Revisiting the Bright and Dark Sides of Capital Flows in Business Groups

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Abstract

Extensive prior studies report that the business group structure and the attendant intra-group capital flows are prone to conflicts of interest between controlling shareholders and minority outside investors in group-companies. Yet the business group is a prevalent and stable structure around the globe, particularly where capital markets are under-developed. This paper empirically studies the trade-off between the negative and positive roles played by intra-group capital flows, and discusses and tests the efficiency implications of this tradeoff. We find that from the perspective of the whole group, such intra-group capital flows are most efficient when the groups are least subject to conflicts of interest between controlling shareholders and outside minority shareholders and when they face strong external financing constraints.

Keywords: business group, emerging market, financial constraints, expropriation, corporate governance.

JEL Classification: G31 G32 G34 G15

1. Introduction

A business group is an important organizational structure observed in many parts of the world. Business group member firms are legally separate, but effectively controlled by a controlling owner (hereafter, the group owner), either directly or indirectly through intermediate companies, i.e., a control pyramid. Prior studies emphasize that the intricate ownership structure within a business group is embedded with conflicts of interest and that the group owner may transfer wealth from minority shareholders (Bae, Kang, and Kim, 2002; Claessens, Djankov, Fan, and Lang, 2002; Bertrand, Mehta, and Mullainathan, 2002; Baek, Kang, and Park, 2004; Baek, Kang, and Lee, 2006). This transfer is often manifested by intra-group capital flows. Such flows have received significant attention in recent literature (Johnson et al., 2000; Bertrand et al., 2002; Jiang et al, 2010; Fisman and Wang, 2010, and many others).

In equilibrium, if the capital market is not systematically fooled, one would expect that the detrimental impacts of intra-group capital flows would eventually be reflected in lower stock prices (Claessens et al., 2002; La Porta et al., 2002; Lemmon and Lins, 2003). The negative impact on firm value therefore would represent a value loss for the group, which is ultimately born by the group owners. Yet we observe that in countries ranging from Asia to Europe to Latin America, many businesses, including publicly listed businesses, organize into groups *voluntarily* and *stay that way over time* (Khanna and Palepu, 2000; Morck, Wolfenzon, and Yeung, 2005; Khanna and Yafeh, 2007). What is the countervailing force that offsets the negative impact of intra-group capital flows, thus allowing the group structure to remain *stable* in the long run?

One potential explanation is that business groups, especially those structured as pyramids, possess a financing advantage created by their internal markets (Hoshi, Kashyap, and Scharfstein, 1991). Almeida and Wolfenzon (2006) model that business groups are better able to support the funding requirements of new firms operating in underdeveloped external capital markets.[1]

[1] An important insight in their work is the modeling of a pyramidal structure as a useful tool for controlling shareholders to set up a new firm, which allows them to access the entire stock of retained earnings of the group member firms and to share the security benefits of the new firm with other

It is difficult to empirically test the trade-off between the benefits and costs of intra-group financing. Many group-affiliated firms are not publicly traded, and thus how they ultimately benefit from intra-group capital transfers is not easily tractable using conventional data on publicly listed firms. Furthermore, it is often difficult to disentangle the positive and negative effects of intra-group capital flows: resources may be diverted from one member firm to another to facilitate group capital allocation efficiency, or resources may be diverted to satisfy the self-interests of group owners at the cost of outside shareholders. For minority shareholders, both of these constitute conflicts of interest, whereby resources are transferred from one member firm to another firm with a potentially different ownership structure,[2] yet at the group level, they have different efficiency implications.

We make an attempt to bypass the above difficulties by focusing on the impact of intra-group capital flows on the *total value of the whole group*, rather than on individual member firms. We focus on transfers of financial resources within business groups and test the hypothesis that such financial transfers may be motivated by both group capital allocation efficiency considerations and intentions to expropriate minority shareholders. The former would tend to enhance the overall value of the group as a whole, whereas the later would tend to decrease such value.[3]

We look for evidence of the existence of both a positive and a negative role for intra-group capital flows on the total group value. To do that, we divide our sample along two dimensions. First, we divide the sample into firms with different levels of conflicts of interest between group owners and minority outside investors, arguing that when such conflicts of interest are more severe, the incentive for expropriation will be stronger and thus we are more likely to observe intra-group capital flows with

existing shareholders of the original business group. This is a valuable feature when the security benefits of the new firm are low, as in many emerging markets. Khanna and Palepu (2000) provide evidence consistent with their findings in emerging markets.

[2] A typical case is where financial resources are transferred from a group member firm with a lower ownership stake by the group owner to another member firm with a higher ownership stake by the same group owner; see, for example, Bertrand, Mehta and Mullainathan (2002).

[3] In our analytical framework, "zero-sum games," whereby a dollar loss of one group member firm is completely offset by a dollar gain by another group member firm, will have zero impact on overall group efficiency. In equilibrium, if outside investors can price-protect themselves and correctly factor in such transfers, then the whole group value would not be affected by these inter-firm transfers.

the intention of expropriating minority shareholders. If intra-group capital flows are used primarily for this purpose, then it can be shown (as sketched in the next section and elaborated on in the appendix) that intra-group capital flows *on average* will have low capital allocation efficiency and thus the total value of the group member firms will be hurt. We indeed find evidence to support this. Second, we also divide the sample into firms with different degrees of financial constraints, measured in a variety of ways, to ascertain how a severe constraint on external financing might give rise to a need to resort to intra-group capital flows. If a business group relies on intra-group capital transfers to fund valuable investment opportunities, we expect such capital flows to increase the overall capital efficiency and to flow from firms with a lower Tobin's q to firms with a higher Tobin's q. Again, our evidence supports this.

Taken together, our results indicate that the intra-group financing of business groups cannot be viewed simply as good or bad, as neither side completely explains the phenomenon. The explanation that is most consistent with our empirical results is one featuring a trade-off: in under-developed financial markets, even though the risk of tunneling clearly is very important and may be detrimental to the overall group value, such a risk does not preclude altogether the use of intra-group capital transfers. *Some* resource transfers may be a second-best outcome from the overall group perspective, if they alleviate severe financing constraints on the external financial market and thus enable the undertaking of otherwise un-funded positive net present value (NPV) projects.

For the main analysis in this paper, we employ the conventional estimation technique used in the existing literature to estimate the magnitude of capital flows across divisions (firms) (Lamont, 1997, Shin and Stulz, 1998). This entails estimating the sensitivity of the investment in one member firm (division) to the cash flow in another. Realizing that this conventional measure still comes as an *estimate* of the true intra-group capital flows rather than as a direct *observation*, and that it can be affected by other factors unrelated to the intra-group cash flow, we corroborate the evidence by additionally conducting two robustness checks of our main results, using hand-collected direct observations of important *components* of such intra-group capital flows. Although none of these measures is perfect, the robustness of our

empirical results to these measures gives us some confidence about the validity of our empirical conclusion.

One of our contributions comes from the unique data set, which contains hand-collected data from Chinese business groups, particularly on the non-publicly listed firms within the groups. It is likely that such non-publicly listed firms experience more severe financial constraints.

More importantly, as elaborated later, our dataset is largely free of endogeneity problems in the formation of business groups. Most of the group structures in our dataset were created due to a common *exogenous* shock: China's shareholding reforms. During this reform, subsidiaries of large firms were carved out and listed on the stock exchanges. This creates the basic group structure in our study: a non-listed parent firm and a publicly listed subsidiary firm. The reform was politically motivated, aimed at creating a stock market that is representative of various geographical regions and industries in China. The central government decided which subsidiaries to be carved out and listed and the firms themselves had little say in that process. This ensures that concerns that the group structures are endogenous to group-level factors are largely absent from our sample, whereas business groups in other studies might have voluntarily chosen to form groups if and only if doing so was beneficial.

Our paper complements several recent studies of financing advantages associated with business groups. Gopalan et al (2007) study intra-group loans in India and find that the loans support financially weaker group member firms to prevent their bankruptcy and the consequent negative spillovers to the rest of the group. Almeida et al. (2011) report that Korean chaebols (business groups) tend to use their established affiliated firms to control newly acquired firms with low cash flows and/or low tangible assets, while controlling owners tend to directly control newly acquired firms with more cash and pledgeable assets. As low cash flows and low tangible assets indicate financial constraints, the emerging pyramidal ownership potentially will help alleviate the acquired firms' financial constraints. In a cross-country setting, Masulis et al. (2009) find that affiliated firms at the bottom levels of the pyramidal control chains tend to be higher growth firms with higher capital requirements than those at the upper levels.

Belenzon and Berkovitz (2010) find that group affiliates are more innovative than standalones, and group affiliation is particularly important for innovation in industries that rely more on external funding and in groups with more diversified capital sources. Fisman and Wang (2010) find that the effects of related-party transactions on the value of Chinese firms may be explained by pyramidal structures serving a risk-mitigation and insurance function for the controller, and possibly also by reducing transactions costs on intra-group interactions.

Our paper is highly related to, and builds on, the work by Jiang et al. (2010). Although many of the controlling shareholders of publicly listed Chinese firms are State Owned Enterprises (hereafter SOEs) and thus might a priori have a weaker incentive to maximize profits, Jiang et al. show that expropriation of minority shareholders of listed firms is rampant in China. They point out several reasons for this: the widespread existence of a controlling shareholder in publicly listed firms due to history and design, the restriction on controlling shareholders to trade to recoup benefits of control through price appreciation of the listed firm, and the weak private and public enforcement actions against expropriations. Our paper provides strong supporting evidence of their findings. In addition, we go beyond their work and show that despite the "dark side" of the use of intra-group capital flows for expropriation purposes, such capital flows also have a "bright side".[4]

Our paper bridges two highly related but still separate strands of literature: financing constraints and expropriation of minority investors in emerging markets. The former focuses on whether and how weak legal systems and underdeveloped financial markets constrain the financing of individual firms and limit economic growth (Beck and Levine, 2002; Beck, Levine, and Loayza, 2000; Claessens and Laeven, 2003; King and Levine, 1993; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997,

[4] The fact that many of the heads of the controlling owners are bureaucrats in charge of the SOEs does not necessarily diminish the incentive to expropriate. Although the heads of SOEs may not have as strong monetary incentives from the better performance of their firms, they do have non-monetary incentives, such as their own promotion in the political hierarchy. It is thus not clear whether the reward for better performance is necessarily smaller. In addition, as implied in the analysis of Jiang et al (2010) and others, the cost of expropriation might be low: the odds of being caught and the odds of being disciplined when caught might both be low in China, compared to in other countries. We thus believe that it is quite possible that there are not many fewer expropriations in SOEs than in non-SOEs. In un-tabulated results, we find that the patterns documented in our paper are not significantly different across the SOE and non-SOE subsamples.

1998, 2000; Rajan and Zingales, 1998; Stenbacka and Tombak, 2002, among many others).[5] The latter establishes that the complex ownership structure and weak legal enforcement in emerging markets are associated with expropriation of minority shareholders (Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000, Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2008, among others).[6] Almeida et al. (2011) and Masulis et al. (2009) attribute the expropriation results in past studies to a selection bias -- that weak and financially constrained firms tend to be controlled by pyramids. By contrast, we argue that both "mitigating financing constraints" and "expropriating minority investors" are important functions provided by intra-group financing, and they *combine* to shape the existence and functioning of business group financing.[7]

The remainder of the paper is organized as follows. Section 2 sketches a conceptual model of business group financing and develops several empirical predictions. In Section 3, we detail the institutional background of our study and define our data sources and empirical methodologies. The empirical analysis and some interpretations are offered in Section 4. Section 5 discusses the various robustness checks of our results. Section 6 concludes.

2. A Sketch of Business Group Financing and Hypothesis Development

Before we empirically test this dual role of the intra-group capital market, we use a simple model to justify our intuition and show that the pyramidal business group structure can facilitate both capital allocation efficiency and expropriation. We provide more details about the model in the Appendix.

[5] There is also a growing literature on how financing constraints affect firm investments in developed markets. See, for example, Almeida, Campello, and Weisbach (2004, 2006), Almeida and Campello (2007), Fazzari, Hubbard, and Petersen (1988, 2000), Fee, Hadlock, and Pierce (2009), Hadlock and Pierce (2008), Kaplan and Zingales (1997, 2000), Moyen (2004), Rauh (2006), Whited and Wu (2006). Several contemporary case studies focus on the roles of managerial power on internal capital allocations (Cremers, Huang, and Sautner, 2008; Glaser, Lopez-De-Silanes, Sautner, 2008).

[6] La Porta, Lopez-de-Silanes, and Shleifer (1999) document the widespread use of pyramids, Claessens, Djankov, and Lang (2000) find a large divergence between cash flow rights and control rights in many East Asian firms, and Claessens et al. (2002), La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2002), Mitton (2002), Lemmon and Lins (2003), and Baek, Kang, and Park (2004) find that the separation of cash flows and control rights of controlling shareholders negatively affect firm value.

[7] Fisman and Wang (2010) also point out that looking at only one component of the transfers within a group may lead to a very misleading view of the impact of pyramidal transactions. However, in their paper, the different effects of intra-group financing on the value of the whole group are not directly tested.

We start with an owner of a business carving out a subset of the assets of the firm and listing the carve-out on a stock exchange. Through the parent company, the owner maintains majority ownership and therefore control of the listed subsidiary. The public listing allows the owner to raise external capital and create a class of minority shareholders in the subsidiary. Assuming that the parent company and the subsidiary are not related operationally, then any transactions between the two companies will be financial and will either serve to fund investment projects in the parent or subsidiary or will be consumed by the controlling owner as private benefits.[8] We further assume that the legal environment in which the business group is located is unable to fully prevent such intra-group capital flow activities, because the probability of being discovered is not very high and the expected punishment not prohibitively severe. We also assume that the parent company cannot effectively commit to refraining from cash transfers because such a commitment would be costly in terms of the opportunity losses from private benefits and investment opportunities, or because of the costs of self-imposed corporate governance constraints. However, minority shareholders can protect themselves by buying the stocks at a discount (Claessens et al., 2002; La Porta et al., 2002; Lemmon and Lins, 2003). Therefore, the cost of intra-group capital flows, including the expected cash expropriated from minority shareholders and the resources required to materialize such an expropriation, is borne entirely by the controlling shareholder, in the form of the discounted price of shares.

Assume that the parent company, because it is not publicly listed, is much more financially constrained than the listed subsidiary, and therefore cash is therefore transferred from the subsidiary to the parent company[9]. We can now consider the incentive for the controlling owner's intra-group capital transfer. The benefit of intra-group capital transfers for private benefit consumption decreases with the parent company's percentage stake in the subsidiary. At the extreme, if the subsidiary is completely owned by the parent (e.g., a typical multi-division conglomerate structure

[8] Consistent with the literature, we define "private benefits" broadly to include things like pet projects, managerial perks, and waste in the parent company. We measure the amount of private benefits as the difference between the benefit received and the cost of arranging such a transfer. For example, if the parent company transfers $1 from the subsidiary to itself and incurs a cost of $0.03 for such a transfer, then the net private benefit of the transfer would be $0.97.

[9] We believe this assumption is consistent with the empirical observations in many emerging markets. In the specific case of China, we provide more details in the next section to justify this assumption.

with identical ownership structures across divisions), there is no private benefit for an intra-group capital transfer, as the financial resources will be transferred from one pocket to another of the same owner.

In addition to expropriation, intra-group capital flows can create value for the parent company by relieving financial constraints.[10] The parent company by itself may not have sufficient capital to take on all of the available positive NPV projects. Assuming (without loss of generality) that lost investment opportunities are permanently gone, then intra-group capital flows potentially enable the parent company to undertake more value-creating investment. For simplicity, we assume that the first extra dollar invested in the parent firm generates a high marginal value (a positive NPV) for the parent company, but that each additional dollar put into the parent firm generates a decreasing amount of marginal value, thus reflecting a depletion of valuable investment opportunities available to the parent firm.

Intuitively, we should observe more intra-group capital flows if the parent company and the listed subsidiary are more severely misaligned in incentives (concomitant with a lower ownership stake of the parent in the subsidiary), or if they face more severe financial constraints. For given parameter values of legal enforcement (the probability of intra-group capital flows being exposed and penalized) and intra-group capital flow costs, we can plot the "actions" of intra-group capital flows against a two-dimensional diagram, with the two dimensions being "the parent company ownership stake in the listed subsidiary" and "the financing constraints" (see the Appendix).

In this setting, when the ownership stake of the parent firm in the subsidiary is low – indicating a misalignment of interests between the parent and the subsidiary – intra-group capital flows occur even if the financing constraints are not severe. In fact, it is possible that capital will flow from the subsidiary to the parent if the parent firm has worse investment opportunities than the subsidiary, suggesting that the parent firm sometimes engages in intra-group capital flows purely to expropriate minority

[10] This also means that there is a possibility, at least in theory, that a dollar transferred from the subsidiary to the parent could be worth more than a dollar to the parent. If the net private benefit of the dollar transfer is $0.9 and it also enables the undertaking of a positive NPV project with an NPV of 0.3, then the total value of the dollar transfer to the parent would be $1.2.

investors in the subsidiary, despite the fact that doing so will hurt the overall capital allocation efficiency of the whole group.

In cases in which the parent ownership stake in the subsidiary is high and financing constraints are severe, the parent firm may optimally engage in intra-group capital transfers for a different reason. In such cases, mitigating financing constraints serves as the main motivation for intra-group capital flows, and expropriation of minority investors is less of a concern due to a better alignment of the interests of the group owner and outside investors. The efficiency of such intra-group capital flows is shown to be higher.

In summary, the model shows that intra-group capital flows may be motivated by both private benefit consumption of controlling owners and group capital allocation efficiency considerations, and the extent to which one or the other is true depends on the controlling owner's ownership stake in the subsidiary, as well as the extent of the external financing constraints faced by the parent firm.

Our model generates the following testable predications for business groups with a non-listed parent and a listed subsidiary structure:

H1: There will be an asymmetry in the flow of internal capital within the group. In particular, more funds will flow from the listed subsidiary to the non-listed parent than the other way around, both because the parent company is more likely to be financially constrained (due to its non-listed nature) and because of the potential motivation for expropriating the outside shareholders of the listed subsidiary.

H2A: We will observe more fund flows from the listed subsidiary to the parent when the cash flow rights of the controlling parent in the listed subsidiary are low (more tunneling incentives).

H2B: We will also observe more fund flows from the listed subsidiary to the parent when the controlling parent's financial constraints are high (more capital allocation efficiency benefits).

H3: When we group the observations into four categories, by both the cash flow rights of the controlling parent in the listed firm and by the financial constraints of the parent firm, we should expect to see the highest magnitude of internal capital flows from the listed subsidiary to the parent firm when the parent's cash flow rights in the subsidiary are low (indicating stronger incentives to expropriate) and the parent's financial constraints are high (indicating a stronger motivation to mitigate financing constraints), and we should expect to see the lowest magnitude of internal capital flows from the subsidiary to the parent when the parent's cash flow rights in the subsidiary are high and the parent is less financially constrained. The remaining two cases should have magnitudes of internal capital flows that fall in between the above two cases.

H4: When we group the observations into four categories, by both the cash flow rights of the controlling parent in the listed firm and by the financial constraints of the parent firm, we should expect to see the highest efficiency of the internal capital flow from the listed subsidiary to the parent firm when the parent's cash flow rights in the subsidiary are high and the parent's financial constraint is high (indicating that mitigating the financing constraints are more likely the reason for the internal capital flows), and we should expect to see the lowest magnitude of internal capital flows from the subsidiary to the parent when the parent's cash flow rights in the subsidiary are low and the parent is less financially constrained (indicating that expropriating listed subsidiary shareholders is likely to be the reason for the internal capital flows).

In our empirical section below, we will directly test these hypotheses.

3. Institutional Background, Data Sources, and Empirical Methodology

3.1. Institutional Background

After the inception of Chinese stock exchanges in the early 1990s, Chinese firms selected by the government were given quotas of equity that they were permitted to float on the exchanges. To limit the total float and stabilize stock prices, the government imposed a size quota system and mandated that large firms carve out

subsidiaries of an appropriate size and list those subsidiaries. The selection of the parent firms and the carving out of the listed subsidiary, as well as the proportion to be floated, were determined by careful political deliberations aimed at balancing regions and industries and inducing regional competition. The firms themselves did not have a major influence on the decision (Pistor and Xu, 2005). The quota system was scrapped in 2001and since then securities firms have been allowed to nominate enterprises for public listing, subject to screening by an independent listing committee of the Chinese Securities Regulatory Commission. Most of the companies in our sample (96%) went public prior to 2001.

Under the quota system, and till the end of our sample period, parent firms of the listed subsidiaries were typically not allowed to sell their stakes in those listed subsidiaries on the public market, again out of concern that floating too much equity could flood China's fledgling stock market and dampen stock prices. By 2004, roughly two-thirds of the equity of publicly listed Chinese companies was in the form of "non-tradable" shares held by the parent firm, and in some cases held directly by the State. At the start of our sample period in 2000, we observe a number of firm pairs consisting of a publicly listed subsidiary and a non-listed controlling parent firm. This is one of the simplest pyramid structures whereby control is one-directional, with non-listed parents controlling listed subsidiaries. The controlling parent companies (hereafter, parents) typically retain a controlling stake in the listed subsidiaries (hereafter, subs), and the remainder of their shares are distributed among outside equity investors. In our sample, the mean (median) percentage ownership of the listed subsidiary by the parent firm is 52.00% (54.43%). This structure resembles that found in business groups elsewhere in the world, that is, legally independent entities with overlapping ownership and close financial and operational relationships.

As an emerging market economy, China lacks a smooth, well-functioning external financial market. The tradable public equity market in early 2004 was equivalent to only 17% of China's total GDP, compared to over 100% in the U.S. and the UK (McKinsey, 2006). The public corporate debt market in China in 2004 was virtually non-existent and the state-owned banking system was quite rigid in its lending practices, resulting in many firms with good investment projects being starved of cash (Allen, Qian, and Qian, 2005; Ayyagari, Demurguc-Kunt, and Maksimovic, 2008;

Cull and Xu, 2000, 2003; Maskin and Xu, 2001). Unlike practice in many developed markets, private equity and venture capital (PEVC) investor operations in China were in a legal grey area and were not well protected. The scale of such operations was typically quite small during our sample period, rendering them less relevant for the funding of large-scale investment projects. As a consequence, Chinese firms often operated in rigid financial environments and external financing was frequently prohibitively costly or outright unavailable. At the same time, since IPOs are heavily rationed in China, publicly listed firms are viewed as a precious resource and command great prestige. This means that they are also more likely to be able to rely on a "halo effect" and obtain other financing such as bank loans and trade credits (see Allen, Qian, and Qian, 2005; McKinsey, 2006). In theory listed firms can also conduct seasoned equity offerings to raise new equity finance, whereas non-listed parent companies face more severe financing constraints. Meanwhile, the expropriation of minority shareholders is a major concern in China, given the weak protection of investor rights (Jiang et al, 2010).

The weak financial and legal environments give parent firms at least two potential motivations to rely on intra-group capital flows from listed subs: to expropriate the minority shareholders of the sub and to mitigate the financing constraints. It is the interaction between the two rationales that yields the potential interesting characteristic of intra-group capital flows within Chinese firm pairs. In addition, since parents have control over listed subs and not vice versa and financing constraints are also more severe for parents, we might expect to observe more cash flowing from listed subs to parents.[11]

3.2. Data Sources

Our sample consists of 604 pair-year observations. Each pair consists of a listed firm and its non-listed parent. The study period is 1999 to 2005. We have income statement and balance sheet data for both the parents and the listed subs, enabling us to directly test the direction of internal capital flows by running regressions on both

[11] This asymmetry is an important characteristic that differentiates the intra-financing of a business group from that of a typical conglomerate and helps to differentiate intra-group capital flows and other mechanisms in terms of why shocks to cash flows might propagate through a business group, such as cross-subsidization and risk sharing among member firms. See also footnote 2 in Bertrand et al (2002).

the non-listed parent firms and their listed subsidiaries. Data on the trade credits hand-collected from the annual reports of the listed subs are used to adjust cash flows and to construct the invest-cash flow model. To further test our hypothesis regarding internal capital flows, we also hand-collected data on the cash-flow rights of the parents in the list subs and bank ownership, which will be used as one proxy for the extent of financial constraints.

Data other than the above hand-collected data come from two main sources: the annual reports of the listed firms, which are publicly available from the Chinese Securities Regulatory Commission Web site, and the National Bureau of Statistics (NBS) Annual Industrial Survey Database. The NBS database is our source of information on the non-listed parent firms. The database covers all industrial firms with total annual sales of more than RMB5 million (about US$600,000 using the exchange rate on December 31, 2005).[12] The database is representative of the national economy, used by the Chinese government for reporting statistics in its official *China Statistical Yearbook*, and has been increasingly used in academic research (Chow, 1993; Cheung and Hsu, 2004; Fan, Huang, and Zhu, 2008; Li, Yue, and Zhao, 2009; Liu and Siu, forthcoming).

We begin with the universe of firms covered by the aforementioned sources. To ensure that we are not including "shell" or holding companies that have no real operations at the parent company level, we include only observations in which the parent is an industrial firm as surveyed by the NBS. We further remove instances for which we have missing data or for which the parent firm of the list sub cannot be identified in the NBS Database.[13] Then, to ensure that the parent firms have at least a relative controlling position in the associated listed firms, we drop observations in

[12] Beginning in 1993, all industrial firms in China, regardless of ownership type and size, have been required to report their financial statements according to the same "Accounting Standards for Enterprises." As almost our entire sample is composed of industrial firms, the financial and operating information of the listed firms and the parent firms are thus consistent. Note that the NBS data is non-consolidated, and therefore the financial data reported for an entity does not incorporate the numbers for its legally separate affiliates.

[13] This may occur, for example, when organizational changes (e.g., restructuring, mergers, or acquisitions) result in a firm legally changing its name and identification code such that the name and business of the parent firm recorded in a listed firm's annual report might not be precisely the same as that recorded in the NBS Database. Data entry errors made during the NBS survey and data collection process may also account for some mismatches.

which the parent company's stake in a listed subsidiary is 20 percent or less.[14] This yields a sample of 1,496 firm pair-year observations. Based on this sample, we drop the sample pairs when listed subs and parents are in the same 3-digit industry code, which leads to a 786 pair-year sample loss. We focus only on different-industry pairs in order to avoid concerns that Own Cash Flow and Other Cash Flow in both the listed subs' and parents' regressions are correlated, and to avoid concern about the noise in calculating the relative Q (for example, we would have to use the industry average Q for the parent and the firm Q for the listed sub to calculate the relative Q when the listed subs and parents are in the same industry)[15]. Finally, we further exclude 106 firm pairs with a negative cash flow to focus on intra-group capital flows, resulting in a final sample of 504 firm-year observations[16].

3.3. Empirical Methodology

In our main analysis, we measure the capital flows within the business group by the method used in the literature for internal capital markets of conglomerates. In that literature, unobservable capital flows from one division to another are measured by the sensitivity of the investment of one firm to the available cash flow of another firm in the group (Lamont 1997; Shin and Stulz, 1998; Rajan, Servaes, and Zingales, 2000; among others).[17] We also adopt the standard approach to measure the efficiency of

[14] Although not all of the parent firms have an absolute majority stake in the associated listed firms, our descriptive statistics (not reported) show the cash flow rights of the parent firms to be about six times larger by mean, or ten times larger by median, than the sum of the cash flow rights of the second and third largest block holders. The non-listed parents in our sample are thus dominant shareholders because the other large shareholders are not sufficiently large to have a comparable impact on the listed firms.

[15] We conducted robustness checks based on the enlarged sample where we did not drop these observations. The results are qualitatively unchanged.

[16] When the listed sub firms have negative adjusted cash flows, our regression can be interpreted differently. It implicitly assumes that when a listed sub experiences a negative cash flow, the parent correspondingly invests less. In other words, capital may flow in the reverse direction, from the parent to the listed sub, to support the sub that might be in financial trouble. The literature documents ample evidence to show that even a controlling shareholder or a corporate insider of a listed firm may occasionally prop up a firm, if this would preserve future opportunities for more expropriation (Friedman, Johnson, and Mitton, 2003; Jin and Myers, 2006). However, there is no reason to believe that the extent of the prop up is the same as the extent of the intra-group capital flow, so as to generate the same slope coefficient β_2 in the regressions. To avoid the potential asymmetry in the regression coefficients for the positive and negative cash flows and to allow us to focus on the intra-group capital flow "tunneling" aspect of intra-group financing, we exclude the small sub-sample of listed subs with a negative cash flow. The inclusion of the negative cash flow observations will not qualitatively change our main results.

[17] We also considered the alternative measure of Billet and Mauer (2003) to capture internal capital market activities within conglomerates, but decided that this would not work as well in our context.

investment of internal capital by the sensitivity of investments to a measured investment opportunity (Shin and Stulz, 1998, Rajan, Servaes, and Zingales, 2000, Gertner, Powers, and Scharfstein, 2002). In subsequent robustness checks, we additionally define two other measures of the intra-group capital flows by hand-collected data on important components of such capital transfers.

3.3.1. Measurement of Cash Flows

To deal with the context of the business group, we also need to refine the methodology used in the existing literature on conglomerates by amending the cash flow measurement and the measure of the relative investment opportunity between the parent and the subsidiary, realizing that, unlike most of the divisions of conglomerates, business group members are legally independent identities and thus capable of raising external financing on their own.

In the literature, the sensitivity of investment to cash flows (typically measured as earnings before interest and tax, or EBIT, plus depreciation and amortization) is used to test for internal capital markets among the divisions of a conglomerate (Kaplan and Zingales, 1997). Other researchers have employed similar definitions. For example, Shin and Stulz (1998) define cash flows as operating profit plus depreciation, and Hoshi, Kashyap, and Scharfstein (1991) define cash flows as income after tax plus depreciation minus dividends. In the context of business groups, one typical feature is that the member firms of the business groups are operationally inter-connected. A large fraction of the EBIT of the firms may take the form of trade credits between the parents and listed subs (i.e., accounts receivable and payable), as a result of the large amount of related-party transactions arising naturally due to the operational inter-dependency of the firms. For example, a parent might carve out its manufacturing assets to create a listed sub but retain raw material production assets. In this case, neither the parent nor the listed sub can be operationally independent

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Although it possesses many nice properties, this measure relies on a comparison of capital expenditures of segments to the segments' own after-tax cash flows. It is therefore a measure of the "surplus" or the "shortfall" of the segments' own internally generated cash flow. What is more complicated for the business group (compared to the conglomerate) is that member firms are legally independent firms that can raise their own financing, so the "internal cash flow shortfall/surplus" does not necessarily equal the transfer between group members.

from the other, and related-party transactions between the two will naturally arise, even if there is no intentional transfer of financial resources between the parties.

The changes in trade credits – accounts receivable and accounts payable – create an additional layer of complication for the measurement of the "cash flow" used in a cash flow-investment sensitivity regression. There are two possibilities: one, these changes in trade credits could naturally arise due to normal transactions and there are no secret fund transfers embedded in the trade credits; two, they could be implicit loans from one firm to the other (for example, from the listed sub to the parent). The two scenarios justify different treatment of the cash flow measures used in the calculation of the intra-group capital flows. If trade credits naturally arise as a result of normal transactions, then, intuitively, they should not be included in the "cash available for intra-group capital flows." As a numerical example, if a listed sub has a total EBIT of $100, and due to increased business activities its total outstanding trade credits (accounts receivable minus accounts payable) have to increase by $30 during this period, then the cash flow that is available for the investment of the listed sub itself or for the intra-group capital flows by the parent firm is only $70 (=$100-$30). In this setting, for the purpose of measuring the "sensitivity of investment in the parent to available cash flows in the sub," it will be more appropriate to measure the cash flows of the sub by EBIT minus the (non-discretionary) increase in extended trade credits. However, if the trade credit is largely an implicit hidden loan, then in the numerical example above, the $30 increase in the trade credit should be viewed as a part of the intra-group capital flows, and the total amount of cash at the listed sub available for intra-group capital flows by the parent should be the full amount of $100. Which one more closely resembles the reality is an empirical question. In the empirical works below, we will explore both measures. If the cash flow (hereafter CF) measure adjusted for changes in trade credit underestimates intra-group capital flows relative to the traditional CF measure, we should find investment to be less sensitive to the adjusted CF measure than to the traditional CF measure. As it turns out, we find stronger sensitivity between the investment of the parent and the adjusted cash flow of the listed sub, suggesting that the adjusted cash flow measure does not underestimate intra-group capital flows because substantial trade credit-generating activities appear to be normal business transactions. It appears that intra-group capital flows in China take less obvious forms than through the extension of trade credits. Examples of

forms of intra-group capital flows might include things such as equity co-investments, purchases or sales of assets, direct loans, debt guarantees, unreported cryptic transactions, and so forth.

A different but related issue is the treatment of the related-party transactions and the possibility of transfer pricing. Theoretically, intra-group capital flows can take the form of related-party transactions between the parent and the listed sub if these transactions occur at unfair prices. Unfortunately, the related-party transaction data that we have, similar to those used in all previous research, do not contain the transaction prices. Therefore, in this case we are not able to find direct evidence of intra-group capital flows.

The traditional measure of cash flows used in most existing studies also neglects the effect of income tax. This is less significant in studies of the business segments of conglomerates, as income tax typically is not levied at the segment level. However, as listed subsidiaries and their non-listed parent firms are separate legal entities, a further adjustment on tax must be made to the cash flow measurement. Therefore, our refined definition of cash flows is EBIT plus depreciation, minus change in trade credit, minus income tax.

Another difference between segments in a conglomerate and subsidiary firms in a business group is the ability of the subsidiary firms to secure external financing through additional debt and equity financing. Because the segments of the conglomerate usually cannot obtain financing independently (other than through project financing), cash flows from financing are typically not considered in the literature on internal capital markets within conglomerates. Funds secured by listed subs through external financing do, however, affect the cash flow available for intra-group capital transfers, thus necessitating a further adjustment to the traditional cash flow measure in this context.

We propose four cash flow measures in our tests of internal capital market activity. We first measure cash flows in the traditional way, as EBIT plus depreciation. We also introduce three refinements: **Measure 1** is the traditional cash flow measure adjusted for changes in trade credits, that is, EBIT + depreciation - net change in trade

credits (increase in accounts receivables minus increase in payables). **Measure 2** is the after-tax version of **Measure 1**. **Measure 3** further includes external financing, that is, EBIT + depreciation - net change in trade credits - income tax + the net increase in bank debt and equity.

3.3.2. Measurement of Relative Investment Opportunity

The literature measures investment opportunity by using Tobin's Q. Following the same intuition as in the existing literature, such as Shin and Stulz (1998), Rajan, Servaes, and Zingales (2000), Gertner, Powers, and Scharfstein (2002) and Ozbas and Scharfstein (2010), if the internal market is efficient, we will observe firm investment positively affected by the cash flow level of the firm when the firm's investment opportunity is good (high Q), and vice versa.

Because we focus on the efficiency of capital flows from the perspective of the entire business group rather than the perspective of individual member firms, we focus on the relative Q, defined as the difference between the Q of the parent (which is receiving capital) and the Q of the listed sub (which is providing capital). In interpreting the regression results, we focus on the interaction term of the relative Q and other firm cash flows. Intuitively, if more capital flows from the listed sub to the parent when the parent's investment opportunity is better than that of the listed sub (denoted by a positive relative Q), it is an indication of the efficient use of internally generated funds. Conversely, more capital flowing from the listed sub to the parent when the parent's investment opportunity is worse is an indication of the inefficient use of internal capital. To implement this approach with our data, the relative Q is defined as the parent's industry average Q minus the listed sub's industry Q, where the industry average Q is the mean Tobin's Q of all of the listed firms in that three-digit SIC industry category at the beginning of the year. We use the industry average Q rather than the individual firm Q for two reasons. First, the individual Q is not available for the non-listed parents, and, second, the industry average Q avoids measurement errors that might be specific to a particular firm.[18]

[18] In unreported robustness checks, we find that replacing the listed sub industry average Q with its own Q does not qualitatively change any of our results.

3.3.3. Measuring Corporate Governance and Financing Constraints

In our main empirical analysis, we use the ownership stake of the parent in the listed sub as an indication of the severity of corporate governance problems. As argued by Jensen and Meckling (1976) and Shleifer and Vishny (1997), ownership is fundamental to – and cash flow rights theoretically are at the core of – corporate governance. Ownership is also empirically strongly related to the incentives of large shareholders to tunnel the listed firms that they control (Bertrand, Mehta, and Mullainathan, 2002; Claessens, Djankov, Fan, and Lang, 2002), especially when legal protection for outside investors is weak (La Porta, Lopez-de-Silanes, Shleifer, and Vishy, 1997, 1998; La Porta, Lopez-de-Silanes, and Shleifer, 1999). We therefore use the cash flow rights of the parents as our measure of corporate governance and conflicts of interest.

In robustness checks, we replace our main measure of corporate governance with a time dummy, arguing that in the later years of our sample period the incentives for expropriation of minority shareholders were weakened due to regulatory changes. In response to the large number of expropriation cases reported in Chinese capital markets, in 2003 Chinese regulators developed a series of capital market regulations. Two of the regulations against insider expropriation have been widely discussed by Chinese media and market participants. The first was issued on August 28, 2003, regulating various types of fund transfers and debt guarantees between large shareholders and listed firms. The second, issued on December 4, 2004,[19] deals with mechanisms that protect minority shareholders, including giving more power to independent outside directors and demanding more compelling information disclosures. Assuming that to some extent these regulations have taken effect, we might expect to observe changes in intra-group financing activities aimed at expropriation of minority investors.

In our main empirical analysis, we use bank ownership by the firm pair as an indicator of easier access to financing. Bank ownership has been argued to be important to

[19] The draft for open comments on this document was issued at the beginning of 2004. Details of the regulations can be found at http://www.csrc.gov.cn/n575458/n4239016/n6634558/n9768098/n9768450/index_1.html.

firms for raising external finance. For example, Hoshi, Kashyap, and Scharfstein (1991) examine two sets of Japanese firms, one with close financial ties to large Japanese banks that serve as the primary source of external financing and one without such ties. They find investment to be more sensitive to liquidity for the latter set of firms, demonstrating that bank ownership is an important mechanism to mitigate financing constraints. In China, firms with ownership ties to local banks tend to have better access to bank loans (Lin, Zhang and Zhu, 2009; Firth, Lin, Liu, and Wong, 2009, Luo, Zhang, and Zhu, 2011). Bank ownership by industrial firms typically is a government decision rather than being determined by firm managers, and thus it is less subject to the endogeneity concerns of other settings. We hypothesize that parent-sub pairs that own shares in a local bank (about one-fourth of our total sample) will have easier access to bank credit. However, firm pairs with no bank ownership will have more severe financial constraints and thus will rely more on intra-group financing as a mitigating mechanism. In robustness checks, we use firm size as an alternative proxy for financing constraints (Almeida and Campello, 2007; Erickson and Whited, 2000, among others). In these tests, a small size is an indicator of more financing constraints.

3.3.4. Baseline Regression Model

We estimate the following model for both the listed sub and the parent samples.

$$CapitalExpenditure = \alpha_0 + \beta_1 OwnCashFlow + \beta_2 OtherCashFlow + \beta_3 \mathrm{Re}lativeQ + \beta_4 OtherCashFlow * \mathrm{Re}lativeQ + \gamma YearDummies + \varepsilon .$$

Capital Expenditure is measured as fixed asset investment. In the listed sub regressions, Own Cash Flow is the cash flow of the listed sub and Other Cash Flow is the cash flow of the parent. Conversely, in the parent regressions, Own Cash Flow is the cash flow of the parent and Other Cash Flow is the cash flow of the listed sub. All of these variables are normalized by the total assets of the listed sub (or parent) at the beginning of the fiscal year. Year dummy variables and firm fixed effects are included in the regression.

If internal capital markets exist, then controlling for everything else including Own Cash Flow, a firm's capital expenditure should be sensitive to the cash flows of the other affiliated firm, which means that β_2 should be significantly positive. The higher the value of β_2, the more sensitive one company's capital expenditure is to the other's cash flows, that is, the greater the magnitude of the internal capital market. Following the literature, we use β_4 to measure the investment efficiency of internal capital market activities. A significantly negative β_4 means that a firm tends to invest more using the other firm's cash flows when its relative investment opportunity (as measured by the difference in the Q) is worse, thus reflecting an inefficient use of the internal capital market. A significantly positive β_4 means that a firm tends to invest more of the other firm's cash flows when its relative investment opportunity is better, thus reflecting an efficient use of the internally generated capital.

4. Empirical Results

4.1. Summary Statistics

Table 1 reports the summary statistics of the main variables. The average (median) capital expenditure adjusted by total assets at the beginning of the period is 11.91% (7.61%) for the listed subs and 8.64% (4.05%) for the parents, representing a 3.27% (3.56%) difference in the fixed asset investment level. The net change in trade credits normalized by total assets at the beginning of the period is -3.92% (-3.62%) for the listed subs and 2.84% (1.97%) for the parents, which means that, on average, the listed subs tend to be net trade credit providers. For the listed subs, the average (median) cash flow under the traditional measure (EBIT + Depreciation), the adjusted cash flow measure 1, measure 2, and measure 3 is 10.16% (9.66%) , 6.24% (6.64%), 4.55% (4.74%), and 8.49% (8.47%), respectively. For parents,[20] the average (median) cash flow under the traditional measure (EBIT + Depreciation) and the adjusted cash flow measure 1 is 6.99% (5.95%) and 9.83% (7.89%), respectively. As expected, the trade credit adjustments significantly affect the cash flow levels of both the listed subs and the parents, but in different directions.

[20] We have no data to calculate the adjusted cash flow measure 2 and measure 3 for the parent firms, but this is not that important since we are mainly focusing on how parent investment relies on the cash flow from the listed sub, which has the three adjusted measures.

Table 1 also reports the industry Q, relative Q, and industry growth for the listed sub and the parent samples. For the listed subs, the average (median) industry Q and the industry growth is 1.64 (1.69) and 11.50% (9.25%) respectively. For the parents, the average (median) industry Q and the industry growth is 1.56 (1.54) and 10.70% (8.69%) respectively. The relative Q of the parent sample is -0.08 (-0.10) at the mean (median) level, insignificantly different from zero.[21] Parents control an average (median) of 52.00% (54.43%) of the shares of the listed subs, and 24.47% of the listed subs have an ownership stake in local banks. The average (median) size of the listed subs and the parents is 229,261 (143,129) and 542,179 (235,155) thousand yuan, respectively.

Insert Table 1 here

4.2. Empirical Tests

4.2.1. On the Existence of Intra-Group Financing

We test our first hypothesis:

H1: There will be an asymmetry in the flow of internal capital within the group. In particular, more funds will flow from the listed subsidiary to the parent than the other way around, both because the parent company is more likely to be financially constrained, and because of the potential motivation to expropriate the outside shareholders of the listed subsidiary.

We first report the results using both the traditional cash flow measure and the three adjusted cash flow measures in the listed sub regression (Table 2, Panel A) and the parent regression (Table 2, Panel B), respectively.

Panel A in Table 2 presents the results for the listed sub regression. Only Own Cash Flow is significantly positively related to the listed sub capital expenditure and Other

[21] The dispersion of the relative Q is large: the value of the relative Q at the 25% and the 75% percentiles is -0.4448 and 0.3839, respectively.

Cash Flow under the traditional and adjusted measure 1 are both insignificant, which means that the listed subs do not seem to rely on the cash flow from their parents to finance their capital expenditures. We also find that the relative Q is significantly positive to capital expenditures but the interaction between the relative Q and Other Cash Flow is not significant.

In contrast, Panel B in Table 2 shows quite different results. For the parents, no matter what cash flow measures are used, capital expenditures are significantly related to both Own Cash Flow and Other Cash Flow. Combined with Panel A, the results demonstrate the existence and asymmetric nature of the intra-group financing activities parents and listed subs, with parent investments relying on the cash flows of the listed subs but not vice versa. Consistent with H1, we find stronger effects of the intra-group financing activities in the regression explaining parent investment activities. This is consistent with the hypothesis that financing constraints are greater for parents (because they are non-listed), but it could also be consistent with the hypothesis that parents have a greater incentive to expropriate from the minority shareholders of listed subs. The economic significance is large: as the cash flows of the listed sub increases by 10%, the parent investment increases by 0.94% for the Traditional Cash Flow Measure, 2.24% for the Adjusted Cash Flow Measure 1, 2.01% for the Adjusted Cash Flow Measure 2, and 1.39% for the Adjusted Cash Flow Measure 3, respectively.[22] We also see that the coefficients of the interaction between Other Cash Flow and relative Q are positive in the regressions with the three adjusted CF measures. Theoretically, there is no ex ante prediction of the sign of this coefficient. In general, the efficiency of the use of intra-group financing may be either positive or negative depending on whether the intra-group capital flow is used productively (to mitigate financing constraints) or unproductively (to expropriate minority shareholders).

By comparing the coefficients of Other Cash Flow under the different measures in Table 2, we see that, compared to that under the three adjusted cash flow measures,

[22]Given that the average magnitude of the parent investment is 46.844 million yuan, as the cash flow (measured alternately by the Traditional CF, Adjusted CF1, CF2, and CF3) of the listed sub increases by 10 percent (5.51, 3.38, 2.47, and 4.60 million yuan) , the parent investment increases by 0.47, 1.19,1.09, and 0.60 million yuan respectively.

Other Cash Flow under the traditional measure is smaller in terms of coefficient and less significant, which highlights that the traditional measure is noisy, probably because many related-party transactions are normal transactions. Our unreported results show that this problem is even more severe if the firm pairs are in the same industry where indeed many of the related-party transactions might occur naturally, and thus potentially are mis-classified by the traditional measure.

Our discussion below focuses on results using the Adjusted Cash Flow Measure 1. The other three cash flow measures yield qualitatively similar results. Also, because we focus on the effects of the cash flows out of the listed sub and into the parent, the following analysis focuses on the empirical results of the parent regressions with its Own Cash Flow and the cash flows of the sub.

Insert Table 2 here

4.2.2. On the Role of Corporate Governance and Conflicts of Interest

We conjecture that the incentive to expropriate will be weaker for controlling parents with a higher percentage of ownership of their listed subs because the interests of the shareholders of the parents and the listed subs will be more closely aligned. Everything else being equal, we expect to observe stronger intra-group financing activity due to expropriation when the percentage ownership of the parents in their listed subs is lower. Because the main purpose of intra-group capital flows in this case is to expropriate minority shareholders, there is less consideration of the efficiency of the activity and the parents may attempt to steal as much as possible (see Section 2 and the Appendix). Formally, we develop hypothesis H2A:

H2A: We will observe more fund flows from the listed subsidiary to the parent when the cash flow rights of the controlling parent in the listed subsidiary are low.

Table 3 presents the results. We define **"*Low Cash Flow Right*"** as an indicator of conflicts of interest, which equals to ***1*** when the cash flow rights are below the median for the total sample in the year and ***0*** otherwise. We focus on the interaction of Low Cash Flow Right with the magnitude and efficiency of intra-group financing activities respectively. As can be seen in column (1) of Table 3, the coefficient of the interaction term "**Low Cash Flow Right* Other Cash Flow**" is positive and significant at the 1% level, which means that the investments of parents with lower cash flow rights in their listed subs are more dependent on the cash flows of the listed subs. In column (2), the negative and significant coefficient of the interaction term "**Low Cash Flow Right* Other Cash Flow* Relative Q**" further demonstrates the lower investment efficiency for parents with lower cash flow rights. The asymmetry of the existence and efficiency of intra-group financing between firms with different cash flow rights in emerging markets is consistent with the expropriation hypothesis. In contrast, unreported results on the investments of the listed subs from the parent cash flow show no significant difference in investment-cash flow sensitivity between the high cash flow rights and low cash flow rights samples.

Insert Table 3 here

4.2.3. On the Role of Mitigating Severe Financing Constraints

We hypothesize that parent-sub pairs that own shares in a local bank (about one-fourth of our total sample) will have a good relationship with the bank and thus will have easier access to bank credit. In contrast, firm pairs with no bank ownership will have more severe financial constraints, and thus will rely more on intra-group financing as a mitigating mechanism. Thus, we expect to see more intra-group financing activity in the pairs with no bank ownership, controlling for everything else. We also expect the intra-group fund flows so occasioned to be generally value-enhancing, as the need to mitigate financing constraints are greater when investment opportunities are greater for the parent than for the listed sub. Formally, we develop the following hypothesis:

H2B: We will observe more fund flows from the listed subsidiary to the parent when the financial constraints for the controlling parent are high.

Table 3 reports the results. We define ***"No Bank Ownership"*** as an indicator of more severe financing constraints, which equals to ***1*** when the firm pair does not own shares in a local bank and ***0*** otherwise. Again, we focus on the interaction of **No Bank Ownership** and the magnitude and efficiency of intra-group financing activities respectively. As can be seen in column (3) of Table 3, the coefficient of "**No Bank Ownership * Other Cash Flow**" is positive and significant at the 1% level, showing that the investments of parents with no bank ownership are more dependent on the cash flows of their listed subs. It is also clear that investment efficiency is greater for these parents, as the interaction term of "**No Bank Ownership * Other Cash Flow* Relative Q**" is significantly positive in column (4). In contrast, in unreported tests on the listed subs in which we run the same regressions in the same way, we find no significant pattern. Overall, the empirical results are consistent with the hypothesis that intra-group cash flows from listed subs to parents are stronger when the parents face more severe financing constraints and the efficiency of such cash flows is higher than when the parents that do not face severe financing constraints.

4.2.4. The Interaction of Corporate Governance and Financing Constraints

We next examine the joint effects of corporate governance/conflicts of interest and financing constraints on the existence and efficiency of intra-group financing. As motivated by our model, we consider four types of interactions of corporate governance and financing constraints: "strong governance and financially constrained," "strong governance and not financially constrained," "weak governance and financially constrained," and "weak governance and not financially constrained." If both incentives (to expropriate minority shareholders and to mitigate financing constraints) are important, then we would expect to see both leading to more intra-group financing activities but with an offsetting effect on the efficiency of such activities. Specifically, we would expect the efficiency of intra-group financing activity to be the highest when the parent ownership of the listed subs is high but there is no bank ownership, because the most likely reason for internal capital market activity in this context is to mitigate the financing constraints. In contrast, we would expect the efficiency of internal markets to be the lowest for the sub-sample in which

parent ownership of the listed subs is low and there is bank ownership, because the most likely reason for intra-group financing activity in this context is the expropriation of the minority shareholders of the listed subs. Formally, we have:

H3: When we group the observations into four categories, by both the cash flow rights of the controlling parent in the listed firm and by the financial constraints of the parent firm, we should expect to see the highest magnitude of internal capital flows from the listed subsidiary to the parent firm when the parent's cash flow rights in the listed firm are low (indicating stronger incentives to expropriate) and the parent financial constraints are high (indicating a stronger motivation to mitigate the financing constraints), and we should expect to see the lowest magnitude of internal capital flows from the subsidiary to the parent when the parent cash flow rights in the subsidiary are high and the parent is less financially constrained. The magnitudes for the remaining two cases should fall between the above two cases.

And

H4: When we group the observations into four categories, by both the cash flow rights of the controlling parent in the listed firm and by the financial constraints of the parent firm, we should expect to see the highest efficiency of the internal capital flows from the listed subsidiary to the parent firm when the parent cash flow rights in the subsidiary are high and the parent financial constraints are high (indicating that mitigating the financing constraints is more likely to be the reason for the internal capital flows), and we should expect to see the lowest efficiency of the internal capital flows from the subsidiary to the parent when the parent cash flow rights in the subsidiary are low and the parent is less financially constrained (indicating that expropriating the listed subsidiary shareholders is likely the reason for the internal capital flows).

We define 4 dummy variables based on the interactions of cash flow rights and bank ownership: *D1* equals to 1 when a parent's cash flow rights of a listed sub is above the sample median level and the firm pair owns shares of a local bank, and 0 otherwise; *D2* equals to 1 when cash flow rights are above the median and the firm pair does not

own shares of local banks, and 0 otherwise; *D3* equals to 1 when cash flow rights are below the median and the firm pair owns shares of local banks, and 0 otherwise; *D4* equals to 1 when the cash flow rights are below the median and the firm pair does not own shares of local banks, and 0 otherwise. We treat D1 as the benchmark and include the three other variables into the model.

Table 4 reports the regression results of the interaction effects of corporate governance and financing constraints. In column (1), the coefficient of "**D2* Other Cash Flow**", "**D3* Other Cash Flow**" and "**D4* Other Cash Flow**" are all significantly positive, consistent with our hypothesis. The positive coefficient of "**D2* Other Cash Flow**" shows the incremental effect of bank ownership when controlling for good governance, and "**D3* Other Cash Flow**" shows the incremental effect of cash flow rights when controlling for strong bank relationship. Furthermore, the largest coefficient (almost 2 times larger than the other interaction terms) of "**D4* Other Cash Flow**" shows that when significant conflicts of interest (low cash flow rights) are accompanied by greater financing constraints, the magnitude of intra-group financing is the largest.

In column (2), the coefficient of the three-way interaction term "**D2* Other Cash Flow* Relative Q**" is significantly positive, whereas "**D3* Other Cash Flow* Relative Q**" is significantly negative and "**D4* Other Cash Flow* Relative Q**" is positive but insignificant. This result is consistent with H4 that is compared with the benchmark of "strong governance with less financing constraints." "Strong governance with more financing constraints" leads to higher investment efficiency of the internally generated capital, whereas "weak governance with less financing constraints" leads to lower investment efficiency. However, there is no significant difference between the two scenarios "strong governance with less financing constraints" and "weak governance with more financing constraints," suggesting the offsetting effect of governance and financing constraints on the overall efficiency of such transfers.

To summarize, our basic results regarding the existence and efficiency of intra-group financing are robust to simultaneously controlling for the effects of both expropriation and the mitigation of financing constraints.

Insert Table 4 here

5. Robustness Checks

In this section we provide a variety of robustness checks on the measures of intra-group cash flows and on the measures of a variety of other important variables. The results of a variety of robustness tests are reported in Tables 5-11. Our key results persist throughout these additional tests. Note that because the several cash flow measures yield similar results, we only report the results using Adjusted Cash Flow Measure 1 as the several cash flow measures yield similar results.

5.1. Robustness Checks Using Alternative Measures of Intra-group Cash Flows

Realizing that the conventional measure of investment-cash flow sensitivity still comes as an *estimate* of the true capital flows, and may be related to various other reasons that do not have much to do with the intra-group cash flows, we also corroborate the evidence by a conducting a number of additional robustness checks of our main results. For such analysis, we rely on two different measures of the components of such capital flows: the first one, **ORECTA**, pioneered by Jiang et al (2010), is the measure of other receivables, deflated by total assets; the second, **ORECTA_Parent**, is from our own hand-collected data on the other receivables provided by the listed subsidiary to its parent firm, deflated by total assets. As discussed extensively by Jiang et al. (2010), the "other receivables" accounting item mostly includes financial transactions, such as loans to affiliated firms, therefore it captures pure financial capital flows.[23] Furthermore, the correlation between **ORECTA** and **ORECTA_Parent** is 0.6967, which is consistent with the argument of Jiang et al. (2010) that most of the other receivables are closely related to the controlling shareholder.

[23] We are fully aware that not all inter-corporate loans are ill-purposed. In fact, some might be due to legitimate reasons such as normal business interactions between business group members. If that is the case, these measures will overstate the true magnitude of the "abnormal" intra-group capital flows. The fact that we still find, despite the noise in the measure, that these activities are highly related to our proxies for conflicts of interest and financial constraints could be interpreted to mean that the true relationship might be even stronger.

Needless to say, these two measures are still not perfect, as they do not account for the full scope of capital transfers among group members. Capital transfers from one group member to another may take many other forms, in addition to inter-corporate loans. Nonetheless, due to data limitations, we have not found any related works to exhaustively account for all types of capital transfers across firms. Also, although neither of the two kinds of measures (the estimation of capital transfers through investment-cash flow sensitivity, and the direct observation of the component of such transfers) is perfect, the robustness of our empirical results across these different measures gives us some confidence about the validity of our empirical conclusions.

Our robustness checks on the measures of intra-group capital flows are done in a fashion parallel to the main results presented earlier. First, we report the descriptive statistics of **ORECTA** and **ORECTA_Parent**: Table 5 shows that the mean (median) of **ORECTA** and **ORECTA_Parent** are 4.89% (1.93%) and 2.32% (0.91%) respectively of the total assets,[24] suggesting **ORECTA** to be significant sources of cash flows inside a business group. Next, we regress **ORECTA** and **ORECTA_Parent** separately on cash flow rights, bank ownership, relative Q, and some control variables as shown in Jiang et al. (2010), such as ROA, size, state control dummy, market capitalization, and layer as reported in Tables 6-7. The results here confirm what we have observed earlier. For example, Table 6 considers separately the effect of cash flow rights and bank ownership on the determinants of **ORECTA** and Table 7 tests their interaction effects. From Table 6 we see that after controlling for all the factors in Jiang et al. (2010),[25] the coefficient of "***Low Cash Flow Right***" is significantly positive whereas the coefficient of "***Low Cash Flow Right* Relative Q***" is significantly negative. The results seem stronger when **ORECTA_Parent** is the dependent variable. These results are consistent with our

[24] In Jiang et al., on average the ORECTA is 8.1% of total assets, which is larger than our number, due to differences in size and time periods in the two papers.

[25] When comparing Table 6-7 in this paper with **Table 6** in Jiang et al. (2010), we find that most the control variables have the same directions and level of significance.

hypothesis that, when the conflict of interest is large, more intra-group capital flows in terms of other receivables are provided to the parent firm and, at the same time, this kind of capital flow seems to be less related to investment opportunities. Similar results on "***No Bank Ownership***" and "***No Bank Ownership* Relative Q***" are also reported in Table 6. Table 7 looks further at the interaction effect of corporate governance and financing constraints and, once again, we see that when the conflicts of interest and financing constraints are both serious, the amount of capital transferred to the parent firm is the greatest, and the efficiency of using the capital flows is worst in the firm pairs with worse conflicts of interest and small financial constraints.

5.2. Absolute Instead of Relative Investment Opportunity

Similar results are obtained using the absolute industry Q rather than the relative Q of the parent firm (Table 8), or the industry average growth of the parent (Table 9), to proxy for the investment opportunity of the parent. The absolute industry average Q of the parent provides the absolute measure of the investment opportunity of the parent, whereas the industry growth measure is the mean of the lagged sales growth of all firms in the parent's industry, calculated from the NBS Annual Industrial Survey Database. Whereas the former (industry average Q) measure is more consistent with the original measure of investment opportunity proposed in the finance literature, the latter (industry growth measure) is more exogenous and potentially more robust to noise in the observations, as it is calculated from the previous year's sales growth data drawn from a large sample of non-listed firms (approximately 200,000 observations per year, in contrast to about 1,400 publicly listed firms in China) and is applied to our relatively small sample. The results in Tables 8 and 9 are quite similar to those reported in the previous tables. For example, the coefficient of "**D3*Other Cash Flow*Industry Q**" and "**D3*Other Cash Flow*Industry Growth**" are most negative and significant in the tables, showing the lowest efficiency when the parent cash flow rights are low and financing constraints are not severe.

Insert Tables8 and 9 here

5.3. Effects of Change in the Regulatory Environment

Although we realize that the time span of our sample is not long enough to warrant extensive study of time-series changes in the patterns, we carried out some modest experiments to explore possible time variations in the regulatory environment in China, as the securities market has been developing very rapidly. As already argued, regulatory changes in China might make it much less likely that firms engaged in expropriation activities during the later part of our sample period. We define ***Regulation*** as an indicator of capital market regulation, which equals to 1 when the sample years are from 2004-2005, and 0 from 1999-2003. In Table 10, we use two models to test the effect of capital market regulation: the **Investment-Cash Flow Sensitivity Model (Panel A)** and **Capital Flow Determinate Model (Panel B)**, both of which report significant and similar results to our predictions. For example, in Panel A, the coefficient of "***Regulation * Other Cash Flow***" is significantly negative and "***Regulation * Other Cash Flow * Relative Q***" is significantly positive. At the same time, in Panel B, the coefficient of "***Regulation***" is significantly negative and "***Regulation * Relative Q***" is significantly positive. In unreported tests, we further interact market regulation with bank ownership in both models, essentially treating the "market improvement" as a substitute for our proxy for corporate governance, and we find similar evidence. These results suggest that when the external governance restrictions become more stringent, expropriation effects become less severe while intra-group financing activities slow down.

Insert Table 10 here

5.4. Size as an Alternative Measure of Financial Constraints

We use firm size as an alternative proxy for financing constraints (e.g., Almeida and Campello, 2007; Erickson and Whited, 2000). We define ***Small Size*** as an indicator of more financing constraints, which equals to 1 when the size of the parent at the beginning year is below the sample median, and 0 otherwise. In Table 11, we replace bank relationship by the firm size measure in the test of financing constraints as in Columns (3) and (4) of Table 3, and use the two models reported in Table 10. Once

again, the results reported in Panel A and Panel B are similar with Table 3 and Table 6 respectively. For example, in Panel A, the coefficient of "***Small Size * Other Cash Flow***" is significantly positive and "***Small Size * Other Cash Flow * Relative Q***" is significantly positive. At the same time, in Panel B, the coefficient of "***Small Size***" is significantly positive and "***Small Size * Relative Q***" is significantly positive. In unreported results, we also use the size measure to replace bank ownership in the joint tests as in Table 4. These results based on the size measure are similar to those based on the bank ownership measure.

Insert Table 11 here

6. Conclusion

Using hand-collected data on intra-group financing activities of 604 pair-years of Chinese listed firms and their non-listed parents, we document the existence and impact of two factors contributing to intra-business group financing, namely, cross-financing to mitigate severe financing constraints and the expropriation of minority shareholders due to weak corporate governance. Our results suggest that both can account for the rise of intra-business group financing activities, but their implications for the efficiency of such intra-group financing are opposite: the efficiency of intra-group financing is the highest when the motivation is purely to mitigate financial constraints and it is the lowest when it is purely to expropriate outside investors. Our results suggest that looking at either aspect of the motivations in isolation might not give a complete picture of the role of intra-group financing.

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Appendix: A Simple Theoretical Model

In the following, we sketch a simple setup to illustrate the intuition behind the empirical tests. It is a parsimonious model, with just enough features to show all of the intuition.

We have a listed subsidiary. At the time of the listing, the parent company sold shares of the subsidiary on the stock exchange to outsiders. These outside investors factored in the expectation of intra-group capital flow activities. Thus, the investors were not fooled and were compensated for the intra-group capital flows through a lower IPO price given the future earnings. From the perspective of the controlling shareholder, expropriation of minority investors is *ex ante* not a first best choice because of potential *ex ante* resource allocation inefficiency and *ex post* deadweight loss if additional resources must be used to conceal the intra-group capital flows. Nevertheless, due to the lack of cost-effective governance mechanisms, the controlling shareholder cannot commit to refraining from expropriating *ex post*, and thus must suffer from lower welfare due to the expropriation.

Intra-group capital flows here mean taking away the cash flows of the subsidiary and using them in the parent firm.[26] From the perspective of the business group, intra-group capital flows may be conducted for positive or negative reasons. A positive reason is to mitigate the financing constraints of the parent to support positive NPV investment opportunities. A negative reason is to expropriate from the minority shareholders of the listed firm.

[26] The other direction of cash flows – from the parent firm to the listed subsidiary – is also possible. Theoretical and empirical studies have discussed the possibility of "propping" by controlling the shareholders of the listed firms to preserve future opportunities to expropriate from the minority shareholders. For simplicity, such propping is not modeled here.

From the perspective of the listed firm, once the shares have been purchased at the IPO, outside equity investors will not want to see any subsequent intra-group capital flows, regardless of the motivation, because intra-group capital flows strictly reduce the cash flows of the listed firm and consequently the value of the equity stake held by the outside equity investors.

The legal system protects the shareholders of the listed firm, and therefore any intra-group capital flows will be penalized if exposed, regardless of the ultimate motivation.

Expropriation Motivation and Punishment as a Deterrent to Intra-group Capital Flows

The probability of being discovered increases with the scale of the intra-group capital flows (X^0): the more intra-group capital flows by the parent, the more likely they are to be discovered.

$$\textbf{Prob (discovery)} = \min(\delta X^0, 1).$$

As a numerical example, δ=0.01% and the maximum probability of being discovered is 1. If intra-group capital flows are discovered, then the punishment is proportional to the crime committed:

$$\textbf{punishment} = \xi X.$$

For example, ξ=5 means paying a fine that is 500% of the amount tunneled.

There may also be a cost associated with intra-group capital flows and covering up intra-group capital flows. For example, a special investment vehicle might have to be set up to enable intra-group capital flows and bribes might have to be paid to auditors and other involved individuals. The cost also increases with the intra-group capital flow activity. For simplicity, assume that it is also proportional to the size of the intra-group capital flows, where **cost = cX**.

The benefit from expropriation decreases with the parent firm's percentage stake in the subsidiary. The higher the percentage stake, the less meaningful it is to tunnel money out of the subsidiary. At the extreme, if the subsidiary is 100% owned by the parent, then there is no benefit at all to intra-group capital flows, because that constitutes taking money out of the right pocket and putting it in the left.[27] Mathematically, before adding other costs, the benefit of transferring $\$X^0$ from the subsidiary to the parent is equal to $X^0 (1 - \theta)$, where θ is the percentage ownership of the parent in the subsidiary.

Mitigating Financing Constraints as Another Motivation for Intra-group Capital Flows

Intra-group capital flows transfer financial resources from the subsidiary to the parent. In this setting, receipt of this transfer may create value for the parent, because the parent initially may be financially constrained and have insufficient capital to take on

[27] Note that we neglect the potential benefit of using the cash flows of the listed sub to better mitigate the financing constraints faced by the parent. We discuss that possibility in greater detail later.

all positive NPV projects. Assuming that these investment opportunities are lost forever, there is an added benefit of transferring resources to the parent in that it enables more value-creating investment.[28]

Due to financing constraints, each additional $1 that flows into the parent firm will bring an additional amount of value due to the realization of positive NPV investment opportunities. As an increasing amount of capital flows in and the financing constraints are relaxed, the marginal benefit of an incremental dollar of capital flows will decrease, as positive NPV projects are depleted. Eventually, the additional benefits of a dollar investment could reach zero, as illustrated by the downward sloping curve in the figure below.

For simplicity, assume that the first dollar of investment brings in an additional value of $Y. The incremental contribution of the additional investment decreases with the total amount of intra-group capital flows. Assume that the decreasing relation between intra-group capital flows and the incremental value of another dollar can be approximated by a straight line, and the slope of the line is k. Intuitively, k is a measure of the scale diseconomy of the resource transfer from the subsidiary to the parent firm to mitigate the financing constraints faced by the parent. Thus, if the amount of the intra-group capital flows is $\$X^0$, then the total additional benefit from relaxing the financing constraints will be

$$\frac{1}{2} * [Y + (Y - kX^0)] * X^0,$$

[28] Note that we assume that the listed subs have many fewer financing constraints than the parent firms. This is likely to be the case in China, given the institutional details that we discuss in this paper.

which is the area of the trapezoid (shaded area in Figure 1).

The incremental contribution to firm NPV per $1 additional investment

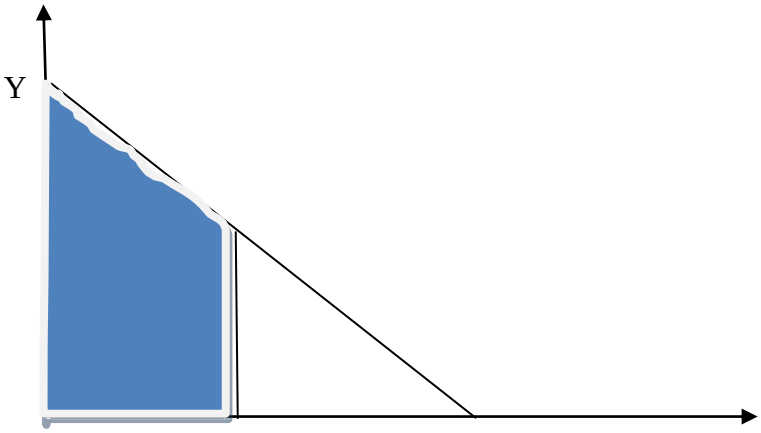

Figure 1: The relation between the incremental value of relaxing financing constraints and the total amount of intra-group capital flows.

The Maximization Problem for the Parent

At any time, controlling shareholders solve the following problem to determine the amount of intra-group capital flows (X^{0*}).

$$\text{Max}_{X^0} X^0 (1-\theta - c) - \delta X^0 \xi X^0 + \tfrac{1}{2} * [Y + (Y - kX^0)] * X^0$$

We can see that from the parent's perspective, there are two components of value creation. The first is expropriation from minority shareholders, which creates the value $X^0 (1-\theta - c) - \delta X^0 \xi X^0$. Within a certain range of the value of X^0, this is an increasing and concave function of X^0. The second is the benefit of mitigating the

financing constraints, which is ½ * [Y + (Y-kX^0)]*X^0. Within a certain range of the value of X^0, this is also increasing and concave in X^0. These two components are additive rather than multiplicative, meaning that they can each separately influence the total value creation but there is no interaction effect between them.[29]

This is a simple quadratic form of the objective function. Solving for the maximum, we obtain $X^{0*} = (1-\theta - c + kY) / (2\delta\xi+1)$.

Thus, for given parameter values of the cost of intra-group capital flows, the scale diseconomy of mitigating financing constraints and the probability and penalty of the discovery of intra-group capital flows (c, K, δ, and ξ), X^{0*} increases with Y (the value of the first dollar of additional investment in the parent, or a measure of the severity of the financing constraints) and decreases with θ (the percentage ownership of the parent in the subsidiary). Intuitively, we would expect to see more intra-group capital flows if there is greater misalignment between the incentives of the parent firm and those of the subsidiary (a lower ownership stake θ), or more severe financing constraints (Y).

We can plot the "actions" of intra-group capital flows with given parameter values of c, K, δ, and ξ against a two-dimensional diagram of θ and Y as in Figure 2.

[29] We could add higher order terms, for example making the δX0 ξX0 cubic rather than quadratic, but doing so would only add complexity to the problem without adding much intuition.

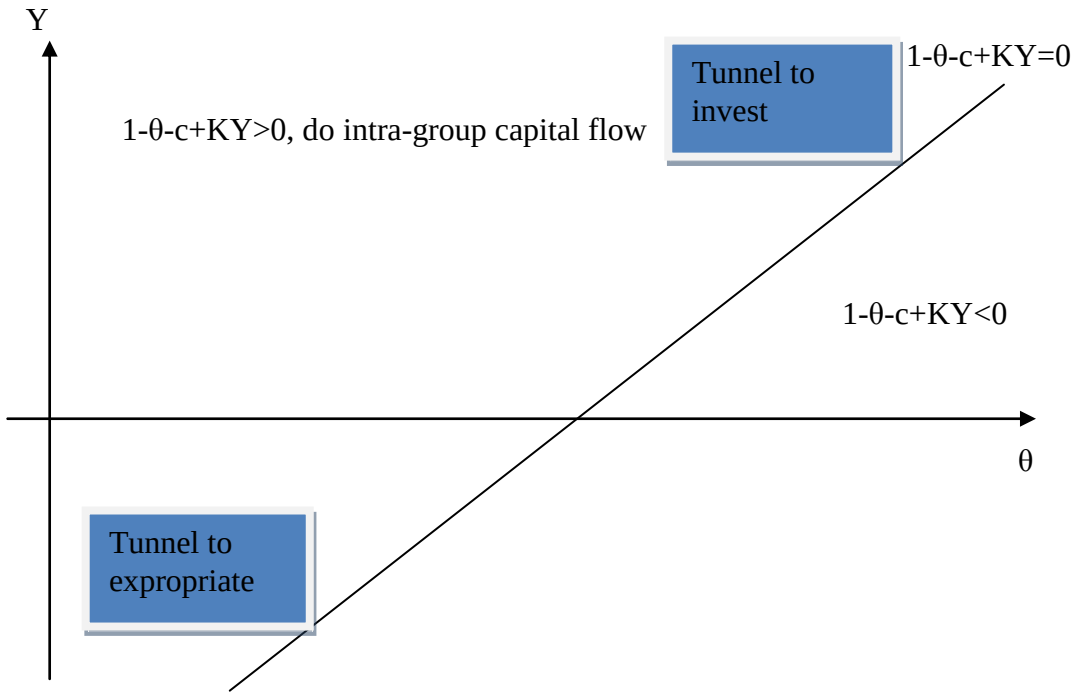

Figure 2: The intra-group capital flows with given parameter values of c, K, δ, and ξ.

At values above and to the left of the line 1-θ-c+KY=0, the firm will optimally engage in intra-group capital flows. Furthermore, the further the (Y, θ) combination is above the line, the more intra-group capital flows will be optimally performed. As this illustrative graph shows, for a small value of θ (less alignment between the interests of the parent and the subsidiary), intra-group capital flows occur even if Y is negative. These are cases of intra-group capital flows for firms to expropriate from the minority investors in the subsidiary rather than to mitigate the financing constraints, despite the fact that doing so hurts the overall capital allocation efficiency of the group. This is marked on the plot by the area "tunnel to expropriate."

There are also cases in which θ is high but Y is also high, and the firm might optimally engage in intra-group capital flows. In these cases, mitigating financing

constraints is the main motivation for intra-group capital flows, as expropriation is less of a concern. Almost by definition, the efficiency of such intra-group capital flows, as measured by the sensitivity of the parent investment to the interaction term between the subsidiary cash flow and the relative Q, will be the highest. This is marked on the plot by the area "tunnel to invest."

Discussion of the Welfare Implications from the Perspective of the Business Group

Intra-group capital flows to expropriate are value destroying, despite the fact that everyone rationally expects them and outsiders are compensated for them by a lower IPO share price. In a rational equilibrium model, outside investors will not be systematically fooled, and thus they will get what they paid for and break even. However, the insiders bear all of the dead-weight loss in welfare from intra-group capital flows, as they will have to sell the equity at a lower price to outsiders if some intra-group capital flows are expected. This is not a first best outcome for insiders, but because they cannot commit to refraining from intra-group capital flows after the IPO, they cannot achieve a first best outcome.

In some circumstances, intra-group capital flows to mitigate financing constraints may be value-creating, even from the perspective of the business group. And, given that outsiders break even ex ante, this also means that intra-group capital flows could be value-creating from the perspective of the insider (here we treat the insider and the non-listed parent firm as the same).

The gain or loss from intra-group capital flows, from the perspective of the business group, will be as follows.

Gain: $\frac{1}{2} * [Y + (Y-kX^0)]*X^0$, which is the value created by reducing the parent financing constraints.

Loss: $X^0 c - \delta\xi X^0$, which is the value absorbed by the cost of intra-group capital flows by covering them up, or by the legal system in preventing them. From the perspective of the business group, this value disappears rather than being transferred from one group member to another.

It is conceivable that, given different parameter values, the gain could be larger than, equal to, or smaller than, the loss. Thus, from the perspective of the business group, intra-group capital flows could, at least in theory, be value-enhancing when the parent firm faces severe financing constraints.

Table 1 Summary Statistics

This table reports summary statistics for the listed sub and parent samples. ***Capital Expenditure*** is the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Net Trade Credits*** = increase of accounts receivable – increase of accounts payable in year t ; ***Traditional Cash Flow Measure***= EBIT +depreciation ; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits; ***Adjusted Cash Flow Measure 2*** (only for the listed subs) = EBIT + depreciation – net trade credits - income tax; ***Adjusted Cash Flow Measure 3*** (only for the listed subs) = EBIT + depreciation – net trade credits - income tax + net increase in bank debt + net increase in equity offerings. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. ***Listed Sub Relative Q*** = listed sub industry Q - parent industry Q, and Parent ***Relative Q*** = parent industry Q- listed sub industry Q; ***Industry Growth*** is the mean of the firm-level lagged sales growth in the same three-digit industry as calculated from the National Bureau of Statistics' Annual Industrial Survey Database. ***Cash Flow Right*** is the percentage of the total listed sub shares owned by the parent. ***Bank Ownership*** equals to 1 when the firm pair owns shares in a local bank, and 0 otherwise. ***Size*** is the total assets of the listed sub (parent) at the beginning of the year in thousand yuan.

Variable	Obs.	Mean	Median	Mean	Median
		Listed Sub		**Parent**	
Capital Expenditure	604	0.1191	0.0761	0.0864	0.0405
Net Trade Credits	604	-0.0392	-0.0362	0.0284	0.0197
Traditional Cash Flow Measure	604	0.1016	0.0966	0.0699	0.0595
Adjusted Cash Flow Measure 1	604	0.0624	0.0664	0.0983	0.0789
Adjusted Cash Flow Measure 2	604	0.0455	0.0474	——	——
Adjusted Cash Flow Measure 3	604	0.0849	0.0847	——	——
Industry Q	604	1.6380	1.6914	1.5580	1.5422
Relative Q	604	0.0800	0.0952	-0.0800	-0.0952
Industry Growth	604	0.1150	0.0925	0.1070	0.0869
Cash Flow Right of Parent	604	52.0038	54.4250	52.0038	54.4250
Bank Ownership Dummy	604	0.2447	0.0000	0,.2447	0.0000
Size (thousand yuan)	604	229261	143129	542179	235155

Table 2 The Magnitude and Efficiency of Intra-Group Financing

This table reports regression results on the magnitude and efficiency of intra-group financing for the total sample. ***Capital Expenditure*** is the change in the net value of fixed assets from year t-1 to year t, plus depreciation. For listed subs (parents), ***Own Cash Flow*** is the cash flow of listed sub (parent) and ***Other Cash Flow*** **is** the cash flow of parent (listed sub). ***Net Trade Credits*** = increase in accounts receivable – increase in accounts payable in year t ; ***Traditional Cash Flow Measure*** = EBIT +depreciation ; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits; ***Adjusted Cash Flow Measure 2*** (only for the listed subs)= EBIT + depreciation – net trade credits - income tax; ***Adjusted Cash Flow Measure 3*** (only for the listed subs), = EBIT + depreciation – net trade credits - income tax + net increase in bank debt + net increase in equity offerings. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. ***Listed Sub Relative Q*** = listed sub industry Q - parent industry Q, and Parent ***Relative Q*** = parent industry Q- listed sub industry Q; All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A	**Listed Sub Regression**			
Cash Flow Measure	**Traditional Cash Flow Measure**		**Adjusted Cash Flow Measure 1**	
	(1)	(2)	(3)	(4)
Own Cash Flow	0.4143	0.4235	0.3601	0.3637
	(0.1154)***	(0.1261)***	(0.0547)***	(0.0603)***
Other Cash Flow	**0.0441**	**0.0476**	**0.0223**	**0.0254**
	(0.0301)	**(0.0357)**	**(0.0178)**	**(0.0189)**
Relative Q	0.0214	0.0243	0.0201	0.0214
	(0.0126)*	(0.0138)*	(0.0112)*	(0.0119)*
Other Cash Flow * Relative Q		**0.0212**		**0.0168**
		(0.0176)		**(0.0210)**
Obs.	604	604	604	604
Adj_R2	0.2055	0.2068	0.1876	0.1882

Panel B	**Parent Regression**							
Cash Flow Measure	**Traditional Cash Flow Measure**		**Adjusted Cash Flow Measure 1**		**Adjusted Cash Flow Measure 2**		**Adjusted Cash Flow Measure 3**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Own Cash Flow	0.5041	0.5088	0.5114	0.5132	0.5262	0.5251	0.5278	0.5299
	(0.0565)***	(0.0579)***	(0.0654)***	(0.0689)***	(0.0502)***	(0.0511)***	(0.0534)***	(0.0541)***
Other Cash Flow	**0.0938**	**0.0802**	**0.2243**	**0.2067**	**0.2012**	**0.1874**	**0.1387**	**0.1031**
	(0.0445) **	**(0.0466)** *	**(0.0564)*** **	**(0.0576)*** **	**(0.0413)*** **	**(0.0389)*** **	**(0.0367)*** **	**(0.0278)*** **
Relative Q	0.0162	0.0159	0.0177	0.0167	0.0178	0.0166	0.0161	0.0153
	(0.0081)**	(0.0102)	(0.0068)**	(0.0087)*	(0.0101)*	(0.0113)	(0.0122)	(0.0112)
Other Cash Flow * Relative Q		**0.0842**		**0.1504**		**0.1231**		**0.0962**
		(0.0551)		**(0.0750)** **		**(0.0682)** *		**(0.0449)** **
Obs.	604	604	604	604	604	604	604	604
Adj_R2	0.2019	0.2012	0.2243	0.2296	0.2225	0.2287	0.2132	0.2209

Table 3 Cash Flow Rights, Bank Ownership, and Intra-Group Financing

This table reports the parent firm regression results considering separately the effect of cash flow rights and bank ownership. ***Cash Flow Right*** is the percentage of listed sub shares owned by the parent and ***Bank Ownership*** is the shares of local banks owned by the listed subs. **"*Low Cash Flow Right*"** equals to ***1*** when the cash flow rights are below the median for the total sample, and ***0*** otherwise; ***"No Bank Ownership"*** equals to ***1*** when the listed sub does not own shares in a local bank, and ***0*** otherwise. ***Capital Expenditure*** is the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Own Cash Flow*** is the cash flow of the parent and ***Other Cash Flow*** **is** the cash flow of the listed sub. ***Net Trade Credits*** = increase of accounts receivable – increase of accounts payable in year t; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. ***Listed Sub Relative Q*** = listed sub industry Q - parent industry Q, and Parent ***Relative Q*** = parent industry Q- listed sub industry Q; All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Cash Flow Measure	**Adjusted Cash Flow Measure 1**			
	(1)	(2)	(3)	(4)
Own Cash Flow	0.5033	0.5042	0.5076	0.5085
	(0.0423)***	(0.0434)***	(0.0462)***	(0.0483)***
Other Cash Flow	0.1724	0.1578	0.1820	0.1689
	(0.0912)*	(0.0972)	(0.0913)**	(0.0884)*
Relative Q	0.0162	0.0151	0.0168	0.0156
	(0.0074)**	(0.0093)	(0.0081)**	(0.0089)*
Other Cash Flow * Relative Q		0.1343		0.1172
		(0.0622)**		(0.0618)*
Low Cash Flow Right	-0.0356	-0.0347		
	(0.0313)	(0.0322)		
No Bank Ownership			-0.0278	-0.0296
			(0.0289)	(0.0297)
Low Cash Flow Right * Other Cash Flow	**0.1615**	**0.1486**		
	(0.0554)* **	**(0.0676)** **		
No Bank Ownership * Other Cash Flow			**0.1243**	**0.1068**
			(0.0391)* **	**(0.0483)** **
Low Cash Flow Right * Other Cash Flow* Relative Q		**-0.0612**		
		(0.0303) **		
No Bank Ownership * Other Cash Flow* Relative Q				**0.0831**
				(0.0401) **
Obs.	604	604	604	604
Adj_R2	0.2421	0.2447	0.2349	0.2406

Table 4 The Interaction Effect of Cash Flow Rights and Bank Ownership on Intra-Group Financing

This table reports the parent firm regression results considering the interaction effect of cash flow rights and bank ownership. ***Cash Flow Right*** is the percentage of listed sub shares owned by the parent and ***Bank Ownership*** is the shares of local banks owned by the listed subs. We define 4 dummy variables based on the interaction of cash flow rights and bank ownership: ***D1*** equals to 1 when cash flow rights are **above** the median and the listed sub **owns** shares of local banks, and 0 otherwise; ***D2*** equals to 1 when cash flow rights are **above** the median and the listed sub **does not own** shares of local banks, and 0 otherwise; ***D3*** equals to 1 when cash flow rights are **below** the median and the listed sub **owns** shares of the local banks, and 0 otherwise; ***D4*** equals to 1 when cash flow rights are **below** the median and the listed sub **does not own** shares of the local banks, and 0 otherwise; ***Capital Expenditure*** is the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Own Cash Flow*** is the cash flow of the parent and ***Other Cash Flow*** **is** the cash flow of the listed sub. ***Net Trade Credits*** = the increase of accounts receivable – the increase of accounts payable in year t; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. ***Listed Sub Relative Q*** = listed sub industry Q - parent industry Q, and parent ***Relative Q*** = parent industry Q- listed sub industry Q; All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Cash Flow Measure	**Adjusted CF Measure 1**	
	(1)	(2)
Own Cash Flow	0.5110	0.5145
	(0.0412)***	(0.0475)***
Other Cash Flow	0.1145	0.1062
	(0.0698)	(0.0657)
Relative Q	0.0167	0.0150
	(0.0084)**	(0.0091)
Other Cash Flow* Relative Q		0.1142
		(0.0693)
D2	0.0312	0.0325
	(0.0347)	(0.0384)
D3	-0.0269	-0.0278
	(0.0691)	(0.0754)
D4	-0.0398	-0.0411
	(0.0287)	(0.0332)
D2* Other Cash Flow	**0.1247**	**0.1124**
	(0.0621)**	**(0.0642)***
D3* Other Cash Flow	**0.1126**	**0.1004**
	(0.0558)**	**(0.0527)***
D4* Other Cash Flow	**0.2043**	**0.1924**
	(0.0726)***	**(0.0825)****
D2* Other Cash Flow* Relative Q		**0.1465**
		(0.0728)**
D3* Other Cash Flow* Relative Q		**-0.1012**
		(0.0358)***
D4* Other Cash Flow* Relative Q		**0.0334**
		(0.0452)
Obs.	604	604
Adj_R2	0.2412	0.2623

Table 5 Descriptive Statistics of the Alternative Measures of Intra-group Capital Flows

In this table, we report the descriptive statistics of the alternative measures: **ORECTA** is the other receivables deflated by total assets; and **ORECTA_Parent** is the other receivables provided to the controlling shareholder deflated by the total assets. All of the variables are winsorized at the 1% and 99% points.

Variable	Mean	Median	Std.dev	Q1	Q3
ORECTA	0.0489	0.0193	0.0815	0.0066	0.0528
GORECTA	0.0232	0.0091	0.0514	0.0000	0.0276

Table 6 Cash Flow Rights, Bank Ownership, and the Determinants of ORECTA and ORECTA_Parent

In this table we examine the determinants of ORECTA and ORECTA_Parent. ***ORECTA*** is the other receivables deflated by total assets and ***ORECTA_Parent*** is the other receivables provided to the controlling shareholder, deflated by total assets. The independent variables are: **"*Low Cash Flow Right*"** equals to ***1*** when the cash flow rights of the largest shareholder are below the median for the total sample, and ***0*** otherwise; ***"No Bank Ownership"*** equals to ***1*** when the listed sub does not own shares in a local bank, and ***0*** otherwise. ***Relative Q*** = parent industry Q- listed sub industry Q, where ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry; ***ROA*** is the return on total assets in the previous fiscal year; ***Size*** is the natural logarithm of the total assets of the listed sub at the beginning year; ***State*** is a dummy variable which takes a value one if the largest shareholder is any government-owned institution; ***Marketization*** is a comprehensive index measuring the development of the regional market in which the firm is registered (see Fan and Wang, 2006), where higher values indicate greater regional market development; ***Layer*** is the number of intermediate layers between the company and its controlling owner through the longest pyramidal chain, defined following Fan, Wong, and Zhang (2007). All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * and denote significance at the 1%, 5%, and 10% levels, respectively.

Dep. Variable	**ORECTA**		**ORECTA_Parent**	
	(1)	(2)	(3)	(4)
Low Cash Flow Right	**0.0075**		**0.0096**	
	(0.0040)*		**(0.0034)*****	
No Bank Ownership		**0.0036**		**0.0049**
		(0.0019)*		**(0.0021)****
Low Cash Flow Right * Relative Q	**-0.0191**		**-0.0078**	
	(0.0094)**		**(0.0024)*****	
No Bank Ownership * Relative Q		**0.0252**		**0.0094**
		(0.0120)**		**(0.0042)****
Relative Q	0.0028	0.0112	0.0036	0.0102
	(0.0056)	(0.0111)	(0.0032)	(0.0066)
ROA	-0.6070	-0.6147	-0.3169	-0.3117
	(0.0344)***	(0.0341)***	(0.0234)***	(0.0231)***
Size	-0.0022	-0.0019	-0.0036	-0.0036
	(0.0012)*	(0.0012)	(0.0009)***	(0.0009)***
State	-0.0173	-0.0185	-0.0064	-0.0055
	(0.0066)***	(0.0066)***	(0.0045)	(0.0045)
Marketization	-0.0021	-0.0023	-0.0037	-0.0037
	(0.0014)*	(0.0016)	(0.0011)***	(0.0011)***
Layer	-0.0077	-0.0074	-0.0055	-0.0053
	(0.0035)**	(0.0036)**	(0.0024)**	(0.0024)**
Obs.	604	604	604	604
Adj_R2	0.2365	0.2356	0.1918	0.1910

Table 7 The Interaction Effect of Cash Flow Rights and Bank Ownership on the Determinants of ORECTA and ORECTA_Parent

In this table we examine the interaction effect of cash flow rights and bank ownership on the determinants of ORECTA and ORECTA_Parent. ***ORECTA*** is other receivables deflated by total assets and ***ORECTA_Parent*** is other receivables provided to the controlling shareholder, deflated by total assets. The independent variables are: We define 4 dummy variables based on the interaction of cash flow rights and bank ownership: ***D1*** equals to 1 when cash flow rights are **above** the median and the listed sub **owns** shares of local banks, and 0 otherwise; ***D2*** equals to 1 when cash flow rights are **above** the median and the listed sub **does not own** shares of local banks, and 0 otherwise; ***D3*** equals to 1 when cash flow rights are **below** the median and the listed sub **owns** shares of the local banks, and 0 otherwise; ***D4*** equals to 1 when cash flow rights are **below** the median and the listed sub **does not own** shares of local banks, and 0 otherwise; ***Relative Q*** = parent industry Q- listed sub industry Q, where ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry; ***ROA*** is the return on total assets in the previous fiscal year; ***Size*** is the natural logarithm of the total assets of the listed sub at the beginning year; ***State*** is a dummy variable which takes a value of one if the largest shareholder is any government-owned institution; ***Marketization*** is a comprehensive index measuring the development of the regional market in which the firm is registered, where higher values indicate greater regional market development; ***Layer*** is the number of intermediate layers between the company and its controlling owner through the longest pyramidal chain, defined following Fan, Wong, and Zhang (2007). All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dep. Variable	ORECTA		ORECTA_Parent	
	(1)	(2)	(3)	(4)
D2	**0.0036**	0.0016	**0.0064**	0.0059
	(0.0021)	(0.0022)	**(0.0028)****	(0.0027)**
D3	**0.0095**	0.0080	**0.0072**	0.0065
	(0.0051)*	(0.0052)	**(0.0031)****	(0.0033)**
D4	**0.0111**	0.0081	**0.0102**	0.0091
	(0.0040)***	(0.0042)*	**(0.0036)*****	(0.0049)**
D2* Relative Q		**0.0459**		**0.0208**
		(0.0200)**		**(0.0105)****
D3* Relative Q		**-0.0599**		**-0.0367**
		(0.0193)***		**(0.0126)*****
D4*Relative Q		**-0.0242**		**-0.0188**
		(0.0161)		**(0.0130)**
Relative Q	-0.0073	0.0413	0.0028	0.0209
	(0.0047)	(0.0284)	(0.0032)	(0.0124)*
ROA	-0.6082	-0.6009	-0.3174	-0.3167
	(0.0345)***	(0.0345)***	(0.0234)***	(0.0235)***
Size	-0.0019	-0.0019	-0.0037	-0.0038
	(0.0012)	(0.0012)	(0.0009)***	(0.0009)***
State	-0.0150	-0.0161	-0.0065	-0.0066
	(0.0067)**	(0.0067)**	(0.0045)	(0.0046)
Marketization	-0.0021	-0.0022	-0.0036	-0.0035
	(0.0016)	(0.0016)	(0.0011)***	(0.0011)***
Layer	-0.0078	-0.0079	-0.0055	-0.0055
	(0.0036)**	(0.0036)**	(0.0024)**	(0.0024)**
Obs.	604	604	604	604
Adj_R2	0.2342	0.2389	0.1910	0.1914

Table 8 Use of the Industry Q to Proxy for Investment Opportunity

This table reports the parent firm regression results using the industry Q considering the interaction effect of the cash flow rights and bank ownership. ***Cash Flow Right*** is the percentage of listed sub shares owned by the parent and ***Bank Ownership*** is the shares of local banks owned by the listed subs. We define 4 dummy variables based on the interaction of cash flow right and bank ownership: ***D1*** equals to 1 when cash flow right is **above** the median and the listed sub **owns** shares of the local banks, and 0 otherwise; ***D2*** equals to 1 when cash flow right is **above** the median and the listed sub **does not own** shares of the local banks, and 0 otherwise; ***D3*** equals to 1 when cash flow right is **below** the median and the listed sub **owns** shares of the local banks, and 0 otherwise; ***D4*** equals to 1 when cash flow right is **below** the median and the listed sub **does not own** shares of local banks, and 0 otherwise; ***Capital Expenditure*** is the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Own Cash Flow*** is the cash flow of the parent and ***Other Cash Flow*** **is** the cash flow of the listed sub. ***Net Trade Credits*** = increase of accounts receivable – increase of accounts payable in year t; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Cash Flow Measure	**Adjusted CF Measure 1**	
	(1)	(2)
Own Cash Flow	0.5158	0.5195
	(0.0416)***	(0.0425)***
Other Cash Flow	**0.1236**	**0.1087**
	(0.0755)	**(0.0671)**
Industry Q	0.0302	0.0322
	(0.0201)	(0.0214)
Other Cash Flow* Industry Q		**-0.0613**
		(0.0452)
D2	0.0224	0.0263
	(0.0321)	(0.0367)
D3	-0.0198	-0.0208
	(0.0543)	(0.0557)
D4	-0.0369	-0.0388
	(0.0287)	(0.0275)
D2* Other Cash Flow	**0.1134**	**0.1046**
	(0.0546)**	**(0.0512)****
D3* Other Cash Flow	**0.1112**	**0.0941**
	(0.0555)**	**(0.0486)***
D4* Other Cash Flow	**0.1717**	**0.1525**
	(0.0621)***	**(0.0684)****
D2* Other Cash Flow* Industry Q		**0.1628**
		(0.0714)**
D3* Other Cash Flow* Industry Q		**-0.2046**
		(0.0701)***
D4* Other Cash Flow* Industry Q		**-0.0512**
		(0.0357)
Obs.	604	604
Adj_R2	0.2328	0.2539

Table 9 The Use of Industry Growth to Proxy for Investment Opportunity

This table reports the parent firm regression results using industry growth considering the interaction effect of cash flow rights and bank ownership. ***Cash Flow Right*** is the percentage of listed sub shares owned by the parent and ***Bank Ownership*** is the shares of the local banks owned by the listed subs. We define 4 dummy variables based on the interaction of cash flow right and bank ownership: ***D1*** equals to 1 when cash flow right is **above the** median and listed sub **owns** shares of the local banks, and 0 otherwise; ***D2*** equals to 1 when cash flow right is **above** the median and the listed sub **does not own** shares of the local banks, and 0 otherwise; ***D3*** equals to 1 when cash flow right is **below the** median and the listed sub **owns** shares of the local banks, and 0 otherwise; ***D4*** equals to 1 when cash flow right is **below the** median and the listed sub **does not own** shares of local banks, and 0 otherwise; ***Capital Expenditure*** is the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Own Cash Flow*** is the cash flow of the parent and ***Other Cash Flow*** **is** the cash flow of the listed sub. ***Net Trade Credits*** = increase of accounts receivable – increase of accounts payable in year t; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Industry Growth*** is the mean firm-level lagged sales growth in the same three-digit industry as calculated from the National Bureau of Statistics' (NBS) Annual Industrial Survey Database. All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Cash Flow Measure	Adjusted CF Measure 1	
	(1)	(2)
Own Cash Flow	0.4954	0.4902
	(0.0452)***	(0.0478)***
Other Cash Flow	**0.1516**	**0.1247**
	(0.0789)*	**(0.0745)***
Industry Growth	0.1225	0.1094
	(0.0409)***	(0.0510)**
Other Cash Flow* Industry Growth		**0.1254**
		(0.0708)*
D2	0.0305	0.0412
	(0.0365)	(0.0378)
D3	-0.0287	-0.0294
	(0.0581)	(0.0549)
D4	-0.0343	-0.0385
	(0.0285)	(0.0296)
D2* Other Cash Flow	**0.1128**	**0.1040**
	(0.0547)**	**(0.0516)****
D3* Other Cash Flow	**0.0858**	**0.0747**
	(0.0447)*	**(0.0486)**
D4* Other Cash Flow	**0.1964**	**0.1721**
	(0.0875)**	**(0.0791)****
D2* Other Cash Flow* Industry Growth		**0.1542**
		(0.0472)***
D3* Other Cash Flow* Industry Growth		**-0.0576**
		(0.0273)**
D4* Other Cash Flow* Industry Growth		**0.0847**
		(0.0619)
Obs.	604	604
Adj_R2	0.2442	0.2624

Table 10 The Effect of Capital Market Regulation on Intra-Group Financing

This table reports the parent firm regression results considering capital market regulation. To capture the effect of capital market regulation against insider expropriation, we define ***Regulation*** as an indicator of capital market regulation, which equals to 1 when the sample years are from 2004-2005, and 0 when the sample years are 1999-2003.

We use two models to test the effect of capital market regulation:

Panel A uses the **Investment-Cash Flow Sensitivity Model**.

The dependent variable is ***Capital Expenditure***, the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Own Cash Flow*** is the cash flow of the parent and ***Other Cash Flow*** **is** the cash flow of the listed sub. ***Net Trade Credits*** = increase of accounts receivable – increase of accounts payable in year t; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. ***Listed Sub Relative Q*** = listed sub industry Q - parent industry Q, and Parent ***Relative Q*** = parent industry Q- listed sub industry Q;

Panel B uses the **Capital Flow Determinant Model**:

The dependent variables are ORECTA and ORECTA_Parent respectively. ***ORECTA*** is other receivables deflated by total assets and ***ORECTA_Parent*** is other receivables provided to the controlling shareholder, deflated by the total assets. ***ROA*** is the return on total assets in the previous fiscal year; ***Size*** is the natural logarithm of the total assets of the listed sub at the beginning year; ***State*** is a dummy variable which takes a value of one if the largest shareholder is any government-owned institution; ***Marketization*** is a comprehensive index measuring the development of the regional market in which the firm is registered (see Fan and Wang, 2006), where higher values indicate greater regional market development; ***Layer*** is the number of intermediate layers between the company and its controlling owner through the longest pyramidal chain, defined following Fan, Wong, and Zhang (2007).

All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Investment-Cash Flow Sensitivity Model

Cash Flow Measure	**Adjusted CF Measure 1**	
	(1)	(2)
Own Cash Flow	0.5012	0.4915
	(0.0446)***	(0.0425)***
Other Cash Flow	**0.2042**	**0.1733**
	(0.0655)* **	**(0.0754)** **
Relative Q	0.0161	0.0156
	(0.0084)*	(0.0099)
Other Cash Flow * Relative Q		**0.1285**
		(0.0665)*
Regulation	0.0723	0.0685
	(0.0226)***	(0.0266)**
Regulation * Other Cash Flow	**-0.0624**	**-0.0542**
	(0.0356)*	**(0.0288)***
Regulation * Other Cash Flow* Relative Q		**0.1156**
		(0.0658)*
Obs.	604	604
Adj_R2	0.2438	0.2598

Panel B: Capital Flow Determinant Model

Dep. Variable	**ORECTA**		**ORECTA_Parent**	
	(1)	(2)	(3)	(4)
Regulation	-0.0411	**-0.0415**	-0.0247	**-0.0245**
	(0.0078)***	**(0.0078)*** **	(0.0053)***	**(0.0054)*** **
Regulation * Relative Q		**0.0103**		**0.0053**
		(0.0053)*		**(0.0020)** **
Relative Q	0.0098	0.0128	0.0061	0.0061
	(0.0057)	(0.0076)	(0.0042)	(0.0048)
ROA	-0.6181	-0.6180	-0.3130	-0.3140
	(0.0341)***	(0.0341)***	(0.0231)***	(0.0231)***
Size	-0.0019	-0.0019	-0.0035	-0.0036
	(0.0012)	(0.0012)	(0.0009)***	(0.0009)***
State	-0.0174	-0.0176	-0.0052	-0.0053
	(0.0066)***	(0.0066)***	(0.0044)	(0.0044)
Marketization	-0.0021	-0.0021	-0.0035	-0.0037
	(0.0016)	(0.0016)	(0.0011)***	(0.0011)***
Layer	-0.0078	-0.0079	-0.0054	-0.0055
	(0.0036)**	(0.0036)**	(0.0024)**	(0.0024)**
Obs.	604	604	604	604
Adj_R2	0.2339	0.2341	0.1908	0.1914

Table 11 The Use of Firm Size to Proxy for Financing Constraints

This table reports the parent firm regression results using size to proxy for financing constraints. ***Small Size*** equals to 1 when the size of the parent at the beginning year is below the median in the total sample, and 0 otherwise:

We use two models to test the effect of capital market regulation:

Panel A uses the **Investment-Cash Flow Sensitivity Model**.
The dependent variable is ***Capital Expenditure***, the change in the net value of fixed assets from year t-1 to year t, plus depreciation. ***Own Cash Flow*** is the cash flow of the parent and ***Other Cash Flow*** **is** the cash flow of the listed sub. ***Net Trade Credits*** = increase of accounts receivable – increase of accounts payable in year t; ***Adjusted Cash Flow Measure 1*** = EBIT + depreciation – net trade credits. The capital expenditure and cash flow measures are all adjusted by the total assets of the listed sub (parent) at the beginning of the year. ***Listed Sub Industry Q*** is the mean firm-level Tobin's Q at the beginning of the year in the same three-digit industry as calculated from the total listed firms in China's capital market and ***Parent Industry Q*** is matched from the listed sub industry Q for the same three-digit industry. ***Listed Sub Relative Q*** = listed sub industry Q - parent industry Q, and Parent ***Relative Q*** = parent industry Q- listed sub industry Q;

Panel B uses the **Capital Flow Determinant Model**:
The dependent variables are ORECTA and ORECTA_Parent respectively. ***ORECTA*** is other receivables deflated by total assets and ***ORECTA_Parent*** is other receivables provided to the controlling shareholder, deflated by the total assets. ***ROA*** is the return on total assets in the previous fiscal year; ***Size*** is the natural logarithm of the total assets of the listed sub at the beginning year; ***State*** is a dummy variable which takes a value of one if the largest shareholder is any government-owned institution; ***Marketization*** is a comprehensive index measuring the development of the regional market in which the firm is registered (see Fan and Wang, 2006), where higher values indicate greater regional market development; ***Layer*** is the number of intermediate layers between the company and its controlling owner through the longest pyramidal chain, defined following Fan, Wong, and Zhang (2007).

All of the regressions include year dummies (not reported) and all of the variables are winsorized at the 1% and 99% points. The regressions employ the firm-level fixed effects method. The standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Investment-Cash Flow Sensitivity Model

Cash Flow Measure	**Adjusted CF Measure 1**	
	(1)	(2)
Own Cash Flow	0.4952	0.4978
	(0.0528)***	(0.0513)***
Other Cash Flow	**0.1945**	**0.1661**
	(0.0755)**	**(0.0822)****
Relative Q	0.0171	0.0141
	(0.0084)**	(0.0086)
Other Cash Flow * Relative Q		**0.1278**
		(0.0725)*
Small Size	-0.1402	-0.1335
	(0.0286)***	(0.0301)***
Small Size * Other Cash Flow	**0.1047**	**0.0918**
	(0.0486)**	**(0.0496)***
Small Size * Other Cash Flow* Relative Q		**0.0809**
		(0.0391)**
Obs.	604	604
Adj_R2	0.2447	0.2525

Panel B: Capital Flow Determinant Model

Dep. Variable	**ORECTA**		**ORECTA_Parent**	
	(1)	(2)	(3)	(4)
Small Size	0.0135	**0.0133**	0.0045	**0.0042**
	(0.0044)***	**(0.0044)*****	(0.0020)**	**(0.0021)****
Small Size * Relative Q		**0.0041**		**0.0097**
		(0.0020)**		**(0.0050)***
Relative Q	0.0083	0.0060	0.0059	0.0084
	(0.0047)*	(0.0041)	(0.0043)	(0.0048)*
ROA	-0.6037	-0.6037	-0.3145	-0.3142
	(0.0343)***	(0.0343)***	(0.0233)***	(0.0233)***
Size	-0.0016	-0.0016	-0.0037	-0.0037
	(0.0012)	(0.0012)	(0.0009)***	(0.0009)***
State	-0.0159	-0.0159	-0.0054	-0.0055
	(0.0065)**	(0.0066)**	(0.0044)	(0.0044)
Marketization	-0.0022	-0.0022	-0.0037	-0.0036
	(0.0016)	(0.0016)	(0.0011)***	(0.0011)***
Layer	-0.0079	-0.0079	-0.0055	-0.0054
	(0.0036)**	(0.0036)**	(0.0024)**	(0.0024)**
Obs.	604	604	604	604
Adj_R2	0.2393	0.2388	0.1909	0.1918