Blockholders and Leverage: When Debt Leads to Higher Dividends*

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Abstract

This paper focuses on dominant owners' use of leverage to finance their blocks and its relationship to dividend policy. We postulate that the leverage of blockholders leads to higher dividend payouts and lower investments because dividends are needed to service blockholder debt (Debt Service Hypothesis). We use data for France where blockholders have tax incentives to structure their leverage in pyramidal holding companies. We find strong evidence for our hypothesis: dividend payouts increase in proportion to pyramidal debt of dominant owners. We inspect pyramidal entities individually and find that dividends received are explained by debt obligation needs. Companies dominated by levered blockholders invest significantly less. Alternative explanations for payout policy in pyramids, based on investments or cash preferences, cannot explain the dividend pattern.

Keywords: payout policy, blockholders, leverage, debt service hypothesis, concentrated ownership, investment policy, pyramids.

JEL classification: G32, G34, G35.

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Abstract

This paper focuses on dominant owners' use of leverage to finance their blocks and its relationship to dividend policy. We postulate that the leverage of blockholders leads to higher dividend payouts and lower investments because dividends are needed to service blockholder debt (Debt Service Hypothesis). We use data for France where blockholders have tax incentives to structure their leverage in pyramidal holding companies. We find strong evidence for our hypothesis: dividend payouts increase in proportion to pyramidal debt of dominant owners. We inspect pyramidal entities individually and find that dividends received are explained by debt obligation needs. Companies dominated by levered blockholders invest significantly less. Alternative explanations for payout policy in pyramids, based on investments or cash preferences, cannot explain the dividend pattern.

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We address the use of leverage to finance controlling equity stakes and the effects of this leverage on company policies, dividends and investment. The extensive literature on the role of blockholders in corporate governance and company policies implicitly assumes owners use deep pockets to finance their controlling share blocks. But blockholders use debt financing, for example Ronald S. Lauder, the owner of a large block in cosmetics and fashion group Estée Lauder Companies, uses debt apparently for tax motives: "Nearly $400 million of that stock [worth $600 million] is pledged to secure various lines of credit. Many financial planners consider it imprudent for principal shareholders in a company to borrow against their stock. But it remains a popular way for wealthy taxpayers to get cash out of their holdings without selling and paying taxes" (New York Times, Nov. 26, 2011).

We investigate the economic consequences of blockholders' leverage by focusing on the link between the debt exposure of controlling shareholders and the dividend payout policy for blockholder controlled companies, as illustrated by the following examples. When Carrefour, a large multinational retailer, experienced floundering sales in 2011, observers urged it to cut its dividend, but Nomura analysts cautioned: "Since Carrefour's core shareholders' (Blue Capital) investment in Carrefour is 80 percent debt financed, we question whether they can accept a sharp reduction in dividend."[1] When the government of Argentina nationalized the majority block in oil company YPF in April 2012, a main motive, reportedly, was to punish the Eskenazi family who depended on YPF's generous dividends to finance its levered 25% equity stake (Financial Times, April 18, 2012).

Our central hypothesis focuses on the potential need by the dominant owner for higher dividends to service debt. Specifically, the dividend payout of the listed operating company should increase in the pyramidal leverage of the dominant owner's equity stake. We call this supposition the Debt Service Hypothesis. As a consequence of the need for high payouts, the company's policies may be defined in a way that facilitates the extraction of a large and steady stream of cash. For example, the company's capital expenditure may be reduced in order to preserve cash by not draining away cash with new investments. We investigate this corollary on the investment behavior as a second hypothesis.

[1] Reported by Reuters, November 2012, http://www.reuters.com/article/2011/11/17/us-carrefour-analysis-idUSTRE7AG0M220111117. Blue Capital is Carrefour's largest blockholder; it is a holding vehicle in which Bernard Arnault, one of the world's wealthiest individuals, is the lead investor.

Data availability presents a major challenge given the privacy of information on personal debt, despite a renewed regulatory interest to understand the consequences of debt financing. We focus on France because much of the leverage of large shareholders is in fact structured in holding vehicles. France's specific institutions and personal tax rules convey considerable advantages if levered owners organize their leverage in these holding companies. Tax costs of using holding companies are negligible, and tax rules discourage the use of pyramidal mixed companies that combine financial holdings with operating investments. Furthermore, holding companies are quite transparent, i.e., we observe ownership structure, financial structure and payout policy of privately-owned as well as publicly listed companies, including holding companies. Thus, while we cannot observe the use of private leverage comprehensively, fiscal incentives and the relative transparency of holding vehicles provide a starting point to investigate its consequences. In France, as in most countries, a large majority of listed firms are controlled by dominant owners.

Our first finding is that the use of pyramidal leverage, our proxy for the use of private leverage by controlling blockholders, is wide-spread. We find that a majority of publicly listed companies are organized as pyramids. We show the phenomenon of pyramidal debt to be wide-spread: 71.5% of pyramidal holding companies use leverage, and pyramids lead to a mean increase of the dominant owner's leverage exposure by 17.9%, according to our preferred measure of pyramidal leverage. The true pyramidal leverage number is substantially higher since we assume conservatively the debt to be equal to zero for the 19.2% of the pyramidal entities for which we do not observe the capital structure. Thus, in France, debt in holding companies leads to a significant divergence between the leverage exposure of the dominant owner and the minority shareholders, and the debt service for pyramidal debt significantly reduces the cash flows freely available to dominant shareholders.

Second, we find robust support for the Debt Service Hypothesis. Using multiple measures to aggregate the leverage of pyramids, we find pyramidal leverage to be a major determinant of dividend payouts of listed companies controlled by a large owner. We then take a closer look at the flow of funds within pyramids for additional evidence that payout decisions are explained by pyramidal debt. If dividend payouts are driven by the need to service debt, then the dominant owner should ultimately receive only a fraction of the dividends, and the fraction received should decrease in the importance of holding company debt. Inspecting pyramids on an entity-by-entity basis, we find the debt service

obligation of each holding company to be the leading factor explaining the dividends it receives. Crucially, the fraction of dividends consumed in each holding company and not passed on to the ultimate owner or the next entity increases strongly in our measures of the importance of debt service in that holding company. Dominant owners ultimately receive less than two thirds of the cash that operating companies make available to them, a fraction that decreases strongly in our measures of pyramidal debt.

Third, we find that companies controlled by levered owners substantially reduce their investments (capital expenditures). A one-standard deviation increase in pyramidal leverage reduces capital expenditures of the average firm by one third**,** after controlling for other determinants of investment behavior, in particular investment opportunities.

The research literature suggests alternative explanations for the relationship between pyramidal leverage and payout policy. Notably, according to the theory on pyramids by Almeida and Wolfenzon (2006), investment in other business ventures could explain large dividends in pyramidal structures. As mentioned, this explanation is unlikely because of tax incentives in France; furthermore, our detailed anatomy of the use of dividends reveals that dividends consumed in each pyramidal entity are used primarily to service the debt of that entity. Still, we investigate investments as an alternative use of dividends, and find that dividends used for investments are negligible compared to debt service. According to another explanation, higher dividend payouts could also be determined by a desire to cater to different dividend preferences among shareholders.[2] Again, we show that debt service motives, not cash accumulation, drive the operating company's payout policy.

We address the econometric concerns that pyramidal leverage and dividend policy may not be chosen independently, or that causality may be reversed. Blockholders with a desire to use pyramidal leverage may select firms with suitable characteristics. We undertake a series of tests and use alternative specifications to address these concerns. Corporate ownership structures and holding companies are very stable in France, so much so that a larger number of lags confirms our findings. The same is true for the use of leverage to finance dominant equity blocks. We also detect no measurable difference in the companies with levered blockholders and those without in terms of their risk profiles, capital structures, cash flows, or investment opportunities. We find that levered French blockholders embraced an

[2] Holding companies allow personal tax deferrals if blockholders do not want current cash payouts (Section 2.1).

exogenous law change facilitating the use of stock repurchases as a second payout channel. These findings provide reasonable assurance that our main results are not driven by self-selection and endogeneity.

The Debt Service Hypothesis contributes to the literature on the role of dominant shareholders and dividend payout policy, currently marked by two competing hypotheses. According to the Expropriation Hypothesis introduced by La Porta et al. (2000), dominant owners prefer to keep cash resources within the firm rather than share them with minority shareholders. The weaker the investor protection and the larger the distance between the dominant owner's voting rights and cash flow rights, the smaller should be the payout. Empirical support, however, is mixed. While the findings of La Porta et al. (2000) are consistent with the Expropriation Hypothesis, Faccio, Lang and Young (2001) present seemingly contradictory evidence that dominant owners in European business groups pay larger dividends. They refer to an alternative explanation, the Substitution Hypothesis, which stipulates that large shareholders care about the stock market value and thus build a reputation by paying higher dividends. In the context of this disagreement, the Debt Service Hypothesis provides an explanation for the puzzling finding that pyramidal-controlled firms have relatively high dividend payouts.

Our paper also contributes to the investigation of pyramidal ownership. Studies on pyramids focus on companies in which at least one holding vehicle is a publicly listed company, e.g. LaPorta, Lopez-de-Silanes, and Shleifer (1999) in their seminal article that classifies more than a quarter of listed firms worldwide as pyramids. With the ability to observe privately held holding companies, we document that pyramids are probably even more prevalent than generally assumed. In France, once private holding vehicles are fully taken into account, we find 55% of listed firms organized as pyramids, twice as many pyramids as previously estimated. Our second contribution to the research on pyramids is that pyramidal debt may help to resolve an old puzzle, observed in Almeida and Wolfenzon (2006), that owners often hold overwhelming majority stakes, even 100% stakes, in a holding company along the control chain. There is no puzzle if they contain debt or its opposite, cash reserves. The link between blockholder leverage and payout policy has not yet been discussed in the literature.[3] Holding company debt is absent

[3] None of the papers in the pyramids literature considers payout policy or holding company debt. Attig, Fischer, and Gadhoum (2004) find that pyramidal firms tend to be larger than unaffiliated firms and appear to be associated with larger capital investments. Claessens, Fan, and Lang (2002) find that firms with the highest

from recent lists of control-enhancing mechanisms creating a disparity between voting and cash flow rights (Adams and Ferreira, 2008; Shearman and Sterling, 2007).

While our paper and its hypotheses contribute to the work on pyramids, pyramids and business groups should not be confounded, as Khanna and Yafeh (2007) note in their survey. Our paper focuses exclusively on financial aspects of pyramids, and the pyramid-controlled companies in our sample are predominantly not part of business groups (see Section 6.1). A small number of papers explicitly address how business groups allocate debt between parent firms and subsidiaries (Bianco and Nicodano, 2006; Luciano and Nicodano, 2008; Lee, 2009) from the perspective of the internal capital market of the group. They generally find evidence that debt seems to be concentrated within parent firms and argue this arrangement is optimal. None of these papers investigates payout policy or the role of pyramidal debt as private leverage of the dominant shareholder.

The paper is organized as follows. Section 1 presents the theoretical arguments. Section 2 describes the study's design and data. Section 3 outlines our main results. Section 4 presents further evidence on how dividends are passed through pyramidal entities. Section 5 addresses the relationship between capital expenditures of the operating company and pyramidal debt. Section 6 considers alternative explanations and endogeneity issues. Section 7 concludes.

1. Hypotheses Development

The Expropriation Hypothesis on dividend payouts in companies with controlling shareholders argues that owners choose a higher level of expropriation if the control wedge, the discrepancy between control and cash flow rights, increases (Burkart and Lee, 2008). For a given dividend payment, a dominant shareholder with a control wedge gets only a fraction of the cash benefit compared with a dominant shareholder without a control wedge (the latter has a larger cash flow stake) but loses the same amount in

separation of cash flow and voting rights are younger than those with less separation. There is also broad evidence of a negative relationship between firm valuation and the control wedge induced by pyramidal ownership. Papers linking this negative firm valuation effect specifically to pyramid ownership include Claessens et al. (2002), Volpin (2002) and Cronqvist and Nilsson (2003); other studies do not specifically consider pyramids, but pyramids are likely to be the primary reason for the disparity of cash flow rights from control rights in their samples (Morck, Wolfenzon, and Yeung, 2005; Claessens et al., 2002; Bennedsen and Nielsen, 2006; Lins, 2003).

control benefits. Therefore, for a given level of voting rights, a higher control wedge provides larger incentives for the dominant shareholder to engage in expropriation.

In the alternative view, the Substitution Hypothesis (La Porta et al., 2000; Faccio, Lang, and Young, 2001), dominant owners commit to a stable dividend level in order to offset market doubts about expropriation risk. Dividend payouts are favorably received by stock markets per the two most influential theories on dividend payouts, the free cash flow hypothesis and the dividend signaling model. Accordingly, the Substitution Hypothesis holds that from the dominant shareholder's perspective, the positive stock market value effect dominates the potential gains from expropriation. The larger the control wedge, the more skeptical the stock market and the more important the dividend payout. The Substitution Hypothesis, however, has not been subjected to a formal theoretical analysis. It is not obvious that a dominant owner wants to commit to generous dividend payouts, even if this commitment could generate positive value effects. Only the level of control, i.e., her voting rights, determines her control benefits. As a consequence, the larger the discrepancy between control rights and cash flow rights, the smaller the impact of the stock market reaction on the dominant owner's wealth.

We suggest an alternative mechanism that explains why a pyramid-induced control wedge may lead to higher dividend payouts. This effect arises if the ownership stake of the dominant owner is leveraged, because the owner directly benefits from an increased dividend payout as a source of funding to service her debt. The use of debt in a pyramid implies that the dominant shareholder must assure the solvency of the holdings. Leveraged ownership creates a disparity between the dominant owner's use of cash flows and the uses of other shareholders. Therefore, we postulate that dividend payouts should increase in the use of pyramidal debt by dominant owners: *Pyramidal debt has a positive effect on operating company dividends* (*Debt Service Hypothesis*).

A second hypothesis closely related to the Debt Service Hypothesis concerns investments by the operating company. A large body of empirical evidence shows that companies with more financial slack invest more.[4] Models based on financial constraints, as well as models based on the disciplining role of debt reining in investments (Jensen, 1986), constitute the theoretical foundation for this relationship. We

[4] E.g. Fazzari, Hubbard, Petersen (1988), Hoshi, Kashyap and Scharfstein (1991), as well as studies addressing endogeneity concerns, such as Duchin, Ozbas, and Sensoy (2010). In a survey, Stein summarizes the evidence: "Perhaps the one clearest empirical finding emerging from research on investment over the last 15 or so years is that … controlling for investment opportunities, firms with more cash on hand invest more, as do firms with lower debt burdens." (Stein, 2003).

extend this reasoning to include the total leverage of the controlling shareholder, not only the debt of the operating company. A specific question is whether the presence of a blockholder mitigates or heightens the relationship between financial slack and investment. According to the literature (e.g., Morellec and Schurhoff, 2011), blockholders could mitigate financial constraints and loosen the relationship under the condition that they be willing to accept either more operating company debt or equity dilution. Lins, Volpin and Wagner (2012) argue that blockholders lead to a tighter relationship if they extract private benefits (to which the service of private leverage belongs) and their research presents evidence consistent with this hypothesis. Hadlock (1998) shows a non-linear relationship for insider ownership that is roughly consistent with these two opposing views. Hence we do not expect the relationship between financial slack and investments to be fundamentally altered by the presence of a blockholder, and we expect *pyramidal debt to have a negative effect on operating company investments (capital expenditures)*.

2. Research Design and Data

2.1 Pyramids in France

France presents an ideal laboratory to investigate the role of pyramids and of pyramidal leverage in the relationship between large and small shareholders. France is a developed market, with the largest percentage of foreign stock ownership among the large European economies, and with a high degree of ownership concentration in listed firms. Structuring a large equity block in a holding vehicle, i.e. creating a pyramid, offers several potential benefits for blockholders but entails little administrative cost. As this institutional set-up suggests, pyramids are widely used and deeply embedded.

According to the tax regime that has essentially been stable since 1965, a holding company receives almost full tax credit for the corporate income tax paid by the operating company or a subordinate holding vehicle, meaning that pyramids in France are essentially tax neutral (so-called "régime des sociétés mères"). This corporate tax credit, however, is conditional on holding the share block for at least two years[5] and on holding at least 5% of the equity (10% until 2000); thus, only long-term investors that are significant shareholders benefit from the avoidance of double taxation. The tax

[5] A declaration of intent to hold the shares for more than two years is considered sufficient. Breach of the declaration of intent through an earlier sale carries no other penalty besides back taxes. Thus, the tax neutrality of a new blockholder is in practice effective immediately and not after a two-year waiting period.

credit is only approximately complete because the administration costs of a holding company remain taxable, at a level of the true administrative cost of the entity or 5% of its revenue, whichever is smaller. This creates a tax incentive to keep the true administrative costs of holding vehicles at a minimum and to structure them as pure financial holding entities unencumbered by any real assets or activities that would lead to higher administrative costs and a smaller tax credit. Thus, tax reasons can explain why holdings companies do not typically consist of a portfolio of equity blocks and operating assets as is the case in business groups that are prevalent in other countries.

Using a pyramid to structure an equity block offers several advantages in France. First, if the large shareholder has issued some debt, structuring the debt in a holding company allows the interest expense to be deducted against the dividend payouts that are subject to personal income taxes. Thus, the prevailing tax regime suggests that large share blocks financed with debt will be organized in pyramids. Second, pyramids decouple the decision of a listed operating company to pay dividends from the decision of a large blockholder to receive the dividend. That is, blockholders can use pyramidal holdings as a tax shelter; they will only incur the corresponding personal income tax on dividends when the dividend received by the holding are later transferred to the ultimate owner. Therefore, since holdings are neutral regarding corporate taxes, increasing the use of debt in a pyramid procures no tax savings, neither for personal nor corporate taxes.[6] Third, holdings are the only practicable way in France to engineer a disparity between voting and cash flow rights. For all practical purposes, dual class shares are not allowed. France allows double voting rights for long-term investors, but their role is different and their impact limited, as our robustness results for double voting rights show (Section 6.4). Finally, holding companies jointly held by multiple blockholders, such as family members, provide a vehicle for the multiple blockholders to vote as one block in corporate decisions.

Finally, French regulations require all companies, public and private, to file their *un*consolidated financial statements on an annual basis. French regulations also require all companies, public and private, to register their list of important shareholders and listed companies to disclose important changes in shareholdings and their holding structure.[7] Thus, the ownership structure, financial structure and payout

[6] That is, the same tax advantage can be achieved by simply sheltering dividends in holdings, without using debt. On the other hand, conditional on using personal debt, it is tax-efficient to structure it as pyramidal debt.

[7] Per French corporate laws, the following key thresholds give rise to discontinuous changes in control rights: 1) 33%: This level of control grants veto rights. It also triggers the mandatory bid rule, i.e. any owner passing

policy of privately-owned as well as publicly-listed companies, including holding companies are accessible.

2.2 Measures of Pyramidal Leverage and Control

In this section, we present a simple example to introduce our key variables for debt and control. Pyramids can be complex, and France is no exception. Appendix A presents a full description of the design and algorithms that address cross-holdings and parallel ownership chains.

The Figure 1 example features an operating company, two holding companies and a dominant owner. All entities in the pyramid are vertically aligned, and the two holding companies have no other assets. Ms. *X* dominates company *OpCo* by controlling 30% of its equity by means of two holding companies: *HoldCo1* owns 30% of *OpCo*; *HoldCo2* owns 60% of *HoldCo1*; and Ms. X owns 70% of *HoldCo2*. Ms. *X*'s cash flow rights are conventionally measured by the product .7*.6*.3 = .126, her claim on *OpCo*'s dividends. In measuring control rights, we apply the same product rule but convert majority stakes, .6 and .7, to full control, 1.0. Thus, her control rights are 1.0*1.0*0.3 = .3. The measure of the disparity between control rights and cash flow rights that we call the *control wedge* is the ratio of control rights/cash flow rights, calculated as .3/(.7*.6*.3) = 2.38.

Our focus is on the dominant owner's exposure to leverage in the various entities of the pyramid. We use two measures to aggregate the leverage throughout the various entities of the pyramid. We explain the two measures using our example. *HoldCo1* is financed with 35% debt and 65% equity and *HoldCo2* is financed with 20% debt and 80% equity. We denote the leverage ratio in pyramidal entity k by l_k, so that in our example $l_1 = .35$ and $l_2 = .2$. In this setting, *OpCo* needs to pay a sufficient dividend so that *HoldCo1* and *HoldCo2* can service their debt. Ms. *X*'s effective claim on *OpCo*'s cash flows is reduced as a consequence.

Focusing on holding company debt, our first measure of pyramidal leverage, which we call *average leverage*, is just the mean leverage ratio of all the holding entities in the pyramid. In the example,

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through the 33% threshold is required to launch a full and unrestricted takeover offer; 2) 40%: Control is presumed if one shareholder has at least 40% of voting rights, directly or indirectly, and is the largest shareholder (according to article 355-1 of French securities law per Bloch and Kremp (2001)); 3) 50%: This level constitutes majority voting rights (or legal control) and triggers notification to the French authorities; 4) 67%: Reverse of the 33% rule, i.e. the ability to block any veto rights by other shareholders. This level is also the highest conditional takeover offer allowed under French law (restricted offers are not allowed in France).

we have an average leverage of (.35 +.2)/2 = .275. More generally, if the pyramid consists of n holding companies, k = 1, 2, …, n, average leverage is defined as $\frac{1}{n}\sum_k l_k$.

Our second measure, *equivalent leverage,* is motivated by the concern that average leverage may underestimate the dominant owner's true debt exposure. Such is the case when several levered holding companies are vertically superimposed on the operating company, as in our example. Ms. *X*'s cash flow profile from her stake in *OpCo* is successively exposed to the leverage in the pyramidal layers. Equivalent leverage determines the leverage ratio that would give Ms. *X* the same cash flow profile if she were to hold her stake in *OpCo* and her pyramidal debt in a single levered holding company. In our example, equivalent leverage is calculated as $l_1 + (1- l_1)l_2 = 0.35 + (1 - .35)*.2 = .48$.[8] Thus, $l_1 + (1- l_1)l_2$ aggregates Ms. *X*'s full leverage exposure in the entire pyramid. More generally, if the pyramid consists of n vertically stacked holding companies, k = 1, 2, …, n, equivalent leverage is defined as $l_1 + (1- l_1)l_2 + (1- l_1)\ (1- l_2)l_3 + \ldots + (1- l_1)*\ldots*(1- l_{n-1})l_n$. Equivalent leverage collapses the dominant owner's pyramidal leverage to the equivalent leverage ratio that would arise if she were to hold the same aggregate cash flow rights and the same aggregate pyramidal debt exposure in a single pyramidal entity.

When calculating the values for the two measures of pyramidal debt, we assume there is zero debt in a holding company in the pyramid when such data is not available, thereby presenting conservative estimates for our leverage measures, average and equivalent. We have no capital structure information for 19.2% of the reported pyramidal holding companies, so that our leverage estimates contain a considerable downwards bias.

2.3 Data and Implementation

Our starting point is the set of all publicly listed companies on Euronext Paris as of January 31, 2003. Our initial sample includes firms from all three tiers of the Paris market: 393 listed firms on the Premier Marché (market), 324 listed firms on the Second Marché, and 152 listed on the Nouveau Marché. We

[8] For an intuition for the logic behind equivalent leverage, let r_D be the cost of debt (assume r_D is the same for all entities in the pyramid). If *OpCo* pays a dividend yield of x, then *HoldCo1* receives $.3*x$ and, after paying interest, has earnings (ROE) of $.3(x - l_1 r_D)$. If *HoldCo1* pays out all of its earnings as dividends, then *HoldCo2* receives $.6*.3(x - l_1 r_D)$ and, after paying interest, has earnings (ROE) of $.6*.3(x - l_1 r_D - (1- l_1)l_2\ r_D)$. If all of it is paid out, the dominant owner receives $.7*.6*.3(x - l_1 r_D - (1- l_1)l_2\ r_D)$, whereas she would receive $.7*.6*.3*x$ if there was no pyramidal debt.

then impose one filtering criterion, which is inclusion in the WorldScope and Datastream databases over the period 1996-2005. The final sample consists of 355 firms (i.e. 206 Premier, 138 Second and 11 Nouveau Marché firms). We refer to each of these publicly listed companies as an operating company. Next, we collect the complete ownership information for 1997, 1999, 2001, and 2003 for all holding companies, public and private. This information is available from the Dafsaliens database that also documents validation dates (Dafsaliens was set up by large French financial institutions to provide precise ownership information). Starting from the operating company, we use Dafsaliens to trace the ownership of the owners of the operating company and continue this process until we have traced the entire ownership structure to the dominant owners. We trace ownership across all ownership classes, individual/family, public company, unlisted private company and state.

In accordance with La Porta, Lopez-de-Silanes, and Shleifer (1999), Claessens, Djankov, and Lang (2000), Faccio and Lang (2002) and others, we require a shareholder possess a substantial level of control (i.e. voting rights) in order to qualify as a dominant owner. The typical threshold used in the literature is 20%. To be consistent with the literature and allow comparisons with prior findings, we use the same 20% threshold in our baseline analysis and perform robustness analyses for 33% and 40% thresholds. In each operating company, we verify whether the largest ultimate owner exceeds this threshold. If no shareholder has a control right stake of 20% or more, the company is considered as widely held. Otherwise, we identify the ultimate owner with the largest control right stake, and we refer to this ultimate owner as the dominant owner.

We capture the discontinuous character of control rights by using concepts similar to those adopted in Almeida et al. (2011) and assume the dominant shareholder has absolute control over the operating company if he has a majority of votes. That is, we convert effective control rights of greater than 50% in any entity into full control of 100%. The other stakes are then allocated zero control rights. Again, more complex cases with several control chains are discussed in the Appendix A.

From the Diane database (the French component of Bureau van Dijk's Amadeus database), we collect the unconsolidated financial statements for private unlisted and for listed companies in the ownership chain for 1996 to 2004. The *un*consolidated financial data provided by Diane eliminates the

effect of group debt and focuses the analysis on the capital structure of the firm itself. For the sample of 355 operating companies, we use their consolidated financial statement information from WorldScope.[9]

The richness of the Dafsaliens and Diane information offers an important advantage over annual report-based data and company handbooks used in most previous works such as La Porta, Lopez-de-Silanes, and Shleifer (1999) and Faccio and Lang (2002), which cover only ownership information of public companies. As the ownership structures are stable over time (see Section 6.2 for a detailed analysis), we also use the ownership structures information collected for a specific year in the subsequent year. With our ownership data from 1997, 1999, 2001 and 2003 we measure ownership structures in 1997-2004. In our payout regressions, we use the ownership and control variables in year *t* to explain payout variables in year *t*+1.

3. Results: Payout Policy of Operating Companies and Pyramidal Leverage

Section 3.1 presents the summary statistics and determinants of dividend payouts for all operating firms. Focusing on pyramids, Section 3.2 addresses the importance of leverage in pyramids. Section 3.3 discusses the determinants of dividend payout for operating companies with pyramidal structure.

3.1 Summary Statistics and Determinants of Dividend Payouts for the Full Sample

Table 1 describes the ownership structure and firm characteristics of the 355 French operating companies, yielding 2,597 observations in our 1997-2004 window. We find 85.6% of operating companies have a blockholder who satisfies the inclusion threshold of 20%, and only 14.4% of the firms are widely-held. Moreover, in 55.3% of our sample, dominant shareholders use pyramids to control the operating company. Note the frequency of pyramid-controlled firms is more than double the 26% frequency that La Porta, Lopez-de-Silanes, and Shleifer (1999) and Faccio and Lang (2002) report for France. This dramatic increase in the frequency of pyramidal structures results from the inclusion of private holding companies. By contrast, all earlier studies on pyramids in France classify firms as pyramids only if at least one of the holding companies in the pyramidal structure was a public company.[10]

[9] If any of the 355 companies controls subsidiaries, the net financial position of the subsidiaries and operating company is reflected in the operating company's consolidated financial information.

[10] La Porta, Lopez-de-Silanes, and Shleifer (1999); Faccio and Lang (2002); Ginglinger and Hamon (2008).

We find that only 20.1% of pyramidal structures contain a public company (not reported in tables). While perhaps an inevitable restriction in cross-country studies, limiting the pyramid definition to only structures with listed holding entities leads to a substantial undercount of the use of pyramids in at least the case of France.

Table 1 also classifies dominant owners by type (individual/family, firm, and state). Forty-seven percent of operating companies are controlled by either a family or an individual, roughly in line with earlier studies. Firms comprise 30.2% of dominant owners followed by state ownership of 3.6%. Again, 14.4% of the firms do not have a dominant owner with a stake equal to or greater than 20%.

The table next provides an overview of key financial characteristics with definitions for the companies in our sample, both in the aggregate as well as broken down according to control. We measure dividends relative to cash flow and net earnings. We follow common practice and set payout ratios to unity when dividends are paid but cash flow or earnings are negative or less than the dividend (e.g. Megginson and Von Eije, 2008). Leverage is defined as total debt obligations, scaled by book value of total assets. Sales growth is the two-year growth rate of sales.

Measured in terms of total assets, widely-held firms are substantially larger than firms with dominant owners, and they have about the same sales growth rate as operating companies in pyramids. Widely-held firms have dividend measures comparable to full sample means. Relative to the full sample, operating companies with pyramidal ownership generally pay higher dividends and grow faster. Relative to operating companies with pyramids, blockholder-controlled firms have lower dividend payouts. The frequency of loss firms and the level of operating risk are comparable across the subsamples with operating companies in pyramids slightly lower. We also tabulate an industry breakdown. A wide mix of industries is represented in the full sample as well as in the subsamples of block owner-controlled and pyramid-controlled operating companies.

For the full sample, Table 2 presents regression results analyzing the impact of financial characteristics and ownership structure on dividend policy for operating companies. All regressions include industry and year-fixed effects, use firm-clustered standard errors, and report robust *t*-values. We measure explanatory variables in year *t-1* and explained variables in year *t*.

The dependent variables are two conventional measures used for dividend payout, dividend/cash flow and dividend/earnings.[11] Dividends decrease with leverage and operating risk. Dividends increase in firm size and are significant for the dividends/earnings measure. Sales growth does not have a significant influence. Companies in loss years tend to cut back on dividends. Industry also influences the dividend payout, with services having a lower payout and financials having a higher payout (industry effects not reported in the table).

The surprising result is that ownership structure does not influence dividend payouts. Given our hypotheses, the implications of the Expropriation Hypothesis, lower dividends, could be offsetting the implications of the Debt Service Hypothesis, higher dividends. The Substitution Hypothesis generates an analogous prediction although the basis for the prediction is the dominant shareholder's preference for value over control. At this stage of the analysis, we cannot distinguish between the three hypotheses, Substitution, Expropriation and Debt Service. The Debt Service Hypothesis, however, could explain the behavior of pyramid-controlled operating firms, where dividend payouts are driven by debt service obligations in the levered pyramidal structures. We continue our investigation by focusing on pyramids.

3.2 Importance of Pyramidal Leverage

In this section, we focus on operating companies with a dominant blockholder who exceeds the 20% ownership threshold and uses pyramidal structures. In Table 3, we present summary statistics for pyramidal-controlled operating firms. We continue our analysis with a sample of 1253 firm-years for which we have sufficient information to calculate the control wedge as well as the two debt measures for the pyramidal structure. To be included in this refined sample, at least 50% of the holding companies in the pyramidal structure must be traceable in Diane. For the refined sample, 19.2% of holding companies on average have missing data, and the median holding company has no missing data. It is interesting to note that on average only 8% of the holding companies are public firms, which underscores the importance of including private firms in our analysis.

In Table 3, we present summary statistics for pyramidal-controlled operating firms, starting with an expansion of the financial characteristics shown in Table 1 broken down by the average, 25th

[11] We also find similar results when considering dividend yields; results are statistically weaker due to the volatility in yields induced by the wide swings in stock valuations during the sample period.

percentile, median, 75th percentile and standard deviation. Panel A of Table 3 shows the dominant owner holds on average 40.4% of the voting rights in the operating company (median: 34.2%). If we use the more demanding inclusion threshold of 33% (40%) for the dominant blockholder rather than the 20% threshold standard in the literature, the majority of these firms, 83.5% (73.3%), are still classified as pyramidal-controlled firms rather than as widely-held firms. Pyramidal structures contain 2.555 layers on average with a 25th percentile and median of 2, and a 75th percentile of 3. This measure includes the operating company as a layer. The control wedge with a mean of 1.840 (median: 1.563) measures the control-enhancing effect of pyramids as follows: considering only equity stakes in the pyramidal structure, dominant owners own 1.84 times more voting rights on average than they hold cash flow rights.

Our two measures of pyramidal leverage defined in Section 2.2 consistently show that pyramidal debt is wide-spread and important in France. Average leverage, which measures the mean debt-asset ratio in all holding companies across a pyramid, has a mean (median) value of 16.4% (7.8%). Recall that the dominant owner's total exposure to pyramidal leverage is larger than indicated by average leverage if several holding companies are vertically stacked, as is the case in a large fraction of pyramidal firms (the average number of layers of holding companies is 1.555, after subtracting the operating company from the mean of 2.555 layers in total). Equivalent leverage, our preferred measure, which transforms pyramidal debt to the equivalent exposure in a single layer, corrects for this bias. The mean (median) equivalent leverage is 17.9% (8.8%). 25% of the controlling owners of pyramidal firms have an equivalent leverage measure of 31% or more. It should be kept in mind that these numbers calculate only the leverage exposure generated by debt in pyramidal entities; debt in the listed operating firm is excluded. The full leverage exposure of the dominant owner's cash flows is accordingly higher. These numbers show the use of leverage in pyramids to be important for France.

In Panel B of Table 3 we present characteristics for dividends and its determinants in subsamples based on above and below median values for our two leverage metrics. This analysis allows for a simple bivariate test of our first hypothesis. Using the average leverage measure, we find for that dividends over cash flow is 3.6% higher in the subsample with higher leverage, a difference that is significant at the 1% level. The results are similar when we test for equivalent leverage or use the earnings-based dividend measure. We will discuss the results for the other variables in Section 6.3. These results are consistent with our hypothesis. We turn to a multivariate regression analysis of this relationship.

3.3 The Role of Pyramidal Debt for Dividend Payout

Table 4 presents the regression analysis for the dividend policy for the pyramidal-controlled operating firms. We document a strong effect for pyramidal debt, measured by average and equivalent leverage, on the dividend policy of the operating company, which is the key finding of our paper. The coefficients for the two debt measures are positive and significant at the 1% level. The economic magnitude of the debt effect is also significant. If the equivalent leverage changes from the 25th to the 75th percentile, the dividends change by (.310 – 0.000) x .110 = .0341, which is 39% of the median dividend payout based on cash flows. The same increase for average leverage is 13%. We also find that the control wedge is negative but insignificant when analyzed separately and together with the debt measures. The positive and significant coefficient for the two pyramidal debt measures and the negative but insignificant sign for the control wedge coefficient are consistent with the Debt Service Hypothesis. These signed results are inconsistent with the other dividend hypotheses for blockholder-controlled firms: the Expropriation Hypothesis predicts a negative sign for the control wedge but offers no direct prediction for the effect of pyramidal debt. The Substitution Hypothesis predicts a positive sign for the control wedge and also offers no direct prediction for debt.[12]

To complete the discussion, the regressions confirm that dividend policy depends on other variables. While the significance of the coefficients varies, the signs are similar across the two dividend measures introduced in Table 2: dividend payout decreases in the leverage, sales growth, operating risk, and losses in the operating company. Other variables, including firm size, are not significant. Though not shown, the regressions in the two tables load the same for industry categories. Overall, our results corroborate the Debt Service Hypothesis and suggest that leverage is an important determinant of operating companies' dividend payouts.

4. Anatomy of Dividends in Pyramidal Structure

[12] Faccio, Lang, and Young (2001) report regression results for four dividend metrics using a sub-sample of 250 group-affiliated firms from their French sample of 529 firms. Their explanatory variable of interest is the inverse of our control wedge (ratio of ownership to control rights), and their findings are inconclusive, with two out of four coefficient estimates being negative, one of them significantly (at 1% level). Their sample cannot be directly compared with ours because it includes group-affiliated firms with and without pyramidal ownership; 33.1% of the group-affiliated firms in their European sample are pyramid-owned (the corresponding number for France is not reported), whereas our sample includes only pyramid-controlled firms.

We continue our investigation of the Debt Service Hypothesis by looking at more disaggregate information of the flow of funds within pyramids. We investigate by looking directly into the structure of each holding company, in particular its capital structure and dividends. We consider specifically two payout decisions: (1) the amount of dividends received by each entity and the relation to the entity's debt obligations and (2) the proportion of dividends passed on to the next layer in the pyramidal chain. Following the Debt Service Hypothesis, we postulate throughout that dividends received by each pyramidal entity increase in its leverage, and that the fraction of dividends passed on decreases in its debt.

4.1 Anatomy of Dividend Decisions in Holding Companies

We begin with our main payout metric for holding companies, the dividend received by each holding company. At each level of a pyramidal structure, a dividend and leverage decision occurs. Our hypothesis is that dividends are set to enable the holding companies throughout to meet their debt obligations. In other words, each holding company must receive enough dividends to pay its own interest and pass sufficient dividends to the next level. If the next layer is the dominant owner, the leverage of that last layer is assumed to be low (based on tax incentives) and thus we expect that on average a lower dividend needs to be passed on.

These tests require information on the dividend payout for the operating company and for each holding company in the pyramidal structure. For both public and private companies, we again use the unconsolidated financial statements from Diane. While the financial statements do not directly disclose the dividend payments made by the holding company, French regulations and the structure of the owners' equity section of the financial statements allow us to back out the dividend payments.[13] Due to data availability from Diane, we use the entities in the pyramidal structures for 1999, 2001 and 2003.

[13] Net income is used either to pay dividends or be allocated among the specific owners' equity accounts. The English version of Diane's Complete Account format details the net income and allocations. We calculate dividends paid in year *t* from the owners' equity accounts by subtracting the change in allocations between year *t* and year *t-1* from the net income in year *t*. This number reflects the dividends paid if there are no other substantive changes. To insure the veracity of the dividend number, we did the following: to obtain a measure of potential substantive changes in capitalizations for year *t*, as a separate calculation, we compared capitalization for year *t* to year *t-1*. The only other event we need to consider is the potential impact on reserves that are set up or altered directly via the balance sheet (rather than the income statement). To insure the veracity of the formula and verification checks, we compared the dividend payout per the formula to the dividend payout per the annual report for a sample of public companies. Since the private companies typically have simpler capital structures, we are confident in our number. Details are available from the authors upon request.

Table 5 presents the summary statistics for the determinants of the dividends received by holding companies in the pyramidal structures for 1999, 2001 and 2003. For each holding company, we calculate the dividend received denominated in € millions (dividends paid in the lower layer times the ownership stake in the lower layer). Panel A presents the full sample of holding companies. The average (median) for the dividends received by the holding company is €28.75m. (€1.04m.) We use three measures for debt. Interest expense is the interest payments for the holding company in € millions, with average (median) value of €33.24m. (€0.91m.). Holding companies hold total debt and long-term debt with average (median) values of €567.81m. (€13.17m.) and €562.52m. (€11.58m.), respectively, showing that they hold long-term debt almost exclusively. We calculate the ratio between the holding company's equity stake in the lower layer and the holding company's total assets (book value) and call it the *investment ratio*; it measures the importance of the investment in the lower layer relative to the holding company's assets. Its mean value of 77% indicates holding companies in our sample are dominated by purely financial holdings dedicated to a single operating company.[14] The ultimate owner constitutes the next layer for 53% of holding companies (the indicator variable ultimate owner is one in this case and zero otherwise). Panel B breaks the sample down according to whether the next layer is the ultimate owner or not. There are no large differences, but holding companies directly controlled by the ultimate owner tend to be larger, less levered, and more strictly limited to the equity stake in the next entity than intermediate holding vehicles (mean investment ratio of .88 compared to .61 for intermediate vehicles).

Table 6 presents the regression results. Panel A considers the full sample of holding entities. The dependent variable is denominated in currency values, and we control for size; we also control for cash because a holding company can accumulate cash to cater to dividend preferences (see Section 6.1 below). Regression (1) focuses on the ownership percentage and the investment ratio. Both are highly significant. In regressions (2), (3) and (4), we scale the investment ratio by the three measures of debt in the pyramidal entity. For example, the variable, interest expense x investment ratio, measures the debt service obligation that needs to be covered by the dividends from the equity stake in the entity below, assuming that all of the holding company's assets contribute equitably to the debt service. The results are virtually the same whether we scale by total debt, long-term debt, or interest expense of the holding company. The

[14] We exclude observations with a negative investment ratio or an investment ratio beyond an upper limit (set at four in the reported baseline) to avoid outlier effects.

findings suggest that dividends received by the holding company are increasing in the interest expense of the company as well as the total and long-term debt, lending support to the Debt Service Hypothesis, which implies a positive sign for funds needed to service debt. With adjusted R^2 between 43.9% and 46.7%, we are able to explain a substantial portion of the dividends received by the individual holding companies in the pyramid. By comparison, the R^2 is only 16.2% if none of the pyramidal debt measures are included. The results are insignificant for the variable ultimate owner (which takes the value one if the next layer above is the ultimate owner). The insignificant result is consistent with the notion that the strong relationship between debt service and dividends is independent of the position of an entity in the pyramidal chain. This finding is confirmed in Panel B, which breaks down the sample into those entities directly held by the Ultimate Owner and those in an intermediate position. The findings are virtually the same in both subsamples.

The results for dividends received and their clear dependence on debt service obligations in every holding company along the control chain provide strong additional support for the Debt Service Hypothesis.

4.2 Dividend Pass-Through to Dominant Owner

To provide additional perspective on the pass-through decision of dividends in levered pyramids, we calculate the dividends ultimately received by the dominant shareholder as a fraction of the operating company's dividends made available to him. We call this fraction, which excludes the part of dividends absorbed somewhere in the pyramidal chain, the *dividend pass-through* of the ultimate owner. The Debt Service Hypothesis implies that the dividend pass-through should decrease in the leverage in the holding companies.

For these tests, we include observations with a dividend payout by the operating company; a dividend pass-through equal or less than two, and an average leverage equal or less than one, leaving a sample of 329 observations.[15] For missing holding companies, we again set leverage equal to zero and the ratio of dividends received and dividends paid equal to 1, which biases against our tests. Using the Diane

[15] The dividend pass-through may reach values greater than one, e.g. because of dissavings or assets of holding companies in excess of the shareholdings, leading to dividend outflows exceeding the inflow. Our results are not sensitive to excluding these observations, or to observations with negative book value of equity.

database, we have sufficient balance sheet information for 72.9% of the holding companies along these pyramidal structures. Panel A of Table 7 shows that the mean (median) of the dividend pass-through in our sample is 0.655 (0.827), i.e. ultimate owners receive on average less than two thirds of the dividends made available to them. In Panel B of Table 7, we find that the dividend pass-through is strongly negatively associated with leverage in the pyramid. The coefficients for average leverage and equivalent leverage are negative and statistically significant at the 1% level. They are also economically significant, with a change in equivalent leverage (average leverage) from the 25th to the 75th percentile, implying a reduction in the predicted dividend pass-through of 12% (11%), based on the median. To check the possible implications of missing holding company data, we redo our tests for pyramidal structures with complete data (not reported). There are 128 observations with an average dividend pass-through of only 0.471. Using averages, the dividend pass-through is lower for the pyramidal structures with complete data, and pyramidal leverage is higher. We find comparable results in this subsample. These results are clearly consistent with the Debt Service Hypothesis.

5. Operating Company Capital Expenditures and Pyramidal Debt

We turn to our second hypothesis, which predicts a negative relationship between pyramidal debt and capital expenditures of the operating company (see Section 1). We regress capital expenditures of the operating company on our two measures of pyramidal debt, and include all the control variables that the literature has shown to co-determine the investment behavior of firms, in particular investment opportunities (measured by Tobin's Q) and cash flows.[16] The results are reported in Panel A of Table 8. We find a highly significant relationship as predicted, both for average leverage and for equivalent leverage. The magnitude of the effect is also significant in economic terms: a one standard deviation change in average leverage reduces average capital expenditures by 33.0%.[17]

In Panel B of Table 8, we use a different methodology, popular in the literature on investment behavior (see, for example, Hoshi, Kashyap and Scharfstein, 1991). We split the sample in the subset below and above the median of our two measures of pyramidal leverage. Consistent with the "q theory"

[16] Capital expenditures include M&A-driven acquisitions of fixed assets. We have too few observations for R&D spending to use it as an alternative specification of investment opportunities. Our regression results are unchanged if we control for size.

[17] The coefficient for average leverage estimated in regression (3) is -0.078. A one standard deviation change in average leverage (0.267) reduces capital expenditures by -0.0208, or 33.0% of average capital expenditures (0.063).

of investment and theoretical arguments on the role of financial constraints, the literature has found the significance of the two control variables that generally predict investments, Tobin's Q and cash flows, depends on the status of financial constraints. For firms with binding financial constraints, cash flow is more significant as a predictor of capital expenditure; for firms with financial slack, investment opportunities predict capital expenditure. We extend this reasoning to the financial constraint we investigate in this paper, pyramidal debt. Firms with high pyramidal debt should be more constrained, and hence investment spending should critically depend on available cash flows; for firms with more slack because of low pyramidal debt, investments should be driven by investment opportunities. This supposition is exactly what we find: the cash flow variable is only significant for the subsample with above-median pyramidal leverage but not for the below-median subsample, and Tobin's Q is only significant for the subsample with below-median pyramidal leverage but not for the above-median subsample. We conclude that there is strong evidence in favor of our second hypothesis: pyramidal leverage has real economic effects since companies controlled by levered blockholders cut back their investments.

6. Alternative Explanations, Endogeneity and Extensions

We have presented evidence that the pyramidal leverage of dominant blockholders determines dividend payouts, dividends passed through, and investments. In this section, we address the possibility that other factors could drive these patterns. We consider alternative explanations of high payouts in pyramidal firms (Section 6.1), endogeneity issues related to block ownership and levered blockholders (Section 6.2), an exogenous regulatory change that introduced stock repurchases, an interesting alternative payout channel for levered owners (Section 6.3), and control motives (Section 6.4).

6.1 Alternative Explanations for Dividends in Pyramids: Investments and Dividend Preferences

We consider two possible explanations for a high level of dividends in pyramid-controlled companies besides the Debt Service Hypothesis. First, Almeida and Wolfenzon (2006) suggest pyramids are used to create new businesses from retained earnings of existing companies in the presence of imperfect capital markets, thereby taking minority investors hostage in the interest of capital accumulation. In this theory, dividends received in a layer and not passed through to the dominant owner can fund investments in other

entrepreneurial activities.[18] According to the second explanation, dividends are accumulated because the dominant owner has lower dividend preferences than other shareholders. A characteristic of pyramidal structures, given tax neutrality, is that they can accommodate diverging dividend preferences by paying out dividends to cater to owners with high dividend preferences, while permitting a dominant owner with lower dividend preferences to retain part or all of her dividend allocation in a holding company.

Inspecting the asset base of holding companies allows for a simple but insightful observation concerning the investment explanation. For a given holding company in the pyramidal structure, on average the investment in the company one layer below comprises 77% of the total assets of the pyramidal entity (see Table 5, Panel A). With the stake in the company below constituting over three quarters of a typical holding company's assets, it is unlikely that French holding companies are predominantly used to accumulate new investments in other subsidiaries.

Specific evidence emerges when we analyze the relationship between dividends received and the various alternative uses of those dividends, using individual holding companies as the unit of observation. If a holding company absorbs dividends, i.e. receives dividends but does not pass them on to the next layer, it can do so for one of three uses: (1) to pay debt service; (2) to make investments; and (3) to save by increasing cash or paying down debt. Performing correlation analyses with these three variables, we find that the correlation between dividends received and interest rate obligations (i.e., normalized for the size of the stake in the holding company below by the holding company's total assets) is very high, at $\rho = 0.65$ ($\rho = 0.91$ if we exclude outliers). By contrast, there is no correlation between dividends received and the two other possible dividend uses, the increase in total assets between year t and year t+1 and the increase in cash; we find the correlation coefficient is $\rho < 0.01$ in both cases. We also examine whether the debt in a holding company is explained by the size of the holding company's other assets (besides the equity stake in the control chain) into which dividends received could be invested. We find that there is no such correlation ($\rho = 0.0076$).

[18] Consistent with the predictions of Almeida and Wolfenzon (2006), Almeida et al. (2011) provide evidence that affiliated firms in Korean business groups have lower profitability and are more capital intensive than firms outside business groups. Gopalan, Nanda, and Seru (2007) show that in business groups dividends are used to finance investments in new subsidiaries. Bae, Kang, and Kim (2002) argue that intra-chaebol acquisitions transfer wealth from firms in which the family has low cash flow rights (typically the acquirer) to those in which the family has higher cash flow rights. Bertrand, Mehta, and Mullainathan (2002) and Baek, Kang, and Lee (2006) document evidence for India and in Korea that in business groups wealth is transferred to controlling shareholders, even though methodological challenges remain (Siegel and Choudhury, 2012). None of these papers investigates the link between debt and dividends in their analysis.

Our regression analysis confirms the absence of a relationship. Table 6, Panel A, presents evidence on the impact of a holding company's cash holdings on dividends received, and the findings reveal no such relationship. In untabulated regressions, we also find no evidence that dividends received are determined by a change in the holding vehicle's total assets. By contrast, the coefficient for the interest expense (normalized by the holding company's investment ratio) is highly significant and positive, as are other specifications of pyramidal debt. Furthermore, the coefficient for the (normalized) interest expense of 1.65 (regression (2)) means that for every euro needed to cover the holding company's interest expense (in proportion to the holding company's total assets) 1.65 euro in dividends are received; in other words, the interest expense absorbs 60% of the dividends received. In conclusion, we cannot discard the possibility that the two alternative explanations matter for the dividend decisions within levered pyramidal structures,[19] but our findings suggest debt service considerations are the major determinant of payout decisions in the pyramid.

6.2 Endogeneity and Reverse Causality

In this section we address concerns that the blockholders' choice to use pyramidal leverage may be endogenously related to company characteristics and payout policy, or that causality may be reversed.

We start by investigating whether there is evidence that block ownership or the use of pyramids are endogenous; this is a concern since the presence of dominant blockholders and of their use of pyramids are a prerequisite for blockholder leverage, and hence their endogenous determination might drive the endogeneity of blockholder debt. If block ownership is endogenous it should dynamically adjust when the firm's conditions change.[20] We investigate the rate of change in block ownership by looking at the two-year changes and find that the ownership classification (widely held, block-non pyramid, block-pyramid) does not change for 85.10% of the available two-year pairs (1997 to 1999, 1999 to 2001, and 2001 to 2003). Further, the average (median) change in the ownership stake in all two-year pairs is 12.18% (4.37%), which is relatively small. In addition, we repeat all regressions in these tables with three-year lagged ownership measures instead of the one-year lagged ownership measures that we use in

[19] We find for entities at the top end of the pyramids (and only for these entities) a positive relationship between the dividends received and their contemporaneous cash holdings, see Table 6, Panel B; this pattern may be consistent with the dividend preferences explanation.

[20] See e.g. Demsetz and Lehn (1985), Agrawal and Knoeber (1996), Cronqvist and Fahlenbrach (2009).

all regressions reported in Tables 2 and 4. The results (not reported) in Table 2 and Table 4 are robust to this three-year lag.[21] The stability of the ownership structure and these extended lags imply that endogeneity of this variable is not likely to induce biased estimates.

We investigate whether pyramidal structures exhibit the same persistence that we find for the dominant owners and their blockholdings. We find that pyramids and the holding vehicles are their constituting elements are very stable over time. We draw a random sample of 100 holding companies and investigate the year they were founded. The average year the holding companies were founded is 1966, with the 75th percentile year 1977. The oldest holding company was founded in 1865; only 6% were founded in 1990 or later. The large number of companies controlled by families (69.2% of the pyramidal firms versus 47.0% for the non-pyramidal firms with a controlling blockholder, see Table 1) is one of the main drivers of the longstanding nature of the relationship between dominant blockholders and listed operating companies.

We turn then to the relationship between pyramidal debt and payout policy, which is the relationship of interest according to the Debt Service Hypothesis. The first concern is that causality might be reverse. As discussed in Section 2.1, pyramidal debt is not in any way useful to reduce the tax bill of dominant owners, neither for personal income tax nor for corporate income tax. Hence there is no clear rationale why owners of high-payout firms would want to use pyramidal leverage, and why reverse causality should be expected. Still, we investigate whether there is any evidence in favor of reverse causality. Our regressions in Table 4 use lagged variables of pyramidal debt. In unreported tests. we expand the lag size to two years, and even to three years. In spite of the loss of power of our tests, the level of significance of the now twice lagged pyramidal debt variables in explaining dividend payouts is virtually unchanged.[22] These results show that reverse causality is unlikely to determine the relationship between blockholder debt and dividends.

The second concern is that statistical correlation between pyramidal debt and payout policy might be explained by reasons other than the causal relationship, such as omitted variables. As a first pass on this investigation, we search for any evidence that there is a selection effect between companies

[21] In a few instances the significance of the results becomes weak; this is a consequence of the loss of power in our tests because we cannot use the first two years of our panel.

[22] We also check that the same results hold if we use the twice-lagged pyramidal debt variables as instrumental variables in an IV estimation. However, the use of lagged variables as instruments in corporate finance outside an Euler equation setting is hard to justify (Roberts and Whited, 2011).

controlled by levered block owners and other companies. We confine the control sample to companies controlled by unlevered block owners and split the sample into companies below and above the median of pyramidal leverage. We look in particular at the variables known to explain dividend payouts: size, operating company leverage, sales growth, a measure of operating company risk (observed cash flow variance), the loss dummy and control wedge which are included in our dividend regressions. As the difference tests in Panel B of Table 3 show, among these variables, firm size is the only variable with a significant difference between companies with below-median and companies with above-median pyramidal leverage. Interestingly, firm size does not explain dividend payout in levered pyramids (see Table 4 and Section 3.3). We also run a multivariate regression analysis (not reported in tables) trying to explain the use of pyramidal debt by size, operating company leverage, sales growth, and several measures of operating company risk, and find that none of these variables has explanatory power.

Specifically, we examine the relationship between measures of operating company risk and our pyramidal debt metrics, since risk seems to be particularly important when trying to understand dominant owners' choice of leverage. To explore this relationship, we use a variety of variables measuring operating company risk: the operating company's stock return variance, its unlevered beta, 5-year average of ROA variance, ratio of intangible assets to total assets, and R&D expenditures to total assets as measures of operating company risk. We find that these measures of risk are not correlated with equivalent leverage, average leverage or operating company leverage, respectively.[23] We run multivariate regressions trying to explain our pyramidal debt measures in turn by each of these risk characteristics and find that none of them has explanatory power (not reported in tables). We conclude there is no evidence that differences in operating risk profiles are a significant driver of pyramidal debt.

Similarly, we explore the relationship between operating company debt and pyramidal debt. From the dominant owner's perspective, there is a choice regarding where to place his or her total leverage exposure, the operating company, pyramidal entities or some combination of the two.[24]

[23] Specifically, we find all correlation coefficients between risk and pyramidal debt are low and not significant. The correlations between ROA variance, equivalent leverage, and average leverage are respectively, 0.016 and -0.098. For the ratio of intangible assets to total assets, the two respective correlations are -0.083 and -0.042. Finally, for R&D expenditures to total assets, the correlations are -0.024 and -0.051.

[24] There are explanations that the location of debt within a pyramidal control chain can make a difference. For instance, ultimate owners benefit from a lower debt tax shield if some of their leverage exposure is placed in the pyramid, compared to the case where all leverage is absorbed by the operating company. On the other hand, the possible benefits include the advantage of a less indebted listed company, and the dominant owner's enhanced

Specifically, we ask whether operating company debt and pyramidal debt are substitutes (if owners target a given overall leverage exposure, so that borrowing more in the pyramid means less debt in the operating company) or complements (if highly leveraged owners spread out the debt along the entire pyramidal chain). In non-tabulated tests, we find a low correlation between the leverage ratio and our two measures of pyramidal debt, average leverage ($\rho = 0.016$) and equivalent leverage ($\rho = 0.161$), consistent with our findings in Panel B of Table 3. This result holds also in regressions when controlling for other variables that typically explain leverage, such as size, age, tangible assets or past profitability.

Finally, we search for valid instruments for pyramidal debt as a determinant of dividends. Our search for exogenous institutional changes, as recommended by Roberts and Whited (2011), is hampered by the fact that the legal framework governing pyramidal entities and the relevant tax regime for holding companies has been essentially stable for more than 45 years, long before the start of our sample period. Corporate tax rates have been stable for 20 years (see Section 2.1). We can identify only one relevant change in the tax regime in our sample period, in 2000, but the rule change affected only small stakes and hence was too unimportant to generate a measurable change in dividend payouts. Still, we find weak evidence confirming an increased use of pyramids following the rule change in the relevant bracket consistent with our predictions.[25] We search for other economically meaningful instrumental variables that satisfy the relevance criterion and the exclusion restriction. We identify five variables that are reasonably exogenous: the fraction of missing observations among pyramidal entities, the fraction of financials in the holding entities, fraction of listed holding entities, number of layers, and whether the controlling blockholder is a family. For each of these variables, it is plausible that they are correlated with our measures of pyramidal debt but that do not influence dividend payouts other than through their

flexibility to overcome distress when debt is placed in private holding companies. Luciano and Nicodano (2008) provide a stylized model with an alternative explanation for a difference.

[25] More precisely, the French rule change in 2000 was as follows. Before 2000, avoidance of double taxation was only possible for equity stakes that were either greater than 10%, or had a market value of at least € 25 million. In 2000, the threshold was reduced to 5%, while the alternative minimum market value of € 25 million was maintained. We expect levered equity stakes affected by this tax change to be more frequently organized as holding companies to benefit from the new tax deductibility. Consistent with this prediction, the number of stakes equal to or greater than 5% but less than 10% and worth € 25 million or less increases as predicted, from 39 before 2000 to 78 after 2000. We do not find a significant increase in the use of leverage for these stakes though; it is worth keeping in mind, however, that stakes in the affected bracket between 5% and 10% are a small part of the overall stake of dominant owners that hold at least 20% of the operating company.

correlation with pyramidal debt.[26] We re-estimate our main regressions in Table 4 in a 2SLS regression, using these five variables jointly as instruments for our two measures for pyramidal debt.[27] In the first-stage regression, they have strong predictive power for the endogenous variables and allow us to reject the hypothesis that they are weak instruments (Stock and Staiger, 1997); moreover, the tests of overidentifying restrictions indicate that they are valid instruments. The second-stage results show that the instrumented measures of pyramidal debt are significant at the 5% level (equivalent leverage) and 10% level (average leverage) when explaining the dividend payout ratio, and have the right sign but no significance when explaining the dividend cash flow ratio. Taken together, we interpret these instrumental variables tests as providing weak evidence that our main results are not driven by omitted variables bias.

To conclude, our tests provide reasonable assurance that the reported relationship between pyramidal debt and dividends is not driven by reverse causality, by self-selection related to observable firm characteristics such as leverage, size, or measures of risk, or by other omitted variable bias that our instrumental variable test would detect.

6.3 Stock Repurchases

Levered dominant blockholders (or the holding vehicles they control) can also raise cash to meet debt service obligations by selling shares; stock repurchases can avoid dilution of their control rights and mitigate any negative price impact.[28] In this section, we investigate stock repurchases as the second, increasingly important channel of payout policy besides dividends. This investigation is particularly interesting because of an important exogenous change concerning payout channels that occurred during our sample period: France enacted regulation on July 2, 1998, enabling open-market repurchases; the 1998 law allows open-market repurchases up to 10% of market capital over an 18 month period, conditional on shareholders approving the terms of the repurchase and a registration statement being filed with stock market regulator AMF. This change amounted to the de facto introduction of share repurchases

[26] The rationale for each of the variables is as follows: the fraction of missing observations among pyramidal entities reduces the observed pyramidal leverage as defined and because of reporting bias; the fraction of listed holding companies should reduce pyramidal debt since there is no gain relative to operating company debt; the number of pyramidal layers should increase pyramidal debt as it amplifies the effect of debt in our debt measures; the fraction of financials in pyramid should increase pyramidal debt as they have better access to credit; families are more likely to use pyramidal debt to maintain control.

[27] To reduce the measurement error in our pyramidal debt measures we correct them using the ratio of missing observations.

[28] This rationale for stock repurchases is similar to the motive for their use around stock or stock option grants.

that were virtually non-existent prior to July 1998 but that have quickly become and remain a major channel for payouts since then.

From the perspective of the Debt Service Hypothesis, the introduction of stock repurchases is an intriguing event. Repurchases distribute cash exactly to those owners who sell shares, i.e. owners can differentiate their cash receipts in accordance with their needs. Thus, if blockholders determine payouts according to their debt service needs, then repurchases are potentially a more targeted tool than dividends. At the same time, repurchases are attractive for owners who sell shares as a means of avoiding dilution of control rights and neutralizing the price impact of the share sales. In addition, given that in France effective tax rates for payouts via repurchases have been consistently lower than for dividends during the sample period, it is tax-efficient for a dominant owner to raise cash by selling shares, rather than by paying dividends. Therefore, we expect levered blockholders to embrace the new possibility to channel payouts via share repurchases; at the same time, we expect these owners to sell shares.

We analyze stock repurchases for our full sample for the first years after the reform, from July 1998 to December 2002.[29] The Euronext database contains a time stamped record of all transactions, transaction prices, volumes, best limits of the order book, and market capitalization. The AMF database contains all the daily repurchases by firms. The results of our analysis are presented in Table 9, where the stock repurchase variable is defined as the value of the repurchase divided by cash flows.

For the full sample, there are 1,549 repurchases during the sample period. With dividends as the dependent variable of interest, regression (1) results provide evidence that stock repurchases are complements to dividends. The coefficient for stock repurchases is positive and significant. For our pyramidal sample, there are 896 repurchases. Consistent with the view that stock repurchases complement dividends, the coefficients from regression (2) and (3) provide evidence that stock repurchases are negatively related to the control wedge and positively related to pyramidal leverage, both average and equivalent leverage. This result is also robust when the dependent variable of interest includes dividends plus stock repurchases, regression (4) and (5).

In France, as in other jurisdictions, the legal obligation for large shareholders to report share sales is limited, as explained in Section 2.1. Therefore, ownership data do not have sufficient granularity and

[29] We thank Edith Ginglinger and Jacques Hamon for generously providing the complete stock repurchase data, including the data for 1998 and 1999 not used in Ginglinger and Hamon (2009) where the data are described.

timeliness to investigate whether large shareholders' stock sales are timed around stock repurchases. The evidence we do find, however, suggests controlling blocks around share repurchases are stable, even sometimes decrease, and do not typically increase as they would if blockholders did not sell. For example, we verify the 60 largest stock repurchases in our pyramidal sample for the occurrence of contemporaneous ownership changes; we find block ownership drops or remains stable in 54.5% of these events, providing evidence that stock repurchases allow dominant owners to sell shares.[30]

6.4 Double Voting Rights

When dominant owners decide to use debt in their control chain, they reduce the cash flows they receive but fully maintain the level of control rights in the operating company. As a result, pyramidal leverage also has an impact on the effective control wedge of dominant owners, the disproportionality between voting and cash flow rights. As mentioned in Section 2.1, in France pyramids are the only available control-enhancing mechanism, besides double voting rights. One final possibility we explore is that owners might choose pyramidal leverage mostly as a means to magnify their effective control wedge, and that the change in payout policy is primarily driven by the change in the control wedge, as the Substitution Hypothesis asserts, not by debt service motives.

Our regressions in Table 4 already indicate that there is no evidence in favor of the Substitution Hypothesis because the control wedge is not a significant determinant of dividend payouts. Still, to investigate this possibility further, we explicitly analyze double voting rights, which are a widely used control-enhancing mechanism in France.[31] According to French law, the company's charter can convey a double voting right to each share if the share is held for a specified period, which must be between 2 and 4 years. Double voting rights are distinct from dual-class shares as they are a premium for loyalty that is non-exclusive (*every* share acquires the right after satisfying the holding requirement) and is lost when the share is sold. Controlling owners who adopt double voting rights are those most likely to be driven by control motives, and the use of pyramidal leverage will magnify the control wedge most for those owners.

[30] We find that in 36.3% of the cases the stake of the controlling blockholder does not change and in 18.2% of the cases the stake of the controlling blockholder decreases, while in 31.8% of the cases the stake increases (in 9.1% of the cases the firm drops out of the pyramid sample).

[31] Ginglinger and Hamon (2008) report that about two thirds of listed French companies adopt double voting rights and that they are most popular among smaller and family companies; our numbers are comparable. Two other control-enhancing devices are in principle available but rarely used: non-voting shares are used by less than 2% of blockholder-controlled firms; voting caps are used by only about 1% (Ginglinger and Hamon, 2008).

To assess the role played by double voting rights, we trace the actual voting rights (including double voting rights) of the dominant owner in our 2003 sample from annual reports and disclosure statements obtained from the AMF, the French stock market regulator. We find that for 30.4% of all operating firms in our sample, double voting rights change the control rights, and for these companies double voting rights increase the mean (median) voting rights of the dominant owner by 17% (16%). For 58.9% of the operating firms, double voting rights make no difference to the control rights allocation – either because the dominant owner already holds more than 50% of the votes, or because the firm remains widely held after accounting for double voting rights. [32]

We calculate a modified measure for the control wedge taking into account double voting rights, and rerun our main regressions with this modified measure. Our results are unchanged by this modification: the control wedge variable remains insignificant, whereas the variables for pyramidal leverage remain strongly significant at a 1% level. This finding confirms the tight link between dividends and pyramidal debt is unlikely to be an indirect effect as stipulated by the Substitution Hypothesis.

7. Conclusions

We investigate the use of leverage by dominant owners by analyzing the case of France where blockholders have tax incentives to structure their leverage in holding vehicles, and holding companies are relatively transparent. We suggest that debt in pyramidal holdings leads to a need for dividend payouts such that the controlling owner can meet the debt service obligations (Debt Service Hypothesis), and that pyramidal debt leads to lower capital expenditures to preserve cash. These predictions are borne out in our empirical investigation. We find the use of debt in holdings commits the dominant block owner to larger dividend payouts. We use different metrics to aggregate the leverage of pyramids and find that in each case the dividend payouts of the listed holding company are largely determined by the debt service obligations in the holding companies. We find that companies controlled by owners using pyramidal debt have significantly lower capital expenditures.

[32] Only 1.4% of operating companies change status from widely held to blockholder-controlled when including double voting rights. We can identify the voting rights for 82.2% of the companies with a possible change in control rights.

We analyze the actual dividend payouts to dominant owners along the pyramidal chain. We find that dividends received by each entity are explained by the proportional debt service obligation of that entity, as are the dividends passed through to the next level. Levered owners ultimately receive less than two-thirds of the dividends made available to them, with the rest being absorbed in pyramids mainly to service debt. We analyze two alternative explanations for dividend payouts by pyramid-controlled companies, the investment hypothesis and the dividend preference hypothesis. Our evidence suggests these explanations play a minor role compared with those emphasized by the Debt Service Hypothesis. We are able to address endogeneity concerns and consider the exogenous introduction of share repurchases and the role played by double voting rights.

This paper leaves several issues unaddressed. The dominant shareholder's decision to use leverage in the holding company is not neutral. This decision affects the size and risk profile of the residual cash flow left for the dominant owner, her incentives for risk-taking, and alters her options when reacting to financial distress and when raising equity in distress-like situations. There is also the question regarding when and why large shareholders choose to lever their holdings.

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Table 1: Summary statistics: full sample

	Full sample	Widely held companies	Block owned-no pyramid companies	Block owned-pyramid companies
Ownership structure:				
Widely held	0.144			
Block-owned, no pyramid	0.303			
Block-owned and pyramid	0.553			
Dominant owner:				
- Individual/family	0.471	0.000	0.470	0.692
- Firm	0.302	0.000	0.407	0.323
- State	0.036	0.000	0.029	0.048
- Unclassified	0.049	0.000	0.094	0.037
- Widely held, no dominant owner	0.144	1.000	0.000	0.000
Financial characteristics:				
Dividends/cash flow	0.193	0.182	0.177	0.205
	[0.116]	[0.141]	[0.104]	[0.122]
	(0.250)	(0.243)	(0.240)	(0.257)
Dividends/earnings	0.361	0.377	0.323	0.377
	[0.267]	[0.285]	[0.229]	[0.284]
	(0.349)	(0.366)	(0.340)	(0.348)
Total assets	3010	8568	2689	1733
	[206]	[636]	[139]	[201]
	(9800)	(19036)	(9569)	(4404)
Leverage	0.239	0.252	0.228	0.242
	[0.218]	[0.223]	[0.196]	[0.223]
	(0.223)	(0.167)	(0.217)	(0.255)
Sales growth	0.040	0.047	0.021	0.048
	[0.037]	[0.047]	[0.035]	[0.036]
	(0.301)	(0.289)	(0.309)	(0.300)
Operational risk	0.045	0.052	0.054	0.038
	[0.021]	[0.019]	[0.022]	[0.021]
	(0.217)	(0.321)	(0.313)	(0.068)
Loss	0.091	0.104	0.102	0.082
Share repurchase	0.300	0.407	0.312	0.274
Industry:				
- Primary products and construction	0.046	0.080	0.080	0.019
- Manufacturing, chemicals	0.077	0.067	0.067	0.084
- Manufacturing, equipment	0.151	0.115	0.216	0.125
- Manufacturing, other	0.219	0.152	0.217	0.237
- Trade	0.158	0.203	0.130	0.162
- Transport, comm. and energy	0.054	0.053	0.066	0.033
- Services	0.139	0.216	0.136	0.121
- Financial	0.153	0.115	0.116	0.184
Observations	*2597*	*375*	*787*	*1435*

This table presents the summary statistics of the full sample and three subsamples (widely-held firms, block-owned firms without pyramidal structures and block-owned firms with pyramidal structures) in 1997-2004. Presented are the averages and for continuous variables the median (in brackets) and standard deviations (in parentheses). Dividends/cash flow is defined as cash dividend divided by net income plus depreciation. Dividend/earnings is cash dividend over net income. For both dividend measures the ratio is set to one when cash flows or earnings are negative and when the ratio exceeds one. Total assets is book value of total assets. Leverage is total debt over total assets. Sales growth is the two-year growth rate of sales. Operational risk is the standard deviation of return on assets measured over five years (t-4 to t). The dummy variable loss equals one when net income is negative and zero otherwise.

Table 1: Summary statistics: full sample (continued)

The dummy variable share repurchase equals one in case of a share repurchase and zero otherwise. The dummy variables for dominant owner equals one if the dominant owner is respectively, an individual or family, another firm or the state. Eight dummy variables describe the industry of the firm's main activities. The number of observations are included in the bottom row (for operational risk the number of observations is 2,361 in the full sample, 283 for widely held firms, 735 for block held firms and 1,343 for the pyramids; for share repurchase the number of observations is 1775 in the full sample, 226 for widely held firms, 542 for block held firms and 985 for the pyramids. The dividend variables are measured at $t+1$.

Table 2: Determinants of dividend payout for the full sample

	(1) Dividend/ cash flow	(2) Dividend/ cash flow	(3) Dividend/ earnings	(4) Dividend/ earnings
Ln(Assets)	0.007	0.007	0.018***	0.017***
	(1.43)	(1.42)	(3.04)	(2.77)
Leverage	-0.167***	-0.167***	-0.104*	-0.105*
	(-2.59)	(-2.60)	(-1.90)	(-1.93)
Sales growth	-0.019	-0.020	-0.007	-0.008
	(-0.78)	(-0.80)	(-0.25)	(-0.26)
Operational risk	-0.042***	-0.042***	-0.082**	-0.082**
	(-2.64)	(-2.60)	(-2.43)	(-2.42)
Loss	-0.060**	-0.060*	-0.193***	-0.192***
	(-1.98)	(-1.96)	(-5.75)	(-5.71)
Block owned-no pyramid		-0.004		-0.037
		(-0.18)		(-1.07)
Block owned-pyramid		0.005		-0.007
		(0.25)		(-0.21)
Observations	*2361*	*2361*	*2361*	*2361*
Adjusted R^2	*0.136*	*0.136*	*0.107*	*0.109*

This table presents regression results for the full sample of firms. The explained variables are the measures for dividends. All variables are defined in Table 1. The regressions include an intercept, seven industry dummies and seven year dummies (not reported). Reported are coefficients and *t*-values, with firm-clustered standard errors. Significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Table 3: Summary statistics - pyramidal controlled firms

Panel A: Full sample of pyramidal controlled firms

	Average	25th percentile	Median	75th percentile	Standard deviation
Dividends/cash flow	0.196	0.000	0.118	0.235	0.253
Dividends/earnings	0.363	0.000	0.270	0.575	0.343
Total assets	1619	60	184	755	4201
Leverage	0.244	0.092	0.224	0.347	0.263
Sales growth	0.043	-0.014	0.034	0.090	0.309
Operational risk	0.038	0.013	0.022	0.043	0.069
Loss	0.085	0.000	0.000	0.000	0.280
Capital expenditures	0.063	-0.017	0.083	0.166	0.257
Tobin's Q	1.389	0.977	1.129	1.444	0.954
Cash flow	0.774	0.050	0.760	0.111	0.136
Share repurchase	0.260	0.000	0.000	1.000	0.439
Share repurchase/cash flow	0.119	0.000	0.000	0.013	0.302
Payout/cash flow	0.318	0.060	0.161	0.408	0.389
Direct ownership	0.404	0.257	0.342	0.525	0.205
Control wedge	1.840	1.085	1.563	1.996	1.016
Pyramidal leverage (average)	0.164	0.000	0.078	0.238	0.267
Pyramidal leverage (equivalent)	0.179	0.000	0.088	0.310	0.258
Number of layers	2.555	2.000	2.000	3.000	1.034
Proportion missing entities	0.192	0.000	0.000	0.500	0.221
Proportion listed firms	0.080	0.000	0.000	0.000	0.182
Pyramid with 33% threshold	0.835	1.000	1.000	1.000	0.372
Pyramid with 40% threshold	0.733	0.000	1.000	1.000	0.442

Panel B: Sub samples

	Pyramidal leverage (average)			Pyramidal leverage (equivalent)		
	Below median	Above median	Difference (t-value)	Below median	Above median	Difference (t-value)
Dividends/cash flow	0.178	0.214	0.036** (2.54)	0.172	0.218	0.046*** (3.28)
Dividends/earnings	0.334	0.393	0.059*** (3.05)	0.328	0.398	0.070*** (3.62)
Total assets	1065	2180	1114*** (4.73)	1132	2093	960*** (4.07)
Leverage	0.241	0.247	0.006 (0.42)	0.255	0.233	-0.021 (-1.44)
Sales growth	0.034	0.052	0.018 (1.01)	0.031	0.054	0.023 (1.34)
Operational risk	0.036	0.040	0.004 (1.01)	0.035	0.041	0.005 (1.28)
Loss	0.082	0.088	0.006 (0.038)	0.081	0.089	0.009 (0.56)
Control wedge	1.852	1.826	-0.027 (-0.46)	1.840	1.839	-0.001 (-0.02)

Table 3: Summary statistics - pyramidal controlled firms (continued)

This table describes the firms block-owned via a pyramid over 1997-2004. Panel A presents characteristics for the full sample. Capital expenditures is one-year change in fixed assets plus depreciation, scaled by total fixed assets (observations with capital expenditures above 1 are excluded). Tobin's Q is book value of total assets minus book value of equity plus market value of equity, scaled by total assets. Cash flow is net income plus depreciation, scaled by total assets. Share repurchase/cash flow is share repurchase amount over cash flow, truncated at one and negative values set at zero. Payout/cash flow is dividends/cash flow plus share repurchase/cash flow. Direct ownership measures the direct equity stake of the dominant owner (in percent of total equity). Control wedge is the ratio of the total ultimate ownership over the direct stake of the dominant shareholder. Pyramidal leverage (average) is the average leverage ratio over the entities in the pyramid. Pyramidal leverage (equivalent) is the leverage in the operating company that, if only the operating company was indebted and all holdings were all-equity financed, would expose the cash flow rights of the dominant owner to the same level of leverage as the combined debt in the pyramid, minus operating company leverage. The number of layers is the number of layers in the pyramid; it includes the operating company but not the ultimate owner so that a company without holding entities has a value of 1. The proportion missing entities (listed firms) is the ratio of elements of a pyramid without leverage information (defined as publicly listed firm), scaled by the total number of layers. The variables pyramid with 33% and 40% threshold measure the proportion of firms still classified as a pyramid with other thresholds than 20%. The other variables are defined in Table 1. The sample includes observations with a proportion of missing entities of at most 0.5. The number of observations is 1,253; 991 for capital expenditures, 1,121 for operating risk and 952 for share repurchases. The dividend variables are measured at $t+1$. Panel B presents average values for sub samples based on the median of average and equivalent pyramidal leverage. The below median samples have 627 observations and the above median samples 626. Reported are averages, differences between averages and t-values of the difference between the sample averages, where significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Table 4: Determinants of dividend payout for pyramidal controlled firms

Panel A: Determinants of dividend payout (cash flow measure)

	(1)	(2)	(3)
Ln(Assets)	0.001	0.003	-0.002
	(0.12)	(0.04)	(-0.29)
Leverage	-0.135*	-0.135*	-0.119*
	(-1.80)	(-1.78)	(-1.72)
Sales growth	-0.048**	-0.049***	-0.046***
	(-2.86)	(-2.98)	(-3.28)
Operating risk	-0.074	-0.075	-0.080
	(-0.55)	(-0.58)	(-0.62)
Loss	-0.068	-0.071	-0.084*
	(-1.40)	(-1.49)	(-1.78)
Control wedge	-0.011	-0.009	-0.010
	(-1.07)	(-0.90)	(-1.10)
Pyramidal leverage (average)		0.064***	
		(2.80)	
Pyramidal leverage (equivalent)			0.110***
			(2.95)
Observations	*1131*	*1131*	*1131*
Adjusted R^2	*0.156*	*0.160*	*0.169*

Panel B: Determinants of dividend payout (earnings measure)

	(1)	(2)	(3)
Ln(Assets)	0.012	0.012	0.010
	(1.37)	(1.30)	(1.12)
Leverage	-0.061	-0.061	-0.045
	(-0.95)	(-0.95)	(-0.76)
Sales growth	-0.028	-0.029	-0.027
	(-0.88)	(-0.93)	(-0.92)
Operating risk	-0.454***	-0.456***	-0.464***
	(-2.69)	(-2.68)	(-2.70)
Loss	-0.162***	-0.166***	-0.178***
	(-3.11)	(-3.21)	(-3.45)
Control wedge	-0.024	-0.022	-0.023
	(-1.52)	(-1.40)	(-1.50)
Pyramidal leverage (average)		0.074**	
		(2.06)	
Pyramidal leverage (equivalent)			0.115**
			(2.52)
Observations	*1131*	*1131*	*1131*
Adjusted R^2	*0.101*	*0.105*	*0.109*

This table presents regression results for the subsample of firms that are owned using a pyramidal structure. Observations where more than 50% of the entities in the pyramidal structure have missing data are omitted. In Panel A the explained variable is dividend/cash flow and in Panel B the explained variable is dividend/earnings. All variables are defined in Table 1 and Table 3. The regressions include an intercept, seven industry dummies and seven year dummies (not reported). Reported are coefficients and *t*-values, with firm-clustered standard errors. Significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Table 5: Summary statistics - holding companies in the pyramid

Panel A: Full sample

	Average	25th percentile	Median	75th percentile	Standard deviation
Dividend received	28.75	0.001	1.04	6.14	118.52
Interest expense	33.24	0.04	0.91	12.00	158.77
Total debt	567.81	0.37	13.17	128.72	2423.17
Long-term debt	562.52	0.22	11.58	128.31	2417.10
Investment ratio	0.77	0.22	0.64	1.04	0.75
Total assets	2021	25	145	709	8438
Next is ultimate owner	0.53	0.00	1.00	1.00	0.50
Ownership percentage	0.618	0.412	0.615	0.914	0.280
Cash	72.67	0.01	0.97	12.72	284.70

Panel B: Sub samples

	Next layer is ultimate owner	Next layer is not ultimate owner
Dividend received	22.45	35.89
	[1.02]	[1.04]
	(66.73)	(157.70)
Interest expense	29.61	37.51
	[0.59]	[1.63]
	(149.84)	(163.05)
Total debt	490.58	654.87
	[11.22]	[16.33]
	(2377.51)	(2474.44)
Long-term debt	485.80	649.02
	[10.88]	[13.61]
	(2374.91)	(2464.62)
Investment ratio	0.88	0.61
	[0.70]	[0.41]
	(0.79)	(0.67)
Total assets	2172	1799
	[97]	[207]
	(9751)	(6237)
Ownership percentage	64.45	60.38
	[62.62]	[60.35]
	(26.37)	(29.83)
Cash	52.15	92.61
	[0.88]	[1.26]
	(289.51)	(266.53)
Observations	*349*	*308*

Panel A presents summary statistics for dividend received and its determinants for individual holding entities in a pyramidal structure in 1999, 2001 and 2003. The number of observations is 657. Dividend received is the dividend paid in the lower layer times ownership percentage, in € million. Interest expense is the interest payment in the holding company in € million. Total debt and long-term debt are debts in € million. Investment ratio is the (holding) company's equity stake in the lower layer, divided by the company's asset value. Total assets are the book value of total assets. Ultimate owner is an indicator variable with a value of one if the next layer is the ultimate owner, and zero otherwise. Ownership percentage is the company's shareholdings in the lower layer (in %).

Table 5: Summary statistics - holding companies in the pyramid (continued)

Cash is the amount of cash and securities of the holding company in € million. We include observations with an investment ratio greater than zero and less than four. Panel B presents the average, median (in brackets) and standard deviation (in parentheses) for all variables for sub samples with/without observations where the next layer is the ultimate owner.

Table 6: Determinants of dividends received for holding companies in the pyramid

Panel A: Full sample

	(1)	(2)	(3)	(4)
Intercept	-102.69***	-51.746***	-62.911***	-62.808***
	(-4.38)	(-3.42)	(-3.30)	(-3.30)
Log(Total assets)	16.461***	7.733***	8.807***	8.901***
	(4.70)	(3.07)	(3.22)	(3.27)
Ultimate owner	-9.089	-4.023	1.739	2.049
	(-0.82)	(-0.46)	(0.19)	(0.23)
Investment ratio	24.253***	11.309***	12.732***	12.728***
	(3.92)	(3.28)	(3.24)	(3.25)
Ownership percentage	0.515**	0.336**	0.379**	0.369**
	(2.50)	(2.00)	(2.13)	(2.08)
Cash	0.043	0.014	0.006	0.005
	(0.81)	(0.48)	(0.21)	(0.19)
Interest expense x Investment ratio		1.646***		
		(11.70)		
Total debt x Investment ratio			0.102***	
			(12.96)	
Long-term debt x Investment ratio				0.103***
				(13.00)
Observations	*657*	*657*	*657*	*657*
Adjusted R^2	*0.162*	*0.467*	*0.439*	*0.441*

Panel B: Sub samples

	Next layer is the ultimate owner		**Next layer is not ultimate owner**	
	(1)	**(2)**	**(3)**	**(4)**
Intercept	-30.829**	-65.1890**	-52.022**	-37.433*
	(-2.23)	(-2.96)	(-2.35)	(-1.72)
Log(Total assets)	4.314**	9.089***	6.556	4.080
	(2.37)	(3.17)	(1.50)	(1.07)
Investment ratio	5.801**	13.161***	13.071**	9.59*
	(2.32)	(2.68)	(2.34)	(1.75)
Ownership percentage	0.214*	0.397**	0.337	0.299
	(1.70)	(2.35)	(1.38)	(1.22)
Cash	-0.021**	-0.0390**	0.094	0.093
	(-2.55)	(-3.15)	(1.57)	(1.57)
Interest expense x Investment ratio	2.640***		1.451***	
	(6.50)		(10.15)	
Total debt x Investment ratio		0.159***		0.094***
		(3.70)		(8.70)
Observations	*349*	*349*	*308*	*308*
Adjusted R^2	*0.650*	*0.454*	*0.460*	*0.462*

Panel A presents regression results for the full sample and Panel b presents results for samples where the next layer is the ultimate owner or not the ultimate owner. The explained variable is the dividend received by the holding company in the pyramidal structure. Reported are coefficients and *t*-values, with firm-clustered standard errors. Significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Table 7: Determinants of dividend pass-through of dominant owners

Panel A: Descriptive statistics

	Average	25th percentile	Median	75th percentile	Standard deviation
Dividend pass-through	0.655	0.299	0.827	1.000	0.389
Pyramidal leverage (average)	0.141	0.000	0.052	0.236	0.186
Pyramidal leverage (equivalent)	0.193	0.000	0.106	0.322	0.259
Number of layers	2.441	2.000	2.000	3.000	0.878
Proportion missing entities	0.271	0.000	0.333	0.500	0.228

Panel B: Regression analysis.
Dependent variable: dividend pass-through of dominant owners

	(1)	(2)	(3)
Intercept	1.095***		1.033***
	(18.93)		(15.25)
Number of layers	-0.153***		-0.140***
	(-6.88)		(-4.94)
Pyramidal leverage (average)	-0.471***		
	(-4.49)		
Pyramidal leverage (equivalent)			-0.363***
			(-3.11)
Observations	*329*		*329*
Adjusted R^2	*0.184*		*0.137*

Panel A presents the analysis of dividend pass-through in 1999, 2001 and 2003. We calculate for each dominant owner the ratio of the dividends that he actually receives as a fraction of the dividends that the operating company makes available to him; the ratio is smaller than one if some dividends are absorbed (not passed through) in the pyramidal chain. The number of layers is the maximum number of layers from the bottom company to ultimate owner. The average leverage is the average of total debt/total assets ratios in the pyramid. Pyramidal leverage (equivalent) is the leverage in the operating company that, if only the operating company was indebted and all holdings were all-equity financed, would expose the cash flow rights of the dominant owner to the same level of leverage as the combined debt in the pyramid, minus operating company leverage. The proportion missing entities is the number of entities without dividend and leverage information over the number of layers. We include observations that meet the following requirements: the bottom company pays a non-zero dividend; the proportion missing entities has a maximum of 0.5; the average leverage ratio is less than or equal to one; and the ratio of dividends received and dividends paid is less than or equal to two. In case of missing dividend information we assume 100% payout; for missing leverage information we assume zero debt. The sample includes 329 observations. Panel B presents regression results. The dependent variable is the dividend pass-through of the dominant owner. Reported are coefficients and *t*-values, with firm-clustered standard errors. Significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Table 8: Determinants of capital expenditures

Panel A: Full sample

	(1)	(2)	(3)	(4)
Tobin's Q	0.024**	0.024**	0.024**	0.024**
	(2.11)	(2.10)	(2.19)	(2.17)
Cash flow	0.297***	0.297***	0.285***	0.286***
	(2.84)	(2.83)	(2.79)	(2.79)
Dividend/cash flow		0.001	0.007	0.005
		(0.01)	(0.17)	(0.11)
Pyramidal leverage (average)			-0.078***	
			(-2.63)	
Pyramidal leverage (equivalent)				-0.075**
				(-2.09)
Observations	*911*	*911*	*911*	*911*
Adjusted R^2	*0.059*	*0.060*	*0.066*	*0.065*

Panel B: Sub samples

	Median pyramidal leverage (average)		**Median pyramidal leverage (equivalent)**	
	(1) Below median	**(2) Above median**	**(3) Below median**	**(4) Above median**
Tobin's Q	0.042***	-0.008	0.045***	-0.012
	(2.76)	(-0.95)	(2.91)	(-1.25)
Cash flow	0.221	0.355**	0.205	0.364**
	(1.50)	(2.59)	(1.54)	(2.56)
Dividend/cash flow	0.019	0.002	0.004	0.010
	(0.25)	(0.03))	(0.05)	(0.22)
Observations	*491*	*500*	*495*	*496*
Adjusted R^2	*0.083*	*0.071*	*0.082*	*0.069*

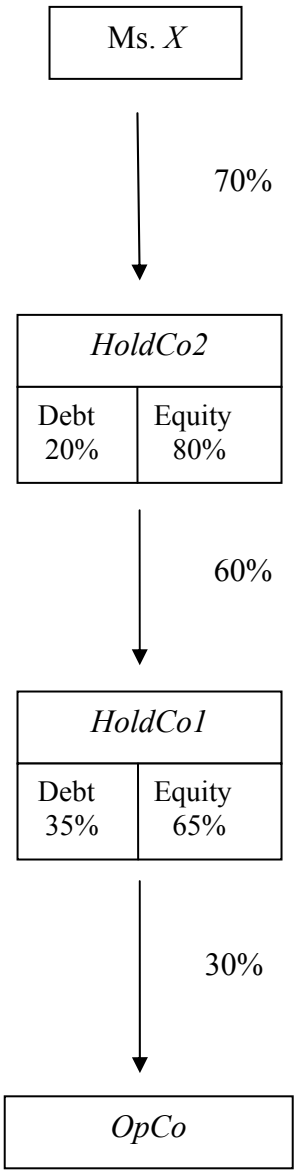
Panel A presents regression results for the full sample and Panel B presents results for sub samples based on median pyramidal leverage. The explained variable is capital expenditures. All variables are defined in Table 1 and 3. The regressions include an intercept, seven industry dummies and seven year dummies (not reported). Reported are coefficients and *t*-values, with firm-clustered standard errors. Significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Table 9: Robustness analysis for share repurchases

	(1) Dividend/ cash flow (full sample)	(2) Repurchase/ cash flow (pyramid sample)	(3) Repurchase/ cash flow (pyramid sample)	(4) Payout/ cash flow (pyramid sample)	(5) Payout/ cash flow (pyramid sample)
Ln(Assets)	0.007	-0.020**	-0.020**	-0.016	-0.018*
	(1.26)	(-2.22)	(-2.22)	(-1.47)	(-1.70)
Leverage	-0.146**	0.052	0.065*	-0.085	-0.058
	(-2.19)	(1.53)	(1.78)	(-1.12)	(-0.89)
Sales growth	-0.053	-0.034	-0.031	-0.089***	-0.083***
	(-1.77)*	(-1.04)	(-1.04)	(-1.12)	(-1.12)
Operational risk	-0.001***	0.010***	0.010***	0.008***	0.008**
	(-2.71)	(4.65)	(4.64)	(2.98)	(2.08)
Loss	-0.051				
	(-1.48)				
Share repurchase	0.043**				
	(2.41)				
Block owned-no pyramid	0.031				
	(0.05)				
Block owned-pyramid	0.009				
	(0.39)				
Control wedge		-0.020**	-0.019**	-0.040**	-0.040**
		(-2.03)	(-2.08)	(-2.53)	(-2.53)
Pyramidal leverage (average)		0.063*		0.109**	
		(1.70)		(2.38)	
Pyramidal leverage (equivalent)			0.097**		0.194***
			(2.08)		(2.96)
Industry fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	*1549*	*896*	*896*	*896*	*896*
Adjusted R^2	*0.147*	*0.138*	*0.141*	*0.167*	*0.177*

This table presents regression results for the full sample of firms (column 1) and the pyramid sample (columns 2-5). The explained variables are the measures for dividends and repurchases. All variables are defined in Table 1 and 3. The regressions include an intercept, seven industry dummies and seven year dummies (not reported). Reported are coefficients and *t*-values, with firm-clustered standard errors. Significance is indicated as follows: '*' is 10% significance, '**' is 5%, and '***' is 1%.

Figure 1: Stylized example



Stylized example in which Ms. *X* holds a 70% equity stake in *HoldCo2, HoldCo2* holds a 60% stake in *HoldCo1*, and *HoldCo1* holds a 30% stake in *OpCo*. *HoldCo2* is financed with 80% equity and 20% debt, *HoldCo1* with 65% equity and 35% debt.

Appendix A: Full Algorithms for the Equivalent Leverage and Control Wedge

To correctly identify dominant owners and their control and cash flow rights, we first identify for each company all direct equity stakes in excess of 5%. We then determine whether the entities owning these blocks of shares are directly or indirectly owned by other shareholders or entities with stakes in excess of 5%. This process is iterated until we reach the ultimate owners.[38] For the set of N entities found in this process, including ultimate owners and the operating company, we denote the equity stake of entity i in entity j by α_{ij}. Let $\mathbf{A} = (\alpha_{ij})$ be the $N \times N$-matrix of all shareholdings in the pyramid, including those of ultimate owners. We place the operating company in the last position, so that α_{iN} denotes entity i's stake in the operating company. Let $\mathbf{a_k}$ be the column vector of direct stockholdings of ultimate shareholder k in the N entities. Then the cash flow rights $\mathbf{f_k}$ of ultimate shareholder k in all entities are consistently defined by the vector:[39]

$$\mathbf{f_k} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{a_k},$$

where $\mathbf{I}$ is the identity matrix. The N-th element of this vector, f_{kN}, denotes shareholder k's level of cash flow rights in the operating firm. For example, if the pyramid consists only of a single control chain of vertically stacked entities (as in the Section 2.2 example), this algorithm determines f_{kN} simply as the product of all ownership stakes along this control chain, $f_{kN} = \prod_{i=k,\ldots,N-1} \alpha_{i,i+1}$. If the ultimate owner is linked to the operating company via multiple but disjoint control chains, the algorithm will calculate the product of ownership stakes along each control chain and then add these products to obtain f_{kN}.[40] Following Almeida et al. (2011), we capture the discontinuous character of control rights by introducing a threshold that indicates the level of control above which the shareholder is said to assume absolute control; we also fix its value at 50%. Adopting this majority rule, we convert effective control rights (i.e. the sum of direct and indirect voting rights in a company) of greater than 50% in any entity into full control of 100%. The other stakes are then allocated zero control rights. Formally, we redefine the control right stake of owner k in entity j as:

$$c_{kj} = \begin{cases} 1 & \text{if} \quad f_{kj} > 0.5 \\ 0 & \text{if} \quad \exists i \neq k, f_{ij} > 0.5 \\ f_{kj} & \text{otherwise} \end{cases}$$

[38] For ultimate owners identified in this procedure, we also record share stakes smaller than 5% that they hold in the operating company or in another entity.

[39] This procedure is used and explained e.g. in Almeida et al. (2011) and Chapelle and Szafarz (2005). It follows the classical example of input-output analysis and can handle any level of pyramidal complexity.

[40] The matrix approach is only needed to properly define ownership rights in more complex pyramidal structures, such as cross-holdings, and it handles any level of complexity consistently. For the implementation of the matrix algorithm, we use a consistent and conventional procedure to resolve possible conflicts and to assign the appropriate stake to the applicable control chain, by checking whether a particular stake occurs twice and then stopping tracing.

This algorithm must be applied iteratively, by replacing f_{kj} by c_{kj} for all ultimate owners and repeating the algorithm until the procedure converges to a vector $\mathbf{c_k}$, which in our sample it does in all cases after only a few rounds.[41] After the iterative process converges, c_{kN}, the N-th element in the vector $\mathbf{c_k}$, denotes shareholder k's level of control rights in the operating firm.[42] We define the control wedge of owner k as:

$$\text{Control Wedge}_k = \frac{c_{kN}}{f_{kN}} .$$

We calculate *equivalent leverage* in complex pyramids as follows. Let l_i denote the leverage ratio (1 - equity/total assets) of entity i ($l_i = 0$ for ultimate owners). We define $\beta_{ij} = \alpha_{ij} \cdot (1 - l_i)$ as the debt-adjusted cash flow right of entity i after receiving dividends from entity j and paying its debt service. We disregard operating company's debt, i.e. set $l_N = 0$, since we consider only pyramidal debt. Let $\mathbf{B} = (\beta_{ij})$ be the $N \times N$-matrix of all debt-adjusted cash flow rights in the pyramid, and $\mathbf{b_k}$ as the vector of debt-adjusted cash flow rights of shareholder k. Following the same procedure as for unadjusted cash flow rights, we obtain the vector $\mathbf{d_k} \equiv (\mathbf{I} - \mathbf{B})^{-1} \mathbf{b_k}$, where the N-th element d_{kN} denotes shareholder k's level of debt-adjusted cash flow rights in the operating firm. That is, we decompose f_{kN} introduced above into two components: $f_{kN} - d_{kN}$ is the part that is consumed by debt service obligations, and d_{kN} is the part that is left for the ultimate owner. Taking into account that we need to scale by the aggregate cash flow rights, we define the equivalent leverage of ultimate owner k as:

$$\text{Equivalent leverage}_k = \frac{f_{kN} - d_{kN}}{f_{kN}} .$$

To provide some intuition for this matrix expression, in the case where there are just two distinct control chains (but there are no crossholdings or loops), this expression can be written as:

$$\text{Equivalent leverage}_k = \frac{f_{kN} - d_{kN}}{f_{kN}} = \frac{\prod_{i=k,\ldots,N-1} \alpha_{i,i+1} \sum_{m=k+1,\ldots,N-1} \left(l_m \prod_{n=m+1,\ldots,N} (1 - l_n) \right) + \prod_{i'=k,\ldots,N-1} \alpha_{i',i'+1} \sum_{m'=k+1,\ldots,N-1} \left(l_{m'} \prod_{n'=m'+1,\ldots,N} (1 - l_{n'}) \right)}{\prod_{i=k,\ldots,N-1} \alpha_{i,i+1} + \prod_{i'=k,\ldots,N-1} \alpha_{i',i'+1}} .$$

Obviously, in the case of a single control chain (as in the Section 2.2 example), there is a single product of equity stakes, $\prod_{i=k,\ldots,N-1} \alpha_{i,i+1}$, that cancels out from both the numerator and denominator, and we are left with the expression given in Section 2.2.

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[41] The iteration is only needed if an ultimate owner k has several, direct or indirect, holdings in an entity j; if their sum f_{kj} exceeds 0.5, the algorithm will convert f_{kj} to $c_{kj} = 1$, which in turn may lead the combined holdings of owner k in another entity m to exceed 0.5 and hence trigger the next round of conversions, etc.

[42] It is instructive to compare this measure of control rights to the widely used weakest link rule (see La Porta, Lopez-de-Silanes, and Shleifer, 1999). In a single control chain such as in the Figure 1 example, the weakest link equates control rights with the smallest equity stake along the chain, thus implicitly converting the control rights of all other links to 100% similar to our rule. Since this conversion, however, also applies to equity stakes smaller than 50% but larger than the weakest link, the weakest link rule often leads to assigning larger control rights to dominant owners than our rule does. The control rights assigned by the weakest link rule are not always larger in the case of multiple and complex control chains.