinary items, and depreciation and amortization scaled by beginning-of-period book value of total assets; and *MB* is the market-to-book ratio of total assets. The other control variables (not reported) *Cash, Leverage, PPE,* and *Size* are lagged by one year and are defined in the Appendix. We repeat the analysis with separate samples of firms in emerging markets (Emg.) and developed markets (Dev.). All results use robust standard errors clustered by firm. The t-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All Markets	Emg. Markets	Dev. Markets	All Markets	Emg. Markets	Dev. Markets
	(1)	(2)	(3)	(4)	(5)	(6)
GFC	0·010**	0·015***	−0·001	−0·002	0·009	−0·020
	(2·206)	(2·781)	(−0·079)	(−0·279)	(1·026)	(−1·370)
OwnCF × GFC				−0·136***	−0·169***	−0·162**
				(−4·130)	(−3·766)	(−2·282)
MB × GFC				0·012***	0·015**	0·011
				(2·959)	(2·495)	(1·390)
OwnCF	−0·032	−0·025	−0·046	0·011	0·036	0·004
	(−0·972)	(−0·552)	(−0·994)	(0·485)	(1·174)	(0·092)
MB	−0·001	0·005	−0·007	0·004	0·006	−0·001
	(−0·134)	(0·842)	(−1·000)	(1·361)	(1·382)	(−0·209)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Firm	Firm	Firm	Group	Group	Group
Observations	13,089	7,861	5,228	13,089	7,861	5,228
Adj. R2	0.002	0.003	0.007	0.180	0.135	0.233

Table 8: Difference-in-Differences of Investment Levels Before and After the GFC

This table reports estimates based on a matching estimator analysis of changes in investment levels pre- and post-GFC. The pre-GFC and post-GFC investment levels are capital expenditures scaled by beginning-of-period book value of total assets measured in year 2007 and 2009, respectively. Alternatively, we analyze change in average investments levels pre-GFC (average of 2006 and 2007) and post-GFC (average of 2008 and 2009). We compare family group-affiliated firms (F) to standalone firms (S) and non-family group-affiliated firms (NF). We use the Abadie and Imbens (2006, 2011) matching procedure to match each family group-affiliated firm-year observation to one standalone or non-family group-affiliated firm-year observation based on firm-specific covariates (*MB, Cash, Leverage, PPE,* and *Size*) with exact matching on country and one-digit SIC to produce a sample of matched standalone firms (MS) and matched non-family group-affiliated firms (MNF). We repeat the analysis with separate samples of firms in emerging markets (Panel A) and developed markets (Panel B). ATT is the bias-corrected average treatment effect on the treated matching estimator. z-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	2007	2009	2009-2007	Average 2006, 2007	Average 2008, 2009	Diff. in Average
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Emerging Markets						
Family Group Firms (F)	0·075	0·056	−0·019***	0·074	0·064	−0·010***
			(−7·957)			(−5·053)
Standalone firms (S)	0·068	0·049	−0·019***	0·067	0·057	−0·010***
			(−10·791)			(−7·541)
Matched standalone firms (MS)						
Diff. (F - S)	0·007**	0·007***	0·000	0·007***	0·007***	0·000
	(2·343)	(2·844)	(0·064)	(2·708)	(3·194)	(0·072)
ATT (F - MS)			0·014***			0·009**
			(3·240)			(2·530)
Non-family group firms (NF)	0·071	0·055	−0·016***	0·069	0·062	−0·007**
			(−3·583)			(−2·073)
Matched NF group firms (MNF)						
Diff. (F - NF)	0·004	0·001	−0·003	0·005	0·002	−0·003
	(0·635)	(0·952)	(−0·576)	(0·902)	(0·444)	(0·541)
ATT (F - MNF)			0·010			0·016**
			(1·050)			(2·220)

Table 8—*Continued*

	2007	2009	2009-2007	Average 2006, 2007	Average 2008, 2009	Diff. in Average
	(7)	(8)	(9)	(10)	(11)	(12)
Panel B: Developed Markets						
Family Group Firms (F)	0·063	0·041	−0·022***	0·064	0·048	−0·016***
			(−9·184)			(−8·366)
Standalone firms (S)	0·066	0·044	−0·022***	0·066	0·053	−0·013***
			(−22·940)			(−18·084)
Matched standalone firms (MS)						
Diff. (F - S)	−0·003	−0·003	0·000	−0·002	−0·005*	−0·003
	(0·997)	(−1·478)	(−0·018)	(−0·597)	(−1·847)	(1·089)
ATT (F - MS)			−0·002			−0·004
			(−0·540)			(−1·410)
Non-family group firms (NF)	0·056	0·047	−0·009***	0·055	0·051	−0·004***
			(−5·532)			(−3·199)
Matched NF group firms (MNF)						
Diff. (F - NF)	0·007*	−0·006**	−0·013***	0·009***	−0·003	−0·012***
	(1·952)	(−2·439)	(−4·289)	(2·877)	(−1·117)	(−5·401)
ATT (F - MNF)			−0·003			−0·015***
			(−0·480)			(−3·260)

Table 9: Market Share and Stock Returns (Matching Estimator)

This table reports matching estimator results based on analyses of change in market share and holding period stock returns for three time periods, from beginning 2008 to end 2009, beginning 2008 to end 2010, and beginning 2009 to end 2012. We define Market Share as the firm's annual sales over the total annual sales of the one-digit SIC industry in which the firm operates. Stock Returns is the holding period stock return of the time period under study. Panel A compares family group-affiliated firms to standalone firms and reports the Abadie and Imbens (2006, 2011) bias-corrected average treatment effect on the treated (ATT) matching estimators for separate samples of firms in emerging and developed markets. Panel B compares family group-affiliated firms to non-family group-affiliated firms and reports the Abadie and Imbens (2006, 2011) ATT matching estimators. The matching covariates where Market Share is the outcome variable are *MB, OwnCF, Cash, Leverage, PPE,* and *Size* with exacting matching on country and one-digit SIC. The matching covariates where Stock Returns is the outcome variable are *Cash, Leverage, Size, Book-to-Market, Momentum, Beta,* and *Liquidity* with exacting matching on country and one-digit SIC. z-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Change in Market Share			Holding Period Stock Returns		
	Beg. 2008–End 2009	Beg. 2008–End 2010	Beg. 2009–End 2012	Beg. 2008–End 2009	Beg. 2008–End 2010	Beg. 2009–End 2012
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Family Groups vs. Standalone						
Emerging	0·120	0·406**	0·630***	0·027	0·056	0·279***
	(0·704)	(2·055)	(2·628)	(1·101)	(1·353)	(2·584)
Developed	−0·362*	−0·554**	−0·569*	−0·048**	−0·029	−0·021
	(−1·767)	(−2·220)	(−1·904)	(−2·348)	(−1·001)	(−0·255)
Panel B: Family Groups vs. Non-Family Groups						
Emerging	0·646*	0·689	0·033	0·032	0·023	0·199
	(1·751)	(1·371)	(0·050)	(0·493)	(0·220)	(0·968)
Developed	−1·874**	−1·935**	−1·156*	−0·085**	−0·099	−0·079
	(−2·437)	(−2·368)	(−1·937)	(−2·199)	(−1·554)	(−0·389)

Appendix: Variable Descriptions

Variable	Description
Beta	The correlation between a firm's stock return and the domestic market return obtained from Worldscope.
Book-to-Market	A firm's ratio of its book value of common equity divided by its equity market capitalization.
Cash	A firm's cash and short term investments equivalent to cash scaled by contemporaneous book value of total assets.
GFC	Indicator variable for the Global Financial Crisis period. GFC takes on a value of 1 if the observation is taken from years 2008 or 2009, and 0 otherwise.
Group	Indicator variable equals to 1 if the firm is affiliated to a family business group, and 0 otherwise.
Group_CF	The sum of the operating cash flows of all firms in the same business group excluding the subject firm, scaled by the beginning-of-period sum of book value of total assets of all other firms in the same group in year t.
Group_Ind_CF	An instrumental variable defined as the median percentage change (from the pre-GFC period to the post-GFC period) in industry-level operating cash flows of the other group affiliates. The median industry-level operating cash flows is computed as the sum of operating cash flows of all standalone firms in the same country and one-digit SIC industry scaled by the sum of the book value of total assets of these standalone firms. Where there are two or more other group affiliates, the measure is computed as a weighted average, with the weights being the book value of total assets of these affiliates scaled by their sum.

Appendix—*Continued*

Variable	Description
IAF	Change in investments in affiliates (IAF) from year $t-1$ to year t, computed as the change in book value of debt and equity investments made by a particular firm in its affiliated firms less net increase in retained earnings of affiliated firms plus the product of *Impairment Ratio* (IR) and beginning-of-period IAF.
IAF_HiMB (IAF_LoMB)	The IAF made by a High-MB (Low-MB) group firm in its affiliated firms. A group firm is classified as High-MB (Low-MB) if its Market-to-Book value of asset ratio in 2007 is above (below) the median Market-to-Book value of asset ratio of the group.
IAF_Parent	The IAF made by a group firm which is also a direct parent to other affiliated firms in the group.
IAF_Parent_HiMB (IAF_Parent_LoMB)	The IAF made by a High-MB (Low-MB) group firm which also acts as a direct parent to other affiliated firms in the group. A group firm is classified as High-MB (Low-MB) if its market-to-book value of asset ratio in 2007 is above (below) the median market-to-book value of asset ratio of the group.
Impairment Ratio (IR)	The firm's ratio of impairment charges on investment assets in year t to the beginning-of-period value of investment assets.
Ind_CF	The median percentage change (from the pre-GFC period to the post-GFC period) in industry-level operating cash flows of the subject group firm. The median industry-level operating cash flows is computed as the sum of operating cash flows of all standalone firms in the same country and one-digit SIC industry as the subject group firm scaled by the sum of the book value of total assets of these standalone firms.
Invest	Net capital expenditures scaled by beginning-of-period book value of assets. Net capital expenditures are capital expenditure less depreciation and amortization.
Leverage	The ratio of book value of total debt to book value of assets.
Liquidity	The percentage of days in the year during which the stock return of the firm is nonzero.
Market-to-Book	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.
Momentum	The stock return of a firm over the preceding year.

Appendix—*Continued*

Variable	Description
Own_CF	A firm's own operating cash flows defined as the sum of net income before extraordinary items, and depreciation and amortization scaled by beginning-of-period book value of assets.
Positive_IAF	Indicator variable equals 1 if the IAF made by a group firm in its affiliated firms is a positive value, and 0 otherwise.
PPE	The firm's book value of net property, plant and equipment scaled by the contemporaneous book value of assets.
Size	The natural logarithm of the firm's book value of total assets in U.S. dollars.

Table A1: Instrumental Variable Regression Results–Pyramidal vs. Horizontal Family Groups

This table reports the IV regression estimates for separate samples of diversified business groups (those with member firms operating in at least two different one digit SIC industries) held in a pyramidal structure, and horizontal structure. All variables are constructed as the percentage change in median levels from pre-GFC (2004–2007) to post-GFC (2008–2010). The dependent variable is the percentage change in a subject group firm's median capital expenditures scaled by beginning-of-period book value of total assets from the pre-GFC to post-GFC period ($\Delta Invest_A$). $\Delta OwnCF$ represents the equivalent change in own operating cash flows scaled by beginning-of-period book value of total assets of the subject firm. $\Delta Group\_CF$ represents the equivalent change in the sum of operating cash flows scaled by beginning-of-period book value of total assets of other group members. $\Delta Group\_Ind\_CF$ is the IV, which represents the percentage change in industry-level median operating cash flows scaled by beginning-of-period book value of total assets of other group members. The control variables (not reported) include ΔMB, $\Delta Cash$, $\Delta Leverage$, ΔPPE, and $\Delta Size$ and are defined in the Appendix. Columns 1 and 3 report results of using $\Delta Group\_Ind\_CF$ as the IV. Columns 2 and 4 report results of using an alternative IV constructed as the difference between $\Delta Group\_Ind\_CF$ and the percentage change in industry-level median operating cash flows of the subject firm scaled by beginning-of-period book value of total assets, ΔInd_CF. All results use robust standard errors. The z-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Emerging Markets				Developed Markets			
	Pyramidal		Horizontal		Pyramidal		Horizontal	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: First-Stage Estimates								
ΔGroup_Ind_CF (instrument)	0·155***		−0·023		0·031		−0·043	
	(3·513)		(−0·200)		(0·428)		(−0·325)	
ΔGroup_Ind_CF − ΔInd_CF								
(alt. instrument)		0·155***		−0·037		0·117		−0·014
ΔOwnCF		(2·932)		(−0·270)		(1·411)		(−0·088)
	0·002***	0·002***	0·002	0·002	0·015***	0·014***	−0·000	0·000
	(3·488)	(3·481)	(1·515)	(1·513)	(3·079)	(2·999)	(−0·006)	(0·015)
Panel B: Second-Stage Estimates								
ΔGroup_CF (instrumented)	2·131**	2·109**	−14·616	−11·808	4·148	0·954	8·335	26·979
	(2·491)	(2·070)	(−0·200)	(−0·269)	(0·397)	(0·665)	(0·335)	(0·090)
ΔOwnCF	−0·003	−0·003	0·033	0·026	−0·040	0·007	−0·001	−0·002
	(−1·466)	(−1·320)	(0·195)	(0·259)	(−0·258)	(0·305)	(−0·053)	(−0·032)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,165	1,165	210	210	713	713	181	181

Table A2: Robustness: Difference-in-Differences of Investment Levels Before and After the GFC

This table reports matching estimator results based on a robustness analysis of changes in investment levels pre- and post-GFC after removing firms from countries where significant size gaps remain between family group-affiliated firms and standalone or non-family group-affiliated firms after matching. The pre-GFC and post-GFC investment levels are capital expenditures scaled by beginning-of-period book value of total assets measured in year 2007 and 2009, respectively. We compare family group-affiliated firms (F) to standalone firms (S) and non-family group-affiliated firms (NF). We use the Abadie and Imbens (2006, 2011) matching procedure to match each family group-affiliated firm-year observation to one standalone or non-family group-affiliated firm-year observation based on firm-specific covariates (*MB, Cash, Leverage, PPE,* and *Size*) with exact matching on country and one-digit SIC to produce a sample of matched standalone firms (MS) and matched non-family group-affiliated firms (MNF). We repeat the analysis with separate samples of firms in emerging markets (Emg.) and developed markets (Dev.). ATT is the bias-corrected average treatment effect on the treated matching estimator. The z-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	2007		2009		2009-2007	
	Emg. Markets	Dev. Markets	Emg. Markets	Dev. Markets	Emg. Markets	Dev. Markets
	(1)	(2)	(3)	(4)	(5)	(6)
Family (F)	0·077	0·087	0·060	0·052	−0·017***	−0·035***
					(−3·140)	(−6·806)
Standalone (S)	0·080	0·102	0·055	0·062	−0·025***	−0·040***
					(−6·265)	(−14·314)
Matched Standalone (MS)						
Diff. (F - S)	−0·003	−0·015*	0·005	−0·010*	0·008	0·005
	(0·395)	(1·801)	(1·174)	(−1·884)	(1·240)	(0·624)
ATT (F - MS)					0·025***	−0·011
					(2·960)	(−1·320)

Table A3: Difference in Investment Response to GFC

This table reports results of OLS regression estimates of difference in investment response to the GFC between family group-affiliated and standalone firms. The dependent variable is a firm's capital expenditures scaled by beginning-of-period book value of total assets. The key explanatory variable is the interaction term *Group* × *GFC*. *Group* is an indicator variable equals to 1 if the firm is affiliated with a family business group, and 0 otherwise, and *GFC* is an indicator variable taking the value of 1 if the observation falls in either 2008 or 2009, and 0 otherwise. The unreported control variables *Q, Cash, Leverage, PPE,* and *Size* are lagged by one year and are defined in the Appendix. In columns 2 and 6, we include only non hard-hit firms from family groups with hard-hit members together with all standalone firms. We identify hard-hit family group firms as those belonging to the lowest 5^{th} percentile of crisis-period (i.e. August 2008 to March 2009) stock returns at the country level. In columns 3, 4, 7, and 8 we replace the GFC indicator with two placebo GFC indicators; for years 2006–2007, and 2010–2011. All results use robust standard errors clustered by firm. The t-statistics are reported in parentheses. The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Emerging Markets				Developed Markets			
	Crisis	Without	Placebo Crisis		Crisis	Without	Placebo Crisis	
	2008-2009	Hardhit	2006-2007	2010-2011	2008-2009	Hardhit	2006-2007	2010-2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group × GFC	0·004**	0·004**	0·002	0·000	0·000	0·000	0·000	−0·001
	(2·355)	(2·382)	(1·025)	(0·002)	(0·227)	(0·248)	(0·086)	(−0·328)
GFC	−0·002*	−0·002	0·005***	−0·003**	−0·000	−0·000	0·007***	−0·006***
	(−1·838)	(−1·553)	(5·472)	(−2·334)	(−0·656)	(−0·703)	(13·511)	(−9·660)
OwnCF	0·091***	0·102***	0·090***	0·090***	0·014***	0·014***	0·013***	0·014***
	(22·038)	(23·385)	(21·780)	(22·952)	(8·259)	(8·240)	(7·536)	(8·321)
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,555	30,817	31,555	33,446	74,898	72,233	74,898	79,175
Adj. R^2	0.068	0.071	0.070	0.066	0.067	0.067	0.070	0.067

Table A4: Median Difference in Firm Size

This table reports results of tests on difference in median firm size of family group-affiliated firms and standalone firms in year 2007 on a country-level basis. We use the Abadie and Imbens (2006, 2011) matching procedure to match each family group-affiliated firm observation to one standalone observation based on firm-specific covariates (*MB, Cash, Leverage, PPE,* and *Size*) with exact matching on country and one-digit SIC. We use the Mann-Whitney and Kolmogorov-Smirnov tests of difference in medians and report the p-values.

	Mann-Whitney p-value		Kolmogorov-Smirnov p-value	
	Unmatched	Matched	Unmatched	Matched
	(1)	(2)	(3)	(4)
Panel A: Emerging Markets				
Argentina	0.021	0.219	0.083	0.355
Brazil	0.022	0.084	0.037	0.112
Chile	0.000	0.605	0.000	0.708
Colombia	0.201	0.024	0.224	0.085
Czech Republic	–	–	–	–
Hungary	0.527	0.885	0.765	0.948
India	0.000	0.000	0.000	0.000
Indonesia	0.000	0.726	0.000	0.263
Israel	0.028	0.756	0.153	0.913
Korea	0.000	0.000	0.000	0.000
Malaysia	0.000	0.002	0.000	0.000
Mexico	0.003	0.104	0.018	0.043
Pakistan	0.107	0.098	0.171	0.519
Peru	0.813	0.772	0.380	0.930
Philippines	0.000	0.343	0.000	0.052
Poland	0.164	0.146	0.449	0.070
South Africa	0.010	0.760	0.017	0.657
Sri Lanka	0.002	0.000	0.005	0.000
Taiwan	0.000	0.000	0.000	0.000
Thailand	0.001	0.952	0.002	0.020
Turkey	0.006	0.005	0.036	0.000
Venezuela	0.827	0.439	0.938	0.699
Panel B: Developed Markets				
Australia	0.000	0.668	0.000	0.892
Austria	0.417	0.172	0.660	0.403
Belgium	0.063	0.498	0.035	0.803
Canada	0.000	0.121	0.000	0.124
Denmark	0.034	0.700	0.016	0.481
Finland	0.780	0.809	0.827	0.871
France	0.000	0.010	0.000	0.041

Table A4—*Continued*

	Mann-Whitney p-value		Kolmogorov-Smirnov p-value	
	Unmatched	Matched	Unmatched	Matched
	(1)	(2)	(3)	(4)
Germany	0.000	0.001	0.000	0.003
Greece	0.000	0.744	0.000	0.472
Hong Kong	0.000	0.000	0.000	0.000
Ireland	0.570	0.355	0.841	0.744
Italy	0.000	0.000	0.000	0.000
Japan	0.360	0.002	0.066	0.000
Netherlands	0.225	0.681	0.270	0.862
New Zealand	0.045	0.956	0.090	0.844
Norway	0.005	0.671	0.044	0.562
Portugal	0.087	1.000	0.184	0.653
Singapore	0.000	0.161	0.000	0.017
Spain	0.005	0.218	0.024	0.659
Sweden	0.000	0.546	0.000	0.495
Switzerland	0.015	0.783	0.009	0.397
United Kingdom	0.191	0.022	0.188	0.011
United States	0.321	0.001	0.236	0.014