The Internal Capital Markets of Business Groups: Evidence from Intra-Group Loans

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Abstract

We study business groups’ internal capital markets using a unique data set on intra-group lending in Chile (1990—2009). In line with groups’ financing advantage, firms that borrow internally have higher investment, leverage, and ROE than other firms. At the margin, controlling shareholders have higher cash-flow rights in borrowing firms than in lending firms. However, there is no robust evidence of minority shareholders losing out from intra-group loans as tunneling predicts. Our evidence is consistent with the idea that strict regulation and disclosure requirements for intra-group loans, which are features of the Chilean market, reduce the risk of expropriation in pyramids.

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Abstract

We study business groups’ internal capital markets using a unique data set on intra-group lending in Chile (1990—2009). In line with groups’ financing advantage, firms that borrow internally have higher investment, leverage, and ROE than other firms. At the margin, controlling shareholders have higher cash-flow rights in borrowing firms than in lending firms. However, there is no robust evidence of minority shareholders losing out from intra-group loans as tunneling predicts. Our evidence is consistent with the idea that strict regulation and disclosure requirements for intra-group loans, which are features of the Chilean market, reduce the risk of expropriation in pyramids.
Business groups are prevalent around the world. They are typically controlled by families and organized as pyramidal ownership structures. The literature describes bright and dark sides to business groups (Khanna and Yafeh, 2007). The bright side of business groups is their ability to overcome market frictions. For instance, firms with limited access to intermediated funds can benefit from the support of the rest of the group when they suffer negative cash-flow shocks (Gopalan, Nanda, and Seru, 2007; Khanna and Yafeh, 2005). The dark side of business groups refers to the potential expropriation of minority shareholders. This behavior is called tunneling (Johnson, La Porta, López-de-Silanes, and Shleifer, 2000). For example, Bertrand, Mehta, and Mullainathan (2002) show that Indian groups channel resources away from firms in which the controlling shareholder has low cash flow rights toward firms in which he has high cash flow rights, although Siegel and Choudhury (2012) question the robustness of their result using the same data set of Indian firms. More generally, recent research suggests that the financing advantage of business groups outweighs tunneling problems (Masulis, Pham, and Zein (2011)), and thus the debate about the advantages and disadvantages of business groups remains open.

Despite their ubiquity, the inner workings of business groups remain relatively unexplored because of data limitations. In this paper we have direct access to internal capital markets, which represent a key dimension of business groups. We assemble a unique data set that covers all intra-group lending of Chilean firms. This information must be disclosed as a separate line in the balance sheet of every firm according to Chilean regulation.¹ The fact that we have almost two decades of data

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¹ Because of the relative transparency of Chilean business groups they have been studied before in terms of the benefits of group diversification (Khanna and Palepu, 2000), the synchronization of stock returns and firm interlocks (Khanna and Thomas, 2009), and board compensation (Urzua, 2009), among others, but not in terms of their internal capital markets.
(1990-2009) is an advantage over other studies with more limited samples. Furthermore, we can extract crucial details about intra-group lending from the notes to financial statements, which are available in electronic form for the years 2001-2009. In the notes each firm reports a firm-by-firm loan balance with other affiliated firms. This means that we can identify specific lending relationships, i.e., who is borrowing and from whom, and not only the net borrowing or lending position of each firm within the group. As far as we know, there is no other public data set with such a comprehensive coverage of intra-group lending in this or in other countries.

As with business groups in general, intra-group lending can be motivated by tunneling or by a financing advantage. We develop the main predictions of these two hypotheses and then test them with our data. Our results suggest that, although tunneling can be a concern at the margin, the activity of internal capital markets is better explained by the financing advantage. The regulatory oversight and disclosure requirements of the Chilean market, which are stricter than in other emerging markets such as China or India, probably stack the cards against the tunneling hypothesis in this sample. Our results are consistent with the idea that appropriate regulation can reduce the risk of expropriation in the internal capital markets of pyramids without canceling their financing benefits. However, we cannot fully discard other causes (e.g., culture), because, at the end of the day, we observe only one type of regulation (with minor adjustments) throughout the entire sample period.

More generally, our results show that the link between pyramidal groups and the expropriation of minority shareholders is not an unquestionable axiom (see also Almeida and Wolfenzon, 2006a, and Khanna and Yafeh, 2007). As Siegel and

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2 For example, Gopalan, Nanda, and Seru (2007) and Jiang, Lee and Yue (2010) use approximately 10 years of data of intra-group loans in India and China respectively.
Choudhury (2012) put it, our evidence points towards a role for business groups beyond being mere “expropriation devices.” Pyramids not only allow large shareholders to achieve control while investing relatively little capital; they also give large shareholders access to more cash flows than the ones directly produced by a firm, which in a world of imperfect capital markets can be an important advantage.

In terms of the tunneling hypothesis we first study the impact of the controlling shareholder’s cash-flow rights on the direction of intra-group loans. Cash-Flow Rights (CFRs) represent the proportional claim of the controlling shareholder to the dividends of the firm (Adams and Ferreira, 2008). The tunneling hypothesis predicts that loans go from firms in which the controlling shareholder has low CFRs toward firms in which he has high CFRs. However, the key ingredient for tunneling is that minority shareholders of the lending firm are harmed by this opportunistic behavior of the controlling shareholder. In particular, we expect to find lower than normal return on equity (ROE) and lower than normal dividends in connection to intra-group loans. Without this evidence the abusive behavior of the controlling shareholder cannot be asserted.

In the data we find that firms that are net receivers of intra-group loans have, at the margin, higher CFRs than firms that are net providers of intra-group loans. On average there is a 10 percentage-point difference in CFRs between receivers and providers. However, there are receivers and providers of intra-group loans in all layers of control pyramids. Neither are all receivers at the top of the pyramid nor all providers at the bottom, which would happen if loans were only intended to siphon resources away from minority shareholders. On the contrary, lending relationships are generally created between firms that are close to each other in the control pyramid. Furthermore, product market relationships (e.g., firms in the same industry
or firms in closely integrated industries) predict the creation of lending relations. In other words, considerations beyond the direct benefit of the controlling shareholder also play a role. When we look at ex-post outcomes we do not find robust evidence of lower ROE in providers of intra-group loans when compared to other firms in pyramids and to firms that do not belong to pyramids. There is also no evidence that providers pay lower dividends. Based on our results it is hard to make the case for tunneling as the primary reason for internal capital markets in pyramids.

The financing advantage hypothesis has two key predictions. First, investment and ROE have to increase in the borrowing firm, because alleviating financial constraints is the main reason for the intra-group loan. Second, internal loans affect the capital structure of the firm, because financial contracting within the group is easier, and consequently less expensive, than with outside intermediaries. Since intra-group lending is only available to affiliated firms, firms that receive loans should be over-levered when compared to similar firms outside groups. At the same time, these firms should not only increase leverage, but also replace expensive external debt (i.e., bank debt, bonds, etc.) with cheap loans from related firms.

We find in the data that receivers of intra-group loans are typically small, capital-intensive firms with higher investment rates than providers. This difference in investment rates is statistically significant and robust to multiple regression specifications. There is also evidence that ROE in receivers goes up, although the effects are marginally significant. We find that receivers have leverage ratios that are 7%-10% higher than leverage ratios of other firms, while there is no discernible effect on the leverage ratio of providers. External leverage (external debt over total assets) is about 6% lower in receivers, which speaks of a strong substitution between
external debt and intra-group loans in these firms. Overall, the evidence is consistent with the financing advantage hypothesis.

There is a vast literature on business groups, although less so on intra-group loans. In one of the recent studies, Jiang, Lee, and Yue (2010) argue that the controlling shareholders of Chinese groups use these loans mostly for tunneling. On the other hand, Gopalan, Nanda, and Seru (2007) argue that intra-group loans in India obey the financing advantage logic, as these loans reduce the likelihood of bankruptcy in affiliated firms. We contribute to these papers by showing that, while tunneling can be a concern at the margin, groups also use intra-group lending to alleviate financial constraints and increase investment in some firms.

Other papers in the literature study the financing advantage and tunneling aspects of business groups in a variety of settings. Tunneling has been shown in private placements of equity (Baek, Kang, and Lee, 2006), mergers and acquisitions (Bae, Kang, and Kim, 2002; Cheung, Rau, and Stouraitis, 2006), dilutive equity offerings (Atanasov, Black, Ciccotello, and Gyoshev, 2010), privatizations (Atanasov, 2005), dividend payments (Faccio, Lang, and Young, 2001), and board compensation (Urzúa I., 2009).

In terms of the financing advantage, Almeida, Park, Subrahmanyam, and Wolfenzon (2011) show that groups use internal revenues to set up or acquire capital intensive firms, which are more likely to be constrained in financial markets (see also Belenzon, Berkovitz, and Rios, 2013). Similarly, Gopalan, Nanda, and Seru (2013) find that firm investment is partly financed by the dividends of other firms in the group. Many papers explore the investment-cash flow sensitivities of group and non-group firms (Hoshi, Kashyap, and Scharfstein, 1991; Lee, Park, and Shin, 2009; Shin and Park, 1999). Recently, Almeida and Kim (2012) study the investment of Korean
chaebol and non-chaebol firms after the Asian financial crisis. They argue that the differences in investment can be attributed to the active use of internal capital markets. Because of data availability most of these papers focus on the outcome of internal capital markets (investment), rather than the underlying flows of capital. Testing the mechanism with data like ours is important for understanding the differences in behavior between group and non-group firms.

We also make a contribution to the literature on internal capital markets by focusing on the interplay between internal and external capital markets. While the theoretical literature on internal capital markets is focused on the case of conglomerates with fully owned subsidiaries (see Stein, 2003, for a survey), firms in business groups can be separately listed in the stock market and issue debt independently. As a consequence, the internal capital markets of business groups can have capital structure effects that are absent from conglomerates. The presence of debtholders and minority shareholders in different layers of the control pyramid also implies that the welfare and efficiency implications of intra-group loans are more complicated than in conglomerates. For example, it could be optimal, from the standpoint of investment efficiency, to engage in winner picking in conglomerates (Stein, 1997), but the redistribution of funds between firms in a business group can benefit a group of debtholders and minority shareholders at the expense of others. Even if firms that provide loans have poor investment opportunities, and therefore relatively low ROE, it is not clear that making intra-group loans is justified. The minority shareholders of those firms can prefer an increase in dividends rather than being lenders to other firms.4

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4 Intra-group loans can also be socially inefficient, even if they are privately efficient, because by retaining earnings business groups can make it harder for stand-alone firms to access funds. This negative externality of business groups is discussed by Almeida and Wolfenzon (2006b).
The rest of the paper is organized as follows. In Section 1 we describe the main hypotheses and empirical predictions. In Section 2 we describe our data in detail. Section 3 presents the main results for the provider-receiver status, and the regressions using pairwise balances of intra-group loans. In Section 4 we look at the effect of the provider-receiver status on firm outcomes. Section 5 describes briefly the regulation of the Chilean market in comparison to that of other emerging markets. Section 6 presents our conclusions.

1. On the motives for intra-group loans

The literature identifies two main motives for intra-group loans: tunneling and financing advantage. In this section we describe the key implications of each hypothesis. Most of the implications that we describe are necessary conditions for a particular hypothesis, but they are not sufficient conditions to rule out the alternative hypothesis. In other words, tunneling and financing can also operate simultaneously as motives for borrowing and lending within groups.

1.1. Tunneling

Tunneling refers to corporate decisions that benefit the controlling shareholder at the expense of minority shareholders (Johnson, La Porta, López-de-Silanes, and Shleifer, 2000). Since Bertrand, Mehta, and Mullainathan (2002) a standard in the literature has been to study the controlling shareholder’s cash-flow rights (CFRs) in relation to corporate decisions. These authors find that the controlling shareholders of Indian groups tunnel significant amounts of profits, in particular via nonoperating
components, from firms in which they have low CFRs to firms in which they have high CFRs (see Siegel and Choudhury, 2012, for a different view).

The tunneling hypothesis has two key implications for intra-group loans. First, following the logic of Bertrand, Mehta, and Mullainathan (2002), loans should go from firms with low CFRs to firms with high CFRs. In other words, intra-group loans tunnel resources away from the firm that lends (as in Jiang, Lee, and Yue, 2010). The controlling shareholder has incentives to do so because he faces a small cost of diversion in the firm in which CFRs are low, and he receives a bigger bang for the buck in the firm in which CFRs are high. Intra-group loans are likely to be accompanied by weak enforcement of payments and soft terms (e.g., interest rates below market rates). For example, Gopalan, Nanda, and Seru (2007) report that the typical intra-group loan in India has an interest rate of zero. Even if the rates on intra-group loans are set at market levels, these loans are more easily renegotiated without incurring in penalties or increases in interest rates.

The direction of the loan is not enough to conclude that tunneling is going on. A second key element is that minority shareholders of the lending firm are harmed by the actions of the controlling shareholder. Harm would be, for example, a fall in ROE or dividends because good projects are left unfunded. This is crucial to assert the abuse of the controlling shareholder, otherwise, intra-group loans can be a harmless business practice used only to manage cash excesses in one firm and cash shortages in another. It is not necessary that intra-group loans cause a fall in ROE.

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5 In theory, intra-group loans can go from firms with high CFRs to firms with low CFRs if the purpose of the loan is to tunnel resources away from the firm that pays the loan. In this case loan payments are enforced and terms are hard (e.g., interest rates above market rates). This intra-group loan allows the controlling shareholder to put a senior claim on the balance sheet of the borrowing firm, which is less costly for him given that his equity claim is small in this company. The interest rate on the loan has to be much larger than the market rate in order for the direction of the loan to be reversed. Regulation can sometimes prohibit such high rates, as it happens in Chile.
because better projects than the loan are left without funding. It could be the case that ROE falls because investment opportunities deteriorate and, precisely for this reason, controlling shareholders are more prone to use the cash flows of these firms to lend to other firms in the group. However, even if there is a selection effect of this type, and investment opportunities are deteriorating, minority shareholders of the lending firm probably prefer an increase in dividends instead of becoming lenders to other firms.

In terms of the receiving firm, both controlling and minority shareholders benefit from the loan through an increase in ROE and dividends. The increase in ROE (and consequently dividends) can come from the operating profits of new projects or via non-operating profits as in Bertrand, Mehta, and Mullainathan (2002).

1.2. Financing advantage

The alternative hypothesis is that intra-group loans are a remedy for underdeveloped capital markets (Khanna and Yafeh, 2007). Market frictions, such as asymmetric information and agency problems, leave firms without financing, or with very expensive financing, which limits their investment and growth.

The financing advantage hypothesis differs from tunneling in that the controlling shareholder is assumed to act benevolently without hurting the interests of minority investors. A benevolent controlling shareholder would lend to other firms if the interest rate on the loan is at least as good as the return on the firm's ongoing projects. In other words, lending firms should not have lower-than-normal ROE or dividends. The financing advantage hypothesis does not make predictions regarding the direction of loans in connection to the CFRs of the controlling shareholder. The
direction of loans depends on the financial constraints of firms within the group (i.e., the difference between investment opportunities and the cost of funding in each firm), which can be independent of the position of the controlling shareholder.\footnote{Existing evidence suggests that firms with low CFRs are more financially constrained than firms with high CFRs, and, thus, are more likely to be recipients of intra-group loans under the financing advantage logic. For example, Almeida and Wolfenzon (2006a) predict that firms with low CFRs are capital intensive firms. Lin, Ma, Malatesta, and Xuan (2011) show that firms with low CFRs face higher costs of debt. Both pieces of evidence suggest that firms with low CFRs are indeed more financially constrained.}

The financing advantage hypothesis has two key implications. First, firms that receive loans should increase their investment and ROE, since alleviating financial constraints is the main reason for the loan. If new investments yield profits after paying interest on the intra-group loan, then earnings increase, and ROE increases as well (since equity is constant).\footnote{It is important to emphasize that we focus on ROE and not ROA (return on assets). We focus on ROE because it is the relevant measure for equityholders. ROE increases with leverage even if ROA is constant (the famous Modigliani-Miller result).} Second, intra-group loans should have important capital structure effects because they represent a cheap source of funds. Group-firms that receive internal loans should be over-levered when compared to stand-alone firms that are similarly constrained (e.g., firms of similar size or capital intensity). Intra-group loans can also crowd-out external debt (i.e., bank debt, bonds, commercial paper, trade credit or others) and reduce the importance of external debt on the balance sheet. This crowding out should lead to a reduction of external leverage (i.e., external debt over assets). However, the crowding out will not be severe enough to reduce the overall level of leverage. Shareholders prefer a higher level of leverage to increase expected ROE.

A first advantage of intra-group loans when compared to other sources of funds is that intra-group loans are easier to renegotiate in case of financial distress. Simply put, intra-group loans are soft loans. This happens because the controlling shareholder is an interested party at both ends of the lending relationship. The
payments on intra-group loans are likely to be postponed in the case of financial distress so there are enough funds to serve other debts and avoid default. This preserves the good reputation of the group and the controlling shareholder in the market (see Gopalan, Nanda, and Seru, 2007, on the negative spillover effects of bankruptcy within groups). This also explains why financial intermediaries are willing to lend to firms with intra-group loans in the first place. A second advantage of internal debt is that it avoids excessive reliance on outside investors, in particular banks, who could monitor the controlling shareholder (Lin, Ma, Malatesta, and Xuan, 2013).

Why using internal debt and not internal equity? Internal debt has the advantage that all of the cash from the firm that lends can be used for the firm that borrows. If the controlling shareholder decides to provide equity financing directly he can only contribute with his share of dividends from the firm with excess cash. In this regard internal debt shares the advantage of indirect (pyramidal) equity financing (see Almeida and Wolfenzon, 2006a; and Gopalan, Nanda, and Seru, 2013, for the comparison between direct and indirect equity financing). Additionally, equity issues are more complicated than internal debt due to preemptive rights, which are common in many markets in Latin America, Asia and Europe (La Porta, López-de-Silanes, Shleifer, and Vishny, 1998). Preemptive rights, by which old shareholders have the option to subscribe new equity issues, imply that internal equity cannot be increased without the potential interference of external shareholders. For both of these reasons, internal loans are more convenient than internal equity when it is necessary to alleviate the financial constraint of a firm within the group.
As stated in the beginning of this section, the predictions we explore are necessary conditions for tunneling or the financing advantage motive, but they are not sufficient conditions. In other words, evidence consistent with a particular prediction does not immediately rule out the alternative interpretation. Therefore, it is important to look at the entire set of predictions to avoid misinterpretation. For example, we could find that firms invest more after they receive intra-group loans, which is consistent with the financing advantage hypothesis, but new investment can be in pet projects that produce only private benefits for the controlling shareholder, i.e., a form of tunneling. Pet projects that do not produce real profits should reduce the ROE of the firm that receives the loan, while ROE should go up under the financing advantage hypothesis. In this case, checking the ROE of the firm that borrows can help us distinguish the financing motive from tunneling. Alternatively, we could find that loans go from low CFR firms to high CFR firms, as predicted by the tunneling hypothesis. But if the ROE or the dividends of the lending firm do not fall as a consequence of the loan, and therefore if minority shareholders do not lose from the intra-group loan, it is possible that the loan is motivated by the financing advantage instead of tunneling. These examples highlight the need to look at several pieces of evidence simultaneously instead of one piece of evidence in isolation.

2. Data

2.1. Background on the Chilean market
We benefit in this paper from the unique recent history of Chile that has shaped the regulation of internal capital markets. In 1970, communist Salvador Allende became the country’s president. His government nationalized Chile’s largest private corporations in mining, services, industry, and banking. For example, by 1973 the government represented 85% of the output of the financial sector, 70% of communications, and 100% of utilities (Larrain and Meller, 1991, and Lüders, 1993). The military coup in September of 1973 put an abrupt end to this process. General Augusto Pinochet’s government started a privatization process. Only a few private agents were able to participate, leading to the concentration of ownership and the subsequent formation of business groups (Meller, 1993). The government even provided financing for the acquisition of some companies (Lüders, 1988).

In 1981 another crisis hit the country. U.S. interest rates increased sharply, affecting international net borrowers like Chile. External credit halted, local interest rates went over 40% (Larrain, 1989), and terms of trade fell, all of which severely hit local business groups. Business groups were heavily indebted, with the government and with group-affiliated banks, which aggravated the crisis. For example, the two largest banks that were subsequently intervened by the government (Banco Santiago and Banco Chile) had 42.3% and 18.6% of their lending portfolios in firms that were part of the same groups (Larrain, 1989).

As a consequence of the crisis the government implemented a strict approach towards business groups (Khanna and Rivkin, 2006). Chile’s stock market regulator, the Superintendencia de Valores y Seguros (hereafter, SVS), began tracking the composition of major business groups in the country.8 Since then, ownership links are publicly disclosed, related party transactions are recorded in the financial statements

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8 A clear example of how the SVS tracks business groups can be seen in the SVS’s website (http://www.svs.cl/sitio/mercados/grupos.php). The website shows the list of firms affiliated to each business group since 2002. Before 2002 the list was available in reports from the SVS.
of every company, and they have to be reported to the SVS in a timely fashion. The law also requires related loans to be made at the prevailing market interest rate.

The legal prohibition on cross-holdings, which simplified significantly the configuration of Chilean control pyramids, was also introduced in the aftermath of the crisis. Besides disclosure requirements, other corporate regulations in the Chilean market include preemptive rights and mandatory dividends. These are common features of many emerging markets (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998). Preemptive rights allow shareholders to subscribe new equity issues at pro rata to avoid forced dilution. A mandatory dividend of 30% of earnings is also part of the Chilean regulation. The board of the company can decide to pay extraordinary dividends above this threshold.

2.2. Data on internal capital markets

Since the mid 1980s, every listed firm reports a line called “notes and accounts receivable from related companies” on the asset side of the balance sheet. A similar line on the liability side contains notes and accounts payable to related companies. We define net intra-group loans for a given firm as the difference between these two lines in the balance sheet. We collect this information for Chilean companies between 1990 and 2009. We focus on non-consolidated financial statements since any transaction between related parties disappears whenever a firm consolidates its statements with another company (as the transaction is both on the asset side and the liability side of the consolidated entity).

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9 By cross-holding we refer to situations in which firm A has an ownership stake in firm B and firm B has an ownership stake directly in firm A, or through a third firm C, thus creating a loop. The prohibition of cross-holdings in Chile can be found in article 88 of Ley de Sociedades Anonimas.
In Fig. 1 we provide a stylized example to get a grasp of our data. Assume a pyramidal group with seven firms (A through G). Firm A (a listed firm) lends to firm B, and receives a loan from firm C. Regardless of whether firms B and C are public or private firms, the balance sheet of firm A provides information on these loans as long as they are related to firm A through ownership links. The loan to firm B ($L_{AB}$) is considered an account receivable in firm A, and the loan from firm C ($L_{CA}$) is considered an account payable in firm A. Assume that firm A also lends to firm E and receives a loan from firm F. The balance sheet of firm A reports total accounts receivable of firm A ($= L_{AB} + L_{AE}$) and total accounts payable of firm A ($= L_{CA} + L_{FA}$). The balance sheet does not give direct information on the split between these different loans. For example, from the balance sheet we do not know whether the loan to firm B is larger or smaller than the loan to firm E. In fact, we do not even know the identity of firms B and E. Net intra-groups loans for firm A correspond to the difference between these two lines of the balance sheet ($= L_{AB} + L_{AE} - L_{CA} - L_{FA}$).

With the balance sheet we get only halfway through in terms of identifying relevant data about internal capital markets. The main disadvantage of the balance sheet is that it pools together many different loans into a single line. We can dig deeper by looking at the notes to financial statements, which the SVS compiles electronically since 2001. The notes provide detail on specific loans, identifying the related firm that extends the loan and the one that receives the loan. For instance, in our example above, we are able to identify firms B and C through the notes of firm A. If, say, firm B is a public company, then we can match both ends of the loan to firm-level characteristics reported in financial statements. Most of these loans,

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10 Chilean regulation requires that firms related not only through ownership links (e.g., firms that share a common director, although they are in different business groups) report transactions between them. These transactions tend to be very small compared to intra-group transactions.
however, involve privately-held firms that typically do not report financial statements and that are outside the scope of the SVS. When we study both ends of a lending relationship we restrict our attention to loans between listed firms since there is no data set covering private firms in Chile. The notes do not report the interest rate or the maturity of intra-group loans, although annual reports sometimes do.

Fig. 2 provides an example taken from our data. Fig. 2A shows the structure of the Chilean group controlled by the Luksic family, and Fig. 2B shows its internal capital markets. As can be seen in Fig. 2A, by 2008 the Luksic group controlled nine listed firms, ranging from the largest brewery in Chile (CCU), to a vineyard (Viña San Pedro), a phone company (Telsur), and a manufacturing conglomerate (Madeco), plus a multitude of private firms. The pyramidal structure is straightforward. For example, the family controls 82.11% of Quiñenco (the listed holding company), which controls 50% of Inversiones y Rentas (unlisted), which in turn controls 61.67% of CCU (listed). Fig. 2B shows the net intra-group loans of these companies as fraction of their non-consolidated assets. The largest net loan position between listed firms is the one between Telefónica Coyhaique and Telsur, which accounts for 34.35% of Telefónica Coyhaique’s assets. Quiñenco, the holding company at the top of the pyramid, provides many small loans that together account for almost 15% of its assets.

Table 1 shows examples of loans between public firms in our sample, and the specific amounts and conditions involved in each case when we are able to find them. For instance, Madeco, of the Luksic group, received in 2001 a loan of approximately USD 7.9 million from its parent company, Quiñenco, which was due in 2010. The
annual interest rate on this loan was equal to inflation, plus the Chilean-equivalent of the LIBOR, plus a spread of 1.75\%.$^{11}$

2.3. **Financial and ownership data**

Financial and accounting data for all firms is taken from *Economatica*, a data set that covers publicly-traded companies in Latin America. Financial firms such as banks, insurance companies, or private pension funds are excluded from our sample. Our tests require an intimate knowledge of the ownership links between group-affiliated firms, which are not reported in standard data sets. The SVS requires all listed firms to provide the name of their twelve largest shareholders in annual reports. However, this information is in itself of little help for identifying the ultimate controlling shareholder (typically a family or a tight group of individual investors), as the twelve largest shareholders are almost always other companies—some of them listed, some private. We check the annual reports by hand to understand the web of companies connected through the pyramidal structure of each group. Annual reports typically explain whether control is exercised by the controlling shareholder through one holding company that owns all of the shares, or alternatively through several firms related to the controlling shareholder. This allows us to track the ownership links until we arrive to the ultimate controlling shareholder, even if control is exerted through private companies. We do not miss firms, which are indeed part of a group, only because they are controlled through private firms.

We define a business group as two or more listed firms, plus potentially many more private firms intertwined with these listed firms, that are controlled by the

$^{11}$ Indexation is widespread in the Chilean debt market.
same controlling shareholder. As Khanna and Rivkin (2006) conclude in their study of Chilean business groups, overlap in owners is a strong delineator of group boundaries. In a pyramidal group the controlling shareholder exerts control of some of the listed firms through other listed firms. Not all groups are pyramids, but pyramids certainly represent the most relevant groups in our sample. On average, pyramidal groups are 4 times larger (in terms of book assets) than non-pyramidal groups, they have more affiliated firms, and these firms are more diversified across industries. About 2/3 of the groups are pyramids, but since pyramids have more firms, they represent an even larger fraction of the universe of listed firms. The 19 pyramids in our sample represent approximately 60% of the stock market capitalization of the Chilean market. The average pyramid has 5 listed firms and multiple private firms. The pyramid with most public firms has 11, while there is only one pyramid with just two listed firms.

Throughout the paper we focus on pyramidal groups for two reasons, besides their relevance in terms of number and size. First, there is recent theoretical interest on the advantages and disadvantages of pyramids vis-a-vis other organizational structures in business groups (Almeida and Wolfenzon, 2006a, Gopalan, Nanda, and Seru, 2013). Second, pyramids create a potentially large divergence between voting and cash flow rights of the controlling shareholder and this provides an important incentive for tunneling (Claessens, Djankov, Fan, and Lang, 2002). Focusing on pyramidal groups means that we look for tunneling precisely in those places where it is most likely to happen according to previous literature, therefore it constitutes a strong test for tunneling.

12 Throughout the paper we focus the empirical tests on firms in pyramidal groups. However, the results are basically the same if we run the regressions with firms in business groups in general, i.e., bunching together pyramidal and non-pyramidal groups.
We illustrate our methodology for computing control and cash-flow rights of the controlling shareholder with CCU from Fig. 2. This firm is controlled through a cascade that involves one listed company (Quiñenco) and one private company (Inversiones y Rentas). This private firm is nominally the largest shareholder of CCU, and ultimately gives the Luksic family control over 61.67% of the votes (shares) in CCU. We compute cash-flow rights, i.e. the fraction of dividends the controlling shareholder receives, by multiplying all ownership stakes in the pyramidal chain. Considering the links reported in Fig. 2A, the claim of the Luksic family on CCU’s dividends is 25.62% (=82.11% x 50% x 61.67%). The cash-flow rights of the controlling shareholder are closely linked to the position of the firm in the control pyramid. Cash-flow rights decrease as we move closer to the base of the pyramid since more dividends go to minority shareholders in the different layers of the pyramid. In other words, there are “leaks” along the way as dividends go from the base of the pyramid up to the controlling shareholder. The example of CCU implies a 36.05% (=61.67% - 25.62%) separation between control and cash-flow rights. The separation of control and cash-flow rights is common in our sample, as in many other places, for instance, East Asia (Claessens, Djankov, and Lang, 2000), Europe (Faccio and Lang, 2002), and the U.S. (Villalonga and Amit, 2009).

We are able to track the composition of business groups between 1990 and 2009. To the best of our knowledge, such a long panel on ownership structures is hard to assemble in other countries, even in the U.S. For instance, Helwege, Pirinsky, and Stulz (2007) use a 16-year sample (1986-2001) in their study on ownership dynamics in the U.S. Almeida, Park, Subrahmanyam, and Wolfenzon (2011) collect data on the structure of Korean business groups for seven years (1998-2004). It is important to note that our panel takes into account how groups change.
over time as they add and divest firms. In other words, we do not assume a fixed structure of groups throughout the sample period. For example, the Luksic group (Fig. 2) added San Pedro in 1991 and Quiñenco (the holding firm at the top of the pyramid) in 1996.

3. Providers and receivers of intra-group loans

We first study the identity and characteristics of the firms that provide and that receive intra-group loans. We proceed in two steps: we start with firm-level balances of intra-group loans from the balance sheet of every firm, and then we use information from the notes to financial statements about pairs of firms with a lending relationship. In the next section we study the consequences of intra-group loans in terms of observable outcomes such as profitability, dividend payments, and investment.

3.1. Evidence from firm-level balances

Table 2 reports summary statistics for the main variables in our analysis. On average, net loans represent 1.58% of book assets (individual, non-consolidated assets). This could seem small, but there are some big loans as suggested by the large standard deviation (13.29%). Cash-flow rights (CFRs) are on average high (47.94%) when compared to pyramids in some countries such as Korea, but this is not an anomaly as shown by Almeida and Wolfenzon (2006a).
We define providers (receivers) of intra-group loans as those firm-year observations with net intra-group loans larger (smaller) than 5% (-5%) of book assets. Approximately 20% of firm-year observations are labeled as providers and 12% as receivers. There are several explanations for the higher frequency of providers. First, private firms are more frequently receivers, but since we do not observe their balance sheets they are not counted in these statistics. Private firms are more likely to be receivers since listed status is related to access to external financing (Faulkender and Petersen, 2006). Second, intra-group loans can be intended for a few firms in the group, while the origination of the loan can be spread out among many firms.

The provider-receiver status has some persistence. A simple regression of the provider dummy on its own lag gives an autocorrelation coefficient of about 0.60 (similarly for receivers). There are, however, notable transitions from receiver to provider and also in the other direction. For example, Quiñenco, the holding company of the Luksic group in Fig. 2, was a receiver during the mid 1990s and it became a provider in the 2000s. In the same group, CCU was a provider during the early 1990s and it became a receiver in 1998 during the Asian crisis, and again in the mid-2000s. The fact that there is persistence in the provider-receiver status highlights the importance of having a long sample period like the one we have in this paper. Transitions allow us to distinguish between time-invariant firm characteristics and the effects of intra-group loans.

In Panel B of Table 2 we show differences in firm characteristics between providers and receivers. Crucially for the tunneling hypothesis, the controlling shareholder has higher CFRs in receivers than in providers. The difference in CFRs between the two is close to 10% (=50.26% - 40.44%). Receivers are in general
smaller, more capital-intensive (higher PPE/assets), and with more investment opportunities as measured by Tobin’s Q. These characteristics suggest that receivers are more financially constrained. However, receivers are also more profitable (higher ROE or net earnings over book equity) and pay more extraordinary dividends (dividend payments above the mandatory 30% of earnings.), which suggest the opposite. In line with the financing advantage hypothesis, receivers of intra-group loans invest more than providers.

Pyramid firms that are neither providers nor receivers have characteristics that fall, in general, in between providers and receivers. For example, average ROE of non-providers/non-receivers is 10.61%, while the average for providers is 8.71% and 16.64% for receivers. Something that we confirm later on in the multivariate analysis is that the difference between the ROE of providers and the ROE of other pyramid firms is much smaller than the difference between the ROE of receivers and other pyramid firms. Something similar happens with extraordinary dividends.

Most of the characteristics of non-pyramid firms also fall between providers and receivers, although non-pyramid firms are smaller and slightly less profitable on average than pyramid firms. Since non-pyramid firms are not organized as pyramids, the average CFRs of the controlling shareholder are higher (almost 67%).

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13 Throughout the paper we use the standard measure of Tobin’s Q, i.e., the market value of equity plus the book value of debt, everything divided by book assets. One potential concern is that equity interlocks contaminate this standard measure as proxy for investment opportunities. As a robustness check we adjust Tobin’s Q with a methodology similar to Morck, Nakamura, and Shivdasani (2000). They work with Japanese data in which equity interlocks are prevalent. We subtract from the market value of equity an estimation of the market value of shares held in other firms. To do so we divide the book value of shares held in other firms (available from the balance sheet) by the aggregate book-to-market ratio of the Chilean market each year. The adjusted Q is highly correlated with the standard Q (the correlation coefficient is approximately 0.90), which is probably due to the fact that equity interlocks are less of a concern in Chile since cross-holdings are prohibited by law. Given the high correlation of both measures, the main results in the paper are not affected by the measure of Tobin’s Q that we use. We present results with the standard Q unless noted.

14 Non-pyramid firms include firms in non-pyramidal groups and stand-alone firms.
Net loans in these firms represent mostly loans to private firms (fully-owned subsidiaries) that are associated with the listed firm.

In Table 3 we explore the CFRs of the controlling shareholder in more detail. We split firms according to their position in the control pyramid. To determine the position of the firm in the pyramid we count the number of public firms between the controlling shareholder and the firm under study. Firms in the second row of the pyramid are controlled though another public firm instead of directly by the controlling shareholder. For example, in the case of the Luksic group in Fig. 2, Quiñenco is in the first row, Madeco is in the second row, and Indalum is in the third row. An extreme view of tunneling is that all providers should be at the bottom of pyramids (firms with relatively low CFRs) and all receivers at the top (firms with relatively high CFRs). We find, instead, that providers and receivers are present in all levels of pyramids. In fact, the frequency of receivers seems to increase with pyramidal position. For example, 34.6% of the firms in the fourth level of pyramids are receivers, while only 6.8% of the firms in the first row are receivers. The frequency of providers is almost evenly distributed across layers of the pyramid. However, it is still true that, conditional on the position in the pyramid, providers are firms with lower CFRs than receivers (Panel B in Table 3). The exception is the first line of pyramids in which providers and receivers have the same CFRs (62%).

In Table 4 we show the difference in CFRs between providers and receivers in some of the pyramids in our sample. For example, in the Angelini pyramid, providers have, on average, CFRs of 45% and receivers have CFRs of 48%. The Angelini pyramid contains Copec—a pulp producer and an oil distribution conglomerate—, which during most of our sample represented the largest public firm in Chile. Providers have lower CFRs than receivers in many pyramids, but the opposite
happens in other cases, for example, in the pyramids of the Claro and Matte families. This shows that the tunneling prediction regarding the direction of loans is far from obvious in the data.

To make a more systematic characterization of providers and receivers within pyramids we conduct a multivariate probit analysis in which \( p_{it} \) is the probability that firm \( i \) becomes a provider (receiver) in year \( t \). This probability is modeled as a function of firm characteristics in the previous year:

\[
p_{it} = \Phi \left( a \text{CFR}_{it-1} + b \left( \frac{\text{PPE}}{\text{Assets}} \right)_{it-1} + c \ln(\text{Assets})_{it-1} + d \left( \frac{\text{EBIT}}{\text{Assets}} \right)_{it-1} + e \text{Q}_{it-1} + \delta_t \right),
\]

(1)

where \( \Phi \) is the cumulative standard normal distribution. Year dummies are represented by \( \delta_t \). We also run an ordered probit model in which the dependent variable takes a number 0 if the firm is a receiver, 1 if the firm is neither a receiver nor a provider, and 2 if the firm is a provider. The main difference between probit and ordered probit is the reference point. In probit the reference point for providers is a mix of receivers and firms that are neither providers nor receivers. The ordered probit, instead, allows us to make a three-way split of firms. The main variable of interest for the tunneling hypothesis is cash-flow rights (CFR) of the controlling shareholder. The other variables in Eq. (1) are firm characteristics typically associated with financial constraints, such as capital-intensity (property, plant, and equipment over assets), size (log of assets), cash flow (EBIT over assets) and Tobin’s Q. As shown by Hadlock and Pierce (2010), size is one of the most robust indicators
of financial constraints. Cash flow and Tobin’s Q are included in the Kaplan and Zingales (1997) index of financial constraints.

High CFRs reduce the chance of being a provider in line with the tunneling hypothesis (columns 1-3 in Table 5). According to the estimates in Column 3, a one-standard-deviation increase in CFRs reduces the chances of being a provider from approximately 20% to 13%. CFRs have a non-significant effect on the chance of being a receiver (Columns 4-6). This can be expected from the summary statistics in Table 2 (Panel B), since receivers and non-providers/non-receivers have almost the same average CFRs. High capital intensity reduces the chance of being a provider and increases the chance of being a receiver. A one-standard-deviation increase in capital intensity reduces the chances of being a provider from 20% to 12%. Large firms are more likely to be providers and less likely to be receivers. The effect of Tobin’s Q is not robust across Table 5. Overall, providers of intra-group loans are firms with relatively low CFRs, but also large firms with lower capital intensity. So far, the evidence about the identity of providers and receivers is consistent with both the tunneling and the financing advantage hypotheses.

3.2. Evidence from firm pairs

In the notes to financial statements we have detailed information regarding loan balances with individual firms in the business group. In terms of the stylized example in Fig. 1, we do not only know the overall balance of intra-group loans for firm A (\(= L_{AB} + L_{AE} - L_{CA} - L_{FA} \)), but also the balances between firm A and B (\(L_{AB} \)), firms A and C (\(L_{CA} \)), and so on. We focus on balances between public firms because we can compute firm characteristics at both ends of the loan. Since financial information is not in general available for private firms, we do not know, for
example, their size or EBIT, and by definition we cannot compute market-related variables such as Tobin’s Q.

We restrict attention to loans that account for at least 0.1% of book assets of the lender, so the sample is not contaminated by very small loans. Firm pairs are only counted once, e.g., we count the pair AB if both firms are listed and if they have an outstanding loan between them, but we do not count the pair BA as a different relationship. Overall, we have approximately 250 observations of intra-group loan balances spread out through nine years of data.

Table 6 shows the average number of intra-group loan relationships for a public firm in the database. The average is 1.53 relationships, with a minimum of one relationship and a maximum of five relationships per firm. One potential concern is that there is little time variation in loan relationships in our sample. To address this concern we report statistics about the creation and destruction of loan relationships in time. We measure creation and destruction by comparing the loan relationships of a given firm in two consecutive years. If firm A was related to firm B in year $t$ and is related to firms B and C in year $t+1$, we count this as one relationship being created. If subsequently firm A is related only to firm C in year $t+2$, we count this as one relationship being destroyed in that year. We do not only count the number of relationships, but also their composition. If firm A was related to B and C in year $t$, and to D and E in $t+1$, we count this as two relationships being destroyed and two being created. Then, we add up creation and destruction for each firm each year, and we average across firms. We find that the average of creation and destruction is 0.38, which means that an intra-group loan is originated or paid in full approximately every two and a half years ($1/0.38 = 2.63$). In other words, there is a significant amount of turnover in loan relationships, so it is not the
case that the same firms always lend to the same borrowers. Given that we have close to 250 pair-year observations, and the average relationship lasts for two and a half years, we can say that we have approximately 100 loan relationships in the sample. A loan relationship can encompass several individual loans of different maturities.

Table 7 reports summary statistics for pairs of firms with and without loan relationships. Pairs without loans correspond to potential combinations of firms within the group that do not report loan balances. We report average balances always from the perspective of the lender (i.e., all loans are positive numbers). The average balance of 4% of assets is above the average of 1.58% reported in Table 2 for at least three reasons. First, balances in Table 2 can be positive or negative so they tend to cancel out across firms; second, they net out loans in opposite directions within firms (e.g., the balance of firm A nets out the loan given to firm B and the loan received from firm C); and finally, they include loans to and from private firms.

Table 7 shows means of differences (in absolute value) between firm characteristics in the pair. On average, firms with a lending relationship are more alike (i.e., differences are smaller) than firms that do not have a lending relationship. For example, the absolute difference in CFRs is 12.7% in pairs with a loan, while it is 26.4% in pairs without a loan. In the logic of tunneling one could expect the difference in CFRs between firms in a lending relationship to be as large as possible. This would reduce the cost of diversion for the controlling shareholder and increase the benefit (if the loan goes from low CFRs to high CFRs, of course). However, the fact that firms in lending relationships are more alike in terms of CFRs suggests that firms tend to borrow from firms relatively close in the pyramid rather than from firms that are farther away (upwards or downwards). Also, pairs with loan
relationships are more alike in terms of size, PPE, and Tobin’s Q than pairs without loans. Pairs with and without loans look similar only in terms of EBIT differences.

We also provide information about product-market relationships between lenders and borrowers. For instance, 45.8% of the pairs that have loans are firms in the same industry, while only 9.2% of pairs without loans are in the same industry.\footnote{Industries are defined at the four-digit level.} It is natural that firms in the same industry trade more between them and give more credit to one another (see, for example, Helpman and Krugman, 1989, on the extent of intra-industry trade).

We include a variable that measures the degree of integration between two industries as in Fan and Goyal (2006). From the U.S. input-output table we compute the fraction of its inputs that the lender’s industry $i$ buys from the receiver’s industry $j$ and the fraction of its output that it sells to industry $j$. We compute the maximum of these two numbers as the integration from $i$ to $j$. Then we compute the same number from the point of view of $j$ to $i$. Our integration variable is the average of these two numbers. For instance, Santa Rita, a winery, is one of the largest clients of Cristalerias Chile, a glass container manufacturer. They both belong to the Claro group (Cristalerias Chile owns 55.1% of Santa Rita). For all years in our sample we observe loans from Cristalerias Chile to Santa Rita. According to the input-output table, the wine-making industry buys 6.2% of its inputs from glass manufacturers, but sells none of its output to that industry. Thus, from the point of view of wine-making, the integration between them is 6.2% (the max between 6.2% and 0%). On the other hand, according to the input-output table, glass manufacturers sell 3.3% of their output to wine makers but none of their inputs comes from that industry. Thus, from the point of view of glass manufacturers, the integration with wine-
making is 3.3%. The average of 6.2% and 3.3% is our global measure of integration between the two industries, and therefore between Cristalerias Chile and Santa Rita in this example. We repeat the same procedure for every pair of firms in the sample. As seen in Table 7, average integration between firms with loans is much higher than between firms without loans (7.8% v 3.4%).

In the spirit of Maksimovic (1990), one could argue that intra-group loans are used to support the strategic position of some firms in their respective markets. The idea is that firms that have some monopoly power receive intra-group loans as a financial deterrent for potential new entrants. According to this hypothesis, we would expect loans to go from firms in more competitive industries to firms in less competitive industries. We approach this idea by computing the difference in the Herfindahl index of the industries in which the two firms in the pair operate. At least preliminary, we find in Table 7 that the differences in the Herfindahl index are smaller in pairs with loans than in pairs without loans. In other words, differences in industry competition do not seem to drive the existence of loans within groups. This is heavily influenced by the fact that many firms with lending relationships belong to the same industry, and therefore the difference in Herfindhal is zero for those pairs.

Finally, in Table 7 we include an indicator for the presence of a holding company in the pair of firms. It can be argued that holding companies manage cash excesses inside the group and provide liquidity to productive firms. We do not count in this dummy indicator those pairs in which both firms are holding companies. We find that 37.8% of the pairs with loans involve a holding company; although a higher fraction of pairs without loans (46.9%) also involve holding companies.

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16 We compute the Herfindahl index as the sum of squares of market shares of total industry revenue for the firms in our sample. We compute the Herfindahl index only for productive industries, i.e., the index is missing for holding companies in the industrial sector called conglomerates.
In Table 8 we show results of a probit regression in which the dependent variable equals 1 if the pair of firms has a lending relationship in that year and 0 otherwise. All potential pairs of firms within each business group each year are included. The explanatory variables are the differences (in absolute value) between firm characteristics presented in Table 7. All of these differences have negative coefficients (except for ΔEBIT, although not significant), meaning that firms that are more alike tend to form lending relationships. The dummy variable for pairs in the same industry is highly significant, as well as the measure of industry integration and the dummy indicator for the involvement of a holding company. The differences in Herfindahl are not significant once we control for the other variables (see Column 9 Table 8).

The analysis in Table 8 allows us to understand what firms have lending relationships, or the extensive margin of intra-group loans. To understand the intensive margin (the size of intra-group loans), we report in Table 9 results from the following OLS regression of net loans between firm $i$ and firm $j$ in year $t$.\(^{18}\)

\[
\frac{(\text{Net Loans/Assets})_{ij,t}}{\text{Assets}} = a \Delta_{ij,t-1} \text{Cash Flow Rights} + b \Delta_{ij,t-1} \left(\frac{\text{PPE}}{\text{Assets}}\right) + c \Delta_{ij,t-1} \ln(\text{Assets}) \\
+ d \Delta_{ij,t-1} \left(\frac{\text{EBIT}}{\text{Assets}}\right) + e \Delta_{ij,t-1} Q + \delta_t + \epsilon_{it},
\]

(2)

where the operator $\Delta_{ij,t-1}$ represents the difference (not in absolute value) for a given variable between firm $i$ (lender) and firm $j$ (borrower) in year $t-1$. The difference

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\(^{18}\) We divide loans by total book assets of the provider of the loan. We have checked the robustness of dividing by assets of the receiver, the average assets of the provider and the receiver, and the assets of the firm with higher CFRs, but it does not make a significant difference for the results.
allows us to estimate directly if loans flow, for example, from a firm with low CFRs to a firm with high CFRs, or from a small firm to a big firm, etc. A negative coefficient implies that the borrower has more of the characteristic than the lender. We do not include firm fixed effects in this regression because we do not have enough data points.

In line with previous results, the negative coefficient on the difference in CFRs (Column 1, Table 9) confirms that firms with low CFRs lend more to firms with high CFRs. Together with the results in Table 8, this suggests that we should not expect a firm at the bottom of a pyramid to lend to the firm at the top of the pyramid, but rather to a firm slightly above in terms of cash-flow priority of the controlling shareholder. We also find that loans increase as the capital-intensity (PPE/Assets) of the borrower increases, i.e., coefficient $b$ in the regression above is negative and strongly significant. The negative coefficient $c$ on size implies, counter to our previous evidence, that larger firms receive more loans. However, this coefficient is likely to be contaminated by division bias since the left-hand-side variable is also divided by assets, which can reverse the sign of the coefficient (Borjas, 1980). Finally, the positive coefficient $d$ means that loans increase as the lender has higher EBIT than the borrower.

The first six columns in Table 9 include only pairs of firms with outstanding loans. However, many firms within the same pyramid are not lending and borrowing from each other. In other words, there are many pairs with zero balances. The results so far in Table 9 can be interpreted as the effect of firm characteristics on the direction and magnitude of the loan \textit{conditional on observing a loan}. The potential problem is that pairs with lending relationships can have similar characteristics than pairs without lending relationships, and therefore interpreting the results as
unconditional effects becomes problematic. For example, column 2 in Table 9 shows that lenders tend to be less capital intensive than borrowers. But what if there are important differences in capital intensity in firm pairs in which we do not see a loan? In other words, we cannot be sure that capital intensity is an unconditional predictor of intra-group loans if we do not take into account the pairs without loans between them.19

We approach this issue by running a Heckit model that takes into account the selection bias of considering only pairs of firms with lending relationships. We include in the selection model all the potential pairs of firms within each pyramid each year. We do not include all potential pairs beyond group boundaries or across years. In other words, we do not consider pairs with firms in other groups, or that were part of the group in the past, but were subsequently divested, or with firms that will be part of the group in the future years through acquisitions. We ignore these potential pairs because our focus is on related transactions and not on the more general question of why firms borrow and lend to other (potentially unrelated) firms, for instance through trade credit. This does not imply that the set of potential relationships for each firm is fixed throughout the entire sample period. In fact, the set of potential relationships for each firm changes from year to year if the structure of the pyramid changes through acquisitions and divestures.

Columns 7-12 in Table 9 show the second stage of the Heckit estimation. The first stage of Heckit is a probit model, like the one we show in Table 8, in which the dependent variable is 1 if there is a lending relationship and 0 otherwise. The variables included in this first stage are the same as in Column 9 of Table 8. This implies that we are using the product-market variables, such as the dummy for same

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19 The situation is similar to the one in the international trade literature that studies the determinants of exports and imports. There are many country-pairs with no trade between them and this becomes important for evaluating trade theories (see Helpman, Melitz, and Rubinstein, 2008, among others).
industry or the integration measure, as the source of identification since they are
excluded from the second stage. The second stage is an OLS regression that includes
the differences in firm-characteristics and the inverse of Mill’s ratio to account for
selection bias (Wooldridge, 2002). The results show that the effects of the simple
OLS regression (Columns 1-6, Table 9) are robust to this correction for selection.
The coefficient on Mill’s ratio is generally significant, which implies that correcting
for selection bias is, nevertheless, important.

Overall, the evidence shows that, consistent with tunneling, loans tend to go
from firms in which the controlling shareholder has relatively low CFRs to firms in
which he has high CFRs. However, loans are made between firms that are close in
the pyramid, instead of going straight from the bottom to the top of the pyramid.
Other variables are also crucial for understanding the creation of loan relationships
and the magnitude of the loans. For example, firms in more integrated industries and
within the same industry lend more to each other. Firms with high PPE over assets
tend to receive loans more frequently and they receive larger loans. Something
similar happens with smaller firms. If capital-intensive and smaller firms are more
constrained in financial markets, then this evidence is consistent with the financing
advantage hypothesis. Again, the direction of the loans, i.e., who lends to whom and
how much, is not enough to settle on either tunneling or the financing advantage as
the primary motive for intra-group lending.

4. The real and financial effects of intra-group loans

4.1.  Real effects
After exploring the direction of loans we focus on understanding their real effects. To study the effects of intra-group loans we run OLS regressions of the following type for outcome variable $y_{i,t}$:

$$y_{i,t} = a \text{ Net Receiver}_{i,t} + b \text{ Net Provider}_{i,t} + c \left( \frac{\text{PPE}}{\text{Assets}} \right)_{i,t-1} + d \ln(\text{Assets})_{i,t-1} + e (\text{EBIT/Assets})_{i,t-1} + f \text{Q}_{i,t-1} + \mu_i + \delta_t + \epsilon_{i,t}.$$  

(3)

We study three outcome variables: ROE (return on equity: earnings over book equity), extraordinary dividends, and fixed investment (changes in PPE). Total dividends have a mechanical component because of the mandatory link between dividends and earnings. Extraordinary dividends (i.e., more than 30% of earnings) are up to the board of the company, and therefore represent a true choice variable. Net provider (receiver) is a dummy for the providers (receivers) of intra-group loans as identified in Section 3.a. Firm fixed effects, represented by $\mu_i$, are included in all OLS regressions although the results are robust to excluding them. Standard errors are clustered at the firm level in all OLS regressions.

It is important to comment on the benchmark firm implicit in regression (3). By benchmark we refer to the hypothetical firm to which we compare receivers and providers to see if there are significant differences in outcomes. The benchmark has to be kept in mind if we say, for example, that ROE is abnormally high or low in receivers or providers. First of all, the regression compares receivers and providers with the average non-receiver and non-provider firm in a pyramid, adjusted for observable characteristics such as size, Tobin’s Q, and others. When firm-fixed effects are included, the implicit benchmark is the previous average firm, which
moves in time, refined by the time-invariant average of each firm. The benchmark is different when we include non-pyramid firms in the regression, as we do later on.

In Table 10 we find that being a receiver has a significant positive effect of 3.4% on ROE (Column 2). The impact on ROE of being a provider is of the same magnitude as the effect of being a receiver, although in the opposite direction and with lower statistical significance. When we include both dummies together (for providers and receivers) the effect for receivers remains significant at the 10% level, while the effect for providers becomes insignificant. Statistically speaking, the ROE of providers is no different from the ROE of non-providers and non-receivers. Therefore there is no support in this test for the idea that providers suffer with intra-group loans as the tunneling hypothesis predicts.

Extraordinary dividends are defined as the amount of dividends paid during the year minus the mandatory 30% of earnings. This dependent variable is censored at zero and consequently the Tobit methodology is appropriate (Gopalan, Nanda, and Seru, 2013). As seen in Table 10, there is some positive effect of receivers on extraordinary dividends, although the coefficient is significant only at the 10% level. There is no robust association between extraordinary dividends and providers of intra-group loans.

We find strong and significant effects in investment, particularly for receivers, which is consistent with the financing advantage hypothesis. In the last column of Table 10 we see that the rate of investment is 2.1% higher (significant at 1%) if the firm is a receiver and 1% lower (not significant) if the firm is a provider.
Fig. 3 presents an event study for firms that become receivers or providers of intra-group loans.\textsuperscript{20} Year 1 is the year that the firm becomes a receiver or provider, and we look into the future up to year 3. We normalize all variables for their pre-event level (year -3). For each event year we average across all firms in each category. The effects are in line with the regressions: receivers increase ROE, dividends, and investment, while the opposite effects for providers are weaker. The results are consistent with the idea that receivers and providers are not always different firms, but they become different at the time of the intra-group loan. In other words, our results are not the consequence of time-invariant selection, but firms indeed change around the time of intra-group loans.

Next we try similar regressions as those in Table 10, but including non-pyramid firms in the sample. Non-pyramid firms can potentially introduce biases because of forms of heterogeneity that we cannot capture with the regression specification. However, it is still an interesting question whether the differences observed in Table 10 are noticeable only among pyramid firms or if they are also seen when receivers and providers are compared to the entire universe of listed firms. The new regression, which is analogous to Eq. (3), includes a dummy for pyramid firms and the interaction of the receiver and provider dummies with the pyramid dummy. The pyramid dummy controls for the average effect of belonging to a pyramid. However, this average effect is absorbed by the firm fixed effects when they are included (only in OLS, not in Tobit). The provider-receiver dummies are defined only within pyramids, therefore the interaction of these dummies with the pyramid dummy is nothing more than adding zeros for all non-pyramid observations.

\textsuperscript{20}This figure requires time series variation in the provider-receiver status of the firm, and some years before and after the event, hence it represents only a subset of the firms contained in the regressions in Table 10.
The results in Table 11 confirm the results within pyramids in Table 10. There is no evidence that providers suffer from lower ROE or pay lower extraordinary dividends. Receivers, on the other hand, pay more extraordinary dividends. Consistent with Faccio, Lang, and Young (2001), we find that pyramid firms pay more extraordinary dividends on average, as captured by the positive coefficient on the pyramid dummy in Columns 6 through 10 in Table 11. The effects on investment are as strong as before in statistical terms, and of similar magnitude.

4.2. Capital structure effects

In this section we study the effects on capital structure of being a provider or receiver of intra-group loans. Leverage is defined as the ratio of total book debt to total book assets. Total debt includes financial debt (bank debt, bonds, commercial paper, etc.) and net intra-group loans. External leverage considers only the ratio of financial debt to total book assets.

In Table 12 we find that receivers of intra-group loans have a higher leverage ratio than other pyramid firms by 8.7 percentage points (Column 5). This effect controls for other variables typically used in the capital structure literature (Rajan and Zingales, 1995). The effect is not mechanical since firms can in principle substitute external debt for intra-group loans and end up with the same leverage as before. In fact, there is no noticeable effect on leverage of being a provider. However, leverage hides an interesting effect in composition. Receivers have lower external leverage than other firms, while providers have higher external leverage. The average

\[21\] We find the same signs in the coefficients of the control variables as Rajan and Zingales (1995), except for the positive coefficient on Tobin’s Q.
external leverage among pyramid firms is 12.79% (Table 2); therefore the reduction in external leverage of 5.5% (Column 10, Table 12) for receivers is economically large. Fig. 3 illustrates these patterns for receivers and providers throughout the sample period. Table 13 shows regressions of leverage ratios including non-pyramid firms, which more than doubles the sample size. Again, the results go in the same direction as the regressions within pyramids, and statistical significance increases.

The results in Tables 12 and 13 can be summarized as follows. Firms that receive intra-group loans reduce the amount of debt taken from standard sources of funds such as banks or bondholders. However, once we add up the internal debt, these firms appear to be more highly levered than comparable pyramid and non-pyramid firms. The fact that total leverage goes up can explain in part the increase in ROE previously shown. At the same time, the fact that providers of intra-group loans do not seem to modify their total leverage also fits well with their sustained level of ROE. All of these effects are consistent with the financing advantage hypothesis.

5. Discussion

The previous analysis suggests that business groups in Chile are not expropriating minority shareholders through intra-group lending, at least not on average. We believe this is related to the level of regulation and disclosure to which intra-group loans are subject in the Chilean market. As already mentioned, most of the regulation of intra-group loans was put in place after the crisis of the early 1980s.
The policy makers of the time identified intra-group loans as culprits for the fragility of the Chilean market and decided to regulate them strictly.

There are three features of the Chilean regulation that stand out in comparison to other markets. In this section we briefly comment on these features in relation to other emerging markets. First, Chilean law requires full disclosure of all related loans. Each related loan is reported in the notes to financial statements and the aggregate amounts are reported as separate lines in the balance sheet. This allows investors to easily identify intra-group loans, which is not straightforward in other markets. In China, for example, related loans are muddled together with other transactions in a generic line called “other receivables”. According to Jiang, Lee, and Yue (2010), most of these other receivables correspond to related loans, but this is not necessarily apparent to outside investors. In Hong Kong, related transactions that amount to less than HK$1 million or 3% of the book value of net tangible assets, whichever is highest, are not subject to disclosure requirements (Cheung, Rau, and Stouraitis, 2006). Many loans below the 3% threshold, which is a sizeable amount, are disclosed in the Chilean market, but would not be disclosed in Hong Kong.

Second, Chilean regulation requires related loans to be made at the prevailing market interest rate. As seen in Table 1, loans in Chile have competitive interest rates, many times defined in terms of a spread over inter-bank rates and including a compensation for inflation. Intra-group loans in other markets often have interest rates of zero. For example, Gopalan, Nanda, and Seru (2007) show that 80% of intra-group loans have no interest obligations in their sample of Indian firms.

Third, transactions between related parties have to be approved by a board committee presided by an independent director (i.e., a director not related to the
controlling shareholder). Cheung, Rau, and Stouraitis, (2006) show that large related transactions also have to be disclosed and approved by a shareholder meeting in Hong Kong. However, they also show that many exceptions allow controlling shareholders to circumvent the shareholder approval and obtain a waiver for some of the requirements.

We believe that the combination of these measures makes tunneling through intra-group loans much harder in Chile than in other countries. This is not to say that Chilean regulation is perfect in other respects. In fact, Djankov, La Porta, López-de-Silanes, and Shleifer (2008) find that the overall level of investor protection in Chile is below the level of many developed markets, in particular markets of the common law tradition. Tunneling can occur in other ways in Chile. For example, Urzúa I. (2009) finds evidence consistent with tunnelling in the compensation of Chilean corporate boards. However, the amounts involved in board compensation are likely to be smaller than in intra-group lending.

6. Conclusions

We study business groups’ internal capital markets using a unique data set on intra-group lending in Chile between 1990 and 2009. Lending relationships are formed by firms that are close to each other in the control pyramid. Also, firms that belong to the same industry, and firms in more integrated industries, tend to form lending relationships. At the margin, firms in which controlling shareholders have high cash-flow rights receive more loans than other firms. However, loans do not
typically go from the bottom of the control pyramid straight to the top of the pyramid, as tunneling suggests. Capital-intensive and small firms tend to receive more intra-group loans than other firms. The receivers of intra-group loans increase investment strongly, and to a lesser extent ROE and extraordinary dividends. Receivers are more levered than other firms, but have lower external leverage. On the other hand, there is little evidence that providers of intra-group loans behave differently than other firms except for the fact that they invest less and they have higher external leverage. Overall, this evidence is consistent with the financing advantage hypothesis, but less so with tunneling. The key missing link in favor of tunneling is a clear sign of underperformance in firms that provide internal loans. In other words, there is no conclusive evidence that the controlling shareholder hurts minority shareholders of the lending firm by directing intra-group loans to firms in which he has high cash-flow rights.

The interpretation under the financing advantage hypothesis is that business groups allow firms to increase their debt levels beyond the levels permitted by financial markets. Subject to less stringent financial constraints, these firms can invest more and increase ROE and dividends. The Chilean regulation of intra-group loans is stronger than in other emerging markets such as China or India. Therefore, our results are consistent with the idea that better regulation can reduce the risk of expropriation in the internal capital markets of pyramids without canceling their financing benefits.
References


This table reports terms for a sample of intra-group loans. Loan terms are obtained from the annual reports of the companies and loan sizes are taken from Superintendencia de Valores y Seguros (SVS). Loans are reported in millions of Chilean pesos (MMCLP) and their equivalent in millions of US dollars (MMUS).

<table>
<thead>
<tr>
<th>Lender &amp; Borrower</th>
<th>Main Industry</th>
<th>Year</th>
<th>Terms of the Loan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emel &amp; Eliqsa</td>
<td>Electricity</td>
<td>2001</td>
<td>Long term loan. Annual interest rate = inflation + 6.76%. Loan size: MMCLP$8,450 (MMUS$12.6)</td>
</tr>
<tr>
<td>Emel &amp; Elecda</td>
<td>Electricity</td>
<td>2001</td>
<td>Long term loan. Annual interest rate = inflation + 6.76%. Loan size: MMCLP$11,303 (MMUS$16.9)</td>
</tr>
<tr>
<td>CCU &amp; San Pedro</td>
<td>Beverage products</td>
<td>2002</td>
<td>Short term loan. Annual interest rate = inflation + TAB* + 0.35. Loan size: MMCLP$5,917 (MMUS$8.4).</td>
</tr>
<tr>
<td>Nortegrande &amp; Oroblanco</td>
<td>Mining</td>
<td>2008</td>
<td>Short term loan. Annual interest rate 7%. Loan size: MMUS$59.</td>
</tr>
<tr>
<td>Quemchi &amp; Navarino</td>
<td>Transportation</td>
<td>2001</td>
<td>Short term loan. Annual interest rate = inflation + 5.01%. Loan size: MMCLP$762 (MMUS$1.1). Expiration date: March 2004.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2009</td>
<td>Short term loan. Market interest rate. Loan size: MMCLP$7,463 (MMUS$14.9)</td>
</tr>
</tbody>
</table>

* The TAB is a fixed-rate equivalent to LIBOR for Chile.
Table 2
Summary Statistics for Main Variables
Panel A reports summary statistics for characteristics in pyramid firms. Variables include: net intra-group loans over total assets, cash flow rights of the controlling shareholder, property, plant, and equipment (PPE) over total assets, the natural logarithm of total assets, EBIT over total assets, Tobin’s Q (market equity plus book debt over book assets), ROE (earnings over book equity), leverage (total debt over book assets), external leverage (financial debt over book assets), extraordinary dividends (dividends over total assets for those firms that pay more than 30% of earnings of the past year and zero for the rest), and fixed investment (changes in PPE over the lag of total assets). Panel B presents the average of the previous variables for receivers, providers, and non-provider/receivers in pyramidal business groups, and for non-pyramid firms. We define providers as those firm-year observations with more than 5% of net intra-group loans over total assets, while net receivers are those firm-year observations with less than -5% of net intra-group loans over total assets. All variables except for cash flow rights are winsorized at the 1% level. The sample covers non-financial Chilean firms from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS).

<table>
<thead>
<tr>
<th>Panel A: Pyramid Firms</th>
<th>Number of Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>25th Percentile</th>
<th>Median</th>
<th>75th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Loans / Total Assets</td>
<td>1187</td>
<td>1.58%</td>
<td>13.29%</td>
<td>-0.83%</td>
<td>0.44%</td>
<td>3.88%</td>
</tr>
<tr>
<td>Cash Flow Rights</td>
<td>1243</td>
<td>47.94%</td>
<td>23.08%</td>
<td>0.06%</td>
<td>15.53%</td>
<td>50.07%</td>
</tr>
<tr>
<td>PPE / Total Assets</td>
<td>1187</td>
<td>27.08%</td>
<td>29.62%</td>
<td>0.06%</td>
<td>15.53%</td>
<td>50.07%</td>
</tr>
<tr>
<td>Ln (Total Assets)</td>
<td>1187</td>
<td>18.83%</td>
<td>1.57</td>
<td>17.78</td>
<td>18.75</td>
<td>19.95</td>
</tr>
<tr>
<td>EBIT / Total Assets</td>
<td>1154</td>
<td>4.58%</td>
<td>7.47%</td>
<td>-0.23%</td>
<td>1.95%</td>
<td>8.27%</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>1134</td>
<td>1.27</td>
<td>0.78</td>
<td>0.79</td>
<td>1.08</td>
<td>1.54</td>
</tr>
<tr>
<td>ROE</td>
<td>1216</td>
<td>10.96%</td>
<td>18.16%</td>
<td>5.02%</td>
<td>10.32%</td>
<td>18.16%</td>
</tr>
<tr>
<td>Leverage</td>
<td>1187</td>
<td>25.48%</td>
<td>19.31%</td>
<td>7.34%</td>
<td>24.52%</td>
<td>40.30%</td>
</tr>
<tr>
<td>External Leverage</td>
<td>1068</td>
<td>12.79%</td>
<td>13.66%</td>
<td>0.02%</td>
<td>8.19%</td>
<td>22.09%</td>
</tr>
<tr>
<td>Extraordinary Dividends / Total Assets</td>
<td>1165</td>
<td>5.48%</td>
<td>7.90%</td>
<td>0.00%</td>
<td>2.93%</td>
<td>6.84%</td>
</tr>
<tr>
<td>Fixed Investment</td>
<td>1143</td>
<td>1.10%</td>
<td>5.93%</td>
<td>-0.27%</td>
<td>0.00%</td>
<td>1.32%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Pyramid and Non-Pyramid Firms</th>
<th>Means for Pyramid Firms</th>
<th>Means for Non-Pyramid Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providers</td>
<td>Receivers</td>
<td>Non-Providers/Non-Receivers</td>
</tr>
<tr>
<td>Net Loans / Total Assets</td>
<td>17.61%</td>
<td>-19.53%</td>
</tr>
<tr>
<td>Cash Flow Rights</td>
<td>40.44%</td>
<td>50.26%</td>
</tr>
<tr>
<td>PPE / Total Assets</td>
<td>19.77%</td>
<td>39.60%</td>
</tr>
<tr>
<td>Ln (Total Assets)</td>
<td>19.28</td>
<td>18.55</td>
</tr>
<tr>
<td>EBIT / Total Assets</td>
<td>3%</td>
<td>7.03%</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>1.24</td>
<td>1.45</td>
</tr>
<tr>
<td>ROE</td>
<td>8.71%</td>
<td>16.64%</td>
</tr>
<tr>
<td>Leverage</td>
<td>29.97%</td>
<td>40.68%</td>
</tr>
<tr>
<td>External Leverage</td>
<td>18.62%</td>
<td>7.74%</td>
</tr>
<tr>
<td>Extraordinary Dividends / Total Assets</td>
<td>4.55%</td>
<td>7.89%</td>
</tr>
<tr>
<td>Fixed Investment</td>
<td>-0.04%</td>
<td>3.03%</td>
</tr>
</tbody>
</table>
Table 3  
**Frequency and Average Cash-Flow Rights of the Controlling Shareholder in Providers and Receivers of Intra-Group Loans**

Panel A presents the frequency of providers and receivers at different levels of control pyramids. The position of the firm in the control pyramid refers to the number of listed firms between the controlling shareholder and the firm under study. Firms in the first position are controlled directly by the controlling shareholder. Panel B reports average cash flow rights of the controlling shareholder for providers and receivers. We define net providers as those firm-year observations with more than 5% of net intra-group loans over total assets, while net receivers are those firm-year observations with less than -5% of net intra-group loans over total assets. We perform a t-test for the mean difference between providers and receivers, where significance is *10%, **5%, and ***1%. The sample covers non-financial Chilean firms in pyramidal business groups from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS).

### Panel A: Frequency of Providers and Receivers

<table>
<thead>
<tr>
<th></th>
<th>Provider</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Firms</td>
<td>20.7%</td>
<td>12.2%</td>
</tr>
<tr>
<td>In Position 1 of Pyramids</td>
<td>22.0%</td>
<td>6.8%</td>
</tr>
<tr>
<td>In Position 2 of Pyramids</td>
<td>16.2%</td>
<td>14.4%</td>
</tr>
<tr>
<td>In Position 3 of Pyramids</td>
<td>34.8%</td>
<td>12.9%</td>
</tr>
<tr>
<td>In position 4 or more of Pyramid</td>
<td>29.5%</td>
<td>34.6%</td>
</tr>
</tbody>
</table>

### Panel B: Average Cash Flow Rights of Controlling Shareholder

<table>
<thead>
<tr>
<th></th>
<th>Provider</th>
<th>Receiver</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Firms</td>
<td>0.40</td>
<td>0.50</td>
<td>***</td>
</tr>
<tr>
<td>In Position 1 of Pyramid</td>
<td>0.62</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td>In Position 2 of Pyramid</td>
<td>0.40</td>
<td>0.52</td>
<td>***</td>
</tr>
<tr>
<td>In Position 3 of Pyramid</td>
<td>0.26</td>
<td>0.54</td>
<td>***</td>
</tr>
<tr>
<td>In Position 4 or more of Pyramid</td>
<td>0.08</td>
<td>0.31</td>
<td>***</td>
</tr>
</tbody>
</table>
**Table 4**

**Average Cash Flow Rights of Controlling Shareholders in Providers and Receivers of Intra-Group Loans: Examples of Pyramids**

This table reports the average cash flow rights (CFR) of the controlling shareholder in firms that are providers and receivers of intra-group loans in each pyramid. The sample covers non-financial Chilean firms in pyramidal business groups from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS).

<table>
<thead>
<tr>
<th>Pyramids with CFR providers &lt; CFR receivers:</th>
<th>Average Cash Flow Rights (CFR) in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angelini</td>
<td>Providers: 0.45</td>
</tr>
<tr>
<td>Endesa</td>
<td>Providers: 0.42</td>
</tr>
<tr>
<td>Hurtado-Vicuña</td>
<td>Providers: 0.31</td>
</tr>
<tr>
<td>Luksic</td>
<td>Providers: 0.50</td>
</tr>
<tr>
<td>Soquimich</td>
<td>Providers: 0.20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pyramids with CFR providers &gt; CFR receivers:</th>
<th>Average Cash Flow Rights (CFR) in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES Gener</td>
<td>Providers: 0.20</td>
</tr>
<tr>
<td>Claro</td>
<td>Providers: 0.25</td>
</tr>
<tr>
<td>CGE</td>
<td>Providers: 0.58</td>
</tr>
<tr>
<td>Matte</td>
<td>Providers: 0.51</td>
</tr>
<tr>
<td>Telefonica</td>
<td>Providers: 0.49</td>
</tr>
</tbody>
</table>
Table 5
Probit and Ordered Probit Regressions for Providers and Receivers of Intra-Group Loans

This table presents probit and ordered probit regressions. In the case of the probit our dependent variables are net provider, which is a dummy variable that identifies with a 1 those firm-year observations with more than 5% of net intra-group loans over total assets, and net receiver, defined as a dummy variable that identifies with a 1 those firm-year observations with less than -5% of net intra-group loans over total assets. In the case of the ordered probit our dependent variable is 0 if the observation is a receiver, 1 if the observation is neither a receiver nor a provider, and 2 if the observation is a provider. Our explanatory variables are the lags of cash flow rights, PPE over total assets, the natural logarithm of total asset, EBIT over total assets and Tobin’s Q. All regressions include year dummies and standard errors are robust. All variables except for cash flow rights are winsorized at the 1% level. The sample covers non-financial Chilean firms in pyramidal business groups from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probit</td>
<td>Probit</td>
<td>Probit</td>
<td>Receiver</td>
<td>Receiver</td>
<td>Receiver</td>
<td>Probit</td>
<td>Probit</td>
<td>Probit</td>
</tr>
<tr>
<td>Lagged Cash Flow Rights</td>
<td>-1.286*** (0.209)</td>
<td>-1.202*** (0.219)</td>
<td>0.062 (0.224)</td>
<td>0.162 (0.260)</td>
<td>-0.765*** (0.174)</td>
<td>-0.828*** (0.195)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged PPE / Total Assets</td>
<td>-0.563*** (0.182)</td>
<td>-0.608*** (0.181)</td>
<td>0.634*** (0.191)</td>
<td>0.627*** (0.190)</td>
<td>-0.579*** (0.138)</td>
<td>-0.602*** (0.140)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged Ln(Total Assets)</td>
<td>0.115*** (0.031)</td>
<td>0.086*** (0.031)</td>
<td>-0.086** (0.034)</td>
<td>-0.081** (0.035)</td>
<td>0.106*** (0.025)</td>
<td>0.084*** (0.025)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged EBIT / Total Assets</td>
<td>0.007 (0.961)</td>
<td>-0.572 (0.980)</td>
<td>0.455 (0.945)</td>
<td>0.553 (0.953)</td>
<td>-0.271 (0.773)</td>
<td>-0.683 (0.786)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged Tobin's Q</td>
<td>0.091 (0.070)</td>
<td>0.076 (0.070)</td>
<td>0.152** (0.072)</td>
<td>0.153** (0.072)</td>
<td>-0.014 (0.064)</td>
<td>-0.026 (0.064)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year dummies</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1,195</td>
<td>1,093</td>
<td>1,093</td>
<td>1,157</td>
<td>1,069</td>
<td>1,069</td>
<td>1,195</td>
<td>1,093</td>
<td>1,093</td>
</tr>
</tbody>
</table>
Table 6
Lending Relationships between Listed Firms in Pyramids

This table reports the evolution of the number of lending relationships, and the creation and destruction of these relationships for listed firms in pyramids. A lending relationship is defined as a net loan balance greater than 0.1% of assets of the lending firm for a pair of public firms inside a pyramidal business group. Creation (destruction) means that a new lending relationship appears in (disappears from) the sample for a particular firm in a year. Lending relationships are only counted once (e.g., if pair of firms AB is in the sample, then pair BA is not in the sample). The sample covers non-financial Chilean firms in pyramidal business groups between 2001 and 2009. Data are taken from Superintendencia de Valores y Seguros (SVS).

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Lending Relationships</th>
<th>Creation/Destruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Min</td>
</tr>
<tr>
<td>2001</td>
<td>1.57</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>1.74</td>
<td>1</td>
</tr>
<tr>
<td>2003</td>
<td>1.55</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>1.62</td>
<td>1</td>
</tr>
<tr>
<td>2005</td>
<td>1.55</td>
<td>1</td>
</tr>
<tr>
<td>2006</td>
<td>1.53</td>
<td>1</td>
</tr>
<tr>
<td>2007</td>
<td>1.33</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td>1.44</td>
<td>1</td>
</tr>
<tr>
<td>2009</td>
<td>1.17</td>
<td>1</td>
</tr>
<tr>
<td>All</td>
<td>1.53</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 7

Average Loans and Average Differences in Firm Characteristics for Firm-Pairs with and without Lending Relationships

This table reports average loans between listed firms in pyramids. Loans are considered in the sample if the balance is at least 0.1% of the assets of the firm generating the loan. Difference in firms characteristics between the lender and the borrower are in absolute value. Firm characteristics include cash flow rights of the controlling shareholder, PPE over total assets, the natural logarithm of total assets, EBIT over total assets, Tobin’s Q, and Herfindahl index (sum of squares of market shares of total industry revenue for the firms in our sample). Holding Company Involvement is a dummy for the involvement of a holding company in the pair of firms. Same Industry is a dummy variable that identifies with a 1 the pair of firms in which both firms belong to the same industry at the four digit code level. Integration measures the degree of input-output integration between the industries of firms in the pair. We perform a t-test for the mean difference between firms with loans and firms without loans, where significance is *10%, **5%, and ***1%. The sample covers non-financial Chilean firms in pyramidal business groups between 2001 and 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS).

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<th>With Loans</th>
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<td>Loans / Total Assets</td>
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<td>abs[Δ Cash Flow Rights]</td>
<td>0.241</td>
<td>0.264</td>
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<td>abs[Δ PPE / Total Assets]</td>
<td>0.290</td>
<td>0.298</td>
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<td>1.187</td>
<td>***</td>
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<td>abs[Δ EBIT / Total Assets]</td>
<td>0.062</td>
<td>0.062</td>
<td>0.063</td>
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<tr>
<td>abs[Δ Tobin's Q]</td>
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<td>0.744</td>
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<td>0.378</td>
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Table 8
Probit Regressions for Lending Relationships

The table presents probit regressions. Our dependent variable is a dummy variable that identifies with a 1 those pair firm-year observations with a lending relationship. A lending relationship is defined as a net loan balance greater than 0.1% of assets of the lending firm for a pair of public firms inside a pyramidal business group. All potential pairs within each pyramid are considered each year. Our explanatory variables are the absolute values of the difference in a given characteristic between the two firms in the pair. Firm characteristics are cash flow rights, PPE over total assets, the natural logarithm of total asset, EBIT over total assets, Tobin’s Q, and Herfindahl index (sum of squares of market shares of total industry revenue for the firms in our sample). All variables except for cash flow rights and the Herfindahl index are winsorized at the 1% level. Holding Company Involvement is a dummy for the involvement of a holding company in the pair of firms. Same Industry is a dummy variable that identifies with a 1 the pair of firms in which both firms belong to the same industry at the four digit code level. Integration measures the degree of input-output integration between the industries of firms in the pair. All regressions include year dummies and standard errors are robust. The sample covers non-financial Chilean firms in pyramidal business groups from 2001 to 2009. Data are taken from Economática, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

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<td>-0.5184***</td>
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Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 9

OLS and Heckit Regressions for Loan Balances between Pairs of Firms in Pyramids

This table presents OLS and Heckit regressions for net loans between firm-pairs in pyramids. We divide net loans by the assets of the firm providing the loan. The explanatory variables are the differences (not in absolute value) in a given characteristic between the lender and the borrower. Firm characteristics are cash flow rights, PPE over total assets, the natural logarithm of total assets, EBIT over total assets, and Tobin’s Q. All variables except from cash flow rights are winsorized at the 1% level. The OLS regressions include only observations with positive loan balances. The Heckit includes also zero loan balances between potential pairs of firms within the pyramid. The first stage for the Heckit model uses the specification in Column 9 of Table 8. All regressions include year dummies. The sample covers non-financial Chilean firms in pyramidal business groups from 2001 to 2009. Data are taken from Economática, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

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<td>Δ EBIT / Total Assets</td>
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<td>0.231* (0.135)</td>
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<td>0.210*** (0.067)</td>
<td>0.241*** (0.090)</td>
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<td>Δ Tobin’s Q</td>
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<td>0.241*** (0.090)</td>
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<td>Mills Ratio</td>
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Dependent Variable: Net Loans / Total Assets

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Table 10
The Real Effects of Intra-Group Loans: Evidence within Pyramids
This table presents OLS regressions with firm fixed effects for ROE (earnings over book equity) and fixed investment (changes in PPE over the lag of total assets). The table also shows results of a Tobit model for extraordinary dividends (dividends over total assets for those firms that pay more than 30% of dividends over profits of the past year and zero for the rest). Net provider (receiver) is a dummy variable that identifies with a 1 those firm-year observations with more (less) than 5% (-5%) of net intra-group loans over total assets. All regressions include PPE over total assets, the natural logarithm of total assets, EBIT over total assets, and Tobin’s Q. All variables are winsorized at the 1% level. All OLS regressions include year and firm dummies and standard errors are clustered at the firm level. The sample covers non-financial Chilean firms in pyramidal business groups from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

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Table 11

The Real Effects of Intra-Group Loans: Pooling Pyramid and Non-Pyramid Firms

This table presents OLS regressions with firm fixed effects for ROE (earnings over book equity) and fixed investment (changes in PPE over the lag of total assets). The table also shows results of a Tobit model for extraordinary dividends (dividends over total assets for those firms that pay more than 30% of dividends over profits of the past year and zero for the rest). Net provider (receiver) is a dummy variable that identifies with a 1 those firm-year observations with more (less) than 5% (-5%) of net intra-group loans over total assets. Pyramid is a dummy variable that identifies firm-year observations that belong to pyramidal business groups. All regressions include PPE over total assets, the natural logarithm of total assets, EBIT over total assets, and Tobin’s Q. All variables are winsorized at the 1% level. All OLS regressions include year and firm dummies and standard errors are clustered at the firm level. The sample covers all non-financial Chilean firms from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

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<td>0.017</td>
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Firm Fixed Effects: yes, yes, yes, yes, no, no, no, no, no, yes, yes, yes, yes, yes, yes
Observations: 2,990, 2,370, 2,990, 2,370, 2,370, 2,766, 2,401, 2,766, 2,401, 2,765, 2,347, 2,765, 2,347, 2,347

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Table 12  
Capital Structure Effects of Intra-Group Loans: Evidence within Pyramids

This table presents OLS regressions with firm fixed effects for leverage (total debt over book assets) and external leverage (financial debt over book assets). Net provider (receiver) is a dummy variable that identifies with a 1 those firm-year observations with more (less) than 5% (-5%) of net intra-group loans over total assets. All regressions include PPE over total assets, the natural logarithm of total assets, EBIT over total assets, and Tobin’s Q. All variables are winsorized at the 1% level. All regressions include year and firm dummies and standard errors are clustered at the firm level. The sample covers non-financial Chilean firms in pyramidal business groups from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

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Table 13

**Capital Structure Effects of Intra-Group Loans: Pooling Pyramid and Non-Pyramid Firms**

This table presents OLS regressions with firm fixed effects for leverage (total debt over book assets) and external leverage (financial debt over book assets). Net provider (receiver) is a dummy variable that identifies with a 1 those firm-year observations with more (less) than 5% (-5%) of net intra-group loans over total assets. Pyramid is a dummy variable that identifies firm-year observations that belong to pyramidal business groups. All regressions include PPE over total assets, the natural logarithm of total assets, EBIT over total assets, and Tobin’s Q. All variables are winsorized at the 1% level. All regressions include year and firm dummies and standard errors are clustered at the firm level. The sample covers all non-financial Chilean firms from 1990 to 2009. Data are taken from Economatica, Fecus Plus, and Superintendencia de Valores y Seguros (SVS). Significance: *10%, **5%, ***1%.

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Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Figure 1
Stylized Example of Intra-Group Loans

Net Loans Firm A = (L_{A\rightarrow B} + L_{A\rightarrow E}) - (L_{C\rightarrow A} + L_{F\rightarrow A})
This figure shows the firms that were included in the Luksic Group in 2008. The shaded boxes represent listed firms and white boxes represent unlisted firms. In Figure 2A, arrows indicate ownership links and the percentage number over each arrow indicates the percentage of ownership. In figure 2B, arrows indicate the direction of intra-group loans and the percentage number over each arrow indicates the net loan over total assets of the lender, if the assets of the lender are available (i.e., if it is a listed firm), otherwise over total assets of the borrower.
The event is defined as becoming a provider or receiver of intra-group loans. Provider (receiver) is defined as those firm-year observations with more (less) than 5% (-5%) of net intra-group loans over total assets. We normalize all variables to their pre-event level (year -3), in year 1 the firm becomes a receiver or provider, and we look up to year 3. We average across firms for each year event. The outcome variables are ROE (earnings over book equity), extraordinary dividends (dividends over total assets for those firms that pay more than 30% of dividends over profits of the past year and zero for the rest), fixed investment (changes in PPE over the lag of total assets), leverage (total debt over book assets), and external leverage (financial debt over book assets)