Complex Ownership and Capital Structure

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Abstract

This paper investigates capital structure decisions of pyramid firms and also those controlled by multiple ultimate owners using data on listed firms from G7 countries. More than one-third of our sample firms are in pyramid structure. Multiple large shareholders owning more than 10% of voting rights are also prevalent among these firms. We find that pyramid firms rely more on debt financing than non-pyramid firms controlling for typical factors that affect leverage. A larger divergence of cash-flow and voting rights owned by the largest shareholder is associated with a lower leverage ratio in the firm. The voting rights of the second largest owner in pyramids is positively related to leverage. Furthermore, more equal distributed stakes of the two largest shareholders are associated with higher leverage ratios. Our results are consistent with the view that ultimate owners in pyramids rely on debt to secure their benefits of control.

1 Introduction

The traditional capital structure theory based on agency costs is derived with the assumption of dispersed ownership structure. Mangers may not always make value-maximizing capital structure decisions because the interests between managers and shareholders are not fully aligned and atomic shareholders have low incentives to monitor (Jensen and Meckling (1976)). Jensen (1986) suggests that debt with the feature of regular repayments decreases cash under the discretion of managers and therefore reduces the agency costs. Berger et al. (1997) shows empirically that entrenched managers with incentives to extract private benefits tend to avoid debt.

Under concentrated ownership structure, the presence of controlling shareholders reduces the agency problem that is prevalent under dispersed ownership because large shareholders with significant ownership have more incentives to monitor managers and often they play managerial roles as well. In spite of the benefits from monitoring, concentrated ownership introduces another conflict of interests, that is, controlling shareholders have incentives to extract private benefits at the expenses of minority shareholders (La Porta et al. (1999)). However, few studies examine whether this shift in agency problems under concentrated ownership structure lead to a different capital structure preference?

This paper tackles this question by investigating the relation between concentrated ownership structure and capital structure. Particularly, we focus on capital structure decisions of pyramid firms that have been shown in the literature to exhibit a severe conflicts of interests between ultimate owners (controlling shareholders) and outsiders (For

example, Johnson et al. (2000), Bertrand and Mullainathan (2002)). Pyramid structure creates dispersion in voting and cash-flow rights because ultimate owners control the affiliated companies at lower layer via the weakest link along the control chain and own cash-flow rights of these companies via the product of ownership rights along the chain. Therefore, ultimate owners in pyramids structure have more power and lower costs to deploy corporate resources for their own private benefits at the expense of other shareholders.

Examining a sample of firms in G7 countries, we document that 45% of these firms have ultimate owners with more than 20% voting rights. Among these ultimately controlled firms, 80% of them are in pyramid structures. We find that pyramid firms appear to have significantly higher leverage ratios than non-pyramid firms. Unlike entrenched managers under dispersed ownership structure, ultimate owners of pyramid firms who have stronger incentives to extract private benefits because of lower cash-flow rights tend to use more debt. Debt in pyramid groups seems not to be a bonding device for controlling shareholders as it is for entrenched managers in firms with dispersed ownership structure.

Faccio et al. (2003) suggests that inside shareholders may strategically use debt to expropriate outsiders by imposing more debt in firms where their cash flow rights are low. Debt in pyramid firms is more likely to increase rather than reduce the excess cash under discretion of controlling shareholders because of their ability to tunnel resource within pyramid groups. Moreover, the potential disciplining effect of bankruptcy threat associated with excess leverage is weakened because controlling shareholders suf-

fer smaller bankruptcy costs due to lower cash-flow rights and fewer reputation losses due to the difficulty to pin accountability in the complex opaque control web.

Consistent with the view that debt can be used as a mechanism to facilitate extraction of private benefits, we find that firms with higher dispersion of control and cash-flow rights use more debt. Furthermore, the difference between debt ratios of pyramid and non-pyramid firms is less pronounced in countries with stronger creditor protections. In countries with better protections, pyramid firms use less debt because it is harder to extract private benefits. In addition, we also find that pyramid firms pay lower dividends than non-pyramid firms, which is consistent with the view that controlling shareholders in pyramid firms have incentive to keep excess cash under discretion. To address the concern about the potential endogeneity problem, we apply non-parametric matching method that compares pyramid and non-pyramid firms with similar characteristics and our results still hold.

Finally, we examine the influence of the second ultimate owners in pyramids and find that firms with relatively larger second ultimate owners in terms of voting rights tend to have higher leverage ratios. Leverage ratios are positively associated with equality of voting rights between the first two largest shareholders. We also extend our test to family and non-family firms and find that the leverage ratios of family firms are lower probably because that families as controlling shareholders, who concern about the firms' long-term survival and reputation, have weaker incentives to expropriate other shareholders (Anderson et al. (2003)). Family pyramid firms also pay more dividends than non-family firms. Moreover, the second ultimate owners appear to only affect

non-family firms' leverage ratios.

Our study contributes to the capital structure literature by examining the influence of concentrated ownership structure on debt ratios. The traditional capital structure theories mainly focus on stand-alone firms owned by atomic shareholders. It is underexplored that how the shift in conflict of interests under concentrated ownership structure might affect capital structure decisions. Our findings suggest that the capital structure policy is related to the ownership structure. Unlike entrenched managers under dispersed ownership who tend to avoid debt, controlling shareholders in pyramid firms use more debt because debt increase excess cash under discretion through intra-group transactions and therefore facilitates extraction of private benefits without diluting control rights.

This paper also contributes to the literature of multiple large shareholders. Maury and Pajuste (2005) and Laeven and Levine (2008) find that the presence of multiple large shareholders matters for corporate valuations. Faccio and Lang (2001) show that dividend policies are affected by the presence of multiple ultimate owners. Our work finds that the relationship between capital structure and multiple ultimate owners depends on the comparative size of the large shareholders. Furthermore, the influence of the second ultimate owner also depends on the type of the largest owner.

The rest of paper is organized as follows. Section 2 develops the hypotheses tested in the paper. Section 3 describes the data and document the ownership patterns and firm characteristics in the sample. Section 4 tests the relationship between complex ownership structure and capital structure. Section 5 presents a battery of robustness

checks. Section 6 concludes.

2 Hypotheses

Jensen and Meckling (1976) argue that the divergence of interests between managers and shareholders of firms with dispersed ownership structure results in an agency problem. Managers have discretion over the companies' resources to extract private benefits because atomic shareholders have low incentives monitor. Conflicts between managers and shareholders are more pronounced in presence of free cash flows. Jensen (1986)'s agency theory of capital structure suggests that debt reduces the agency costs of free cash flow by decreasing the cash flow available for spending at the discretion of managers. Berger et al. (1997) show empirically that entrenched managers who are not effectively disciplined by governance mechanisms such as ownership, compensation incentives and/or monitoring prefer lower debt ratios.

The agency conflict between managers and shareholders in widely held firms is less severe if a firm is controlled by ultimate owners (controlling shareholders) (Shleifer and Vishny (1997)). Ultimate owners, holding significant stakes in a firm, have stronger incentives to monitor managers because the benefits from monitoring will be partially internalized (Shleifer and Vishny (1986)). Also, ultimate owners often play managerial roles under concentrated ownership structure.

Notwithstanding this benefit of ultimate owners, their presence gives rise to conflicts of interests between the controlling shareholders and public shareholders. Stultz (1988) claims that larger equity stakes also give insiders more freedom to mislocate resources and

enjoy private benefit of control. Claessens et al. (2002), Faccio and Lang (2002) report that the expropriation by the controlling shareholders is the major agency problem for public corporations in Eastern Asia and Western Europe. Ultimate owners have incentive to expropriate non-controlling parties to extract private benefits, especially when there is a dispersion between voting rights and cash-flow rights.

Morck et al. (2005) describe various control enhancing mechanisms that used by ultimate owners to increase their control. Pyramids, cross-holdings, different voting shares all allow a greater divergency of voting rights from cash-flow rights than direct ownership would permit. La Porta et al. (1999) document that pyramids are the most widely-used ownership structure that allows ultimate owners to control a group of firms through low investment in each affiliates.

Ultimate owners in a pyramidal group have high voting power but low cash-flow rights in affiliates located at the bottom of the pyramid structure. The wedge creates incentives to divert resources from the bottom to the top where controlling shareholders have more cash flow rights. This resource shifting activity is called tunneling (Johnson et al. (2000)). For example, wealth can be transferred among affiliated firms via transfer pricing, using assets of one group member as collateral for another, inflated payments for intangibles such as patents, brand names and insurance. Bertrand and Mullainathan (2002), Bae et al. (2002), Joh (2003), and Baek et al. (2006) find evidence for expropriation of minority shareholders by ultimate owners within groups.

Ultimate owners, who do not bear the full cost of financial distress of their affiliates because of the low cash-flow rights, have incentives to exercise discretion over substantial

pool of resources. Ultimate owners might expropriate by imposing higher debt levels in firms where their cash flow rights are low and roll it over at the top of the pyramid where they can have the loans on their disposal (Faccio and Lang (2002)). In such a way pyramid structures increase the risk of expropriation of outsiders in comparison to non-pyramid firms. In addition, Stultz (1988) argues that high inside ownership should be associated with higher leverage because larger debt ratios allow insiders to increase their voting control. Debt is thus one way to gain voting control. This leads to our first hypothesis:

Hypothesis 1: Other things remaining equal, firms in pyramidal groups tend to use more debt than those in non-pyramidal groups. The higher is the wedge between voting and cash-flow rights in pyramids, the stronger are the incentives to use more debt financing.

The largest ultimate owner's ability to divert corporate resources might be affected by the presence of another large shareholder. The existence of a second ultimate owner with effective voting rights is common in many countries. Faccio and Lang (2001) document that 45% of Western European firms and 32% of East Asian firms have multiple large owners with at least 10% of the shares. Laeven and Levine (2008) study 13 Western Europe countries and 34% of their firms have more than one large shareholder. La Porta et al. (1999) show that second largest owners often hold more than 10% of voting stake. Given this significant fraction of wealth invested in one company, it is likely that second

ultimate owners would influence the first ultimate owner's corporate financing decisions.

Theoretically, there are two views on the role of second ultimate owners. Winton (1993) and Bolton and Thaden (1998) argue that non-controlling shareholders with significant stakes have incentives to monitor controlling shareholders to avoid profit diversion. Burkart et al. (1997) argue that the reduction in the size of the ownership stake of the controlling shareholders reduces their incentives to monitor. Gomes and Novaes (2005) also show that the bargaining problems among multiple controlling shareholders prevent decisions that may harm small shareholders.

On the other hand, second ultimate owners may have incentives to collude with the largest shareholder to share private benefits. Zwiebel (1995) assumes that the control benefits will be divided among different controlling shareholders depending on the relative size of their respective blocks. Therefore, if one block is much smaller than the rest, then the probability that the small blockholders can share private benefits is reduced.

Hence, whether the second controlling owner will monitor or collude with the first ultimate owner on debt financing depends on the relative benefits of monitoring which is proportional to the relative size of the ownership stake. Maury and Pajuste (2005) develop a theoretical model which considers not only the presence of multiple blockholders but also their relative size and identity. The model predicts that high voting power increases private benefit extraction, while low cash flow ownership reduces the incentive effect. Inspired by these studies, we investigate the effect of the presence of second ultimate owners on capital structure. Our second testable hypothesis is:

Hypothesis 2: Debt ratios of firms in pyramidal groups are positively related to the voting rights of second ultimate owners.

Pyramid firms are controlled by various types of ultimate owners, such as families, industrial companies and financial companies. Different types of controlling shareholders might have different incentives to engage in expropriation. Anderson et al. (2003) argue that families as controlling shareholders care more about the firms' long-term survival and reputation, thus they are less likely to expropriate other shareholders. They find that family firms face lower costs of debt relative to non-family firms. Therefore, if debt facilitates expropriation, pyramids controlled by families with more incentives to monitor and less incentive to expropriate are more likely to use less debt. Families usually possess large undiversified portfolios of shares, which make them more risk averse and thus avoiding debt financing. If so, we expect pyramids controlled by families exhibit different debt ratios than those controlled by non-families. Our third hypothesis is

Hypothesis 3: Pyramids controlled by families have lower leverage ratios than non-family controlled pyramids.

3 Data and Sample

To examine the relationship between ownership structure and leverage, we use firm-level ownership data from the OSIRIS database provided by Bureau Van Dijk. The initial

sources of information are from World'Vest Base, Fitch, Thomson Financial, Reuters, and Moody's. We retrieve the name of shareholders, their type and percentage of shareholdings reported once during the period 2003 to 2006 for listed firms in G7 countries (Canada, Germany, France, United Kingdom, Italy, Japan, and USA).

The OSIRIS dataset tries to provide information on as many firms as possible. In Table 1 we compare the number of companies in our sample to the actual total number of listed companies on major stock exchanges. For the period 2003 to 2006 Standard and Poor's (2007) reports a total of 66,115 listed companies on TSX, Deutsche Bourse, Euronext Paris, London Stock Exchange, Borsa Italiana, Tokyo Stock Exhcange, JASDAQ, NYSE, NASDAQ and ASE. The OSIRIS dataset includes 45,290 firm-year observations, thus reaching 70% coverage of the total number of listed companies on these exchanges. The best coverage is achieved for the USA (NYSE, NASDAQ, ASE), 96%, and the worst one is for Germany, 58%. The coverage of our dataset is comparable to the coverage of datasets used in previous studies. For example, Claessens and Lang (2000) use ownership data sample for East Asian corporations which cover about three-quarters of the market value of assets. Faccio and Lang (2002) examine the ownership structure in Western European corporations and their sample reaches 94.32% coverage of all listed firms.

Our sample consists of 14,039 listed companies from G7 countries over the years 2003-2006, totaling to 49,650 firm-year observations.[1] In the analysis we consider only

[1]In Table 1 we report 45,290 firm-year observations. The difference of 4,360 firm years is explained by the fact that some firms are not listed on any of the stock exchange reported in Table 1 and thus they are not included into the calculation of the total number of firm-year observations.

firms with consolidated balance sheets to ensure consistency in the reporting of debt across countries (Faccio et al. (2003)). The US firms comprise 40% of the whole sample, followed by the Japanese (20%) and the British firms (18%). We exclude 1,737 firms in the financial sector (SIC 6000-6999) and we also omit firms with total assets less than US$ 10 million. As a result of this screening, our final sample consists of 23,230 firm-years and 9,096 firms.

3.1 Ownership Patterns

The OSIRIS data report the percentage of ownership for each shareholder only once for the period 2003-2006. Based on shareholders' voting rights, we distinguish among several ownership structures presented in Table 2. An ultimate owner is defined as a shareholder owning more than 20% direct or indirect voting rights (La Porta et al. (1999); Faccio and Lang (2002)).[2] If a firm has such an ultimate owner, we classify it as ultimately owned firm. In our sample, 45.34% of the firms are classified as ultimately owned. Germany and France are the countries with the highest percentage of ultimately owned firms, 92.31% and 93.17% respectively. Faccio and Lang (2002) also document that the highest incidence of controlled ownership in their European sample is in Germany and France. we The lowest percentage of ultimately owned firms is in Japan (21.24%). Examining a sample of East Asian countries, Claessens et al. (2006) find that the average ownership in Japan is 5.13% and the control share is 10.05% over the period 1994-1996.

Widely held firms are classified as firms not having a controlling owner at the 20%.

[2]The cutoff point of 10% and 20% are conventionally used in the literature because, they provide a significant threshold of votes. In addition, most countries require disclosure of 10% and lower percent.

These firms comprise 54.66% of our sample. The lowest percentages of widely held firms are in Germany (7.69%), France (6.83%), and Italy (14.75%). For a sample of Western European corporations, Faccio and Lang (2002) also document that the lowest percentage of widely held firms are in Germany and Italy.

We define a pyramid (group-affiliated) firm as an ultimately owned firm at the 20% (or 10%) threshold that has direct or indirect ownership in a subsidiary company regardless of the percentage of ownership. At the 20% threshold, 36.14% of all firms or 80% of ultimately controlled firms are in a pyramid structure. Pyramid distribution varies across countries. In Canada, for example, pyramids comprise 33.12% of the listed companies, which is comparable to the percentage of pyramids reported by Gadhoum (2006). The highest percentage of pyramids is in Italy (81.56%) and the lowest one is in Japan (7.68%).

Lowering the cutoff level of control from 20% to 10% increases the fraction of pyramids to 53.42%. The most dramatic increase in the fraction of pyramids is in UK where at the 20% threshold, 43.77% of all firms are associated with pyramid structure, however, at the 10% threshold, the fraction of pyramids goes up to 72.11%. The patterns of various ownership structures across countries in our data are generally consistent with previous studies. Enriques and Volpin (2007), analyzing concentrated ownership in Europe, conclude that pyramids are typical mechanisms of control in France, Germany and Italy. Overall, the controlled ownership via pyramid in our sample is concentrated in European companies and to a smaller extent it is observed in Canada and the USA.

Following Faccio and Lang (2001), La Porta et al. (1999), and Claessens and Lang

(2000), we construct a ratio of ownership rights to control rights (O/C ratio). Ownership rights refer to cash flow rights, i.e., the right to claim dividends. Control right is the right of a shareholder to vote. Pyramids, having multiple chains of control, create discrepancy between ownership and control rights. The ownership rights are calculated as the product of cash-flow rights along the control chain, and voting rights are measured by the weakest link in the control chain. For example, if a firm A owns 25% of a firm B, and a firm B owns 30% of a firm C, then a firm A owns 7.5% of the cash-flow rights of firm C and controls 25% of its voting rights. Smaller values of the O/C ratio indicate greater wedge between cash-flow and control rights. If control rights are equal to cash-flow rights, the ratio as defined in Table 2 will be 100%. German firms have the largest O/C ratio and Japanese firms have the smallest one. The pattern of O/C across countries is comparable to the values reported by Faccio et al. (2001).

Depending on the type of the ultimate owner at the 20% threshold, we identify five types of pyramids. We rely on the OSIRIS definitions of shareholder type, according to which there are family (including individuals), industrial company, financial company (including banks and insurance companies), mutual fund (including pension funds, trust and private equity), and miscellaneous (state-owned, undisclosed) types of controlling owners.[3] The most prevalent types of ultimate owners in pyramids are an "industrial company" (40.22%), "family" (34.12%) and "financial firm" (7.17%). The highest percentage of family control is concentrated in Italy (43.72%), while family pyramids are the least prevalent in Japan (9.86%).[4]

[3]The distributions of pyramids controlled by mutual fund and miscellaneous owner are not reported.

[4]Faccio and Lang (2002) define a family controlled firm to be "a family or a firm that is unlisted

Similar to Laeven and Levine (2008) we identify pyramids with second largest owner at 10% and 20% level of control. Table 2 indicates that 47.32% of all pyramids have a second largest owner at the 10% level. Increasing the cutoff point for the second largest owner to 20% decreases the share of pyramids with such type of shareholders to 24.58%. Germany, Italy and France have the highest fraction of pyramids with second largest shareholders. To capture the difference in voting power between shareholders, we calculate the absolute (and relative) difference between voting rights of the two largest shareholders. Second largest shareholder is defined at the 10% cutoff point of ownership. Small value of *AbsoluteDistance* is the difference in voting rights of the first and the second largest shareholders. This is a proxy for equality of the two largest shareholders in terms of their percentage of voting rights. On average the second ultimate owner has 13% fewer voting rights than the first ultimate owner. The largest disparity between the voting rights of the first two largest shareholders is in Germany, 27.43%, and the smallest one is observed in Japan (8.48%).

3.2 Firm Characteristics

Following previous literature, we expect leverage to be affected by profitability, asset tangibility, market-to-book ratio, and firm size (Rajan and Zingales (1995); Booth et al. (2001)). Table 3 summarizes descriptive statistics of these financial characteristics across countries over the period 2003-2006. We use to measures of leverage. Book leverage ratio

on any stock exchange." Unlike them, we consider only families that hold shares in listed companies, which potentially explains the lower percentage of family-controlled firms in our sample. Faccio and Lang (2002) document that 64.82% of their ultimately owned firms are family owned at 20% threshold, while 32.36% of all firms in our sample are ultimately owned by a family at this threshold.

is defined as the ratio of long-term and short term debt to the book value of equity and debt, and market leverage use market equity instead of book equity. On average, listed companies in G7 countries have mean book leverage 33.69% and 24% market leverage over the period 2003-2006. In our sample, Italian firms are the most levered (42.96%, 33.48%) and the US firms have the lowest level of leverage (31.7%). The difference of 11.27 percentage points between mean book leverage ratio of the Italian and US firms, is statistically (and economically) significant at the 1% level. Rajan and Zingales (1995) conduct a study on leverage across G7 countries in which US seems to have similar level of leverage in 1991 compared to the level reported in our sample over the period 2003-2006. Canadian firms have decreased slightly their book leverage levels from 36% in 1991 (Rajan and Zingales (1995)) to almost 33% for the 2003-2006 period.

Market-to-book ratio is the market value of equity divided by the book value of equity. The average value of market-to-book ratios hide a significant variation across countries. Japanese firms have the lowest market-to-book ratio (1.82) and the US firms has the highest one (3.06). The differential of 1.24 between these two groups of firms is statistically significant at the 1% level.

Profitability is defined as earnings before interest, taxes, depreciation, and amortization to total assets. The average German firm is the most profitable (9.72%) and the Japanese one is the least profitable (4.12%). Tangibility is the ratio of fixed assets to the book value of total assets. On average the level of tangibility is 26.42%, with Canadian firms exhibiting the highest level of "tangibility" (41.3%) and the French firm—the lowest (17.86%). The average dividend rate, measured by the ratio of paid dividend to

market value, is 1.06%. UK exhibits the highest rate (1.99%) and US the lowest (0.61%)

Companies are sorted into seven industrial sectors using one-digit Standard Industrial Classification (SIC) codes as reported by OSIRIS. A summary of the number of companies in each sector is presented in Table 4. Overall, around 40% of the sample consists of companies in manufacturing sector, followed by companies in services, 20.02%. Pyramids are distributed in a very similar way across sectors—firms in manufacturing comprise 38.53% of the pyramid sample and services comprise 23.65% of it. Comparing the average pyramid size as measured by total assets to the average size of all firms, we observe that pyramids in mining and construction are larger than the average firm in this sector. The same holds for the manufacturing firms. Overall, the distribution of pyramids across sectors is quite comparable to the distribution of the full sample.

Table 5 provides firm level means statistics for pyramid and pyramid firm. The data clearly suggests that pyramids and non-pyramids differ in terms of their firm characteristics. On average pyramids have 6.95% higher leverage than non-pyramids. The former group exhibits slightly lower market-to-book ratios than the latter group, it is more profitable, smaller and less "tangible." We also observe that pyramid firms incur lower R&D compared to non-pyramids. In terms of debt and equity issuance, pyramids seem to prefer debt to equity financing compared to non-pyramids. A potential explanation is that debt issuance allows pyramids to maintain their control over affiliated, while equity dilutes their stakes.

Of course, these simple descriptive findings are hard to interpret as the pyramid and non-pyramid differences could be driven by a different industry and firm-size composition

of the sampled firms. Nevertheless, the evidence does suggest that pyramid firms exhibit characteristics that might facilitate their debt financing. The rest of this study address this issue in an multivariate framework.

4 Regression Results

4.1 Determinants of Leverage

We first test the impacts of firm characteristics on capital structure across the G7 countries. Following Rajan and Zingales (1995), we estimate the following regression model:

$$\begin{aligned} Leverage_{it} &= \alpha + \beta_1 Profitability_{it-1} + \beta_2 Tangibility_{t-1} \\ &\quad + \beta_3 M/B_{it-1} + \beta_4 Log(Sales)_{it-1} + \epsilon_{it}. \end{aligned} \tag{1}$$

where book (market) leverage is the book value of debt to book (market) value of equity and book value of debt; profitability is earnings before interest, taxes, and depreciation and amortization scaled by total assets; tangibility is net property, plant and equipment scaled by total assets; M/B is the ratio of market value of equity to book value of equity; $log(Sales)$ is logarithm of net sales.

The model is estimated controlling for industry, year and country dummies. Table 6 reports the OLS estimates controlling for firm level cluster and heteroskedasticity. These estimations allow for the correlation within firms, but require independence across firms. Petersen (2008) shows that the standard errors clustered by firm are unbiased in presence of correlation within firms.

Overall, the impacts of firm characteristics on leverage are consistent with previous

research, such as Rajan and Zingales (1995), and Booth et al. (2001).[5] The negative coefficient on profitability is consistent with the hypothesis that more profitable firms have larger amount of internal funds and thus demand less debt. The tangibility of assets has a positive coefficient, which is consistent with the view that firms with more tangible assets have more debt because tangible assets can serve as collateral. Market-to-book has a negative effect on capital structure. The negative coefficient on the market-to-book ratio is consistent with Myers (1977) that firms with high future growth opportunities use less debt. Logarithm of net sales, a proxy for size, is positively related to leverage because larger firms are less likely to go bankrupt and have more debt capacity.

The pooling regression assumes common coefficients across all countries. Although G7 countries share developed markets, they also experience large institutional differences which might be responsible for differences in capital structure and its determinants. Another reason for accounting for cross-country variation is that the U.S. firms comprise 46% of our sample, which might dominate the results in the pooled specification. Table 6 shows the results from the estimation of the leverage regression for each country. The effects of firm characteristics on leverage are similar across the seven countries. More profitable firms have lower leverage. Firms with more tangible assets borrow more. High growth firms use less debt than low growth firms, and large firms use more debt than small firms.

[5]We also include market leverage instead of book leverage. The results are similar.

4.2 The Impact of Pyramid Structure on Leverage

To test our first hypothesis, we estimate the following model:

$$Leverage_{it} = \alpha + Pyramid_i + Controls_{it-1} + \epsilon_{it}. \quad (2)$$

where $Pyramid$ is a dummy which equals to 1 if a firm is affiliated to a pyramidal group and 0 otherwise; $Controls$ include $Profitability$, $Tangibility$, M/B, $Log(Sales)$, country, industry, and time dummies. The tests are based on the assumption that group affiliation is exogeneous in the relatively short period which we analyze. This assumption is reasonable given that the literature agrees that the ownership formation is historically determined to a large extent (La Porta et al. (1999)). To address a potential critique that capital structure choice by pyramids may be endogenous, as a robustness check we employ a nonparametric matching approach which compares leverage ratios of pyramid and non-pyramid firms without imposing a linear functional form of conditional leverage expectations.[6]

Table 7 reports results of book and market leverage regressions for firms affiliated to a pyramid structure at the 20% level of control. Surprisingly, column (1) shows that the pyramid dummy has a significant positive coefficient of 4.97 percentage points, which is consistent with hypothesis 1 that pyramid firms have higher leverage. Controlling shareholders in pyramid groups do not avoid debt as what the entrenched managers would do in widely held companies. This result suggests that debt may not play a disciplinary role under concentrated ownership structure as it does under dispersed ownership.

[6]The results are presented in the robustness checks section.

Johnson et al. (2000) show that ultimate owners of pyramidal groups use loans, intragroup sales of goods and services, and transfers of assets to transfer resources from the bottom to the top of pyramid where she has more cash-flow rights. This resource shifting activity is referred to as tunneling. Faccio et al. (2003) suggest that debt is one of the mechanisms used by ultimate owners to divert wealth. Ultimate owners can tunnel using differential interest rate loans, that is, lending to the subsidiaries at high interest rates and borrowing from the subsidiaries at low interest rates. Ultimate owners may also let the subsidiaries where they have limited liability to raise a large fraction of group debt, since they only bear limited bankruptcy costs from the subsidiaries. Debt financing increases cash under the discretion of ultimate owners who can reap various benefits using their control rights. In addition, ultimate owners might not be threatened by reputation concerns because the multiple levels of control decrease the visibility of expropriation. Ultimate owners of pyramid groups are also less likely to be affected in terms of job tenure or career concerns if an affiliated company goes bankrupt on account of excessive leverage because of the complexity and opaqueness of the ownership structure and their lower risk aversion compared to executives. Therefore, the expropriation benefits from additional debt are more likely to outweigh the associated costs for controlling shareholders of pyramid firms.

Pyramidal structures separate ownership from control by creating a dispersion between the voting rights and the cash-flow rights. Because of this divergence, ultimate owners enjoy more benefits when business is running well and bear less losses when bankruptcy occurs. The ratio between the ownership rights (cash-flow rights) and con-

trol (voting rights) O/C has been used in the literature as a measure of vulnerability to expropriation (Faccio and Lang (2001)). A lower ratio of cash-flow to control rights (O/C ratio) increases ultimate owners' incentives to extract private benefits (Claessens et al. (2002), Lemmon and Karl (2003)). Hence, if debt facilitates expropriation, a lower O/C ratio is expected to be associated with a higher debt ratio.

Column (2) of Table 7 presents the estimations of Equation (2) which includes the O/C ratio. The O/C ratio has a negative coefficient which suggests that a lower O/C is associated with significantly higher debt.[7] Stated differently, firms with ultimate owners having less cash-flow rights relative to voting rights use more debt, which supports the argument that debt is used to facilitate expropriation.

Potential remedy to expropriation via debt might be strong legal protection of creditor rights. In countries with stronger creditor rights protection, pyramid firms should be less able to use debt as an expropriation mechanism. To test the effects of the legal environment, we classify the G7 countries into strong and weak creditor rights countries based on the creditor rights index developed by La Porta et al. (1998). Strong creditor protection countries include UK, Germany, Italy, and Japan, while the weak creditor protection countries are Canada, U.S., and France.[8]

Table 7, column (3), shows a positive coefficient on creditor rights dummy. Firms in countries with better creditor protection use more debt. The higher debt ratio may

[7]For robustness we further estimate this specification excluding non-affiliated firms which have O/C ratio equal to zero. These firms are not vulnerable to expropriation. The results suggest even stronger negative relation between O/C and debt.

[8]The reorganization and liquidation rules in Canada, U.S., and France offer more protection to management against secured creditors. For example, the automatic stay on the assets in the reorganization procedure prevent secured creditors from possessing loan collateral. Canada, U.S., and France have weaker protection for creditors

be related to lower cost of capital because the better protection against expropriation by the controlling shareholders may lead to lower interest rates demanded by creditors. Giannetti (2003) find that firms in countries with good creditor protection have easier access to obtain loans and long-term debt. The positive coefficient on the pyramid dummy indicates that pyramid firms generally use more debt than non-pyramid firms after controlling for the differences in legal environments. The negative coefficient on the interactive terms of creditor protection and the pyramid dummy suggests that pyramid firms in better creditor rights protection countries use less debt because it is harder to extract private benefits in such countries. This result further confirm that debt is used by controlling shareholders in pyramid groups to facilitate expropriation of outsiders.

The finding that pyramid firms in countries with better creditor protection have lower leverage also rules out the possibility that ultimate owners use debt as a self-disciplining device to signal moderation in expropriation to outside investors. If debt plays a bonding role, signalling should be more credible and effective in countries with stronger protection of creditor rights. However, we find a lower debt ratio in countries with adequate creditor protection, which suggests that controlling shareholders do not use debt as a signaling instrument.

Overall, the results suggest that after controlling for typical factors affecting capital structure, pyramids still rely more on debt than non-pyramids. In Section 5 we examine specific channel which might affect the leverage of pyramids.

4.3 The Role of the Second Largest Shareholder

In Table 8, we analyze the role of the second largest owner in pyramids. As stated in Hypothesis 2 the second largest owners are expected to play a role in capital structure decisions. If they play a monitoring role, potentially depending on their voting rights, then pyramids with such type of shareholders would find it relatively more difficult to expropriate by using large amounts of debt. Alternatively, if monitoring is too costly, then the second largest owner might collude with the ultimate owner and thus expropriate together at the expense of all other shareholders. To test this hypothesis, we estimate series of leverage ratio regressions on various characteristics of the second largest shareholder.

Column (1) of Table 8 shows that voting rights of the second largest owner is positive related to leverage in pyramid firms.[9] Increasing the second largest shareholder voting rights by one standard deviation increases the leverage ratios by 1.86 percent. This finding suggests that second largest owner with more voting rights is less likely to monitor the first ultimate owner in their debt financing choices. One potential explanation is that the second largest owner can share relatively larger portion of the private benefits from exercising control over debt resources. In column 2 we estimate specification which relaxes the assumption of the linear relationship between voting rights and leverage by using a dummy for the second largest shareholder having 0-10%, 10-20% or more than 20% voting rights. The reference group is share holdings ranging from 0-10%. Com-

[9]In all specifications in Table 8 we exclude firms with second largest shareholders having voting rights equal to zero. For a robustness check, we include these firms into the estimation by having a dummy variable taking the value of one if a firm has second largest owner with zero voting rights and zero otherwise.

pared to pyramid firms without a second ultimate owner, firms with the second largest shareholders owing more than 20% voting rights have significantly higher debt ratios, while firms with relatively smaller second ultimate owners have statistically insignificant lower leverage ratios.

To further test the role of the voting rights of shareholders, we use the logarithm of the distance of the first and the second largest shareholders to measure the distribution of power. A small value of log(VR1-VR2) signifies more equal distribution of the voting power between the two largest shareholders. A smaller disparity of the voting rights suggests an easier formation of coalition which is expected to result in higher debt ratios. As exhibited in the column (3) of Table 8, the coefficient on log(VR1-VR2) is negative indicating that firms with more equally distributed voting rights have higher leverage ratios. In column (4), we use an alternative proxy, the ratio of (VR1-VR2) to (VR1+VR2), to measure the equality of the voting rights of the two largest shareholders. The negative sign on the coefficient of this variable confirms that equality in terms of voting rights is associated with lower leverage. As robustness checks, we estimate all specifications using market leverage as a dependent variable. The results are similar to those using book leverage ratios.

Overall, the second largest owner with higher voting power do not prevent the ultimate owner from using more debt. These shareholders are more likely to form a coalition to extract private benefits of control. Only the second ultimate owners with smaller voting rights, less then 20%, play somewhat a monitoring role potentially because they have stronger incentive to protect themselves from being expropriated by the first ultimate

owners.

4.4 Type of the Second Largest Shareholders

Claessens et al. (2002) and Burkart et al. (2003) note that the type of the shareholders matters for corporate governance. A family as the largest shareholder possibly has a different incentive from other type of shareholders. Family owners may care more about the long-term survival and reputation of the firm, so they have weaker incentive to expropriate other shareholders. If so, we expect family firms in which the largest ultimate owner is a family to have lower debt ratio than non-family firms. Table 9, specification (1) shows that the family dummy has a negative coefficient, indicating less debt is used in family firms. This is consistent with Hypothesis 3.

We then sub-divide the sample into family firms and non-family firms and examine the effect of the second ultimate owner. Specification (2)-(7) show that the second ultimate owner do not have a significant impact on the capital structure decisions when the largest ultimate owner is a family. The role of the second ultimate owner found in previous section is only observed in non-family firms. These results suggest that the capital structure decisions of family firms are largely made by the family owners with little influence of the second ultimate owners. The second ultimate owner matters only in non-family firms.

5 Robustness Checks

5.1 Dividends and Expropriation

Pyramid structure allows ultimate owners to have effective control over the resources of firms in the group. If controlling shareholders have incentives to expropriate other shareholders, they may want to maximize cash under their control and therefore pay lower dividends. Faccio and Lang (2001) show that Western European and Eastern Asian firms that are loosely affiliated to a group pay less dividends, providing evidence on the expropriation of outside shareholders by controlling shareholders. In this section, we examine whether the pyramidal groups in our G7 sample also make lower dividends payment. The evidence of lower dividend payouts in pyramids will support the view that controlling shareholders in pyramids might expropriate not only by imposing higher leverage but also by paying lower dividends.

Table 10 presents the results from tobit regressions of two measures of dividend rate defined as the ratio of dividends to firm market value.[10] Since a large number of firms do not pay dividend, by using tobit regressions we explicitly account for censoring from below zero. In our sample, 50% of the dividend firm years are equal to zero over the period 2003-2006. The number of firms paying dividend at least once is 7,928 out of which only 2,800 are pyramids. In addition to ownership variables such as pyramid dummy, voting rights of the first largest shareholders, and family dummy, we include in the regression other factors that affect dividend payments, such as leverage, size,

[10]We have estimated dividend regressions using other accepted measures in the literature such as dividends to total assets, dividends to net sales, and dividends to EBITDA. The results still hold.

profitability, and market-to-book ratio.

The first specification shows that the coefficient on the pyramid dummy takes a negative sign. Pyramid firms pay less dividends than non-pyramid firms, suggesting that pyramid firms tend to retain more resources under their control. There is a negative relationship between the voting rights of the largest shareholder and the amount of dividend payment as shown in the second specification. We find that firms with controlling shareholders who have more voting power pay less dividends. These findings are consistent with previous studies which do not focus on pyramids in G7 countries.[11] Thus, the results suggest that the controlling shareholders in pyramidal group generally facilitate rather than prevent expropriation by paying lower dividends.

However, when the controlling shareholders are families, different results are found (specification 3). The pyramidal group controlled by families pay more dividends, consistent with our findings on capital structure that the controlling shareholders in pyramid firms have less incentive to expropriate because they concern more about the longevity of their firms and reputation. La Porta et al. (2002) show that dividends can be used to build up reputation for restraining from expropriation or to reduce the adverse selection costs of asymmetric information.

The estimates of firm characteristics take the expected signs. For all specification in Table 10 we find that leverage has a negative sign (significant at the 1% level), which is consistent with Fama and French (2002). We confirm that large and more profitable

[11]For example, Gugler and Yortoglu (2003) finds that larger holdings of the largest owner reduce, while larger holdings of the second largest owner increase dividend payout ratios in a sample of German firms over the period 1992-1998. Similarly, Mancinelli and Ozkan (2006) examine Italian firms in 2001 and document that firms make lower dividend payout as the voting rights of the largest shareholder increase.

firms pay higher dividends as previously documented by Fama and French (2001). Firms with low growth opportunities pay less dividends as in Faccio and Lang (2001). The Wald χ^2 test indicates that all specifications are statistically significant. The industry, time and country dummies are always significant at the 1% level (not reported in Table 10).[12]

5.2 Additional Investigations

In this section we attempt to enrich our understanding of the channel through which pyramids affect leverage. These results are in the spirit of difference-in-differences estimation and are subject to fewer endogeneity biases. As discussed in Section 4, firm size is a measure of diversification and risk suggesting that large firms are less prone to bankruptcy due to being more diversified. We hypothesis that pyramid firms which are smaller on average would take lower leverage. We break our sample into two groups and create a dummy variable $LargeFirms$ that takes the value of one if firm size is higher than the sample median firm size and zero otherwise.

In the first specification of Table 11, we include the interaction of $LargeFirms$ with $Pyramid$ in addition to pyramid dummy itself and size. The coefficient on the interaction term should be interpreted as the marginal effect of leverage as compared to firms in the lower group ($LargeFirms = 0$). The coefficient on $Pyramid$ is positive and significant as reported in Table 7, indicating that pyramid firms take higher leverage. Both the size dummy and the size continuous variable take the expected positive signs indicating that

[12]The results of the tobit regressions remain unchanged when we use year averages to smoothen the impact of transitory shocks as suggested by Faccio and Lang (2001).

less risky firms get higher leverage as predicted by the trade-off theory. Interestingly, the interaction term, $LargeFirms * Pyramid$, is negative and significant suggesting that small pyramids which are more risky manage to get higher leverage relative to large pyramids. One potential explanation for this results is that the controlling owners at the top of pyramids, via their strong voting rights, manage to impose higher leverage even in firms associated with higher risk in order to increase the pool of resources under their discretion.

In column (2) we explore the effect of tangibility on pyramids and leverage. As with firm size, we define a dummy variable $HighTangibility$ that takes a value of one for firms with tangibility higher than the median value. We include an interaction variable, $Pyramid * HighTangibility$, in the model to disentangle the impact of tangibility on leverage. We find that tangibility and leverage are positively correlated for non-pyramid firms. Surprisingly, the interaction term enters the specific model with negative sign suggesting that "highly collateralized" pyramids have lower leverage ratios than "low collateralized" pyramids. This result provides an additional evidence of pyramids managing to attain higher leverage even when their subordinate firms have poor collateral capacity as measured by tangibility.

In columns (3) and (4) we perform similar exercise by interacting pyramid and high market-to-book ratio (a dummy taking value of one if market-to-book is greater than the median value), $Pyramid * HighGrowth$; and pyramid and high profit (a dummy taking value of one if profit is greater than the median value), $Pyramid * HighProfit$. The interaction term in column (3) has the expected negative sign which indicates that

high growth pyramids have lower leverage ratios than low growth firms. In column (4), the coefficient of the interaction term between profitability measure and pyramid, $Pyramid * HighProfit$, is negative though insignificant. This suggests that the capital structure of pyramids is weakly sensitive to the affiliated firm's profit rate compared to non-pyramid firms.

Finally, in column (5) we include new variable in the specification, non-debt tax shields and its interaction with the pyramid dummy. According to the trade-off theory the main benefit of having debt is the tax deductability of interest payment. DeAngelo and Masulis (1980) argue that the value of this tax shield depends on corporate tax, the level of taxable profits, and on non-debt tax shields such as capital allowances, tax credits and tax losses carried forward. In order to capture the effect of taxes we use a proxy for non-debt tax shield that is the ratio of depreciation to profit depreciation, interest and tax. This measure is an inverse proxy for the corporate tax benefit because depreciation is a substitute for interest payment. This non-debt tax shield measure is expected to have a negative coefficient in the leverage regression. The results in column (5) do confirm a negative significant coefficient of -0.003. The interaction term with pyramid, however is positive and insignificant which potentially signifies that pyramids are not affected by tax consideration when choosing their debt financing policy.

Overall, the results from this interaction exercise are supportive of the idea that size and tangibility matter for the capital structure of pyramids. Profitability and taxation, however, do not seem to play a role in financing decision in pyramids. The pyramid dummy in each specification preserves its positive significant coefficient which suggests

that pyramid firms tend to have higher debt ratios after controlling for interaction effects potentially due to control considerations and/or better access to external capital.

5.3 Endogeneity

One issue that arises from using a simple OLS estimation of the leverage regression in Table 7 is potential endogeneity of the pyramid indicator variable. For example, our results might be driven by omitted variable bias that is correlated with leverage and pyramids' sorting. Pyramids might evolve endogenously within firms and thus their distribution across firms with different characteristics would be non-random. In this section we perform non-parametric matching which accounts for endogeneity.[13]

Non-parametric matching compares only pyramid and non-pyramid firms with similar observable characteristics. This technique is an intuitive alternative to regression-based methods which might misleadingly project the conditional leverage distribution of pyramids onto regions of the non-pyramid leverage distribution in which pyramids are virtually nonexistent. The advantage of non-parametric matching is that it does not impose functional form assumption. It is also immune to the critique that pyramid structures evolve endogenously within the firm. On the downside, the method relies on the assumption that the differences in observable firm characteristics can fully control for the differences in the likelihood of a firm being a pyramid.

We use propensity score matching models to estimate "treatment effects." A treatment effect is the difference in outcomes when a firm undergoes treatment compared

[13]For an application of matching technique in corporate finance, see Li and Zhao (2006) which examines abnormal returns related to SEOs for issuer and non-issuer.

to a firm if it would not have undergone the treatment. In our paper, we estimate the difference between leverage ratios of firms that have "chosen" to be pyramids, which is defined as treatment, to leverage ratios of firms if they would not have chosen this "treatment." This parameter is known as the average treatment on the treated (ATT). As the counterfactual mean leverage ratio for those being treated in not observed, one has to choose a proper substitute for it in order to estimate the ATT. The matching approach aims at estimating the missing counterfactual of what a pyramid's leverage would be if it were not pyramid. The answer is given by the leverage of non-pyramid firms with the same set of firm observable characteristics.

There are several available algorithms for matching "comparable" firms.[14] Traditional methods find matching firms by each individual characteristic. To overcome the curse of dimensionality that arise if the match has to consider a great number of characteristics, we base our results on propensity score matching. It is the conditional probability of being a pyramid that is estimated from a logit model (Rosenbaum and Rubin (1983), Rosenbaum and Rubin (1985)).

We apply kernel and Mahalanobis-metric matching with replacement. Kernel matching is based on the estimated propensity scores and takes local averages of the untreated observations near each treated observation. Mahalanobis matching consists of matching on specific variables in addition to the propensity score; it may decrease selection bias and may also serve as an additional protection against any impact due to inconsistent estimation of the propensity score. We add trimming common support constraint (5%

[14]See Caliendo and Kopeinig (2008) for detailed practical guidance on propensity score matching.

trimming rule) as suggested by Smith and Todd (2005).

Table 12 presents OLS estimates of a pyramid dummy in column (1) together with estimated ATT from two types of matching in columns (2) and (3). Bootstrapped standard errors are reported below the average treatment effects. The ATT estimates for each year are smaller than the OLS-based pyramid estimates but remain large and are above zero with high levels of statistical significance. These results confirm that even after comparing pyramids to non-pyramids with similar characteristics the leverage differences still remain.[15]

6 Conclusions

This paper finds that over one-third of the listed firms in G7 countries are in pyramid ownership structures. Among these pyramid firms, almost half of them have more than one large ultimate owner. Pyramid firms use more debt than non-pyramid firms. Higher debt ratios are observed in pyramid firms owned by the controlling shareholder with more voting rights and fewer cash-flow rights. The role of the second largest owners depends on the percentage of their shareholdings. Higher voting rights of the second ultimate owners are associated with higher leverage ratio. The more equally distributed of the voting rights between the largest two shareholders, the higher the debt ratios.

[15]We conduct diagnostic test to assess the quality of the matching procedure. It has to be checked whether the matching procedure is able to balance the distribution of the relevant variables in both the control and the treatment group. As suggested by Rosenbaum and Rubin (1985), we perform t-tests to check if there are differences in means for both treatment and control groups. It is expected that after matching there will be no significant differences. In all cases the results confirm that there are no statistical differences after the matching is applied.An alternative way to assess the matching quality is to evaluate pseudo-R^2 statistics before and after matching separately for each procedure. In all cases there are no systematic differences in the distribution of covariates after matching and the pseudo-R^2 is close to zero (0.02, down from 0.2 before matching). Similar conclusions come from F-tests on the joint significance of all regressors. The results are available upon request from the authors.

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Table 1: Coverage of the Sample

This table presents data on listed companies on several major exchanges from G7 countries over the period 2003-2006. Column (1) reports the *total number* of all listed companies available from S&P Global Stock Markets Factbook 2007 over the period 2003-2006. Column (2) presents the total number of all listed companies as reported in our sample. Column (3) is the percentage ratio of the total number of all listed companies to companies in our sample.

	Stock Exchange	Total Number of Companies (1)	Total Number of Companies in Our Sample (2)	Percent Coverage (2)/(1)
Canada	TSX	5,896	3,643	62
Germany	Deutsche Borse	2,648	1,549	58
France	Euronext	3,434	2,533	74
UK	London Stock Excahnge	10,469	7,878	75
Italy	Borsa Italiana	1,099	832	76
Japan	Tokyo Stock Exchange, JASDAQ	12,977	8,959	69
USA	NYSE, NASDAQ, and ASE	20,802	19,896	96
Total		66,115	45,290	69

Table 2: Ownership Patterns Across Countries

This table presents the ownership structure (in percentages) of publicly traded companies across G7 countries. An ultimately owned firm is a firms with a shareholder who owns directly and/or indirectly at least 20% of the votes. Pyramid is defined as a company controlled by an ultimate owner. O/C is the ratio of ownership rights to voting rights in pyramid firms. Absolute distance is the difference between the voting rights of the largest and the second largest shareholders in pyramids conditional on present second largest owner at the 10% cutoff point.

Ownership Structure	Canada	Germany	France	UK	Italy	Japan	USA	Total
Number of Firms	1,229	754	717	2,456	244	2,773	5,866	14,039
Ultimately Owned	46.79	92.31	93.17	49.59	85.25	21.24	41.10	45.34
Widely Held	53.11	7.69	6.83	50.41	14.75	78.76	58.9	54.66
Pyramid Structures								
Pyramid (at 20%)	33.12	85.01	88.15	43.77	81.56	7.68	32.51	36.14
Pyramid (at 10%)	49.23	89.79	91.91	72.11	89.34	10.57	55.85	53.42
O/C (at 20%)	80.15	95.63	94.76	97.11	88.99	66.15	79.5	82.72
Identity of the Ultimate Owner in Pyramids								
Family	12.78	34.17	42.41	31.81	43.72	9.86	39.17	34.12
Industrial Company	56.02	33.45	29.75	39.91	41.71	79.34	38.23	40.22
Financial Company	4.67	4.84	6.65	10.05	3.52	6.1	7.55	7.17
Ownership Structure in Pyramids								
Pyramid with Second Largest Owner at 10%	41.77	64.43	68.67	45.95	66.83	20.19	37.44	47.32
Pyramid with Second Largest Owner at 20%	21.38	43.84	40.82	17.3	52.26	11.27	16.1	24.58
Absolute Distance	21.18	27.43	26.00	11.97	15.53	8.48	16.92	13.32

Table 3: Summary Statistics for Firm Characteristics in G7 Countries

The table reports the means (in percents) and standard deviations of firm variables over the period 2003-2006. Financial firms (SIC 6000-6999) are excluded. Book leverage is the book value of debt to book value of equity and debt. Market leverage the book value of debt to book value of debt and market equity. Book debt is long-term debt and short-term debt. Market-to-book (M/B) is market value of equity divided by book value of equity. Profitability is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. Log sales is logarithm of net sales. Tangibility is defined as fixed assets to total assets. Div/M is ratio of dividend paid to total market value. R&D is the ratio of research and development expenditure to total assets. Debt Issues is the yearly change in book debt over total assets.

		Book Lev.	Market Lev.	M/B	Profit.	Log(Sales)	Tangibility	Div/M	R&D	Debt Issues
Canada	Mean	32.72	23.11	2.46	4.68	4.56	41.30	0.94	3.10	2.59
	Std. Dev.	30.67	24.25	4.21	20.83	2.38	29.29	2.62	9.10	11.67
Germany	Mean	38.03	31.33	2.04	8.57	5.34	23.70	1.54	1.73	-0.27
	Std. Dev.	30.35	28.74	4.74	14.97	2.22	19.85	2.52	4.81	12.47
France	Mean	39.43	28.04	2.41	9.42	5.31	17.86	1.47	1.05	1.02
	Std. Dev.	33.67	25.8	6.09	11.07	2.17	17.19	2.11	4.77	11.74
UK	Mean	36.37	23.23	2.50	6.93	4.79	26.10	1.99	2.47	1.39
	Std. Dev.	38.03	23.08	5.45	17.84	2.37	25.59	2.69	7.42	12.66
Italy	Mean	42.96	33.48	1.85	8.59	5.80	25.21	1.57	0.10	0.55
	Std. Dev.	27.76	25.11	3.69	14.01	1.77	19.80	2.51	1.20	14.85
Japan	Mean	33.41	30.17	1.82	8.83	6.10	29.50	1.25	1.32	-0.97
	Std. Dev.	26.97	25.85	2.86	6.87	1.55	18.27	1.23	2.24	8.82
USA	Mean	31.70	19.08	3.06	4.12	5.39	23.40	0.61	5.19	1.23
	Std. Dev.	38.63	22.82	5.46	23.20	2.27	22.36	1.61	10.68	12.88
Total	Mean	33.69	24.09	2.52	6.29	5.44	26.42	1.06	3.22	0.65
	Std. Dev.	34.56	24.85	4.82	18.44	2.17	22.66	1.94	8.27	11.88

Table 4: Firm Distribution across Industries

This table presents firm distribution across one-digit SIC codes for G7 countries. Percent of total for all firms and pyramids is defined as the ration of the number of firms in each sector to total number of firms respectively in the full and the pyramid samples. Total Assets is the mean of total assets in each industry.

One-digit SIC	Number of Companies		Percent of Total		Total Assets ($ million)	
	All	Pyramids	All	Pyramids	All	Pyramids
Mining and Construction	1,240	318	8.85	6.28	1,418	1,912
Manufacturing	5,543	1,950	39.54	38.52	1,581	1,655
Transportation and Communications	1,197	528	8.54	10.43	4,433	4,152
Wholesale and Retail Trade	1,495	487	10.66	9.62	1,558	1,555
Financial Services	1,737	582	12.39	11.50	1,299	1,282
Services	2,806	1,197	20.02	23.65	627	554
Total	14,018	5,062	100.00	100.00	10,917	11,110

Table 5: Comparison of Mean Firm Characteristics between Firms with Different Ownership Structures

This table reports means of firm characteristics by different ownership structures and t-statistics for mean differences. Financial firms (SIC 6000-6999) are excluded. Leverage is the book value of debt to total assets. Book debt is long-term debt and current liabilities. Market-to-book (M/B) is market value of equity divided by book value equity. Profitability is earnings before interest, taxes, depreciation, and amortization divided by total assets. Log sales is logarithm of net sales. Tangibility is fixed assets to total assets. R&D is the ratio of research and development expenditure to total assets. Debt Issues is the yearly change in book debt over total assets. Equity Issues is difference in yearly change of book equity and yearly change in retained earnings scaled by total assets. Pyramid is defined as a company controlled by an owner at 20% (or 10%) threshold and affiliated to a business group via a direct or indirect chain of control. Standard error are reported in brackets. *** indicates significance at the 1% level

	Leverage	M/B	Profit.	Log(Sales)	Tangib.	R&D	Debt Issues	Equity Issues
Pyramid	38.03	2.39	7.58	5.40	25.66	2.31	1.04	6.34
Non-Pyramid	31.08	2.58	5.56	5.48	26.90	3.69	0.46	8.68
Mean Difference	6.95***	-0.2***	2.02***	-0.08***	-1.24***	-1.37***	0.59***	-2.34
	[0.38]	[0.05]	[0.20]	[0.02]	[0.24]	[0.086]	[0.15]	[0.30]

Table 6: Leverage and Firm Characteristics Across Countries

This table reports results of the regressions of book leverage on firm characteristic variables.

$$Leverage_{it} = \alpha + \beta_1 Profitability_{it-1} + \beta_2 Tangibility_{it-1} + \beta_3 M/B_{it-1} + \beta_4 Log(Sales)_{it-1} + \epsilon_{it}$$

Book leverage is book debt divided by invested capital. Book debt is defined as short term debt plus long term debt. Book equity is stockholders' equity plus minority interest. Book debt plus book equity is defined as invested capital. Market-to-book ratio is defined as market equity divided by book equity. $Profitability$ is earnings before interest, taxes, and depreciation divided by total assets. $log(Sales)$ is logarithm of net sales. $Tangibility$ denotes net property, plant and equipment divided by total assets. Standard errors are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	ALL	US	Canada	United Kingdom	France	Germany	Italy	Japan
$Profitability_{t-1}$	-0.201***	-0.149***	-0.305**	-0.032	-0.491***	-0.358***	-0.024	-1.126***
	[0.029]	[0.034]	[0.132]	[0.125]	[0.164]	[0.127]	[0.172]	[0.079]
$Tangibility_{t-1}$	0.285***	0.287***	0.165***	0.165***	0.358***	0.411***	0.012	0.551***
	[0.016]	[0.027]	[0.048]	[0.037]	[0.075]	[0.053]	[0.105]	[0.028]
M/B_{t-1}	-0.200**	-0.334***	-0.126	-0.049	-0.092	-0.474	-1.312**	1.657***
	[0.090]	[0.123]	[0.319]	[0.234]	[0.253]	[0.350]	[0.527]	[0.227]
$log(Sales)_{t-1}$	2.643***	2.505***	2.108***	3.585***	1.740***	0.579	3.476***	3.025***
	[0.167]	[0.250]	[0.553]	[0.587]	[0.556]	[0.541]	[1.100]	[0.313]
Observations	23,230	10,716	1,244	2,110	1,267	1,166	461	6,266
Firms	9,096	4,142	554	944	510	464	183	2,299
R^2	0.09	0.08	0.10	0.08	0.07	0.10	0.10	0.23

Table 7: Leverage and Pyramid Structure

This table reports the estimates from OLS regressions where the dependent variable is book leverage defined as book debt divided by invested capital. Book debt is defined as short term debt plus long term debt. Book equity is stockholders' equity plus minority interest. Book debt plus book equity is defined as invested capital. Market leverage in columns 4-6 is defined in a similar way; market equity is included instead of book equity. *Pyramid* is a dummy which equals to 1 if a firm is affiliated to a pyramidal group and 0 otherwise; O/C is the ratio of ownership (cash-flow) rights to control (voting rights); $Profitability$ is earnings before interest, taxes, and depreciation divided by total assets. $log(Sales)$ is logarithm of net sales. $Tangibility$ denotes net property, plant and equipment divided by total assets. Market-to-book ratio (M/B) is defined as market equity divided by book equity. The estimates of constant, industry, country and time dummies are not reported. Robust standard errors (clustered at the firm level) are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Book Leverage			Market Leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
$Pyramid$	4.971***	5.062***	8.357***	3.891***	4.171***	7.226***
	[0.871]	[0.905]	[0.958]	[0.550]	[0.570]	[0.602]
O/C		-0.017**			-0.019***	
		[0.009]			[0.006]	
$HighCreditRights$			1.247*			6.397***
			[0.725]			[0.509]
$HighCreditRights * Pyramid$			-2.615*			-4.535***
			[1.399]			[0.999]
$Profitability_{t-1}$	-0.204***	-0.204***	-0.197***	-0.152***	-0.158***	-0.150***
	[0.029]	[0.031]	[0.029]	[0.013]	[0.014]	[0.013]
$Tangibility_{t-1}$	0.283***	0.282***	0.269***	0.253***	0.249***	0.245***
	[0.016]	[0.016]	[0.015]	[0.011]	[0.011]	[0.011]
M/B_{t-1}	-0.190**	-0.190**	-0.184**	-0.531***	-0.525***	-0.549***
	[0.089]	[0.092]	[0.089]	[0.040]	[0.041]	[0.040]
$log(Sales)_{t-1}$	2.634***	2.739***	2.546***	1.738***	1.898***	1.776***
	[0.167]	[0.177]	[0.163]	[0.113]	[0.119]	[0.113]
Observations	23,230	22437	23,230	22,973	22,196	22,973
Firms	9,096	8,756	9,096	8,998	8,663	8,998
R^2	0.09	0.09	0.085	0.17	0.17	0.16

Table 8: Leverage and the Second Largest Owner in Pyramidal Group

This table reports the relation between the voting rights of the second largest owner and capital structure of pyramid firms. The dependent variable is book leverage defined as book debt divided by invested capital. Book debt is defined as short term debt plus long term debt. Book equity is stockholders' equity plus minority interest. Book debt plus book equity is defined as invested capital. $VR1$ ($VR2$) is the percentage holdings of the largest (second largest) owner. $VR1 > 50$ is a dummy variable which equals one if the largest shareholder holds at least 50% voting rights. $VR2 \in (10\% - 20\%)$ and $VR2 > 20\%$ equals one if VR2 lies in the specified region. The estimates of constant, country, industry and time dummies are not reported. Standard errors are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Book Leverage				Market Leverage			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$VR2$	0.121***				0.077**			
	[0.043]				[0.030]			
$VR2 > 20\%$		4.756***				3.120***		
		[1.647]				[1.109]		
$VR2(10-20)$		-0.268				0.791		
		[1.642]				[1.049]		
$Log(VR1-VR2)$			-0.995**				-0.502	
			[0.449]				[0.340]	
$(VR1-VR2)/(VR1+VR2)$				-0.054**				-0.030**
				[0.022]				[0.015]
$Profitability_{t-1}$	-0.178**	-0.176**	-0.172*	-0.174**	-0.166***	-0.165***	-0.169***	-0.169***
	[0.078]	[0.079]	[0.088]	[0.087]	[0.029]	[0.029]	[0.032]	[0.032]
$Tangibility_{t-1}$	0.240***	0.237***	0.239***	0.241***	0.275***	0.274***	0.267***	0.269***
	[0.033]	[0.033]	[0.035]	[0.034]	[0.023]	[0.023]	[0.024]	[0.024]
M/B_{t-1}	-0.381**	-0.375**	-0.385**	-0.409**	-0.601***	-0.598***	-0.591***	-0.607***
	[0.163]	[0.163]	[0.180]	[0.176]	[0.083]	[0.083]	[0.092]	[0.090]
$log(Sales)_{t-1}$	1.858***	1.862***	1.858***	1.799***	1.289***	1.302***	1.425***	1.367***
	[0.335]	[0.336]	[0.351]	[0.346]	[0.226]	[0.227]	[0.240]	[0.237]
Observations	6574	6574	5892	6080	6426	6426	5760	5944
Firms	2632	2632	2351	2433	2592	2592	2315	2396
R^2	0.05	0.05	0.05	0.05	0.13	0.13	0.13	0.13

Table 9: Leverage and the Second Ultimate Owner by Shareholder Type

This table reports the relation between the second largest owner and capital structure for family and non-family pyramid firms. $Family$ is a dummy which equals to 1 if a pyramid firm is controlled by a family and 0 otherwise. $VR1(VR2)$ is the percentage holdings of the largest (second largest) owner. $VR2 \in (10\% - 20\%)$ and $VR2 > 20\%$ equals one if $VR2$ lies in the specified region. The estimates of constant, country, industry and time dummies are not reported. Standard errors are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Pyramid	Family Pyramid	Non-Family Pyramid	Family Pyramid	Non-Family Pyramid	Family Pyramid	Non-Family Pyramid
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Family$	-3.453***						
	[1.303]						
$VR2$		0.058	0.143**				
		[0.060]	[0.056]				
$VR2 \in (10\% - 20\%)$				-1.353	-0.32		
				[2.528]	[1.921]		
$VR2 > 20\%$				2.958	5.869***		
				[2.371]	[2.144]		
$Log(VR1 - VR2)$						-0.109	-1.526***
						[0.652]	[0.580]
$Profitability_{t-1}$	-0.135**	-0.173	-0.102**	-0.172	-0.101**	-0.153	-0.091
	[0.059]	[0.131]	[0.046]	[0.132]	[0.046]	[0.145]	[0.055]
$Tangibility_{t-1}$	0.237***	0.261***	0.228***	0.259***	0.222***	0.240***	0.241***
	[0.031]	[0.051]	[0.038]	[0.051]	[0.038]	[0.053]	[0.042]
M/B_{t-1}	-0.306**	-0.278	-0.311*	-0.272	-0.307*	-0.177	-0.355*
	[0.133]	[0.223]	[0.164]	[0.222]	[0.164]	[0.242]	[0.184]
$log(Sales)_{t-1}$	1.719***	1.286**	1.882***	1.266**	1.890***	1.099**	2.007***
	[0.305]	[0.509]	[0.376]	[0.510]	[0.378]	[0.544]	[0.400]
Observations	7,540	2,954	4,586	2,954	4,586	2,662	4,015
Firms	3,164	1,156	2,008	1,156	2,008	1,037	1,763
R^2	0.05	0.05	0.05	0.05	0.05	0.04	0.05

Table 10: Dividends and Ownership Characteristics

This table reports the relation between ownership and dividend-payout estimated using Tobit regressions. The dependent variable is the ratio of paid dividend to firm market value. $VR1(VR2)$ is the percentage holdings of the largest (second largest) owner. $VR2 \in (10\% - 20\%)$ and $VR2 > 20\%$ equals one if $VR2$ lies in the specified region. $Family$ equals one of the largest owner is a family and zero otherwise. The estimates of constant, country, industry and time dummies are not reported. Robust standard errors are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Divided/Market Value		
	(1)	(2)	(3)
Pyramid	-0.212**		
	[0.085]		
$VR1$		-0.005*	
		[0.003]	
Family Pyramid			0.457***
			[0.147]
Leverage	-0.008***	-0.013***	-0.012***
	[0.001]	[0.002]	[0.002]
Profitability	0.071***	0.100***	0.097***
	[0.003]	[0.007]	[0.007]
Market-to-book	-0.048***	-0.019*	-0.022**
	[0.006]	[0.011]	[0.011]
Log Sale	0.445***	0.560***	0.566***
	[0.018]	[0.041]	[0.038]
Firms	9,862	3,255	3,573
Wald χ^2	2687.33	801.4	890.27

Table 11: Pyramid Interactions

This table reports the estimates from OLS regressions where the dependent variable is book leverage defined as book debt divided by invested capital. Book debt is defined as short term debt plus long term debt. Book equity is stockholders' equity plus minority interest. Book debt plus book equity is defined as invested capital. $Pyramid$ is a dummy which equals to 1 if a firm is affiliated to a pyramidal group and 0 otherwise; $Profitability$ is earnings before interest, taxes, and depreciation divided by total assets. $log(Sales)$ is logarithm of net sales. $Tangibility$ denotes net property, plant and equipment divided by total assets. Market-to-book ratio (M/B) is defined as market equity divided by book equity. $LargeFirms, HighTangibility, HighGrowth, HighProfit$ are dummy variables taking the value of one for value higher than the each variable median. $Non-DebtTaxShield$ is the ratio of depreciation to profit before depreciation, interest and taxes. The estimates of profitability, tangibility, market-to-book, sales, constant, industry, country and time dummies are not reported. Standard errors are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Book Leverage				
	(1)	(2)	(3)	(4)	(5)
$Pyramid$	7.745***	7.181***	7.532***	5.800***	4.944***
	[1.247]	[1.178]	[1.414]	[1.275]	[0.870]
$Pyramid * LargeFirms$	-4.691***				
	[1.434]				
$Pyramid * HighTangibility$		-4.297***			
		[1.374]			
$Pyramid * HighGrowth$			-4.829***		
			[1.357]		
$Pyramid * HighProfit$				-1.331	
				[1.338]	
$Pyramid * Non-DebtTaxShield_{t-1}$					0.001
					[0.001]
$LargeFirms$	1.825*				
	[0.968]				
$HighGrowth$			-2.332***		
			[0.764]		
$HighProfit$				-6.709***	
				[0.761]	
$HighTangibility$		2.479***			
		[0.954]			
$Non-DebtTaxShield_{t-1}$					-0.003***
					[0.001]
Observations	23230	23230	23230	23230	23228
R^2	0.09	0.09	0.09	0.01	0.09

Table 12: Propensity Score Matching

Column 1 reports the coefficients of a pyramid dummy from yearly leverage regression specified in Table 7, columns 1. Columns 2 and 3 show the average treatment on the treated (ATT) over the common support. Standard errors are reported in brackets. The standard errors of ATT parameters are bootstrapped. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Year	OLS	Propensity Score ATT	
		Mahalanobis	Kernel
	(1)	(2)	(3)
2004	4.93***	4.12***	4.61***
	[0.99]	[0.77]	[0.70]
2005	4.42***	3.12***	3.8***
	[1.02]	[1.12]	[1.05]
2006	5.77***	3.89***	4.92***
	[1.04]	[1.34]	[1.4]