Firms' Ownership Characteristics and Performance: Evidence from Brazil

Abstract

Relying on a dataset from reports that publicly-traded companies mandatorily file with the Brazilian capital markets' regulatory and enforcement authority, we provide an in-depth account of their patterns of ownership and examine whether they are associated with valuation and return on assets. Albeit we document the persistence of a highly concentrated corporate ownership structure, some features did change over the sample period: shareholders' agreements increasingly grew in importance amid the controlling shareholders while the fraction of non-voting shares sharply declined. By estimating an empirical model that takes into account the potential endogeneity of the ownership variables and checking for robustness with propensity score matching analyses, we find that none of these variables is systematic associated with accounting performance, whereas valuation appears to be related to the company's position at the pyramidal ownership structure.

KEYWORDS

Ownership concentration, controlling shareholder, minority shareholders' expropriation, pyramidal ownership, shareholders' agreement, family control.

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1. Introduction

Mr. Rubens Ometto controlled Cosan S.A., an integrated energy company, through a complex pyramidal ownership scheme, which embraced a Bermuda-incorporated controlling holding firm at the top and multiple chains – one of which with 14 intermediate firms separating him from the company. Since its IPO in 2005, Cosan S.A. has been listed on the Novo Mercado, the Brazilian stock exchange's most stringent governance listing segment. Nevertheless, in a mandatory standardized form (Formulário de Referência, FR) that every listed company has to file with the Comissão de Valores Mobiliários (CVM, Brazil's securities enforcement and regulatory authority), the company reported as one of its main risk factors in 2014 as follows:

> *Mr. Rubens Ometto, our controlling shareholder and board's chairman, has indirectly the power to control us, including with the powers: to elect the majority of our directors and nominate our top executives, to establish our administrative policies and to exert the overall control of our company and affiliates; (...) to determine the result of almost all deliberations requiring shareholders' approval, including related-party transactions, ownership restructuring, asset acquisitions, and transfers, and dividends (...) Currently, given the ownership structure of our controlling company, Cosan Limited, the controlling shareholder is able to substantially control every issue submitted to the shareholders' approval or vote, even if he holds less than 50% of the outstanding and free float shares. The concentrated control will restrain our shareholders' ability to influence corporate decisions and, hence, we can take measures that they may not deem beneficial* (Cosan, , 2014).

Also listed on the Novo Mercado and with an intricate ownership structure, CPFL Energia, an electric public utility company, alerted investors in its 2014 FR that the controlling shareholders (a shareholders' agreement comprising a family business group, the national development bank, and a government-related pension fund) could "take measures at odds with the company' interests, without the other shareholders being able to avoid them," emphasizing that their decisions might "diverge from non-controlling shareholders' expectations and preferences, including owners of American Depositary Shares".

Sharing with Cosan and CPFL the features of a highly concentrated and labyrinthine ownership structure, Braskem, Odebrecht business group's petrochemical affiliate, was pivotal in the

corruption scheme, brought to light in 2014, involving Petrobras' top management, high-level government officials and politicians from Brazil and other Latin American countries,.

Are companies with such ownership arrangements bound to expropriate outside investors? Do they underperform *vis-à-vis* their matches owned through different structures? Can internal or external governance mechanisms moderate the scope for self-dealing? Notwithstanding the longstanding and profuse debate to unravel the links between ownership, amply regarded as the corporate governance mainstay (Kumar & Zattoni, 2015, 2014a; Zattoni, 2011), and firm performance, with studies covering different periods and institutional settings and relying on a broad range of methodological approaches, the results have yet been conclusive.

Empirical research until the early 1990 concentrated on issues reflecting the U.S. institutional context, notably the managers' agency conflict Berle and Means (1932) pointed out and, later on, Ross (1973) and Jensen and Meckling (1976) formalized. With several contributions, La Porta, Lopez-de-Silanes, Shleifer, and Vishny shifted the focus from the collective action problem diffuse shareholders posed to monitor management – and for which concentrated ownership appeared to be a possible remedy – to the prevalent agency problem in non-Anglo-Saxon countries wherein controlling shareholders amass power and incentives to expropriate minority investors. This move triggered a cornucopia of studies on the motivations and implications of "controlling-minority structures", as Bebchuk, Kraakman, and Triantis (2000) called the arrangements separating control (voting rights) from ownership (cash-flow rights).

Almeida and Wolfenzon (2006) imprinted another inflection in the literature by modeling a financing-based theoretical rationale for pyramidal ownership: in economies where outside investors are highly vulnerable to expropriation, family-controlled pyramidal business groups provide an "internal capital market" whereby already established affiliates transfer funds to new, financially-constrained companies. Afterward, several empirical studies endorsed Almeida and Wolfenzon's financing advantage hypothesis (e.g. Almeida et al., 2011; Masulis, Pham, & Zein, 2011; Masulis et al., 2021; Jin & Park, 2015).

This paper thoroughly scrutinizes Brazilian publicly traded companies' ownership characteristics over the period 2003-2013 and examines whether they affect their performance. We built a dataset by hand-collecting data from mandatory reports companies filed with CVM and compiling the data according to criteria and procedures we deem more appropriate to the Brazilian corporate ownership patterns' peculiarities. To pinpoint who held the largest voting power, we traced the ownership chains linking each sample firm to its ultimate shareholders.

In the years shortly before and along the sample period, remarkable economic and institutional changes profoundly affected the Brazilian corporate governance standards. Foremost amid them were the privatization of some major state-controlled listed companies, the stock exchange's implementation of premium governance listing segments, the reforms of the corporate, securities, and bankruptcy laws, and CVM's empowerment as the enforcement authority as well as regulatory initiatives to improve companies' disclosure and accountability. These innovations indeed induced some shifts in the corporate ownership pattern along the sample period: shareholders' agreements stood out among the controlling shareholders while the importance of non-voting share issuance amid the enhancing-control devices waned steadily, albeit remaining still significant. Nonetheless, our granular investigation documents the persistence of an ownership profile predominantly based on high concentration, control, and deviation of voting from cash-flow rights.

Furthermore, we examine the ownership structures' possible impacts on firm performance. Attempting to address endogeneity issues, we estimate dynamic panel data models with the system-GMM estimator and conduct a battery of model specifications as well as propensity score matching analyses to check for robustness, finding evidence that none of the ownership features affected accounting performance whereas pyramidal ownership seems to shape investors' firm valuation.

The remainder of this paper is organized into six further sections. Section 2 briefly outlines the major economic and institutional changes that contributed to molding the corporate governance framework in Brazil over the sample period, thus conditioning the scope for informational asymmetries and insiders' moral hazard. Section 3 reviews the extant literature, from which we derive the testable hypotheses. Section 4 describes the dataset and sets out the sample companies' ownership and governance characteristics. Section 5 lays out the methodological procedures for evaluating the hypotheses and spells out the variables. Section 6 presents and discusses the findings. Finally, the last section summarizes the main conclusions, draws some practical implications, underscores research limitations, and suggests directions for future research.

2. Brazil's corporate governance context

As the privatization model adopted in Brazil over the 1990s was primarily designed to maximize fiscal proceeds, the Federal Government revoked in 1997 a corporate law provision that mandated controlling blocks' acquirers to make public offers to all ordinary shareholders

at the price s/he had paid (the tag-along provision).[1] The same intent also led the government to mobilize banks and pension funds of companies it controlled to join, together with privately owned domestic business groups and foreign investors, bidders' consortia for the privatization auctions. As a result, the new business groups emerging from privatization were owned by complex associations among government-related entities (as state-owned companies' pension funds and the national development bank), domestic business groups, and foreign firms.

At the end of the 1990s, gloomy prospects loomed large at the Brazilian stock market: the legal and regulatory framework as well as its enforcement were feeble; oligopolistic brokerage fees and commissions and a tax on every financial operation imposed high transaction costs on shares; and government bonds, which offered high yields and liquidity, crowded out equity investments. Against this backdrop, no wonder the low trading volume in the Brazilian stock exchange (then called Bovespa and, since 2017, B3), growing delisting, scanty IPOs and seasoned equity offerings, firms' valuation discounts, and increasing trading diversion to the New York Stock Exchange, where the largest Brazilian companies issued ADRs.

Given the political economy-related obstacles to pass legal reforms envisaging redressing the balance between powerful controlling shareholders and weakly protected minority shareholders, B3 launched in December 2000 three new listing segments with governance requirements more stringent than those the corporate law mandated. The rationale for allowing companies to choose amid listing segments with distinct commitments to shareholders' rights, guarantees, and disclosure lay in reducing informational asymmetries and therefore investors' perceived risk of expropriation and valuation discounts by forcing firms to signal their governance quality. In addition to the corporate law, companies listed on "Level 1" were then subject to tighter disclosure rules, a minimum of 25% free float of shares, and share dispersion in public offerings. "Level 2" further required partial tag-along rights in control transfers, a compulsory public tender offer for at least the economic value in case of delisting or exit from the listing segment, dispute resolution via arbitration chambers, and financial statements complying with international standards. Companies listed on Novo Mercado, the segment with the strictest eligibility requirements, could issue only voting shares.

On the legal front, a corporate law reform, passed in October 2001, lowered companies' upper limit to issue non-voting shares from two-thirds to half of the total capital, rendered insider

[1] Unlike public share offerings, private transactions of controlling blocks guarantee high control premiums for the controlling shareholders – be the government or private agents.

trading and market manipulations "crimes against capital markets," and entitled minority shareholders the rights of partial tag-along and, when their aggregate stake of common shares reached 15% of the total equity capital, of nominating a director. Enacted in February 2002, the securities law amendment empowered CVM with greater statutory autonomy at the financial, administrative, operating, and budgetary levels, paving the way to proactive initiatives to enhance and enforce the regulatory framework.[2] In 2007, another important law aligned the financial accounting standards to the developed countries'.

The combination of the legal reforms, investors' continuing demands for better corporate governance practices, economic changes and shocks (as the global financial crisis), and capital markets' as well as companies' own dynamics led B3 to revise twice the special listing segments' regulations within the sample period. In 2006, all these listing segments began to require directors' mandate of up to 2 years and stricter disclosure of insiders' stock trading; Novo Mercado and Level 2 imposed a minimum of 20% of independent directors; and Level 2 rose the tag along for preference shares from 70% to 80%. In 2011, after many hearings with market players, B3 prevented companies listed on the special segments from having the CEO as the chairman and started requiring well-defined policies for insiders' securities trading. In addition, companies listed on the Novo Mercado and Level 2 were barred from imposing voting caps, qualified quorum, and clauses that might harm shareholders or prevent votes in their favor.

Unequivocally, all these institutional innovations improved corporate governance (Black, Carvalho, & Sampaio, 2014), alleviating the ingrained power asymmetry favoring controlling shareholders and also contributing to ushering in the resumption of IPOs and SEOs in 2004, overwhelmingly supported by foreign investors. Nevertheless, did they significantly alter the corporate ownership structures? We address this question after reviewing in the next section the literature tackling the ownership-performance nexus, from which we formulate our testable hypotheses.

3. Literature review and hypotheses development

3.1 Ownership concentration and firm performance

There has been an enduring debate on the impact of ownership concentration and control on company performance. Empirical studies have not yet managed to clear up the controversy,

[2] For example, it set forth two important norms in 2009: one mandating public companies to disclose a standardized form (Formulário de Referência) containing updated, comprehensive, and detailed information to investors; and the other simplifying dissident shareholders' actions and proxy voting at shareholders' general meetings.

whilst sound theoretical arguments support opposing views. Berle and Means (1932) pointed out that modern corporations' distinguishing characteristic feature, the separation between ownership and control, provides managers with *de facto* control, which may be used to pursue private interests at the scattered shareholders' expense. The latter, in turn, have weak individual incentives to monitor managers, as coordinating collective actions is costly. If diffuse ownership entails suboptimal provision of management monitoring, a public good to investors, ownership concentration could improve firm performance since large shareholders wield power and incentives to surmount the collective action problem and curb managerial discretion (Kumar & Zattoni, 2014a, 2014b). Jensen and Meckling (1976) use the same rationale to claim that managers' higher equity stakes strengthen their incentives to act in consonance with the other shareholders' interests and therefore to reduce agency costs.

By contrast, Demsetz (1983) failed to find empirical evidence that ownership structures are systematically related to company performance, arguing that they are endogenously shaped by observed and unobserved company characteristics (e.g. size, business riskiness, and the contracting environment) as well as by shareholders' strategic decisions. Demsetz and Lehn (1985) and Demsetz and Villalonga (2001) endorse this view, with the former finding that diffuse ownership for a cross-section of US corporations was neither statistically significant nor even negatively related to performance. Also with cross-sectional data for large US companies, Morck, Shleifer, and Vishny (1988) identify a non-linear relation of both return on asset and Tobin's *q* with insider ownership, interpreting it as the outcome of two opposing effects: the incentive effect, whereby insiders' large equity stakes align their interests to the other shareholders'; and the entrenchment effect, whereby ownership concentration heightens insiders' discretionary power and renders them more willing to take suboptimal self-interested corporate decisions.

In the 1990s, the focus of the empirical literature turned to the principal-principal agency conflict, whereby controlling shareholders use their corporate power to extract private benefits at the expense of minority shareholders (La Porta et al., 1999; Jin & Park, 2015; Morck, Wolfenzon, & Yeung, 2005; Young et al., 2008).[3] Bebchuk, Kraakman, and Triantis (2000)

[3] Widespread in non-Anglo-Saxon countries, this conflict is usually assigned to deficient institutional frameworks that leave outside shareholders unprotected. Several studies argue that ownership concentration trades off the benefits of a public good provision (management monitoring) for the costs related to shallow equity markets, low share liquidity, expectations of higher expropriation risks (partly due to controlling shareholders' low wealth diversification), and thus higher external finance costs, and the impairment of other governance devices, e.g. low institutional investor activism, lack of a takeover market, and submissive boards (Wang & Shailer, 2015; Kumar & Zattoni, 2014b; Gugler, Ivanova, & Zechmer, 2014; Adams & Ferreira, 2008; Faccio, Lang, & Young, 2001).

argued that controlling-minority structures, by allowing a few shareholders to leverage voting power from a low equity stake, distorted incentives and shielded them from the market discipline, fostering even more tunneling and other forms of expropriation, whose costs were mostly externalized to outside investors. For Claessens and Yurtoglu (2013), deviation between voting and cash flow rights prevents potential benefits of concentrated ownership from emerging.

Dominating the ownership research agenda until the mid-2000s, the expropriation hypothesis was then purportedly corroborated by a plethora of studies. Negative correlations between firm performance and factors potentially enhancing controlling shareholders' discretion were taken as evidence supporting that view – e.g. findings in the estimated performance equation of negative coefficients for the concentration of votes in the largest ultimate shareholder (LUS) or for the discrepancy between LUS control and ownership (Bianco & Casavola, 1999; Joh, 2003; Cronqvist & Nilsson, 2003; Claessens et al., 2002; Lins, 2003), or of positive coefficients for the LUS cash-flow rights (La Porta, Lopes de Silanes, & Shleifer, 2002; Claessens et al., 2002; Joh, 2003).[4]

As Morck, Shleifer, and Vishny (1988), other studies documented non-linear effects of ownership on company performance (Hu & Izumida, 2008; Joh, 2003). Using data from Japanese listed manufacturing firms, Hu and Izumida (2008) show that Tobin's *q* and ROA are U-shaped related to ownership concentration: for large shareholders' low equity stakes, the expropriation effect dominates the monitoring effect when the stakes increase, while the opposite prevails for higher stakes. They claim that investment and leverage are the transmission channels from ownership to companies' performance.

Some studies tackling endogeneity issues found no significant impact of ownership concentration on performance. Himmelberg, Hubbard, and Palia (1999) bring evidence that companies' unobservable and observed characteristics account for both insider ownership and valuation. With a similar methodology, Leal and Carvalhal da Silva (2007) and Gugler and Weigand (2003) reach analogous results with data from Brazilian and US companies, respectively. Unlike Pindado and de La Torre (2004), who document that company size drives the endogeneity of ownership concentration, result which is in accordance with Demsetz and Lehn (1985), Kang and Kim (2012), estimating a dynamic model with a system GMM

[4] Several studies delved into the ways that controlling shareholders used to expropriate corporate wealth, such as Johnson et al. (2000); Bertrand, Mehta, & Mullainathan (2002); Morck, Wolfenzon, & Yeung (2005); Atanasov, Black, & Ciccotello (2011); Friedman, Johnson, & Mitton (2003); Riyanto & Toolsema (2008).

estimator, show evidence that ownership concentration inhibits minority shareholders' expropriation and improves firm performance in China.

Summing up, notwithstanding profuse, the theoretical and empirical literature on the relationship between companies' ownership concentration and performance has not yet built a consensus. The expropriation view attributes a causal link from controlling shareholder's power to minority shareholders' expropriation, claiming that characteristics potentially favoring insiders' moral hazard hurt company performance: higher LUS voting rights strengthen discretionary power and limit external monitoring (the entrenchment effect); higher deviation of voting rights from cash flow rights, by economizing on capital investment to achieve control, lowers the agency costs that controlling shareholders internalize in self-interested value-destroying corporate transactions (Bebchuk, Kraakman, & Triantis, 2000); and higher LUS cash-flow rights align incentives to profit maximization.

This view entails the following linear and non-linear testable hypotheses:

H1a: Companies' returns and valuation are positively associated with the LUS cash flow rights and decrease with both the LUS voting rights and the deviation between these rights.

H1b: Companies' returns and valuation are U-shaped associated with the LUS voting rights.

3.2 Control-enhancing mechanisms and firm performance

The expropriation view does not take stock of the idiosyncrasies of each type of minority-controlling structures, assuming all of them as devices to externalize to outside shareholders most of the costs stemming from corporate expropriation (Villalonga & Amit, 2006; Claessens et al., 2002). Subsequent studies, however, dwelt on such specificities, especially on the motivation and implications of pyramidal ownership schemes.

Almeida and Wolfenzon (2006) defied the expropriation hypothesis by modeling family pyramidal business groups as "internal capital markets" whereby potential new affiliates whose investments require huge amounts of finance but yield low pledgeable cash flows and assets face financial constraints and thus benefit from cash flows diverted from the existent affiliates.[5] Controlling families "select" new affiliates with such characteristics to be owned through pyramid schemes, whilst firms without financial constraints are owned directly. Therefore,

[5] They build on the business groups' literature that highlighted their potential for countervailing capital, product, and labor market failures posed by institutional voids (Leff, 1978; Khanna & Palepu, 2000; Khanna & Yafeh, 2005). Zattoni, Pedersen, and Kumar (2009) also document that Indian family-owned business groups mitigate institutional shortcomings.

companies' asset and cash flow pleadgeability determines the controlling shareholder's ownership structure choice. As the expropriation hypothesis, the financing advantage view also postulates a negative relationship between pyramidal ownership and performance, but unlike the former, for which pyramids lead to lower performance, it argues instead that controlling families choose to locate less profitable companies at the bottom of the pyramidal ownership.

Several studies yield empirical evidence consistent with Almeida and Wolfenzon's (2006) financing advantage hypothesis – Almeida et al. (2011) and Jin & Park (2015) for Korean companies; Masulis, Pham, & Zein (2011) and Masulis et al. (2021) with multi-country data; Bena & Ortiz-Molina (2013), in the context of European companies; and Bianco & Casavola (1999), for Italian companies.

Masulis, Pham, and Zein (2011) find that companies at the bottom of the family business groups' pyramids exhibit higher Tobin's *q* and investment rate, despite being smaller, younger, less transparent, and riskier *vis-à-vis* those at the top or directly controlled. They also observe a lower valuation for affiliates that use control-enhancing mechanisms other than pyramids, as dual-class shares, in line with Villalonga and Amit (2009), who document that pyramidal ownership and shareholders' agreements increase US companies' valuation while dual-class shares and board overrepresentation reduce it.

Torres, Bertina, and López-Iturriaga (2017) interpret their finding of a weaker negative valuation effect of large discrepancies between control and ownership for Chilean family business groups' affiliates as evidence of "the bright side of internal capital markets." Similarly, Jin and Park (2015) show that controlling families' deviation of rights increases the business group affiliates' accounting performance, with the effect being moderated by the affiliates' relative importance to the *chaebol*, R&D expenditure, and analyst coverage. They assign the benign effect of deviation of rights on performance to the conjuncture of business groups' internal capital market, which circumvents information asymmetry and agency costs and thus allows affiliates to have access to lower costly financing, and families' commitment to business groups' transgenerational perpetuation, which restrains myopic expropriation strategies.

Based on the financing view, we assess the two hypotheses below:

H2: Non-voting shares harm firm performance.

H3: By alleviating financial restrictions, affiliation to family-owned pyramidal business groups affects accounting performance and valuation, with this effect being stronger for those more distant from the top of the pyramid.

As Hu and Izumida (2008) argue that investment and leverage are the channels whereby ownership affects firm performance, we may predict the following hypothesis:

H4: Affiliation to family-owned pyramidal business groups affects firm performance through the investment and leverage channels.

3.3 Owners' types and firm performance

Specific features of the LUS' distinct types may shape incentives, interests, and power, affecting consequently corporate governance and performance (Kumar & Zattoni, 2015). Below we synthetize the main findings related to ownership by families, governments, and shareholders' agreements. The review suggests that the link between LUS' type and performance may be context-dependent.

3.3.1 Family ownership

Foremost amid the theoretical arguments underpinning a negative impact of family ownership on firm performance are controlling families' relentless quest for discretionary corporate power and entrenchment, outright loyalty and submissiveness to their members' interests (inside family altruism), and the pursuit of immediate private gains to the other stakeholders' detriment – e.g. by tunneling, self-dealing, nomination of family members as executives or directors earning high compensation irrespective of skill and talent, and earnings management (Bhaumik & Gregoriou, 2010; Burkart, Panunzi, & Shleifer, 2003; Cronqvist & Nilsson, 2003; Morck & Yeung, 2003; Schulze, Lubatkin, & Dino, 2003).

Furthermore, families resorting to control-enhancing devices are seen as willing to abuse the attendant disproportionate power through value-destroying actions. Still, controlling families' commitment to concentration of wealth into companies (relinquishing liquidity and diversification benefits) and "transgenerational wealth creation" may furnish high-powered incentives to efficient and sustainable long-term management strategies, notably during exogenous crises (Anderson & Reeb, 2003; Anderson, Mansi, & Reeb, 2003; Habbershon & Pistrui, 2002; Minichilli, Brogi, & Calabrò, 2016; Dow & McGuire, 2016).

Empirical evidence is also inconclusive, probably due to heterogeneities in institutional backgrounds, governance structures, companies' stage of development, and the permanence of the founder as CEO (Cronqvist & Nilsson (2003) for Sweden; Villalonga & Amit (2006) and Anderson & Reeb (2003) for the United States; Cucculelli & Micucci (2008) for Italy; King &

Santor (2008) for Canada; Jameson, Prevost, & Puthenpurackal (2014) for India; Chang, Zare, & Ramadani (2022) and Paniagua, Rivelles, & Sapena (2018) for multi-country samples).

Some studies document a negative effect of family control on performance (Claessens et al. (2002); Cronqvist & Nilsson (2003); Bertrand et al (2008); Lins, Volpin, & Wagner (2013)). The latter shows that family firms' underperformance during the 2008-2009 financial crisis for a multi-country sample was associated with families' efforts to preserve firms at the expense of outside shareholders. Also with cross-country data, Dow and McGuire (2016) find that national legal and cultural specificities (such as minority shareholders' legal protection, confidence in the legal system's impartiality, and uncertainty avoidance) moderate family firms' lower valuation.

By contrast, there is evidence of family firms' higher resilience and long-term horizon. Van Essen et al. (2015) show that family firms outperformed other European listed firms during the 2007-2009 financial crisis, albeit before it family and non-family firms had similar performance. Also, families' socioemotional wealth motivation may translate into companies' better performance, as evinced by Minichilli, Brogi, and Calabrò (2016) focusing on Italian listed companies during that financial crisis. For Jin and Park (2015), as mentioned above, Korean family business groups' internal capital market and the prevalence of families' long-term drive over "self-serving behaviors" account for the positive relationship of deviation of voting and cash flow rights with affiliates' performance. Relying on data from emerging markets' companies, Wang and Shailer (2017) find that if controlling families own moderate equity stakes and investors' protection rights are adequate, they may create corporate value.

In light of these studies, we formulate the following hypothesis:

H5: Family control affects firm performance, especially in pyramidal business groups' affiliates.

3.3.2 State ownership

The effect of state ownership on companies' performance is debatable. Whereas a soft budget constraint and privileged access to rents and protection may boost state-controlled companies' market valuation and returns (e.g. Kornai, Maskin, & Roland, 2003; Boubakri et al., 2018), the pursuit of non-economic aims coupled with lax monitoring and accountability render them vulnerable to value-destroying political capture or even outright corruption. For example, based on a multi-country sample, Boubakri, Cosset, and Guedhami (2005) document that state-owned companies present lower profitability and operating efficiency as compared to

privatized companies. Similarly, Kang and Kim (2012) find that partly privatized Chinese companies (those wherein non-controlling shareholders have large stakes, albeit the state still retains a tight grip) outperformed the entirely state-controlled counterparts, probably because large non-controlling shareholders limit political interference and provide better monitoring of management in a context of investors' weak protection.

Lazzarini and Musacchio (2018), in turn, conclude that, unless shocks force them to pursue social or political goals, state-controlled companies do not underperform *vis-à-vis* privately controlled companies in a cross-country sample of large publicly listed companies. Along the same lines, Solarino and Boyd (2020) document that state-owned companies are less prone to tunneling than those owned by families and, to a lesser extent, business groups, attributing the distinct scope for expropriating minority shareholders across controlling shareholders' categories to informational asymmetry heterogeneities, with state-owned companies being more restrained by public scrutiny and budget constraints.

We thus derive the following hypothesis:

H6: State-controlled companies' performance differs from their counterparts'.

Until 2014, a noteworthy feature of corporate finance in Brazil was the role that BNDES (Banco Nacional de Desenvolvimento Econômico e Social), the government-owned development bank, played as the main provider of long-term loans at highly subsidized interest rates to large companies, as well as holder of large minority equity stakes in most of these companies or member of their controlling block through shareholders' agreements. Albeit the effect of BNDES' shareholdings on companies' performance still remains unsettled (Inoue, Lazzarini, & Musacchio, 2013), companies wherein it was a shareholder might be in better position to surmount underinvestment problems resulting from financial constraints. Hence, we hypothesize that:

H7: Companies wherein BNDES has an equity stake outperform other firms.

3.3.3 Shareholders' agreements

Shareholders' agreements are formal contracts that bind the members to vote coordinately and usually require from each member interested in selling her/his common shares to give priority to the other members. These agreements may be a substitute for pyramidal ownership and turn into self-benefiting coalitions at the other stakeholders' expense, as they allow their members to reach the firm's control by leveraging voting power (Bianchi e Bianco, 2006).

Nonetheless, in some countries they seem to operate as an efficient governance mechanism to reduce agency and coordination costs by fostering members' mutual monitoring and cooperative behavior (Belot, 2010, with data from French firms; Carvalhal, 2012, for Brazilian firms; Volpin, 2002, Baglioni, 2008, and Mancinelli & Ozkan, 2006, for Italian firms; Villalonga & Amit, 2009, for US companies). In particular, shareholders' agreements may remediate imbalances in the largest shareholder's power either when it is too low, implying weak monitoring over the management and decision-making deadlocks, or too high, giving room for private benefits of control (Baglioni, 2008). For example, members with lower voting power may monitor the largest shareholder and limit his/her discretion, mitigating conflicts of interest among heterogeneous large shareholders. Being the effect of shareholders' agreements on company performance *ex-ante* undetermined, we test the following hypothesis:

H8: Companies controlled by shareholders' agreements differ in performance from their counterparts.

The above brief review of the copious literature on the links between companies' ownership structures and performance reveals that several issues are still blurry (Adams & Ferreira, 2008). As Wang & Shailer (2015) emphasize, divergent findings may be assigned to countries' institutional peculiarities, sampling characteristics (e.g. size, composition, time-periods, and inclusion or exclusion of private companies or certain industries), definitions and choices of proxies for explanatory, control, and dependent variables, model specifications, and estimation methods, particularly if and how endogeneity concerns are addressed.

The next section describes the dataset and provides a thorough account of the ownership structures.

4. Data and descriptive statistics of the listed companies' ownership structure

4.1 The dataset

In 2010, "Formulário de Referência" (FR, Reference Form) substituted for "Informações Anuais" (IAN, Annual Information) as the mandatory report public companies have to file with CVM. More comprehensive and detailed, FR has to be updated whenever further relevant information comes out. By hand collecting primary data from these sources for every public company for every year from 2003 to 2013, we reconstituted the ultimate large shareholders' ownership chains and reckoned their shares in total and voting capital to identify the largest ultimate shareholder. The sample period, 2003-2013, covers the years soon after the reforms in the securities and corporate laws and the creation of the premium governance listing

segments and during which new legal and regulatory measures came into effect. The period also comprises various macroeconomic conjunctures and global financial crises.

Given Brazilian companies' complex ownership structures, most of which involving several large shareholders and multiple layers of indirect ownership (14 in the case of Cosan, as mentioned above), we rely on definitions and criteria, described below, that attempt to overcome some limitations underlying datasets used in previous studies, which, for example, considered only the main *direct* shareholders, or computed the largest ultimate shareholder's voting rights following criteria with some drawbacks (as the weakest link rule, proposed by La Porta, Lopez-de-Silanes, & Shleifer, 1999), or focused on just a few years.

We consider that a shareholder has a pyramidal ownership in a company when the ownership is mediated through at least one intermediate company.[6] A business group, which comprises legally independent companies under the control of one sole entity, can be horizontal, when the controlling shareholder owns the affiliates directly, or through a pyramid, when at least one intermediate company separates the shareholder from the other affiliates.

If the ultimate shareholder owns directly an equity stake in the sample company, her share in the cash-flow rights is the ratio of the sum of her common and preference shares over the company's shares outstanding. For indirect ownership, the share is the product of the stakes in the intermediate companies along the ownership chain; if there is more than one ownership chain, it is the sum of the chains' products of the stakes.

The shareholder's participation in the company's voting rights is the ratio of her common shares over the common shares outstanding if ownership is direct, otherwise it depends on whether she controls the company. If she does not, her participation is calculated in the same way as for cash-flow rights, that is by multiplying the stakes in the voting capital in the intermediate companies along each ownership chain and adding the corresponding products. If the shareholder controls the company, her participation in total voting rights is the direct stake the first intermediate company has in the sample company's voting capital.[7]

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[6] Almeida et al. (2011) use the same criterion, unlike Villalonga and Amit (2009), who define "a company's ownership structure as a pyramid if the founding family holds its shares of the company indirectly, through one or more investment vehicles in which the family owns less than 100%," and Paligorova and Xu (2012), for whom a pyramidal ownership scheme is "a collection or chain of listed companies having an ultimate owner at the top that controls the entire chain of companies."

[7] The "weakest link" criterion La Porta, Lopez-de-Silanes, and Shleifer (1999) and Claessens et al. (2002) use to define the ultimate shareholder's fraction of voting shares in the company (the sum of the lowest fraction of voting rights in each of the sample company's indirect ownership chains) has the clumsy implication that the sum may exceed 100% (Faccio and Lang, 2002).

For companies with cross-ownership (when at least one of them is an indirect shareholder of itself), we reckon a shareholder's participation in total voting or cash-flow rights relative to the number of shares not belonging to the company (Masulis, Pham, & Zein, 2011).

The company's largest ultimate shareholder (LUS) is the ultimate shareholder who owns the largest sum of direct and indirect voting rights. Given the high voting right concentration in most of the Brazilian public companies, we define controlling shareholder as the LUS owning at least 50% of the company's voting rights. In the case of indirect ownership, a shareholder controls the company if s/he owns at least 50% of the voting rights in every intermediate company along the ownership chain.[8]

We class each LUS into one of the following categories: individuals or families,[9] shareholders' agreements (a contractual commitment among shareholders to act and vote coordinately), governments at the various levels and entities and agencies they control, foreigners, mutual funds, pension funds, privately held or listed companies, and others (co-operatives, employees' associations, and foundations). A shareholders' agreement is the LUS if none of its members holds voting rights exceeding 50%.

Compared with Aminadav and Papaioannou's (2020) in-depth cross-country dataset, which enhances the ORBIS database by carefully addressing its gaps with data and information from diverse types of reports and documents, ours covers a slightly larger number of Brazilian companies (335 against 276 for 2012) and an 11-year time series (theirs refers to 2 years),[10] and relies on some distinct procedures and classifications. First, we adopt the 50% voting right cutoff to define controlled companies while they use 20%. Second, some of the types into which they class the LUS differ from our classification: they firstly distinguish between widely held and controlled companies; then class widely held companies into those with no and those with at least one block of shares exceeding 5%, and controlled companies into those controlled by families, state, a widely held private firm, a widely held public company, or a private firm

[8] Laeven and Levine (2008) define control using the 10% voting right cutoff; La Porta, Lopez-de-Silanes, and Shleifer (1999) employ the 10% and 20% cutoffs; Aminadav and Papaioannou (2020) and Masulis, Pham, and Zein (2011) use the 20% cutoff, but the latter reduces the cutoff to 10% if the largest shareholder is the CEO, the chairman, or the founder; analyzing Asian companies, Claessens et al. (2002) further adopt the 40% cutoff. Evidently, the measurement of corporate control is highly sensitive to the cutoff choice (Holderness, 2009).

[9] A family LUS refers to an individual entrepreneur, shareholders with consanguinity ties, or recurrent partnerships of different families or entrepreneurs (Villalonga and Amit, 2009).

[10] Our lengthy period is particularly useful for econometric estimations attempting to mitigate endogeneity concerns. Previous works on Brazil's corporate ownership analyzed just a few years: Leal and Carvalhal da Silva (2007) focus on 1998, 2000, and 2002; Bortolon's (2010) detailed evaluation of pyramidal ownership, on 2004 and 2006.

they were not able to trace back the ultimate owner. We single out shareholders' agreements as a specific category because both the effective corporate power redistribution they imply, which justifies aggregating its members' voting rights, and the increasing importance they gained along the sample period. As far as we know, ownership studies generally neglect voting coordination to calculate voting rights and verify the existence of control.

Besides ownership data, we also compile data from FR and IAN on board size and composition (e.g. the proportion of directors who were not executives or were nominated by the controlling shareholder, and whether the CEO was also a director or the chairman). The sources for accounting and financial data are the companies' financial statements and Economatica, a private financial data provider. Further data we collected from companies' websites (foundation year and main business activity) and B3 (data on listing segments).

4.2 Brazil's ownership structures' main characteristic features

The sample comprises all public companies that filed IAN or FR with CVM in any year between 2003 and 2013, totaling 3,899 year-companies and a number of companies ranging, depending on the year, from 335 to 401 companies. In 2013, the median company was 40 years old (36% of the companies being less than 20 years old) and had market value and total assets of R$1.63 billion and R$2.92 billion, respectively, return on asset of 5.9%, leverage (total liabilities over total assets) of 60.1%, capital expenditures ratio of 11.9%, and immobilized assets accounting for 15.7% of the total assets.[11] Near 37% of the companies in 2013 had gone public over the sample period, 83% of which were listed on the Novo Mercado (Table A2). The number of companies in this premium governance listing segment jumped from 2 in 2003 to 134 in 2013, when it accounted for 40% of the listed companies, slightly below the traditional segment.

Panel A of Table 1 displays the unweighted distribution of the largest ultimate shareholders' types for every year between 2003 and 2013. Families had the lead throughout the sample period, with a share of 46% in 2013, followed by shareholders' agreements, whose share surged from 15.8% to 23.8%,[12] foreigners (10.4%, a fall of 7.7 pp), and government entities, with participation hovering around 8%, as the privatization waves had been concentrated in the

[11] See Table A1 in the Appendices. For space economy, we include in the main text only some of the tables and figures containing the ownership descriptive statistics.

[12] Following institutional reforms aiming to strengthen minority shareholders' rights, shareholders' agreements in Italy substituted for pyramids as a mechanism to ensure control in the 1990s (Bianchi & Bianco, 2006; Enriques & Volpin, 2007).

1990s. Mutual funds' share jumped from 2.0% to 6.3% while pension funds' declined 1.7 pp, to 0.6%. A different picture emerges if we weigh firms by assets (Panel B) and market capitalization (Panel C): shareholders' agreements (28.9% and 40.5%, respectively, in 2013) and government entities (33.5% and 17.5%) account for much higher shares, while the opposite happens for families (11.8% and 17.5%).

[INSERT TABLE 1 ABOUT HERE]

Figure 1 and Table A3 evince the persistence of concentrated corporate ownership and control structures, notwithstanding the declining average voting rights and deviation of rights along the period (a fall of 7.0 and 7.5 pp, respectively). For none of the sample years the average LUS held less than 66.6% of the voting rights and 46.9% of the equity capital, nor was the average wedge between rights lower than 17.3 pp. Taking the 50% voting right cutoff for control, nearly 78% of the companies in 2013 had a controlling shareholder (83% in 2003) and 28% were owned by an LUS holding at least 90% of the votes. Reducing the control cutoff to 10%, 20%, and 40%, the shares of "widely-held" companies in 2013 fall to 1.2%, 8.6%, and 17.6%, respectively (Figure A1). Despite much lower, the concentration of LUS voting rights in Novo Mercado-listed companies was nonetheless high, averaging 46% in 2013 (Table A4), with 56% of the companies having a controlling shareholder. Amid Novo Mercado's LUS categories, shareholders' agreements and families ranked with the highest average voting rights (55.1% and 50.7%, respectively).

[INSERT FIGURE 1 ABOUT HERE]

LUS cash flow rights average from 46.9% to 49.5% over the period, being less concentrated in the high-percentage tail as compared with voting rights. Nevertheless, in most of the companies, they were high enough to ensure control regardless of enhancing-control devices: in 2013, they owned at least 50% of the capital in 52% of the companies (Table A5). The predominance of companies wherein the LUS held high cash-flow rights suggests that the motivation behind the widespread use of mechanisms separating control from ownership may lie in reasons other than minimizing investment to achieve control. Even for companies listed on the Novo Mercado, the LUS share in the equity capital was considerably high, averaging 41.9% and exceeding 50% in 52% thereof in 2013. The average share of cash-flow rights in family companies (46%) is much lower than for governmental entities (63%) and foreigners (57%).

Despite the huge ownership concentration, the wedge between voting and cash flow rights is also large, albeit declining along the sample period (Table A6). Around 37% of the sample companies presented a deviation of at least 20 pp in 2013 (against 51% in 2003). The average deviation for family companies is higher than for companies whose LUS is a governmental entity or a shareholders' agreement – 22.4, 17.1, and 13.5 pp, respectively. Mean and median deviations fall from 24.8 and 20.8 pp in 2003 to 17.3 and 5.9 pp in 2013, respectively, mostly due to companies either going public on, or migrating to, the Novo Mercado, which requires that companies issue only voting shares. Deviation averaged just 4.6 pp in Novo Mercado-listed companies in 2013, being null in more than 81% of them.

Discrepancies between LUS' voting and cash-flow rights were driven primarily by pyramidal ownership, shareholders' agreements, and non-voting shares, with cross-shareholdings being unusual. Until the beginning of the 2000s, most of the Brazilian listed companies had a large proportion of their equity capital in non-voting, preference (PN) shares. However, both the Novo Mercado's listing requisite, requiring companies to issue exclusively voting common shares, and the 2001 corporate law reform, which prevented listed companies from issuing new non-voting shares that exceeded 50% of the equity capital, prompted the decline in importance of PN shares. Various indicators evince this shift (Table 2): from 2003 to 2013, the mean (median) percentage of non-voting shares falls from 42% (50%) to 23% (0%), the percentage of companies wherein that class of shares represented at least 50% (60%) of the equity capital shrink from 53% (36%) to 27% (18%), and that of companies reaching the upper legal limit of 2/3 of the capital (implying that the LUS could gain control with just 17% of the capital) decreases from 18% to 11%. In 2013, preference shares continued to be relatively more important for family companies, averaging 28.6% of the capital (18.9% for the others), with 34% of them having at least 50% of the capital as PN shares (27% for the others).

[INSERT TABLE 2 ABOUT HERE]

Pyramid-owned companies, i.e. companies wherein a shareholder owns an equity stake through at least one intermediate company, accounted for almost 73% of the sample companies in 2013 (Table A7). The average number of intermediate companies ranged from 2.4 to 2.9 over the sample years, with 14.8% of the companies in 2013 being owned through at least five intermediate companies separating them from the corresponding LUS. For companies listed on the Novo Mercado, 65.7% were indirectly owned, 9.7% of which with at least five intermediate companies. Pyramid-affiliated companies with at least one listed intermediate company

comprised 18% of the sample companies in 2013. As expected, the average LUS voting rights for these companies are consistently higher as compared with the other companies, the opposite prevailing for the average LUS cash-flow rights.

The significant number of pyramidal companies with listed intermediate companies that issued a small fraction of PN shares or not at all runs counter the expropriation view, which claims that this type of company emerges only when the legal cap for issuing non-voting shares, a cheaper way of enhancing control, is achieved .[13] Another finding defying that view is that the LUS held more than 50% of the cash-flow rights in 36% of those companies in 2013. Shareholders' agreements stand out amid the LUS owning companies through listed intermediate companies (47.5%), followed by families (37.7%) and governmental entities (9.8%). Thus, unlike the Italian experience (Enriques & Volpin, 2007), shareholders' agreements and pyramidal ownership in Brazil seem to be complementary, rather than substitute, mechanisms. Prevented from issuing non-voting shares, companies listed on the Novo Mercado could arguably rely on pyramidal schemes to leverage voting power, but only 9.7% of them did it in 2013, with an average LUS right deviation of 31.4 pp, quite similar to the other listing segments' companies (32.3 pp).

Shareholders' agreements heightened their share along the period amid the devices to leverage LUS voting power, being more concentrated among large companies. They ensured control in 23.8% of the sample companies in 2013, against 15.8% in 2003 (Figure A2). For companies listed on the Novo Mercado, this share is considerably higher (29.9%, peaking at 33.7% in 2010). On average, shareholders' agreements are the LUS with the highest voting rights, cash-flow rights, and deviations of rights – in 2013, 69.3%, 55.8%, and 13.5 pp, respectively (Figure A3). Taking all the companies with shareholders' agreements, irrespective of ensuring control or not, their share rockets up from 21.8% in 2003 to 37.3% in 2013.

Besides enhancing voting rights *vis-à-vis* their equity investment, some controlling shareholders further levered corporate power by resorting to disproportionate representation in the boards of directors. Along with other descriptive statistics for companies' boards of directors, Table 3 displays LUS board overrepresentation, measured as the difference between the percentage of directors the LUS nominates – and thus to whom they are likely to be submissive – and her voting rights (Villalonga & Amit, 2009). The relatively small average

[13] Of the 61 companies owned through listed intermediate companies in 2013, 46% had issued non-voting shares up to 10% of the capital while less than 20% had issued this type of shares representing at least 50% of the capital.

board overrepresentation, ranging from 5.1 to 8.6 pp over the period (7.5 pp in 2013), is assignable to LUS voting rights' high share. Still, Novo Mercado-listed companies' average overrepresentation achieved 18 pp in 2013, indicating that controlling shareholders, prevented from issuing non-voting shares, might be relying on this device to augment corporate power.

[INSERT TABLE 3 ABOUT HERE]

Concerning other board characteristics, the share of companies where the CEO was also a director fell from 59.5% in 2003 to 50.6% in 2013, while that for companies where the CEO also was the chairman plummeted from 29% to 15.5%, probably reflecting the B3 regulatory rule, which would come into effect in May 2014, precluding companies listed on the special governance listing segments from accumulating both positions. As CVM loosely defined "outside or independent" directors as non-executive directors, we rely instead on the share of directors nominated by the controlling shareholder: it averages 73.9% in 2013 and reaches at least 90% (50%) in 39.6% (85.4%) of the companies. Arguably, directors nominated by the controlling shareholders in such a proportion are unlikely to challenge them, probably rendering the board, the companies' highest internal governance instance, submissive and willing to merely rubber-stamp their decisions.

Notwithstanding the differences in control cutoffs, the classification of the ultimate shareholders' types, and the number of sample companies, it is worth contrasting our findings with those reported by Aminadav and Papaioannou (2020) for Brazilian companies in 2012. As mentioned above, they used a multi-country firm-level ownership dataset that sprang from a careful revision of the ORBIS dataset. Adopting the 20% voting right cutoff, they found that controlled companies accounted for 71.4% of the sample: 22.8% controlled by families, 9.1% by the government, 6.9% by widely held public firms, 3.6% by widely held private firms, and 29.0% by "private unmatched firms," which they deem to be preponderantly "small family-controlled firms." For the remaining 28.6% widely held firms, 27.2% had at least one shareholder owning a block of shares higher than 5%.

Contrariwise, we employ the 50% control cutoff and include some LUS categories they do not (e.g. shareholders' agreements, foreigners, and mutual funds). Also, we strove to identify the actual shareholders behind firms holding direct or indirect stakes in the sample companies, probably this being the reason for the relatively much lower share in our sample of companies whose LUS are classed as listed, unlisted, or unmatched firms. We document that in 2012 there was a controlling shareholder in 76.1% of the companies, with families responding for 39.1%,

shareholders' agreements, 19.1%, government entities, 7.5%, foreigners, 7.2%, and listed and unlisted firms other than pension and mutual funds, 2.7%. In the remaining 23.9% of the companies not meeting the 50% control cutoff, at least one ultimate shareholder owned a block of voting shares higher than 5%, with the following distribution by type of LUS: 10.1% of families, 4.5% of mutual funds, 4.2% of shareholders' agreements, 2.7% of foreigners, 0.9% of government, and 0.6% of entities other than pension funds.

The descriptive statistics discussed above reveal that Brazil's corporate ownership structure did react to the capital markets' sweeping innovations taking place from 2000 on. Along the sample period, shareholders' agreements gained traction and stood out amid the categories of LUS in 2013 (accounting for almost 24% of them, 28.9% if weighted by asset value, and 40.5%, by market capitalization), while family-owned companies weighted by asset value lost ground; non-voting shares relative to each company's total shares plummeted (from 50% to 0% for the median value); and LUS voting rights and deviation of rights fell considerably (by 10 and 7.5 pp, respectively, in the median values). The institutional advances in corporate governance fostered IPOs, most of which from companies that opted to list on the Novo Mercado (in 2013 they represented 83% of the sample companies that had gone public within the sample period), on top of boosting the migration to this segment of already listed companies (in 2013, 40% of the sample companies were listed on the Novo Mercado).

Nonetheless, contrary to widespread expectations, those institutional changes failed to deconcentrate companies' ownership and control. At the end of the sample period, Brazil's corporate landscape still featured controlling shareholders who, albeit owning large equity stakes, resorted to pyramidal schemes and increasingly more on shareholders' agreements to render their discretionary corporate power incontestable.[14] Neither was this pattern impacted by the 2008-2009 world financial crisis.

The next section presents the methodological design to examine the hypotheses formulated in Section 3 regarding the relationships between companies' ownership characteristics and performance over the period.

[14] The modest impact of the remarkable improvements in the corporate governance institutional framework on the number of widely held companies may be at odds with the law and finance view, which claims that corporate control and ownership concentration operate as a substitute for shareholders' protection rights wherein they are absent due to institutional voids (La Porta et al., 1997; 1998; 2008; Aminadav & Papaioannou, 2020). Holderness (2016) rebukes this view at both the theoretical and empirical fronts.

5. Methodology

Endogeneity issues pose thorny challenges to identify causal relationships in corporate finance research (Adams, 2017; Roberts & Whited, 2013; Wintoki, Linck, & Netter, 2012). Concerning specifically the ownership-performance nexus, endogeneity appears in several ways: reverse causality – for example, when top executives anticipate falling future cash flows, they deliberately increase the gap between voting and cash-flow rights to preserve control (Lins, 2003); omitted variables – e.g. when executives' stock options-based compensation packages drive both ownership and performance; measurement errors in the explanatory variables; and "dynamic endogeneity" – when past performance impacts on current ownership features (e.g. via changes in firm size). Until the 1990s, most empirical studies on the ownership-performance relationships either overlooked endogeneity, by supposing stable ownership patterns, or employed instruments of questionable validity.[15] Subsequent research has become more attentive to endogeneity issues, though often neglecting some of their types.

Given the shortage of valid and powerful external instruments or exogenous ownership shocks over the sample period, we assess the existence of links between several ownership variables and firm performance by estimating a dynamic panel data model with the system Generalized Methods of Moments (GMM) estimator,[16] which may control not only for time-invariant unobserved heterogeneity, as does the fixed effects estimator, but, providing some conditions are met, also for simultaneity bias and dynamic endogeneity between current explanatory variables and past firm performance (Wintoki, Linck, & Netter, 2012). After comparing the available estimators for dynamic panel models through simulations with representative corporate finance datasets, Flannery and Hankins (2013) conclude that the system GMM estimator is "the best choice in the presence of endogeneity and even (surprisingly) second-order serial correlation if the dataset includes shorter panels … [being] reliable regardless of the level of endogeneity or dependent variable persistence and should be the default choice under these conditions."

[15] Some studies use instruments that fail to comply with the exclusion (orthogonality) condition, such as proxies for companies' size and idiosyncratic risk, which are observed characteristics commonly used as control variables in performance regressions (Roberts & Whited, 2013). For instance, Leal and Carvalhal da Silva (2007) employ a dummy for firm size as instrument to analyze the effect of ownership on performance.

[16] Whereas corporate finance empirical models use numerous potential endogenous regressors, reliable external instruments (e.g. natural events or features or quasi-natural experiments related to institutional or policy changes orthogonal to the interest variable) are overall scanty (Flannery & Hankins, 2013; Roberts & Whited, 2013). On the system GMM's advantages and limitation, see Blundell and Bond (1998, 2000), Blundell, Bond and Windmeijer (2001), Roodman (2009a, 2009b), Windmeijer (2021), Grieser & Hadlock (2019), and Wintoki, Linck, & Netter (2012).

To test our hypotheses, we employ the following general baseline dynamic empirical model:

$$y_{it} = \alpha + \gamma\, y_{i,t\text{-}1} + \mathbf{x}'_{it}\boldsymbol{\beta} + \eta_i + \varepsilon_{it} \qquad (1),$$

where the dependent variable y_{it} is either the accounting or market (valuation) performance of the company i in year t (t = 2003, ... 2013), $y_{i,t\text{-}1}$ is the lagged value of y_i, used to capture the partial dynamic adjustment process (Minichilli, Brogi, & Calabrò, 2016; Jin & Park, 2015),[17] $\mathbf{x}_{it}$ is a vector of explanatory and control variables referring to companies' ownership, governance, and other characteristics, $\boldsymbol{\beta}$ is a column vector of the parameters to be estimated, η_i is the unobserved company fixed effects, and ε_{it} is the idiosyncratic error.

5.1 Variables

5.1.1 Dependent variables

We use two alternative performance measures as the dependent variable: the accounting performance, proxied by return on assets (ROA), defined as the ratio of the sum of net income plus financial expenditures less the corresponding tax shield over total assets as a way to mitigate the influence of companies' specific financing types on operating profitability; valuation, measured by a proxy for Tobin's *q*, given by the sum of the market value of equity and the book value of long-term and short-term liabilities less the book value of circulating assets, all scaled by the book value of the total assets.

5.1.2 Explanatory variables

The explanatory variables for the performance regression are the following (Table A8 presents the definitions of all covariates tried):

- the LUS shares in the company's voting rights (*vr*) and cash-flow rights (*cfr*), as well as their squares, to capture possible non-linear effects;
- the wedge between *vr* and *cfr* (*dev*);
- dummies for the existence of a controlling shareholder (*control*);
- the extent of a pyramidal ownership scheme, measured either by the number of intermediate companies (*n_int*) or of listed intermediate companies (*n_list*) between the LUS and the sample company; or the existence of such schemes, captured by a dummy;
- the percentage of preference shares in the company's shares outstanding (*pn*) or dummies for preference shares' issuance of at least 33%, 50%, or 60% of the shares outstanding;

[17] As sub-section 5.4 shows, OLS regressions indicate that one lag of the dependent variable as regressor is sufficient to incorporate the relevant past information on its dynamic interaction with ownership variables.

- dummies for LUS categories: family (*fam*), government (*gov*), shareholders' agreements (*ShA*), and BNDES (*bndes*), which includes the case wherein BNDES was a member of the controlling shareholders' agreement;
- other proxies for ownership concentration, such as dummies for shareholders' voting right thresholds of 40%, 50%, or 60%, and the number of direct shareholders holding at least 10% or 20% of the company's voting capital;
- interaction variables of the extent of the pyramidal ownership with dummies for family, government, and shareholders' agreement control (*n_int* × *fam*; *n_int* × *gov*; *n_int* × *sh_a*), to verify whether the impact of pyramidal ownership differs across LUS' categories;
- interaction variables of the extent of the pyramidal ownership with investment (*n_int* × *inv*) and leverage (*n_int* × *lev*), to test whether pyramids alter the effect of the latter two variables on performance.

5.1.3 Control variables

Based on the literature (synthetized e.g. in Wang & Shailer, 2015), we select as controls the following observable company-level characteristics:[18]

- size, proxied by the log of total assets deflated to 2013 Reais (*ln_asset*), to capture possible effects on agency and capital costs from scale economies, better disclosure, and monitoring from a greater number of analysts and rating agencies (unlike other studies, we do not use market capitalization, as it is generally subject to sharp volatility);
- age, measured by the log of the firm's years of existence (*ln_age*);
- companies' growth prospects, taken as the average annual growth in net operating revenue over the former two years (*sales_gr*);
- investment ratio (*inv*), calculated as the ratio of capital expenditures (CAPEX) over the value of property, plant, and equipment (PPE), as it conveys information on either agency costs of free cash flows (overinvestment) or promising opportunities for profit or growth;
- financial leverage ratio (*lev*), measured as the ratio of a company's total liabilities over total assets: a higher leveraged financial structure may either harm performance (by aggravating bankruptcy risks or financial constraints on rewarding investment opportunities, with debt overhang driving underinvestment) or lower agency costs of free cash flows, with debt

[18] Some argue that the institutional framework affects companies' characteristics that contribute to shaping ownership patterns (Aminadav & Papaioannou, 2020; Franks et al., 2012; Wintoki, Linck, & Netter, 2012).

operating as a disciplinary device (Jensen, 1986); also, there may be reverse causality if underperforming companies borrow to keep their business ongoing;

- tangibility (*tang*), reckoned by the value of fixed assets scaled by the value of total assets, as a proxy to asset pledgeability and liquidation value, and thus to credit access, since fixed assets' lower monitoring and verification costs make them reliable collaterals;
- time dummies (*year*), to control for business cycle effects (macroeconomic and overall market conditions).

To focus strictly on ownership, we take governance features related to board structures and premium governance listing segments as control or moderating variables:

- board structure's characteristics: the number of directors (*b_size*), the share of members nominated by the controlling shareholders (*contr_dir*), a dummy for whether the CEO also was the chairman (*ceo_ch*) or a member of the board (*ceo_dir*), and overrepresentation in boards (*b_over*), a proxy for boards' power leverage, measured as the excess of the share of the board nominated by the controlling shareholder over her share in the voting rights. More recent studies attempting to control for endogeneity have not documented any systematic relationship between boards of directors and firms' performance, vindicating the implications of theoretical models wherein board structures are taken as efficient outcome from firms' characteristics and contractual constraints (Adams, Hermalin, & Weisbach, 2010; Hermalin & Weisbach, 2003; Hermalin & Weisbach, 1998; Linck, Netter, & Yang, 2008; Wintoki, Linck, & Netter, 2012; Raheja, 2005; Harris & Raviv, 2008). For instance, Wintoki, Linck, and Netter (2012) show that board variables do not affect current firm performance, whose past realizations in turn do influence the former.[19] However, controlling shareholders with voting rights exceeding cash-flow rights in countries with institutional voids may muster enough power to nominate submissive board members willing to merely homologate the former's self-interest decisions (Andrade, Bressan & Iquiapaza, 2017);
- dummies for listing on the Novo Mercado (*NM*) or Level 2 (*N2*), as companies' adhesion to higher governance standards (such as greater transparency and investors' further protection *vis-à-vis* those mandated by corporate law) may lower risks and capital costs and thus improve valuation and returns (Moura & Norden, 2019; Carvalho & Pennacchi, 2012);

[19] Differently, Van Essen, Engelen, and Carney (2013) find that companies with "vigilant boards" (smaller, more independent, and wherein the CEO is not the chairman) underperform their matches in periods of crises.

- interaction variables of the pyramidal ownership extent with listing on the Novo Mercado (*n_int* × *NM* and *n_list* × *NM*), to check whether the LUS resorts to pyramids as a substitute of non-voting shares, as the expropriation hypothesis claims.

5.2 Summary statistics

To estimate companies' valuation and accounting performance, we exclude from the sample firms operating in the financial sector, as they are subject to stricter specific regulations that may distort results. Overall, the descriptive statistics of the ownership and governance variables included in the model specifications are similar to those for the whole sample: highly concentrated ownership and control, widespread use of pyramidal arrangements, the predominance of families and shareholders' agreements, and a concentration of companies listed on the Novo Mercado and that went public within the sample period (see Table A9). The average company was relatively sizeable (total assets worth R$11.9 billion in 2013 constant prices) and leveraged (66%), invested 21% of its PPE, and had Tobin's *q* close to one and tangible assets accounting for 25% of the total assets.

As Table A10 shows, both ROA and Tobin's *q* are relatively highly correlated with leverage (-43% and 39%, respectively) and the value of assets (19% and -12%), and moderately with firms' age (6% and -11%). The correlation coefficients of value of assets with age and leverage are negative and with tangibility positive. Age is also correlated with investment and sales growth (negatively) and tangibility (positively), which in addition is positively correlated with leverage and negatively with ROA and investment rate.

For ownership and governance variables, the correlations' signs and relevance are as expected (Table A11). LUS voting right (*vr*), cash-flow right (*cfr*), and deviation of rights (*dev*) are highly correlated with one another. Both *vr* and *cfr* correlate positively with the share of directors nominated by the controlling shareholder (*contr_dir*), whereas only *vr* correlates positively with the fraction of non-voting shares (*pn*) and the number of intermediate firms (*n_int*) and negatively with listing on the Novo Mercado (*NM*). The LUS deviation of rights (*dev*) correlates positively with *pn*, *n_int*, the number of listed intermediate companies in the pyramid scheme (*n_list*), firm age (*ln_age*), and listing on Level 1 (*N1*) – where most of the largest business groups' major companies are listed – and negatively with *NM*. Shareholders' agreement as the LUS (*ShA*) presents a high positive correlation with BNDES (*bndes*) and both are positively related with *n_int* and *n_list*, which in turn are negatively correlated with *NM*. PN shares correlate positively with family control (*fam*), *ln_age*, and *N1* and negatively with

ShA (suggesting they are substitutes) and *NM*, which is highly negatively correlated with firm age. It is noteworthy the low correlation of the ownership and governance variables with the regressands Tobin's *q* and ROA. Concerning board variables, while CEO-chairman duality (*ceo_ch*) is highly positively correlated with *fam*, CEO who is also a director (*ceo_dir*) is negatively correlated with *ShA*. Board size (*b*_size) is positively correlated with government control (*gov*), *ShA*, and *N1* and negatively correlated with *ceo_ch* and *fam.*

5.3 Variability in the companies' ownership and governance characteristics

To verify persistence in the main ownership and governance characteristics, we reckon the fraction of companies wherein they changed significantly from year to year and over the whole sample period (Table A12). In most of the years, sizeable variations in LUS cash flow and control rights and in the share of directors nominated by controlling shareholders are observed for more than 20% of the companies. As expected, changes in being listed on the Novo Mercado, government and foreign control, and pyramidal ownership are less frequent – below 8% of the sample companies in most of the years. In between, the existence of control, indirect ownership, the fraction of non-voting shares, CEO–chairman or CEO–director dualities, and LUS family and shareholders' agreement change in the range from 8.6% to 15.3%. Albeit not very high, the magnitude of most of these time-series changes is adequate to estimate panel data regressions (for comparison, Wintoki, Linck, & Netter, 2012).

5.4 Dynamic endogeneity and lags of the dependent variable used as regressors

As a preliminary check for the existence of dynamic endogeneity, we regress variables related to companies' current characteristics on past values of their performance and characteristics (Wintoki, Linck, & Netter, 2012). We find that total asset, leverage, and tangibility are indeed correlated with the lagged values of companies' performance and other characteristics. Similarly, ownership variables are correlated with the lagged values of other ownership variables and firms' characteristics. These results point to potential endogeneity of the explanatory (ownership) and control variables.

Furthermore, we test the strict exogeneity assumption that the current values of the explanatory ownership and control variables are independent of the company performance's past values (the no-feedback condition) by conducting a fixed-effects estimation of the baseline regression (1) augmented by those variables' future values (Wooldridge, 2010; Grieser & Hadlock, 2019):

$$y_{it} = \mathbf{x}'_{it}\boldsymbol{\beta} + \mathbf{w}'_{i,t+1}\boldsymbol{\delta} + \eta i + \varepsilon it,\ t = 1, 2, \ldots, T-1 \qquad (2),$$

where $\mathbf{w}_{i,t+1}$ is a subset of the ownership and control variables' future values ($\mathbf{x}_{i,t+1}$). Under the strict exogeneity null hypothesis, the lead variable coefficients δ should be null. As in most of the specifications they are different from zero (Table A13), the ownership and governance variables are not strictly exogenous, indicating that IV procedures are required to address the feedback between the explanatory and dependent variables.

To identify the number of lags of the dependent variable (performance) that must be included as regressors, we estimate an OLS regression of its current value (y_t) on different combinations of lags as well as on variables related to companies' characteristics. The results suggest that one lag is enough to convey information from past performance persistence, justifying employing only the first lagged dependent variable as regressor in all specifications. Since instrument proliferation may overfit the instrumented variables and yield biased estimates and efficiency loss, we limit the instruments to the second and third lags of the endogenous variables for the first differences equation and their first-lag differences for the equation in levels. We collapse them using one instrument for each variable and lag distance for all the years (Roodman, 2009a).

6. Estimation results and discussion

6.1 Estimations with the system-GMM estimator

After testing the whole set of explanatory (ownership), control, and moderating (board characteristics and companies' listing segments) variables for estimating companies' valuation (Tobin's *q*) and accounting performance (ROA), we employ the following explanatory variables in the baseline regressions: the LUS voting rights' quadratic terms,[20] the deviation between rights, the number of intermediate companies distancing the LUS from the sample company, and the fraction of non-voting shares. As control variables, we use the log of total assets, the log of the company's age, the average change in sales over the previous two years, leverage, tangibility, and CAPEX over total assets.

Following Wintoki, Linck, and Netter (2012), we estimate the performance equations using static (OLS and fixed-effects) and dynamic (OLS and system-GMM) models. Tables 4 and 5 report the results, with specifications in columns (1) to (4) including only control variables, and those in the remaining columns adding ownership variables.

[20] Aminadav and Papaioannou (2020) consider voting rights conceptually better than cash-flow rights.

For regressions using the system GMM estimator, we undertake the two standard post-estimation procedures to evaluate the exogeneity assumption of the instruments relative to the current performance. The Arellano-Bond test shows that the null hypothesis of no second-order serial correlation in the error term could not be rejected, while the Hansen and the difference-in-Hansen tests for overidentifying restrictions indicate that none of the null hypotheses of the joint validity of the full instrument set in the first-differenced equation and the validity of the additional exclusions restrictions in the levels equation could be rejected. Thus, the instruments for the estimated models are valid and their number is not excessive.

[INSERT TABLES 4 AND 5 ABOUT HERE]

The lagged ROA and Tobin's *q* coefficients' high statistical significance confirms the dynamic character of these variables. As regards the control variables, a remarkably robust finding is the leverage's highly statistically significant association with both ROA (negative) and Tobin's *q* (positive) in all specifications and estimators (except in the FE regression for Tobin's *q*). Running counter Jensen (1986) argument, the negative relation between indebtedness and profitability may be due to debt "overhang:" debt-ridden companies, with low borrowing capacity and unable to raise additional financing, are forced to relinquish new profitable investments. Furthermore, high-debt companies' incentives to invest are likely to be weakened, as a significant part of the expected return would be channeled to previous debtholders (Tirole, 2006). For the rather puzzling opposite association of leverage with the valuation proxy, as the FE static model estimation shows a negative relationship between them, a tentative explanation might be that a firm's high past Tobin's *q* renders creditors more willing to lend it more.[21]

ROA has a significant and positive association with firms' age and size (total assets) and is negatively related to tangibility, suggesting that outperforming companies under the profitability metrics tend to be larger, older, less indebted, and with more intangible assets. By contrast, firms with higher valuations tend to be smaller, to take more debt, and to invest more.

Concerning ownership variables, all the estimated coefficients in the ROA equation lack statistical significance, while in the estimation of the Tobin's *q* equation the coefficients for voting rights' quadratic terms (*vr* and *vr_sq*), pyramidal ownership extent (*n_int*), and proportion of non-voting shares (*pn*) are statistically significant. Firms' valuation declines with

[21] As Wintoki, Linck, and Netter (2012, p. 587) demonstrate, the results of FE estimations of current performance on current values of the explanatory variable are biased in the opposite direction of the dynamic relationship if these values are dynamically related to the dependent variable's past values. In our case, the coefficient for leverage is positive in the estimation using system GMM and negative with FE.

the LUS voting rights up to around 52.5% and increases afterward, implying that higher voting rights when the LUS controls the firm are associated with higher valuation. The strong statistical significance for both the positive coefficient of *n_int* and the negative coefficient of *pn* in Tobin's *q* equation indicates that investors perceive and value distinctively these two enhancing-control mechanisms, perhaps due to the potential benefits associated with affiliation to pyramidal business groups – such as financing (Almeida & Wolfenzon, 2006; Almeida et al, 2011; Masulis, Pham, & Zein, 2011; Jin & Park, 2015), propping, and economies on transaction cost (Leff, 1978; Khanna & Yafeh, 2007; Riyanto & Toolsema, 2008).

The distinct findings for the accounting (ROA) and market-based (Tobin's *q*) proxies for corporate performance (unlike the former, the latter is sensitive to ownership characteristics) may be related to investors' behavioral biases: even profitability not being driven by ownership, investors may perceive dual-class shares as prone to expropriation as this device for leveraging voting power from a limited cash-flow exposure is more salient as compared to opaque pyramidal ownership schemes.

6.2 Robustness Checks

6.2.1 Using other ownership and governance proxies

The results are robust to the addition or substitution of most of the other ownership variables (Tables A14 and A15). In the Tobin's *q* equation, the coefficients for voting rights, pyramid extent, and proportion of non-voting shares preserve the signs and statistical significance when we add to the baseline specification each of the following variables, none of which with coefficients passing standard significance levels: dummies for family control, government or shareholders' agreement, firms wherein BNDES is a shareholder, listing on the Novo Mercado or Level 1, board characteristics (size, proportion of directors nominated by the controlling shareholder, or dummies for the CEO-chairman or CEO-director dualities), and interaction variables of pyramidal ownership with listing on the Novo Mercado, family control, or leverage. In addition, results do not change qualitatively when we replace deviation of rights with board overrepresentation or the fraction of non-voting shares with dummies for their issuance above 33% (for issuance exceeding 50%, the coefficients for LUS voting right lose significance). If we remove the quadratic term, the coefficient for LUS voting rights (and also for cash-flow rights) loses statistical significance while that for deviation of rights becomes significant. For the ROA equation, irrespective of the substitution or addition of any ownership variables, all their coefficients remain statistically non-significant.

6.2.2 Propensity score matching analysis

Our estimations of dynamic panel data models with system-GMM estimator find evidence that ROA has no association with the ownership regressors, while the proxy for Tobin's Q appears to be systematically related to LUS' voting rights (decreasing up to 52.5% and increasing thereafter), the percentage of non-voting shares (negatively), and the number of intermediate firms between the LUS and the sample firm (positively).

To test the robustness of these results, we conduct a propensity score matching (PSM) analysis. As firms' ownership attributes are likely selected by other characteristics, confounding the relationship between ownership and performance and biasing the estimated effects, the PSM method may control for the confounding factors driving selection bias in the estimation of the treatment effects by pairing firms receiving a given treatment to others in the opposite (untreated) group with the closest propensity scores, defined as the probabilities of assignment to the treatment conditional on a vector of observed covariates (Rosenbaum & Rubin, 1983).

The rationale for matching firms with the estimated propensity scores lies in balancing the distributions of baseline covariates across the treated and untreated groups in the matched sample, rendering comparable firms with similar propensity scores from the different groups and thus making differences in the groups' outcomes likely assignable to the treatment. To ascribe the counterfactual outcome for each of the firms that takes a given treatment, PSM relies on the average outcome of similar firms in the opposite group with similar propensity scores. The treatment effect on the outcome variable is then gauged as the difference between the average outcome for firms receiving the treatment and the average (counterfactual) estimated outcome for their matched controls in the untreated group with similar propensity scores.

To implement the PSM we define seven binary ownership variables, each dividing the sample into two groups: the treated group, embracing firms with a given ownership attribute, and the comparative group, with firms without it. These dummies are the following: LUS voting rights of at least 75% in firms whose LUS owns at least 52.5% of the voting rights (the minimum point in the previously estimated quadratic relationship between voting rights and Tobin's Q); non-voting shares of at least 30% of the firm's capital; deviation of at least 10 percentage points between LUS voting and cash-flow rights; indirect ownership with at least two intermediate firms; and LUS being a family, a shareholders' agreement, or a governmental entity.

Following PSM conventional procedures, we begin by estimating the propensity scores using logistic regressions of the treatment variable on covariates related to both the treatment

assignment (ownership features) and the outcomes of interest ROA and Tobin's Q (Garrido et al., 2014; Caliendo & Kopeinig, 2008; Becker & Ichino, 2002), assessing if they balance propensity scores across treatment and comparison groups as well as are balanced across these groups within blocks of the propensity scores.

To perform the matching between treated and untreated firms, we use the estimated propensity scores with the single nearest-neighbor matching estimator within caliper, matching on the logarithm of the odds ratio and restricting the calculation of ATT to a common support region for treated and controls (Leuven & Sianesi, 2018). As Table A16 shows, the results are consistent with those estimated with the system-GMM estimator, the only discrepancy being the non-significance of the difference in the coefficients of LUS voting rights of at least 75% for treated and control firms in the Tobin's Q equation. We also check the balancing for each of the covariates in the matched sample across treatment and comparison groups as well as in the samples before and after matching, performing tests for equality of means and verify the standardized percentage bias, the corresponding percentage reduction in bias after matching, and the variance ratios of treated and untreated.

Finally, we estimate the average treatment effects on the treated (ATET) for each binary ownership variable relying on specifications similar to those applied in the estimated dynamic panel data models with the system-GMM estimator (Becker & Ichino, 2002). As propensity scores employed in matching the samples are unknown, we have to estimate analytical standard errors of the treatment effect in the matched samples to account for possible correlation between matching variables and the treatment effect, which could bias the standard errors (Abadie & Imbens, 2016). When ROA is the outcome variable in the matched sample, the results corroborate those of the dynamic panel data model estimations: none of the coefficients of the difference between treated and control firms for the ownership treatment variables is significant (Table 6). As regards Tobin's Q as the outcome variable, the results are also in line with estimations except for two discrepancies: the coefficients for LUS voting rights of at least 75% and for non-voting shares of at least 30% of the capital are not statistically significant, although preserving the signs (positive for the former and negative for the latter).

[INSERT TABLE 6 ABOUT HERE]

6.3 Assessing the hypotheses

Relying on the dynamic panel GMM estimator to attempt to address endogeneity issues, we find no evidence of systematic influence of ownership characteristics on the sample companies'

accounting performance, while valuation appears to be associated with LUS voting rights (through an U-shaped relation), non-voting shares (negatively) and indirect ownership extent (positively). Estimations with propensity score matching mostly provide convergent results. For both estimators, the estimated coefficients in the ROA equation for all ownership variables are not statistically significant. Concerning Tobin's Q, the PSM analysis also confers robustness to the previous results of a significant and positive relationship with indirect ownership as well as of no significant association with LUS deviation of rights nor with any specific type of owner, but it fails to confirm the significance for LUS voting rights and non-voting shares, though providing the same signs (positive and negative, respectively).

If ROA proxies for performance, these findings support none of the formulated hypotheses and are at odds with both the expropriation and financing advantage views, implying that ownership structures do not affect, on average, accounting performance. Using a proxy for Tobin's *q* to measure valuation, results also diverge from the hypotheses of its sensitiveness to voting rights (H1b), unlike Hu and Izumida (2008), non-voting shares (H2), ownership of families (H5), governments (H6), BNDES (H7), and shareholders' agreement (H8) as well as of investment or leverage operating as transmission channels for pyramidal ownership (H4), again unlike Hu and Izumida (2008). The evidence corroborates only the hypothesis relating positively market-based performance to the extent of pyramidal business groups (H3). This latter finding may be rationalized as investors perceiving business groups' affiliation as value increasing. Nonetheless, while Almeida and Wolfenzon's (2006) financing advantage hypothesis refers to pyramidal ownership in *family* business groups, the estimated coefficient for family ownership in none of the model specifications shows statistical significance.

Finally, our results also confirm the endogeneity of companies' ownership and performance variables, both related to companies' characteristics such as size, financial leverage, and tangibility (Demsetz, 1983; Demsetz & Lehn, 1985; Himmelberg, Hubbard, & Palia, 1999; Pindado & de la Torre, 2004; Wintoki, Linck, & Netter, 2012).

Concluding remarks

To revisit the long-standing debate on the relationship between companies' ownership and performance, we rely on an 11-year ownership panel dataset for Brazilian publicly listed companies, which we constructed by hand collecting and compiling data from mandatory reports each of them filed with the Brazilian securities and exchange commission (CVM) for every year between 2003 and 2013.

To identify every sample company's actual largest ultimate shareholder, we trace back all the chains linking it to the ultimate shareholders. We opt for definitions and procedures that address the Brazilian corporate specificities, which in some cases diverge from those the literature usually employs. For example, we do not use the weakest link approach to measure voting rights in pyramidal ownership; we define control using the 50% cutoff; and we include variables that, so far as we know, previous studies on corporate ownership in Brazil do not – e.g. the pyramidal ownership scheme extent, the number of listed intermediate companies, the inclusion of shareholders' agreement amid the shareholders' category, and board overrepresentation. Those studies rely either on financial data providers' datasets (as Economatica) that fail to deal adequately with the difficulties for identifying each company's largest ultimate shareholder, or on very short panel data. Besides allowing us to furnish a granular account of Brazilian listed companies' ownership structures from 2003 to 2013, refinement in the ownership measurement approach, the employment of some underexplored ownership variables, and the longer panel data enable us to apply methodologies to cope with endogeneity issues and thus to make more reliable inferences.

Erstwhile research had portrayed the Brazilian corporate ownership setting at the beginning of the 2000s as dominated by companies controlled by families owning a very high proportion of the voting capital, mostly through dual-class shares and pyramid schemes (Aldrighi & Mazzer Neto, 2007; Bortolon, 2008; Valadares & Leal, 1999/2000). However, capital markets' remarkable institutional and regulatory advances beginning in 2000, which certainly contributed to boosting IPOs, attracting foreign investors, and promoting the entrance or migration to the Novo Mercado, warrant evaluating whether ownership and control structures became less concentrated. Indeed, important changes happened in the ownership pattern over the period: shareholders' agreements stood out amid the LUS (accounting in 2013 for 24% of them), the median participation of non-voting shares plunged from 50% to 0%, and both LUS voting rights and deviation of rights declined 7 pp each. Nonetheless, the LUS' very high voting power concentration and the dominance of corporate control through the pervasive reliance on pyramids (used also by shareholders' agreements) persisted.

Given the endogeneity challenges to test our hypotheses (e.g. the lack of instruments or exogenous shocks to explore quasi-experimental designs for the multiple ownership variables), we estimate a system-GMM dynamic panel model, as Flannery and Hankins (2013) recommend. After conducting the required diagnostic and post-estimation tests, we find: (1) no evidence that ownership concentration, control-enhancing devices, and owners' specific

types systematically hold sway on companies' accounting performance; (2) a significant relation of LUS voting rights, proportion of non-voting shares, and pyramidal ownership extent to companies' valuation. Carrying out robustness checks with PSM analyses as well as using different specifications with distinct ownership and governance variables, almost all results withstand, except for the relation of Tobin's *q* with LUS voting rights and the proportion of non-voting shares, for which the PSM analyses do no find no statistical significance.

The estimates of the accounting performance (ROA) equation underpin neither the expropriation hypothesis, according to which controlling minority shareholders, by separating control from ownership, engage in value-destroying activities to reap private benefits (Bebchuk et al., 2000; La Porta et al., 1999), nor the financing advantage hypothesis (Almeida & Wolfenzon, 2006), as the performance of family-controlled business groups' affiliates is not different from the other sample companies'. By contrast, the evidence that investors perceive pyramidal ownership as value-enhancing is consistent with Almeida and Wolfenzon (2006).

Furthermore, our overall findings vindicate studies documenting a dynamic and endogenous relation between firms' ownership characteristics and performance, with both possibly reflecting the complex interplay of firms' operating and financial features and needs, the contracting setting, and stakeholders' interests, expectations, incentives, and power (Linck, Netter, & Yang, 2008; Himmelberg, Hubbard, & Palia, 1999; Demsetz, 1983).

Divergences between our findings and those observed for other countries are likely due to idiosyncrasies in the institutional and economic backgrounds, which, notwithstanding the increasing convergence in national corporate governance practices and rules, seem to contribute to shaping ownership characteristics as well as their relationship (or lack thereof) with the distinct measures of performance (Minichilli, Brogi, & Calabrò, 2016).

This study shows that controlling shareholders' potential power and incentives for expropriating minority shareholders resulting from concentrated ownership and control-enhancing devices (the principal-principal conflict of interest) may not translate into lower accounting performance, regardless of the controlling shareholder's identity. Given copious anecdotal evidence of minority shareholders' expropriation in Brazilian publicly listed companies, our results cast doubt on the usual equivalence of expropriation and profit underperformance and, regarding empirical research design, on assessing the expropriation hypothesis by regressing a ROA equation. As Shleifer and Vishny (1997) contend, even competitive product markets do not "prevent the managers from expropriating the competitive return after the capital is sunk."

The evidence of the profitability's insensitiveness to changes in ownership is, in turn, at odds with "one-size-fits-all" policies and regulations that, to face controlling shareholders' moral hazard behavior and to improve corporate governance, restrain companies' organizational choices related to ownership – e.g. banning non-voting shares or pyramidal ownership schemes. In economies where institutional and market failures abound, such type of regulation may be costly, stymieing the constitution of organizational structures that can alleviate inefficiencies these failures occasion. As Franks and Mayer (2017, p. 732) point out, "no single form of ownership and governance arrangement offers a panacea for the issues that confront all companies. Companies have very different ownership and governance requirements depending on the activities in which they are engaged, the markets in which they operate, and the social and political conditions that they confront. (…) Prescriptive regulation is unjustified by both our paucity of knowledge about optimal governance arrangements and the diverse and changing needs of firms."

Overall, B3 and CVM's initiatives seem to be on the right track, prioritizing corporate accountability, transparency, and equal disclosure of material information to all investors as well as furthering and enforcing rules to protect minority shareholders from insiders' wrongdoing and mismanagement (Solarino & Boyd, 2020).

Finally, our attempt to disentangle the complex interplay involving companies' ownership, performance, and operating and financial features has inevitably limitations that future research can cope with. First, although strongly recommended to address endogeneity concerns when the conditions for quasi-natural experimental methods are missing, the system GMM estimator's internal validity is undoubtedly inferior. Second, we have not tackled the implications on the performance of multiple large shareholders' strategic interactions, focusing primarily on the LUS (Laeven & Levine, 2008). Third, our conclusions' external validity to private companies cannot be taken for granted. Fourth, exploring cross-country variations may tease out possible interdependence between ownership and other governance mechanisms as well as its impact on performance (Schiehll, Ahmadjian, & Filatotchev, 2014).

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Table 1: Distribution of the Largest Ultimate Shareholders by Categories (Share in %)

Panel A: Unweighted

LUS category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2003/13
Sh. agreem.	15.8	18.2	18.5	17.1	18.7	18.8	22.2	23.6	23.3	23.3	23.8	20.2
Government	8.3	8.0	7.9	8.4	7.7	7.8	7.8	7.6	7.9	8.4	8.9	8.1
Foreigners	18.1	17.9	15.8	15.4	12.7	11.7	11.5	10.7	10.5	9.9	10.4	13.2
Families	46.8	46.9	48.1	50.1	53.1	52.5	52.4	50.6	50.4	49.3	46.4	49.8
Mutual funds	2.0	2.3	0.6	2.0	1.7	3.1	3.2	3.4	4.1	5.1	6.3	3.0
Pension funds	2.3	1.7	1.8	1.7	1.5	1.6	1.2	1.1	0.9	0.9	0.6	1.4
Others	6.6	5.1	7.3	5.3	4.5	4.4	1.7	3.1	2.9	3.3	3.6	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	348	352	341	357	401	383	347	356	343	335	336	3,899

Panel B: Weighted by assets

LUS category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2003/13
Sh. agreem.	21.1	24.3	23.3	24.1	14.0	27.7	26.3	29.2	26.8	26.5	28.9	25.1
Government	33.5	32.7	32.7	30.9	28.2	27.7	27.7	30.0	31.7	31.6	33.5	30.9
Foreigners	11.5	9.3	8.5	7.0	4.8	4.0	10.4	10.1	10.4	9.6	10.7	8.7
Families	30.8	32.0	33.5	35.2	41.0	28.1	24.0	17.4	16.7	17.7	11.8	26.5
Mutual funds	0.7	0.7	0.0	1.4	0.2	0.3	0.7	1.2	1.1	1.5	2.0	1.1
Pension funds	1.5	0.6	1.3	1.1	0.9	0.8	0.4	0.4	0.8	0.6	0.5	0.9
Others	0.9	0.4	0.6	0.3	10.9	11.4	10.4	11.6	12.5	12.5	12.6	6.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	337	340	329	335	371	376	343	351	338	332	334	3786

Panel C: Weighted by market capitalization

LUS category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2003/13
Sh. agreem.	30,2	38,6	38,0	33,5	30,0	37,5	37,6	37,8	39,5	41,5	40,5	37,1
Government	26,7	23,6	25,0	25,2	28,6	27,8	23,8	22,9	21,7	17,5	17,5	23,7
Foreigners	19,3	15,3	12,4	13,2	8,2	9,9	11,2	10,9	12,4	11,1	12,8	12,7
Families	21,5	20,9	22,1	24,4	25,8	17,4	19,8	20,0	16,4	18,1	17,5	20,3
Mutual funds	0,9	1,0	0,2	2,0	0,5	0,5	2,1	2,7	2,5	4,0	3,7	2,4
Pension funds	0,2	0,2	1,7	1,3	0,8	0,6	0,4	0,4	1,9	1,7	1,9	1,0
Others	1,1	0,3	0,6	0,3	6,0	6,2	5,3	5,3	5,7	6,1	6,0	3,6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	258	276	260	275	337	316	303	306	310	302	299	3242

Source: Own elaboration with data from CVM.

Table 2: Non-Voting Shares

year	*N*	*mean*	*mean/fam*	*p50*	*pn>0*	*pn≥50*	*pn≥50/fam*	*pn≥60*	*pn≥66*
2003	346	42.4	44.7	50.0	85.1	53.2	56.4	35.8	18.2
2004	350	40.8	43.9	50.0	81.8	50.9	53.9	33.7	18.6
2005	338	38.2	42.3	48.0	78.3	47.0	52.8	31.7	18.3
2006	353	33.7	38.3	43.0	69.5	41.9	49.4	27.8	15.3
2007	397	30.4	34.2	35.0	62.8	37.0	41.5	24.4	13.6
2008	380	29.8	33.7	31.0	61.4	38.4	44.5	24.7	13.7
2009	345	28.0	31.4	25.0	58.5	34.5	40.1	21.2	12.5
2010	355	25.9	29.7	11.0	55.1	31.3	37.2	20.6	11.8
2011	342	25.1	30.2	6.5	53.4	29.5	35.8	19.6	11.1
2012	333	24.7	29.8	3.0	51.0	29.1	35.8	19.2	11.1
2013	332	23.4	28.6	0.0	48.5	27.1	34.4	18.4	11.1

Source: Own elaboration with data from CVM.

N is the number of observations; *mean* and *mean/fam* refer to the mean percentage of shares issued as non-voting shares by all companies and by family companies, respectively; *p50*, the median; *pn>0* and *pn≥50*, the percentage of companies that issued non-voting shares and at least 50% of the shares as non-voting shares, respectively; *pn≥50/fam*, the percentage of family-controlled companies that issued at least 50% of the shares as non-voting shares; *pn≥60*, the percentage of companies that issued at least 60% of their shares as non-voting shares; *pn≥66*, the percentage of the companies that issued at least 66% of their shares as non-voting shares.

Table 3: Boards of Directors' Size and Composition and LUS Overrepresentation

year	*b_size*	*ceo_ch*	*ceo_dir*	*ext_dir*	*contr_dir*	*b_over*
2003	6.2	29.0	59.5	82.5	79.0	5.1
2004	6.2	23.6	58.0	82.3	82.6	8.7
2005	6.2	24.0	56.6	83.1	82.2	9.2
2006	6.2	24.1	58.8	82.6	80.6	9.6
2007	6.4	24.4	59.9	82.7	77.6	8.4
2008	6.5	25.8	58.0	84.0	76.7	7.8
2009	6.6	27.7	56.8	82.8	79.0	9.0
2010	6.7	27.0	55.3	84.7	76.7	8.2
2011	6.9	21.9	55.1	85.9	76.3	9.3
2012	6.8	22.1	54.0	85.9	74.6	8.4
2013	6.9	15.5	50.6	82.0	73.9	7.5

Source: Own elaboration with data from CVM.

b_size stands for the average number of members in the board of directors (BDs); *ceo_ch* and *ceo_dir* refer to the percentage of companies whose CEO was the chairman or a director, respectively; *ext_dir* and *contr_dir*, the average percentages of outside directors and directors nominated by the controlling shareholder; and *b_over*, is the LUS overrepresentation on the BD, measured as the difference between *contr_dir* and the LUS voting rights.

Table 4: Regressing Tobin's Q on Ownership Variables

variables	*pooled*	*FE*	*pooled_dyn*	*syst-gmm*	*pooled*	*FE*	*pooled_dyn*	*syst-gmm*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.tobin_q			0.823***	0.567***			0.816***	0.634***
			(0.0277)	(0.0677)			(0.0266)	(0.0628)
ln_asset	0.00821	-0.483***	-0.00590	-0.117	-0.00520	-0.477***	-0.0103	-0.150**
	(0.0297)	(0.0961)	(0.00742)	(0.0722)	(0.0287)	(0.0963)	(0.00793)	(0.0736)
ln_age	-0.106*	-0.189	-0.0107	-0.0642	-0.0677	-0.200	-0.00297	0.00914
	(0.0620)	(0.153)	(0.0178)	(0.0427)	(0.0678)	(0.152)	(0.0187)	(0.0532)
lev	0.785***	-0.0854	0.213***	0.442***	0.795***	-0.156	0.223***	0.374***
	(0.184)	(0.253)	(0.0529)	(0.0917)	(0.182)	(0.262)	(0.0512)	(0.114)
sales_gr	0.0293	0.0539	-0.0311	0.105	0.0172	0.0612	-0.0345	0.106
	(0.0308)	(0.0454)	(0.0358)	(0.0701)	(0.0305)	(0.0484)	(0.0370)	(0.0844)
tang	-0.247	-0.257	-0.0186	-0.392	-0.219	-0.268	-0.0238	-0.139
	(0.206)	(0.172)	(0.0590)	(0.399)	(0.200)	(0.178)	(0.0584)	(0.410)
inv	0.0416	0.0125*	-0.00909	0.247	0.0361	0.0115	-0.00963	0.236*
	(0.0295)	(0.00713)	(0.0149)	(0.213)	(0.0258)	(0.00735)	(0.0150)	(0.128)
vr					-0.481	-0.539	-0.418	-2.352*
					(0.918)	(0.667)	(0.259)	(1.228)
vr_sq					0.478	0.218	0.359*	2.240**
					(0.682)	(0.547)	(0.195)	(1.134)
dev					-0.738***	-0.116	-0.185***	0.386
					(0.281)	(0.205)	(0.0653)	(0.309)
pn					-0.200	-0.299	-0.0182	-1.165***
					(0.193)	(0.212)	(0.0439)	(0.399)
n_int					0.0447*	0.0291*	0.0172***	0.0732***
					(0.0263)	(0.0158)	(0.00628)	(0.0280)
N	1,870	1,870	1,804	1,804	1,855	1,855	1,791	1,791
NoC	344	344	334	334	341	341	331	331
NoI				28				43
R-squared	0.429	0.588	0.808		0.448	0.599	0.811	
AR(1)p				0.000				0
AR(2)p				0.331				0.406
Hansen_p				0.407				0.435
D_Hansen_p				0.451				0.500

We estimate pooled and fixed effects static panel data models and pooled and system-GMM dynamic panel data models. The general baseline model is: $y_{it} = \alpha + \gamma\, y_{i,t\text{-}1} + \mathrm{x'}_{it}\beta + \eta_i + \varepsilon_{it}$, where y_{it} is the Tobin's *q* of the firm *i* in year *t*, $\mathbf{x}_{it}$ is a vector of the explanatory (ownership) and control variables, η_i is the firm-fixed effects, and ε_{it} is the idiosyncratic error. Control variables include the following firm characteristics: *L.tobin_q* is the lagged Tobin's *q*; *ln_asset*, the log of total assets; *ln_age*, the log of the firm age; *lev*, leverage; *sales_gr*, the average percentage change in sales over the former two years; *tang*, the ratio of tangible assets over total assets; *inv*, CAPEX scaled by PPE; and year dummies. The ownership variables comprise *vr*, the stake of the largest ultimate shareholder (LUS) in the voting rights; *vr_sq*, the square of *vr*; dev, the deviation between *vr* and the LUS cash-flow rights; *pn*, the proportion of non-voting shares in the shares outstanding; and *n_int*, the number of intermediate firms between the sample firm and the LUS. *N*, *NoC*, and *NoI* stand for the number of observations, firms, and instruments, respectively; *AR*(1)*p* and *AR*(2)*p*, the p-values of the Arellano-Bond tests for serial correlation in the error term; *Hansen_p* and *D_Hansen_p*, the p-values of the Hansen J and the difference-in-Hansen tests of the instruments' exclusion restrictions (exogeneity). The sample is composed of all the publicly traded firms that filed annual forms with the CVM over the period 2003-2013. Robust, company-clustered standard errors in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

Table 5: Regressing Return on Asset on Ownership Variables

variables	*pooled*	*FE*	*pooled_dyn*	*syst-gmm*	*pooled*	*FE*	*pooled_dyn*	*syst-gmm*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.roa			0.175**	0.0370***			0.173*	0.0393***
			(0.0886)	(0.00462)			(0.0890)	(0.00392)
ln_asset	0.0125***	0.0252***	0.0106***	0.0189**	0.0117***	0.0256**	0.0100***	0.0183*
	(0.00300)	(0.00969)	(0.00266)	(0.00823)	(0.00315)	(0.00995)	(0.00282)	(0.0104)
ln_age	0.0120**	0.00706	0.00970**	0.0152***	0.0124**	0.00587	0.0102**	0.0151**
	(0.00505)	(0.0154)	(0.00452)	(0.00541)	(0.00531)	(0.0155)	(0.00468)	(0.00731)
lev	-0.0557***	-0.123***	-0.0450***	-0.0471***	-0.0549***	-0.125***	-0.0444***	-0.0460***
	(0.00541)	(0.0362)	(0.00705)	(0.00253)	(0.00530)	(0.0374)	(0.00699)	(0.00301)
sales_gr	-0.000949	0.00624	-0.00116	-0.00717	-0.00192	0.00551	-0.00193	-0.00315
	(0.00362)	(0.00485)	(0.00360)	(0.00889)	(0.00340)	(0.00506)	(0.00346)	(0.0112)
tang	-0.0530***	-0.0823**	-0.0470***	-0.107*	-0.0583***	-0.0827**	-0.0519***	-0.104**
	(0.0177)	(0.0318)	(0.0172)	(0.0645)	(0.0184)	(0.0324)	(0.0184)	(0.0466)
inv	0.00182	0.00164	0.000353	-0.0120	0.00168	0.00157	0.000258	-0.00118
	(0.00120)	(0.00114)	(0.00156)	(0.0240)	(0.00122)	(0.00117)	(0.00156)	(0.0143)
vr					-0.0279	-0.0870	-0.0321	0.0776
					(0.0744)	(0.0752)	(0.0642)	(0.157)
vr_sq					0.0480	0.0837	0.0496	-0.0224
					(0.0590)	(0.0677)	(0.0511)	(0.155)
dev					-0.0419*	-0.0286	-0.0392*	0.0335
					(0.0220)	(0.0300)	(0.0205)	(0.0495)
pn					0.000403	-0.00506	0.000594	-0.0767
					(0.0177)	(0.0315)	(0.0160)	(0.0651)
n_int					0.00256	0.00214	0.00228	-0.00279
					(0.00176)	(0.00188)	(0.00149)	(0.00454)
N	1,870	1,870	1,862	1,862	1,855	1,855	1,847	1,847
NoC		344		343		341		340
NoI				28				43
R-squared	0.227	0.115	0.259		0.233	0.119	0.264	
AR(1)p				0.00115				0.000859
AR(2)p				0.268				0.273
Hansen_p				0.549				0.339
D_Hansen_p				0.484				0.227

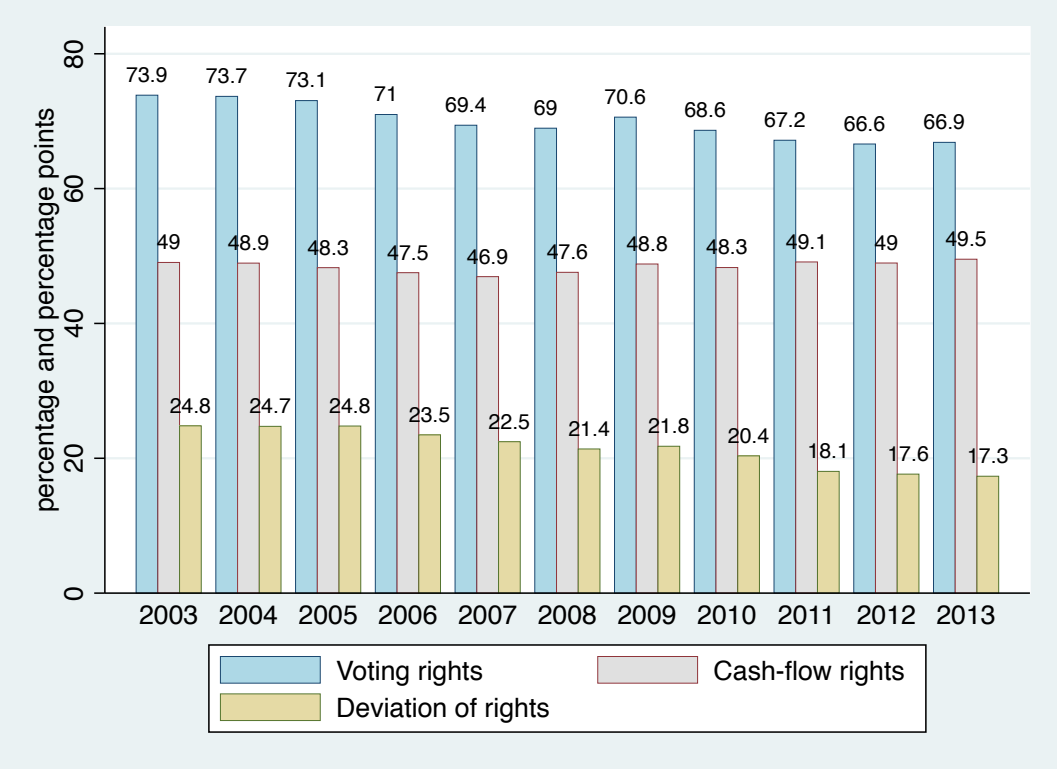
We estimate pooled and fixed effects static panel data models and pooled and system-GMM dynamic panel data models. The general baseline model is: $y_{it} = \alpha + \gamma\, y_{i,t-1} + \mathrm{x'}_{it}\beta + \eta_i + \varepsilon_{it}$, where y_{it} is the return on asset of the firm i in year t, $\mathbf{x}_{it}$ is a vector of the explanatory (ownership) and control variables, η_i is the firm-fixed effects, and ε_{it} is the idiosyncratic error. Control variables include the following firm characteristics: *L.roa* is the lagged ROA; *ln_asset*, the log of total assets; *ln_age*, the log of the firm age; *lev*, leverage; *sales_gr*, the average percentage change in sales over the former two years; *tang*, the ratio of tangible assets over total assets; *inv*, CAPEX scaled by PPE; and year dummies. The ownership variables comprise *vr*, the stake of the largest ultimate shareholder (LUS) in the voting rights; *vr_sq*, the square of *vr*; dev, the deviation between *vr* and the LUS cash-flow rights; *pn*, the proportion of non-voting shares in the shares outstanding; and *n_int*, the number of intermediate firms between the sample firm and the LUS. *N*, *NoC*, and *NoI* stand for the number of observations, firms, and instruments, respectively; *AR*(1)*p* and *AR*(2)*p*, the p-values of the Arellano-Bond tests for serial correlation in the error term; *Hansen_p* and *D_Hansen_p*, the p-values of the Hansen J and the difference-in-Hansen tests of the instruments' exclusion restrictions (exogeneity). The sample is composed of all the publicly traded firms that filed annual forms with the CVM over the period 2003-2013. Robust, company-clustered standard errors in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

Table 6: Estimation of the ATET for Some Ownership Treatments

Treatment	Outcome	# treat.	# control	ATT	S.E.	*t*
vr ≥ 75%	*tobin_q*	1203	590	0,372	0,264	1,409
vr ≥ 75%	*roa*	1669	898	0,011	0,017	0,623
n_vot ≥ 30%	*tobin_q*	1374	556	-0,267	0,302	-0,884
n_vot ≥ 30%	*roa*	1205	580	0,003	0,008	0,429
# *io* ≥ 2	*tobin_q*	1783	749	0,895	0,438	2,042
# *io* ≥ 2	*roa*	1783	832	-0,035	0,066	-0,531
*dev_*10	*tobin_q*	1375	610	0,090	0,123	0,727
*dev_*10	*roa*	1633	705	-0,004	0,007	-0,591
fam	*tobin_q*	1907	738	-0,007	0,122	-0,054
fam	*roa*	1907	846	-0,029	0,077	-0,378
sh. ag.	*tobin_q*	749	488	0,942	0,906	1,039
sh. ag.	*roa*	749	532	0,006	0,015	0,402
gov	*tobin_q*	207	173	0,015	0,099	0,150
gov	*roa*	312	2728	0,037	0,069	0,535

We estimate ATET (Becker & Ichino, 2002) by employing the nearest neighbor matching estimator, with the options logistic regressions, the region of common support, and analytical standard errors. # tret. and # control stand for the number of treated and untreated firms in the (ATET) matched sample; *vr* ≥ 75% is a dummy variable valuing 1 if the LUS voting rights is at least 75%, and 0 otherwise (for this, we consider only firms whose LUS owns at least 52.5% of the voting rights); *n_vot* ≥ 30% is a dummy variable valuing 1 if the firm issued at least 30% of their capital as non-voting shares, and 0 otherwise; # *io* ≥ 2 is a dummy variable valuing 1 if the number of intermediate firms in the indirect ownership chain is at least 2, and 0 otherwise; *dev_*10 is a dummy variable valuing 1 if the wedge between the LUS voting and cash-flow rights is at least 10%, and 0 otherwise; *fam*, *sh. ag.*, and *gov* are dummies valuing 1 if the LUS is, respectively, a family, a shareholders' agreement, and a governmental entity, and 0 otherwise.

Figure 1: Average LUS Voting and Cash-Flow Rights and Deviation of Rights



Source: Own elaboration with data from CVM. Voting rights and cash-flow rights measured in percentage and deviation of rights in percentage points.

Appendices

Table A1: Descriptive statistics for accounting and financial variables (2013)

Variable	*Obs.*	*Mean*	*Median*	*St. Dev.*	*Max*	*Min*
Age	335	40.3	40.0	30.1	205	1
Asset	334	22.10	2.92	117.00	1300.00	0.00
Market value	299	7.92	1.63	26.30	271.00	0.00
ROA	307	0.03	0.06	0.25	0.87	-1.56
Leverage	335	1.62	0.60	11.07	187.93	0.01
CAPEX/Asset	319	0.15	0.12	0.65	5.76	-2.00
Tangibility	311	0.22	0.16	0.23	0.99	0.00

Source: Own elaboration with data from CVM and Economatica. Asset and market value in billions of reais; return on assets, leverage, CAPEX/asset, and tangibility in ratios; age in years.

Table A2: Listing segments and IPOs: 2003-2010 (in %)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
IPO in the *SP* to all firms	0.3	2.3	4.4	11.8	25.2	27.2	29.7	30.3	33.8	34.3	36.9
IPO in the *SP* to *NM* firms	0.0	71.4	64.7	73.3	82.4	80.2	78.9	77.9	78.2	77.0	76.9
Listed on *NM* if IPO in the *SP*	0.0	62.5	73.3	78.6	74.3	74.0	72.8	75.0	80.2	81.7	83.1
IPO in the *SP* and on the *NM*	0.0	1.4	3.2	9.2	18.7	20.1	21.6	22.8	27.1	28.1	30.7
Trad	93.4	90.3	85.6	76.5	62.6	59.3	55.3	53.9	47.8	46.4	43.3
N1	5.2	6.0	7.0	7.0	9.0	9.1	9.8	9.8	10.8	10.5	10.1
N2	0.9	1.7	2.3	3.4	4.5	4.7	5.5	5.6	5.8	5.7	5.7
NM	0.6	2.0	5.0	12.6	22.7	25.1	27.4	29.2	34.7	36.5	40.0
N. of companies	348	352	341	357	401	383	347	356	343	335	336

Source: Own elaboration with data from CVM. Percentages relative to the number of all the companies, the companies listed on the Novo Mercado, or the companies that went public (IPO) over the sample period 2003-2013 (*SP*). *Trad*, *N1*, *N2*, and *NM* stand for the percentage of companies listed on the traditional, Level 1, Level 2, and Novo Mercado segments, respectively.

Table A3: The Largest Ultimate Shareholder's Voting Rights (%)

Year	*mean*	*p25*	*p50*	*p75*	*sd*	*max*	*min*	*N*
2003	73.9	55.6	79.9	95.8	24.7	100.0	10.7	348
2004	73.7	55.7	79.2	96.1	24.5	100.0	5.7	352
2005	73.3	55.7	79.5	95.9	25.0	100.0	5.5	341
2006	71.0	53.1	76.5	95.6	26.4	100.0	5.7	357
2007	69.4	51.9	72.9	94.7	26.9	100.0	6.4	401
2008	69.0	52.1	71.4	94.1	26.7	100.0	8.5	383
2009	70.6	55.0	73.2	96.0	25.8	100.0	5.1	347
2010	68.6	51.8	71.5	94.3	27.0	100.0	5.1	356
2011	67.2	51.4	68.7	91.6	26.1	100.0	5.3	343
2012	66.6	51.0	69.1	92.4	27.0	100.0	5.0	335
2013	66.9	51.9	69.1	92.3	26.7	100.0	5.5	336

Source: Own elaboration with data from CVM. The columns show the LUS voting rights' mean, 25th. percentile, median, 75th. percentile, standard deviation, and maximum and minimum values. N is the number of observations.

Table A4: Mean LUS Voting Rights According to the Listing Segment (%)

year	*Trad*	*N1*	*N2*	*NM*
2003	74.2	69.1	78.0	58.9
2004	74.0	69.9	78.2	65.7
2005	74.0	70.7	85.0	53.8
2006	75.0	70.4	76.7	45.1
2007	75.9	75.5	77.1	46.8
2008	75.7	75.3	80.3	48.5
2009	79.3	76.8	82.8	48.2
2010	78.7	79.3	78.9	45.0
2011	78.4	79.8	79.6	45.7
2012	80.2	81.0	76.1	43.6
2013	81.2	80.1	76.6	46.4

Source: Own elaboration with data from CVM. *NM*, *Trad*, *N1*, and *N2* stand for Novo Mercado, Traditional, Level 1, and Level 2 listing segments, respectively.

Table A5: The Largest Ultimate Shareholder's Cash-Flow Rights (%)

year	*mean*	*p25*	*p50*	*sd*	*max*	*min*	*cfr*≥50%	*NM*	*N*
2003	49.0	25.8	45.5	27.9	100.0	1.2	45.1	55.3	348
2004	48.9	24.8	45.4	28.2	100.0	1.2	45.2	63.3	352
2005	48.3	25.2	43.7	27.4	100.0	0.0	43.4	50.3	341
2006	47.5	24.2	43.8	26.9	100.0	3.9	42.9	41.4	357
2007	46.9	23.9	44.5	26.1	100.0	6.2	45.4	43.0	401
2008	47.6	23.5	46.2	26.9	100.0	3.4	46.2	44.2	383
2009	48.8	24.4	50.1	26.3	100.0	4.5	50.4	43.5	347
2010	48.3	25.3	47.3	26.1	100.0	3.0	46.9	39.2	356
2011	49.1	28.2	50.1	24.9	100.0	4.6	50.4	40.8	343
2012	49.0	27.9	50.8	25.0	100.0	4.6	51.6	39.8	335
2013	49.5	30.3	50.7	24.8	100.0	4.1	52.1	41.9	336

Source: Own elaboration with data from CVM. Columns show the LUS cash-flow rights' mean, 25th. percentile, median, standard deviation, maximum and minimum values, the percentage of the sample companies wherein the LUS cash-flow rights exceed 50%, the mean LUS cash-flow right for NM-listed companies, and the number of observations.

Table A6: Deviation of the LUS' Voting Rights from Cash-Flow Rights

year	*mean*	*p50*	*max*	*min*	≥ 20	*Trad*	*L1*	*L2*	*NM*	*N*
2003	24.8	20.8	91.7	-33.2	51.1	24.3	34.4	35.9	3.6	348
2004	24.7	20.2	94.9	-33.2	50.6	23.9	39.0	45.2	2.4	352
2005	24.8	21.9	92.1	-24.0	50.7	24.1	40.5	47.1	3.5	341
2006	23.5	17.3	93.0	-24.0	47.6	24.5	40.7	34.7	3.7	357
2007	22.5	15.1	93.8	-29.2	46.6	25.9	37.2	30.7	3.7	401
2008	21.4	12.1	93.1	-24.0	44.4	24.6	36.3	35.5	4.3	383
2009	21.8	14.5	93.1	-19.5	43.5	25.4	38.3	34.5	4.7	347
2010	20.4	12.8	93.0	-19.5	41.9	23.4	39.1	32.6	5.8	356
2011	18.1	10.1	85.2	-19.5	38.8	22.2	36.4	26.5	4.8	343
2012	17.6	7.5	89.2	-19.5	37.3	23.0	36.2	23.3	3.8	335
2013	17.3	5.9	89.2	-14.9	37.2	22.8	35.4	28.4	4.6	336

Source: Own elaboration with data from CVM. Deviations are measured in percentage points. Columns show the LUS deviation of rights' mean, median, maximum and minimum values, the percentage of companies wherein the deviation is at least 20 pp, and the mean deviation in the traditional segment, Level 1, Level 2, and Novo Mercado.

Table A7: The Largest Ultimate Shareholders' Average Voting Rights, Cash-Flow Rights, and Deviation of Rights in Pyramidal-Owned Companies

		%	%	*cfr* (%)		*vr* (%)		*dev* (pp)	
year	*N*	*LP*	*P*	*LP*	*P*	*LP*	*P*	*LP*	*P*
2003	349	20.6	73.1	39.1	51.7	74.0	73.9	34.8	22.3
2004	353	21.0	74.2	41.3	51.0	75.1	73.4	33.8	22.4
2005	342	21.9	75.1	43.6	50.0	76.2	72.6	32.6	22.7
2006	359	20.6	76.0	42.3	49.1	76.0	69.9	33.7	20.8
2007	402	19.7	74.9	37.6	49.4	73.9	68.4	36.3	19.0
2008	383	19.8	75.5	37.6	50.0	72.4	68.1	34.8	18.1
2009	347	20.5	78.1	38.5	51.5	76.7	69.0	38.1	17.6
2010	356	20.5	75.0	41.8	50.0	75.7	66.8	33.9	16.9
2011	343	18.4	76.1	43.2	50.5	75.7	65.3	32.5	14.8
2012	335	18.5	74.3	44.2	50.0	77.5	64.1	33.3	14.1
2013	336	18.2	72.9	46.0	50.3	78.1	64.4	32.1	14.1

Source: Own elaboration with data from CVM. *N*: total number of companies; *LP*: pyramidal-owned companies with at least one listed intermediate company; *P*: pyramidal-owned companies. *cfr*: average LUS cash-flow rights; *vr*: average LUS voting rights; *dev*: average LUS deviation of rights.

Table A8: Explanatory and Control Variables

Variables	Description
vr	The share of the voting rights the largest ultimate shareholder (LUS) owns
cfr	The share of the cash-flow rights the LUS owns
dev	The difference between *vr* and *cfr*
control	A dummy variable that takes on the value 1 if the LUS controls the company, and 0 otherwise
pn	The proportion of preferred shares in the company's shares outstanding
d_l_pyr	A dummy variable that takes on the value 1 if the LUS owns the company through a pyramid scheme with at least one intermediate listed company, and 0 otherwise
n_list	The number of intermediate listed companies separating the LUS and the sample company along the pyramidal chain
d_pyr	A dummy variable that takes on the value 1 if the LUS owns the company through a pyramid scheme of at least one intermediate company, and 0 otherwise
n_int	The number of intermediate companies separating the LUS and the sample company along the pyramidal chain
fam, gov, fgn, ShA ...	Dummies for the LUS identity's types: family, government, foreigner, shareholders' agreement …
bndes	A dummy variable that takes on the value 1 if BNDES is the LUS or a member of the shareholder agreement that is the LUS, and 0 otherwise
ceo_ch	A binary variable indicating whether the CEO of the company is also its board chair (CEO duality)
ceo_dir	A binary variable indicating whether the CEO of the company is also a director
b_size	The number of the company's directors
ext_dir	The proportion of outside directors in the board (those who are neither executive nor the controlling shareholder)
contr_dir	The proportion of directors nominated by the controlling shareholder
b_over	The difference between *contr_dir* and *vr*
trad, *N1, N2*, *NM*	Dummies for the companies' listing segments: traditional, Level 1, Level 2, and Novo Mercado
*d_pn**	A dummy variable that takes on the value 1 if the company issued at least *% (33%, 50%, or 60%) of the shares outstanding as preferred shares, and 0 otherwise
ipo	A dummy variable that takes on the value 1 if the company went public over the period 2003-2013, and 0 otherwise
*d_lus**	A dummy variable that takes on the value 1 if the LUS has at least *% (40% or 66%) of the company's voting rights, and 0 otherwise
ln_age	The log of the company's age (years since its foundation)
ln_asset	The company size, proxied by the natural log of total assets at 2013 price
lev	The leverage ratio, a proxy for the financial structure measured as the book value of total debt scaled by the book value of total assets
tang	Tangibility ratio, measured as tangible assets (the net value of property, plant, and equipment, PPE) scaled by total assets
inv	The ratio of capital expenditures (CAPEX) to PPE
sales_gr	The annual geometric growth rate in net revenue at 2013 prices over the previous 2 years

Table A9: Descriptive Statistics (2013)

variable	N	mean	p50	sd	min	max
vr	246	0.621	0.629	0.262	0.055	1
cfr	246	0.458	0.462	0.225	0.046	1
dev	246	16.3	3.1	21.4	-14.9	85.2
control	245	0,727	1	0,447	0	1
pn	243	0.212	0	0.278	0	0.670
d_l_pyr	246	0.134	0	0.342	0	1
n_list	246	0.175	0	0.484	0	3
d_pyr	246	0.748	1	0.435	0	1
n_int	244	2.012	1.5	2.130	0	12
ShA	246	0.232	0	0.423	0.0	1
gov	246	0.065	0	0.247	0.0	1
fgn	246	0.114	0	0.318	0.0	1
fam	246	0.480	0	0.501	0.0	1
bndes	246	0.073	0	0.261	0.0	1
ceo_ch	246	0.142	0	0.350	0.0	1
ceo_dir	246	0.488	0	0.501	0.0	1
b_size	241	7.257	7	2.431	3	15
ext_dir	241	0.823	0.830	0.124	0.330	1
contr_dir	239	0.714	0.800	0.334	0	1
b_over	239	0.097	0.073	0.309	-0.956	0.898
trad	246	0.358	0	0.480	0	1
N1	246	0.089	0	0.286	0	1
N2	246	0.053	0	0.224	0	1
NM	246	0.488	0	0.501	0	1
d_pn50	243	0.259	0	0.439	0	1
d_pn33	243	0.342	0	0.475	0	1
ipo	246	0.415	0	0.494	0	1
age	245	38.9	34	28.8	1	123
roa	246	0.050	0.060	0.157	-1.399	0.355
ln_asset	246	14.76	14.92	1.69	9.67	20.44
lev	246	0.659	0.571	0.486	0.070	4.027
tobin_q	246	1.075	0.803	0.967	0.003	7.747
tang	246	0.250	0.217	0.221	0.000	0.897
inv	244	0.208	0.139	0.636	-1.999	5.760

Source: Own elaboration with data from CVM. Data excludes financial companies. Table A8 describes the variables. Columns show the number of observations and companies' mean, median, standard deviation, and maximum and minimum values. Deviation of rights are measured in percentage points; assets, in log of thousand reais; age in years; ROA, leverage, Tobin's *q*, tangibility, and investment are expressed as ratios.

Table A10: Correlation Matrix for Financial and Accounting Variables

	roa	*tobin_q*	*ln_asset*	*ln_age*	*lev*	*inv*	*tang*
tobin_q	-0.0200						
ln_asset	**0.1939**	**-0.1168**					
ln_age	**0.0584**	**-0.1146**	**-0.1687**				
lev	**-0.4285**	**0.3861**	**-0.1218**	**0.0668**			
inv	0.0041	**0.0804**	-0.0080	**-0.0916**	-0.0202		
tang	**-0.0820**	-0.0046	**0.0995**	**0.0987**	**0.1132**	**-0.1137**	
sales_gr	0,0053	0,0251	0,0426	**-0,1589**	-0,0204	**0,0534**	-0,0413

Data refer to non-financial companies. Table A8 describes the variables. Figures in bold indicate that correlation is statistically significant at the 95% confidence level.

Table A11: Correlation Matrix for ROA, Age, and Ownership and Governance Variables

	tobin_q	*roa*	*cfr*	*vr*	*dev*	*n_int*	*n_list*	*pn*	*b_size*	*ceo_ch*	*ceo_dir*	*contr_dir*	*fam*	*gov*	*ShA*	*bndes*	*N1*	*NM*	*ipo*
roa	-0,0200																		
cfr	**0,0553**	**0,0516**																	
vr	-0,0248	0,0191	**0,5678**																
dev	**-0,0843**	-0,0313	**-0,3860**	**0,5402**															
n_int	0,0248	**0,0641**	-0,0349	**0,2355**	**0,2999**														
n_list	0,0236	**0,0807**	**-0,1205**	**0,0779**	**0,2105**	**0,5428**													
pn	**-0,0701**	-0,0165	**-0,1217**	**0,4044**	**0,5844**	**0,0538**	**0,0441**												
b_size	-0,0269	**0,1187**	**-0,0883**	-0,0381	**0,0475**	**0,1446**	**0,0603**	**-0,0474**											
ceo_ch	-0,0203	**-0,0531**	0,0103	**0,0720**	**0,0702**	**-0,0551**	**-0,0428**	**0,1272**	**-0,2553**										
ceo_dir	**-0,0471**	0,0313	**0,0471**	**0,0485**	0,0063	**-0,0948**	**-0,1112**	**0,0472**	**-0,1117**	**0,5037**									
contr_dir	-0,0206	0,0065	**0,2649**	**0,3384**	**0,1092**	**0,2066**	**0,0924**	**0,1740**	0,0081	-0,0029	0,0099								
fam	**-0,0838**	**-0,0697**	**-0,1047**	0,0193	**0,1287**	**-0,0484**	**-0,1522**	**0,1246**	**-0,2873**	**0,2981**	**0,1601**	0,0015							
gov	-0,0279	-0,0258	**0,0860**	**0,1194**	**0,0459**	**-0,1538**	-0,0206	0,0051	**0,2603**	**-0,0766**	**0,1153**	0,0046	**-0,2649**						
ShA	**0,0747**	0,0324	**0,0614**	-0,013	**-0,0774**	**0,2674**	**0,3097**	**-0,1374**	**0,1767**	**-0,1540**	**-0,2010**	**0,1254**	**-0,5255**	**-0,1403**					
bndes	0,0058	-0,0137	**-0,0470**	**0,0488**	**0,1027**	**0,2712**	**0,2708**	0,0234	**0,1340**	**-0,0516**	-0,0127	**0,0548**	**-0,2447**	**0,1638**	**0,3529**				
N1	**-0,0533**	0,0352	**-0,1258**	**0,1083**	**0,2500**	**0,0619**	-0,0298	**0,2401**	**0,2690**	**-0,0802**	**-0,0660**	**0,0431**	0,012	**0,1285**	-0,036	0,0336			
NM	**0,0544**	0,0373	**-0,0592**	**-0,4766**	**-0,4735**	**-0,1009**	**-0,1039**	**-0,6727**	**0,0953**	**-0,1180**	**-0,0959**	**-0,2390**	**-0,0838**	**-0,0957**	**0,1408**	**-0,0814**	**-0,1932**		
ipo	**0,0647**	0,0078	-0,0041	**-0,3019**	**-0,3341**	**-0,1021**	**-0,0983**	**-0,5323**	**0,0486**	**-0,0638**	**-0,0683**	**-0,1636**	-0,0331	**-0,1168**	**0,1437**	**-0,0782**	**-0,1800**	**0,7482**	
ln_age	**-0,1146**	**0,0584**	**-0,0597**	**0,0891**	**0,1612**	**-0,0769**	-0,028	**0,2566**	**-0,1419**	**0,1060**	**0,0914**	0,0263	**0,1602**	0,0362	**-0,1025**	-0,0218	**0,0985**	**-0,3657**	**-0,4481**

Data refer to non-financial companies. Table A8 describes the variables. Figures in bold indicate that correlation is statistically significant at the 95% confidence level.

Table A12: Companies' Changes in Governance and Ownership Variables (%)

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2004/13
cfr ± 5 pps.	26.2	29.7	25.9	27.3	30.6	25.3	26.2	27.2	21.1	19.9	25.9
vr ± 5 pps.	22.7	23.1	25.5	29.2	29.1	18.9	23.8	21.7	21.1	20.7	23.6
control	7.6	13.2	13.6	20.2	10.5	8.8	11.7	8.7	5.7	7.3	10.8
d_pyr	11.1	8.0	14.1	16.1	7.4	8.4	10.5	11.8	2.8	8.5	9.9
n_int ± 2	12.0	12.3	17.3	20.2	11.6	7.6	10.5	10.3	3.7	7.8	11.3
d_l_pyr	6.7	7.5	10.9	16.5	5.4	2.8	6.9	6.7	2.4	6.1	7.2
n_list ± 2	4.4	4.2	9.1	15.7	3.1	2.4	6.9	5.9	1.6	5.3	5.9
pn ± 5 pps.	8.9	8.0	14.7	16.6	5.9	3.6	10.5	8.3	2.9	7.0	8.6
ceo_ch	12.9	10.4	15.5	19.9	10.9	8.0	14.1	10.6	6.1	16.3	12.5
ceo_dir	14.7	18.4	18.6	25.1	10.1	12.4	14.5	14.6	8.5	15.9	15.3
ext_dir ± 5 pps.	24.4	25.2	29.2	38.5	20.0	20.9	34.7	25.0	21.3	58.9	30.0
contr_dir ± 5 pps.	22.6	31.1	31.0	33.6	21.6	41.9	36.4	31.8	26.0	24.3	30.0
fam	5.3	8.0	12.7	16.1	8.5	4.8	8.9	9.4	5.3	7.7	8.7
fgn	8.0	7.5	12.3	15.7	4.3	2.8	8.1	7.5	2.4	6.5	7.5
gov	3.1	4.7	9.1	14.2	3.9	2.4	6.9	5.5	2.0	4.9	5.7
Sh_A	8.4	9.4	11.4	18.4	10.1	5.6	6.9	7.5	4.5	8.1	9.1
NM	0.0	1.5	2.5	1.3	1.6	0.0	0.0	3.3	0.4	0.9	1.1
N	225	212	220	267	258	249	248	254	247	246	2426

This table indicates the percentage of non-financial companies whose value changed by a given magnitude in a determined year or over the whole period 2003-2013. For example, *cfr ± 5 pp* means that the LUS cash flow rights changed at least 5 percentage points upward or downward relative to the percentage in the previous year; *n_int ± 2*, the number of intermediate companies increased or decreased by at least 2 intermediate companies. *control*: a dummy for the existence of a controlling shareholder; *d_pyr*: a dummy for pyramidal ownership; *d_l_pyr*: a dummy for pyramidal ownership with at least one listed intermediate company; *n_list*: the number of listed intermediate companies along the pyramidal ownership; *pn*: the fraction of non-voting shares issued by the company; *ceo_ch*: a dummy for whether the CEO and the chairman are the same; *ceo_dir*: a dummy for whether the CEO is also a director; *ext_dir*: the fraction of external directors; *contr_dir*: the fraction of directors nominated by the controlling shareholder; *fam*, *fgn*, *gov*, and *Sh_A*: dummies for whether the LUS is a family, a foreigner, the government, or a shareholders' agreement; *NM*: a dummy for being listed on the Novo Mercado; *N*: the number of observations.

Table A13: Test of Strict Exogeneity (Wooldridge, 2010)

Variables	*Tobin's q*	*Tobin's q*	*ROA*	*ROA*
ln_asset	-0.659***	-0.661***	0.0143	0.0142
	(0.140)	(0.141)	(0.0162)	(0.0162)
ln_age	-0.249	-0.243	0.0304**	0.0305**
	(0.190)	(0.187)	(0.0128)	(0.0127)
lev	-0.662***	-0.662***	-0.0642	-0.0642
	(0.173)	(0.173)	(0.0442)	(0.0442)
sales_gr	0.0435	0.0440		
	(0.0463)	(0.0464)		
tang	-0.367**	-0.371**	-0.0370	-0.0366
	(0.151)	(0.145)	(0.0235)	(0.0235)
inv	0.0111	0.0109	-0.00240	-0.00237
	(0.00770)	(0.00688)	(0.00375)	(0.00373)
vr	-0.421*	-0.421*	-0.00871	-0.00726
	(0.215)	(0.217)	(0.0203)	(0.0200)
dev	0.162	0.156	-0.00928	-0.0120
	(0.219)	(0.215)	(0.0210)	(0.0214)
pn	-0.372*	-0.372*	0.0430	0.0527*
	(0.211)	(0.210)	(0.0269)	(0.0304)
n_int	0.0179	0.0203	0.00177	0.00189
	(0.0186)	(0.0168)	(0.00160)	(0.00164)
fam	-0.00888	-0.0109	0.0101	0.0102
	(0.122)	(0.124)	(0.00918)	(0.00913)
F.ln_asset	0.286**	0.284**	0.00536	0.00505
	(0.114)	(0.114)	(0.0129)	(0.0129)
F.lev	0.281	0.283	-0.0829**	-0.0825**
	(0.233)	(0.231)	(0.0396)	(0.0394)
F.inv	0.00142		0.00240	0.00240
	(0.00823)		(0.00273)	(0.00271)
F.vr	0.205	0.212	-0.0394**	-0.0389**
	(0.235)	(0.230)	(0.0194)	(0.0189)
F.dev	-0.470**	-0.454**	0.00603	0.00948
	(0.235)	(0.229)	(0.0255)	(0.0244)
F.pn	0.256	0.247	0.0173	
	(0.233)	(0.224)	(0.0285)	
F.n_int	0.00705		0.000246	
	(0.0207)		(0.00150)	
F.fam	0.0939	0.101	-0.0169*	-0.0163*
	(0.137)	(0.146)	(0.00985)	(0.00959)
Observations	1,557	1,560	2,223	2,226
R-squared	0.595	0.595	0.117	0.116
N. of companies	309	309	372	372

We carry out a fixed effects estimation of the equation $y_{it} = \mathbf{x}'_{it}\boldsymbol{\beta} + \mathbf{w}'_{i,t+1}\boldsymbol{\delta} + \eta_i + \varepsilon_{it}$, t = 2003, … 2013, where $\mathbf{w}_{i,t+1}$ is a subset of future values of the ownership and control variables, y_{it} is the proxy for Tobin's q or the return on asset of the company i in year t, $\mathbf{x}_{it}$ is a vector of the ownership and control variables, and ε_{it} is the idiosyncratic error (Wooldridge, 2010). *F.* stands for the one-year lead value of the variable. Robust, company-clustered standard errors in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

Table A14: Regressing Tobin's *q* on Company Performance on Ownership and Governance Variables

variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
L.tobin_q	0.588***	0.607***	0.622***	0.586***	0.634***	0.615***	0.633***	0.641***	0.634***	0.634***	0.632***	0.628***	0.633***	0.613***
	(0.0613)	(0.0623)	(0.0671)	(0.0639)	(0.0657)	(0.0655)	(0.0669)	(0.0613)	(0.0622)	(0.0637)	(0.0635)	(0.0645)	(0.0644)	(0.0632)
ln_asset	-0.111	-0.126*	-0.139*	-0.123*	-0.182**	-0.116	-0.132*	-0.151**	-0.162**	-0.144*	-0.154**	-0.126	-0.138*	-0.120*
	(0.0683)	(0.0691)	(0.0733)	(0.0703)	(0.0732)	(0.0851)	(0.0705)	(0.0709)	(0.0779)	(0.0752)	(0.0728)	(0.0770)	(0.0732)	(0.0719)
ln_age	-0.00585	-0.00371	0.00313	-0.00692	-0.0285	0.0189	0.00962	0.0116	0.00703	0.0320	-0.00147	0.00352	0.0361	0.00839
	(0.0464)	(0.0481)	(0.0522)	(0.0439)	(0.0504)	(0.0507)	(0.0532)	(0.0511)	(0.0523)	(0.0512)	(0.0539)	(0.0528)	(0.0527)	(0.0526)
lev	0.400***	0.375***	0.420***	0.395***	0.362***	0.398***	0.367***	0.376***	0.379***	0.356***	0.376***	0.415***	0.358***	0.400***
	(0.102)	(0.115)	(0.100)	(0.0944)	(0.132)	(0.110)	(0.116)	(0.111)	(0.113)	(0.132)	(0.111)	(0.0919)	(0.132)	(0.112)
tang	-0.153	-0.252	-0.264	-0.230	-0.443	0.0617	-0.0563	-0.172	-0.217	-0.157	-0.244	-0.0901	-0.156	-0.150
	(0.347)	(0.330)	(0.437)	(0.321)	(0.453)	(0.362)	(0.286)	(0.391)	(0.445)	(0.403)	(0.365)	(0.450)	(0.379)	(0.395)
sales_gr	0.0829	0.0641	0.0756	0.0688	0.0807	0.102	0.0965	0.109	0.102	0.0715	0.104	0.0767	0.0711	0.104
	(0.0754)	(0.0788)	(0.0846)	(0.0749)	(0.0841)	(0.0838)	(0.0852)	(0.0878)	(0.0856)	(0.0834)	(0.0849)	(0.0836)	(0.0836)	(0.0826)
inv	0.214	0.173	0.229	0.127	0.231	0.269*	0.222**	0.220*	0.229*	0.227*	0.186*	0.257*	0.218**	0.213*
	(0.194)	(0.186)	(0.147)	(0.198)	(0.140)	(0.137)	(0.0985)	(0.133)	(0.126)	(0.126)	(0.101)	(0.134)	(0.103)	(0.121)
vr	0.504		-2.145*		-1.765	-2.538**	-2.299*	-2.412*	-2.395*	-2.174*	-2.156*	-2.196*	-2.239*	-2.328**
	(0.437)		(1.206)		(1.232)	(1.223)	(1.193)	(1.235)	(1.241)	(1.225)	(1.172)	(1.204)	(1.223)	(1.178)
vr_sq			2.241*		1.316	2.391**	2.205**	2.331**	2.223**	2.082*	1.996*	2.241**	2.157**	2.191**
			(1.146)		(1.075)	(1.073)	(1.087)	(1.123)	(1.130)	(1.078)	(1.088)	(1.102)	(1.072)	(1.073)
cfr		0.518												
		(1.268)												
cfr_sq		-0.100												
		(1.265)												
control				0.206										
				(0.146)										
dev	0.499*	0.907**		0.664**	0.545	0.300	0.395	0.273	0.470	0.330	0.394	0.418	0.293	0.347
	(0.289)	(0.427)		(0.302)	(0.351)	(0.317)	(0.305)	(0.352)	(0.314)	(0.305)	(0.315)	(0.316)	(0.324)	(0.307)
b_over			-0.0229											
			(0.196)											
pn	-1.335***	-1.316***	-0.974**	-1.356***		-1.159***	-1.226***	-1.161***	-1.172***	-0.959*	-1.062***	-1.223***	-0.953*	-0.986**
	(0.398)	(0.396)	(0.469)	(0.369)		(0.396)	(0.404)	(0.369)	(0.382)	(0.519)	(0.380)	(0.441)	(0.525)	(0.397)
n_int	0.0474*	0.0573**	0.0787***	0.0454	0.0854***	0.0627*	0.0688**	0.0795***	0.0649**	0.0738**	0.0755***	0.0655**	0.0746**	0.0760***
	(0.0284)	(0.0277)	(0.0269)	(0.0309)	(0.0299)	(0.0374)	(0.0284)	(0.0284)	(0.0261)	(0.0291)	(0.0280)	(0.0293)	(0.0292)	(0.0278)
d_pn_50					-0.565**									
					(0.281)									
fam						-0.0508								
						(0.231)								
n_int × fam						0.0484								
						(0.0865)								
gov							0.0171							
							(0.426)							
Sh_A								-0.125						
								(0.192)						
bndes									0.248					
									(0.196)					
NM										0.174			0.172	
										(0.275)			(0.278)	
ceo_ch											0.0778			
											(0.156)			
b_cs_n												0.0358		

												(0.197)		
n_int × NM													0.0178	
													(0.365)	
n_int × lev														-0.299
														(0.289)
N	1,791	1,791	1,754	1,791	1,791	1,791	1,791	1,791	1,791	1,791	1,791	1,754	1,791	1,791
NoC	331	331	331	331	331	331	331	331	331	331	331	331	331	331
NoI	40	43	43	40	43	49	46	46	46	46	46	46	49	46
AR(1)p	0	0	0	0	0	.	0	0	0	0	0	0	0	0
AR(2)p	0.393	0.350	0.527	0.326	0.333	0.441	0.386	0.396	0.393	0.383	0.348	0.574	0.370	0.375
Hansen_p	0.868	0.826	0.497	0.687	0.267	0.279	0.384	0.539	0.520	0.464	0.493	0.601	0.555	0.433
D_Hansen_p	0.984	0.928	0.419	0.950	0.425	0.459	0.439	0.716	0.615	0.473	0.567	0.555	0.555	0.530

We estimate the model $y_{it} = \alpha + \gamma\, y_{i,t-1} + x'_{it}\beta + \eta i + \varepsilon it$, where y_{it} is the Tobin's *q* of the company *i* in year *t*, $\mathbf{x}_{it}$ is a vector of the explanatory (ownership) and control variables, ηi refers to the company-fixed effects, and εit is the idiosyncratic error. Control variables include the following company characteristics: *L.tobin_q* is the lagged Tobin' *q*; *ln_asset*, the log of total assets; *ln_age*, the log of the company's age; *lev*, leverage; *tang*, the ratio of tangible assets over total assets; *sales_gr*, the average percentage change in sales over the former two years; *inv*, CAPEX scaled by PPE, and year dummies. The ownership and governance variables comprise *vr*, the stake of the largest ultimate shareholders (LUS) in the company's voting rights; *cfr*, the stake of the LUS in the company's cash-flow rights; *control*, a dummy for the existence of a controlling shareholder; *dev*, the deviation between *vr* and *cfr*; *pn*, the fraction of non-voting shares in the outstanding shares; *d_pn_50*, a dummy for companies wherein non-voting shares account for at least 50% of the outstanding shares; *n_int* (*n_list*), the number of (listed) intermediate companies between the sample company and its LUS; *ceo_ch*, a dummy for CEO-chairman duality; *fam*, *gov*, and *ShA* are dummy variables for whether the LUS is a family, a governmental entity, or a shareholders' agreement; *bndes* is a dummy variable for whether the BNDES is the LUS or a member of a shareholders' agreement that is the LUS; *NM*, a dummy for Novo Mercado-listed companies; *b_cs_n* is the fraction of the company's directors nominated by the controlling shareholder; *b_over* is the difference between *b_cs_n* and *vr*; *ceo_ch* is a dummy for whether the CEO is also the board's chairman; *n_int* × *fam*, *n_int* × *inv*, *n_int* × *lev*, and *n_int* × *NM* are interaction variables of the pyramid extent with family control, investment ratio, leverage, and listing on the Novo Mercado; *n_list* × *fam*, *n_list* × *inv*, *n_list* × *lev*, and *n_list* × *NM* are interaction variables of the extent o pyramids with atleast one listed intermediate company with family control, investment ratio, leverage, and listing on the Novo Mercado. *N*, *NoC*, and *NoI* stand for the number of observations, firms, and instruments, respectively; *AR*(1)*p* and *AR*(2)*p*, the p-values of the Arellano-Bond tests for serial correlation in the error term; *Hansen_p* and *D_Hansen_p*, the p-values of the Hansen J and the difference-in-Hansen tests of the instruments' exclusion restrictions (exogeneity). The sample is composed of all the publicly traded firms that filed annual forms with the CVM over the period 2003-2013. Robust, company-clustered standard errors in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

Table A15: Regressing ROA on Company Performance on Ownership and Governance Variables

variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
L.roa	0.0390***	0.0395***	0.0384***	0.0395***	0.0397***	0.0390***	0.0396***	0.0392***	0.0392***	0.0390***	0.0389***	0.0383***	0.0388***	0.0383***	0.0389***
	(0.00423)	(0.00407)	(0.00453)	(0.00420)	(0.00462)	(0.00422)	(0.00393)	(0.00419)	(0.00382)	(0.00371)	(0.00297)	(0.00472)	(0.00370)	(0.00423)	(0.00426)
ln_asset	0.0181*	0.0168	0.00648	0.0178*	0.0189*	0.0176*	0.0190*	0.0183*	0.0155	0.0175	0.0167	0.0120	0.0169	0.0215**	0.0200*
	(0.0106)	(0.0123)	(0.0108)	(0.0103)	(0.00984)	(0.0105)	(0.0104)	(0.0101)	(0.0112)	(0.0107)	(0.0104)	(0.0114)	(0.0109)	(0.00933)	(0.0109)
ln_age	0.0149**	0.0144*	0.0136*	0.0145**	0.0127**	0.0165**	0.0138*	0.0149**	0.0126	0.0189**	0.0149*	0.0162**	0.0183**	0.0165**	0.0145*
	(0.00705)	(0.00777)	(0.00756)	(0.00646)	(0.00624)	(0.00722)	(0.00736)	(0.00672)	(0.00788)	(0.00777)	(0.00798)	(0.00748)	(0.00803)	(0.00680)	(0.00781)
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
lev	-0.0461***	0.0459***	0.0482***	0.0473***	0.0469***	0.0455***	0.0465***	0.0462***	0.0460***	0.0455***	0.0451***	0.0473***	0.0455***	0.0457***	0.0460***
	(0.00319)	(0.00285)	(0.00340)	(0.00279)	(0.00349)	(0.00332)	(0.00336)	(0.00302)	(0.00299)	(0.00293)	(0.00345)	(0.00323)	(0.00304)	(0.00307)	(0.00329)
tang	-0.104*	-0.110**	-0.127**	-0.0839	-0.0891*	-0.115**	-0.0833*	-0.0992**	-0.102**	-0.110**	-0.106**	-0.119**	-0.118**	-0.115**	-0.109**
	(0.0560)	(0.0448)	(0.0582)	(0.0530)	(0.0476)	(0.0497)	(0.0491)	(0.0444)	(0.0459)	(0.0485)	(0.0453)	(0.0552)	(0.0485)	(0.0478)	(0.0482)
sales_gr	-0.00395	-0.00388	-0.00337	-0.00863	-0.00399	-0.00371	-0.00307	-0.00376	-0.00592	-0.00337	-0.00102	-0.00168	-0.00368	0.000293	-0.00434
	(0.0115)	(0.0119)	(0.00922)	(0.0107)	(0.0109)	(0.0107)	(0.0112)	(0.0111)	(0.0106)	(0.00990)	(0.0121)	(0.00938)	(0.0102)	(0.0121)	(0.0111)
inv	-0.00155	-0.000296	0.000373	0.00227	-0.000839	-0.00114	0.00208	0.000206	0.000179	-0.000308	-4.30e-05	-0.000978	-0.00229	-0.0119	-0.00397
	(0.0156)	(0.0166)	(0.0254)	(0.0142)	(0.0150)	(0.0160)	(0.0151)	(0.0141)	(0.0151)	(0.0139)	(0.0121)	(0.0288)	(0.0137)	(0.0220)	(0.0154)
vr	0.0468		0.00800		0.0655	0.118	0.0648	0.0746	0.104	0.0712	0.0447	0.0338	0.0845	0.0924	0.105
	(0.0724)		(0.159)		(0.157)	(0.155)	(0.155)	(0.165)	(0.155)	(0.158)	(0.155)	(0.162)	(0.159)	(0.165)	(0.155)
vr_sq			-0.0236		-0.0260	-0.0384	-0.0167	-0.0260	-0.0343	0.00520	-0.00407	-0.0131	-0.00972	-0.0514	-0.0379
			(0.156)		(0.151)	(0.151)	(0.154)	(0.156)	(0.156)	(0.154)	(0.161)	(0.161)	(0.158)	(0.159)	(0.153)
cfr		0.131													
		(0.168)													
cfr_sq		-0.0820													
		(0.188)													
control				0.0205											
				(0.0223)											
dev	0.0360	0.0797		0.0615	0.0236	0.0349	0.0320	0.0303	0.0600	0.0156	0.0248	0.0485	0.0211	0.0475	0.0311
	(0.0454)	(0.0688)		(0.0482)	(0.0510)	(0.0517)	(0.0490)	(0.0526)	(0.0567)	(0.0497)	(0.0555)	(0.0541)	(0.0509)	(0.0463)	(0.0501)
b_over			-0.0346												
			(0.0339)												
pn	-0.0779	-0.0751	-0.0305	-0.0780		-0.102	-0.0723	-0.0759	-0.0965	-0.0609	-0.0598	-0.0676	-0.0552	-0.0680	-0.0787
	(0.0689)	(0.0718)	(0.0664)	(0.0605)		(0.0643)	(0.0668)	(0.0643)	(0.0612)	(0.0760)	(0.0658)	(0.0613)	(0.0761)	(0.0657)	(0.0664)
n_int	-0.00274	-0.00197	0.00439	-0.00277	-0.00225	-0.00260	-0.00182	-0.00244	-0.00271	-0.00123	-0.00297	0.00122	-0.00124	-0.00418	-0.00337
	(0.00470)	(0.00481)	(0.00520)	(0.00415)	(0.00443)	(0.00580)	(0.00448)	(0.00448)	(0.00469)	(0.00495)	(0.00488)	(0.00529)	(0.00502)	(0.00422)	(0.00449)
d_pn_50					-0.0262										
					(0.0329)										
fam						-0.000381									
						(0.0287)									
n_int × fam						-0.00228									
						(0.00848)									
gov							0.0436								
							(0.0661)								
Sh_A								0.000306							
								(0.0259)							
bndes									0.0415						
									(0.0372)						
NM										0.0279			0.0323		
										(0.0343)			(0.0343)		
ceo_ch											-0.0298				
											(0.0342)				

b_cs_n												-0.0264			
												(0.0351)			
n_list × NM													-0.0170		
													(0.0251)		
n_int × inv														0.0110	
														(0.0338)	
n_list × lev															-0.0127
															(0.0302)
N	1,847	1,847	1,808	1,847	1,847	1,847	1,847	1,847	1,847	1,847	1,847	1,808	1,847	1,847	1,847
NoC	340	340	340	340	340	340	340	340	340	340	340	340	340	340	340
NoI	40	43	43	40	43	49	46	46	46	46	46	46	49	46	46
AR(1)p	0.00088	0.00083	0.00129	0.00079	0.00089	0.00080	0.00085	0.00084	0.00073	0.00082	0.00091	0.00119	0.00081	0.00093	0.00086
AR(2)p	0.276	0.260	0.151	0.294	0.279	0.267	0.276	0.278	0.238	0.263	0.218	0.150	0.256	0.271	0.263
Hansen_p	0.259	0.335	0.488	0.310	0.221	0.378	0.390	0.452	0.311	0.432	0.390	0.474	0.488	0.454	0.362
D_Hansen_p	0.145	0.234	0.479	0.421	0.516	0.215	0.482	0.394	0.168	0.289	0.241	0.377	0.314	0.256	0.327

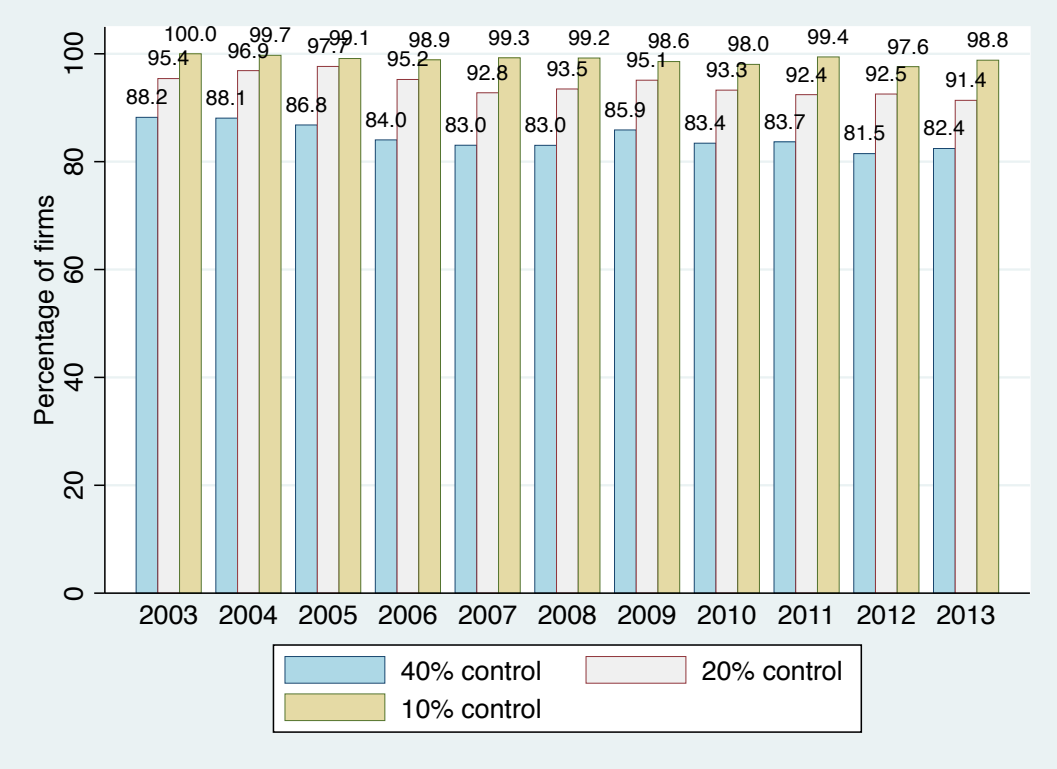
We estimate the model $y_{it} = \alpha + \gamma\, y_{i,t-1} + x'_{it}\beta + \eta i + \varepsilon it$, where y_{it} is the return on assets (ROA) of the company i in year t, $\mathbf{x}_{it}$ is a vector of the explanatory (ownership) and control variables, ηi refers to the company-fixed effects, and εit is the idiosyncratic error. Control variables include the following company characteristics: *L.roa* is the lagged ROA; *ln_asset*, the log of total assets; *ln_age*, the log of the company's age; *lev*, leverage; *tang*, the ratio of tangible assets over total assets; *sales_gr*, the average percentage change in sales over the former two years; *inv*, CAPEX scaled by PPE, and year dummies. The ownership and governance variables comprise *vr*, the stake of the largest ultimate shareholders (LUS) in the company's voting rights; *cfr*, the stake of the LUS in the company's cash-flow rights; *control*, a dummy for the existence of a controlling shareholder; *dev*, the deviation between *vr* and *cfr*; *pn*, the fraction of non-voting shares in the outstanding shares; *d_pn_50*, a dummy for companies wherein non-voting shares account for at least 50% of the outstanding shares; *n_int* (*n_list*), the number of (listed) intermediate companies between the sample company and its LUS; *ceo_ch*, a dummy for CEO-chairman duality; *fam*, *gov*, and *ShA* are dummy variables for whether the LUS is a family, a governmental entity, or a shareholders' agreement; *bndes* is a dummy variable for whether the BNDES is the LUS or a member of a shareholders' agreement that is the LUS; *NM*, a dummy for Novo Mercado-listed companies; *b_cs_n* is the fraction of the company's directors nominated by the controlling shareholder; *b_over* is the difference between *b_cs_n* and *vr*; *ceo_ch* is a dummy for whether the CEO is also the board's chairman; *n_int* × *fam*, *n_int* × *inv*, *n_int* × *lev*, and *n_int* × *NM* are interaction variables of the pyramid extent with family control, investment ratio, leverage, and listing on the Novo Mercado; *n_list* × *fam*, *n_list* × *inv*, *n_list* × *lev*, and *n_list* × *NM* are interaction variables of the extent o pyramids with atleast one listed intermediate company with family control, investment ratio, leverage, and listing on the Novo Mercado. *N*, *NoC*, and *NoI* stand for the number of observations, firms, and instruments, respectively; *AR*(1)*p* and *AR*(2)*p*, the p-values of the Arellano-Bond tests for serial correlation in the error term; *Hansen_p* and *D_Hansen_p*, the p-values of the Hansen J and the difference-in-Hansen tests of the instruments' exclusion restrictions (exogeneity). The sample is composed of all the publicly traded firms that filed annual forms with the CVM over the period 2003-2013. Robust, company-clustered standard errors in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

Table A16: The Matched Samples for Some Ownership Treatments

Treatment	Outcome	# treat.	# untreat.	Treated	Controls	Difference	S.E.	*t stat.*
vr ≥ 75%	*tobin_q*	877	608	2.07780	2.19631	-0.11850	0.24641	-0.48
vr ≥ 75%	*roa*	1440	952	0.04930	0.05374	-0.00444	0.02812	-0.16
n_vot ≥ 30%	*tobin_q*	1089	959	1.79702	2.57074	-0.77372	0.31307	-2.47
n_vot ≥ 30%	*roa*	1194	1108	0.07263	0.07021	0.00243	0.00758	0.32
# *io* ≥ 2	*tobin_q*	1626	1806	2.06500	1.82412	0.24089	0.10065	2.39
# *io* ≥ 2	*roa*	1194	1108	0.00420	0.03072	-0.02652	0.06858	-0.39
*dev_*10	*tobin_q*	1356	1051	1.73096	1.75844	-0.02748	0.06510	-0.42
*dev_*10	*roa*	1504	1188	0.07341	0.07328	0.00013	0.00638	0.02
fam	*tobin_q*	1483	1525	2.05942	2.02078	0.03863	0.12916	0.30
fam	*roa*	1763	1701	-0.01630	0.01934	-0.03564	0.07516	-0.47
sh. ag.	*tobin_q*	636	2372	2.23593	2.05439	0.18154	0.21971	0.83
sh. ag.	*roa*	705	2761	0.08339	0.06662	0.01677	0.01290	1.30
gov	*tobin_q*	194	2218	1.64482	1.61619	0.02863	0.09704	0.30
gov	*roa*	205	3230	0.05645	0.05967	-0.00322	0.01796	-0.18

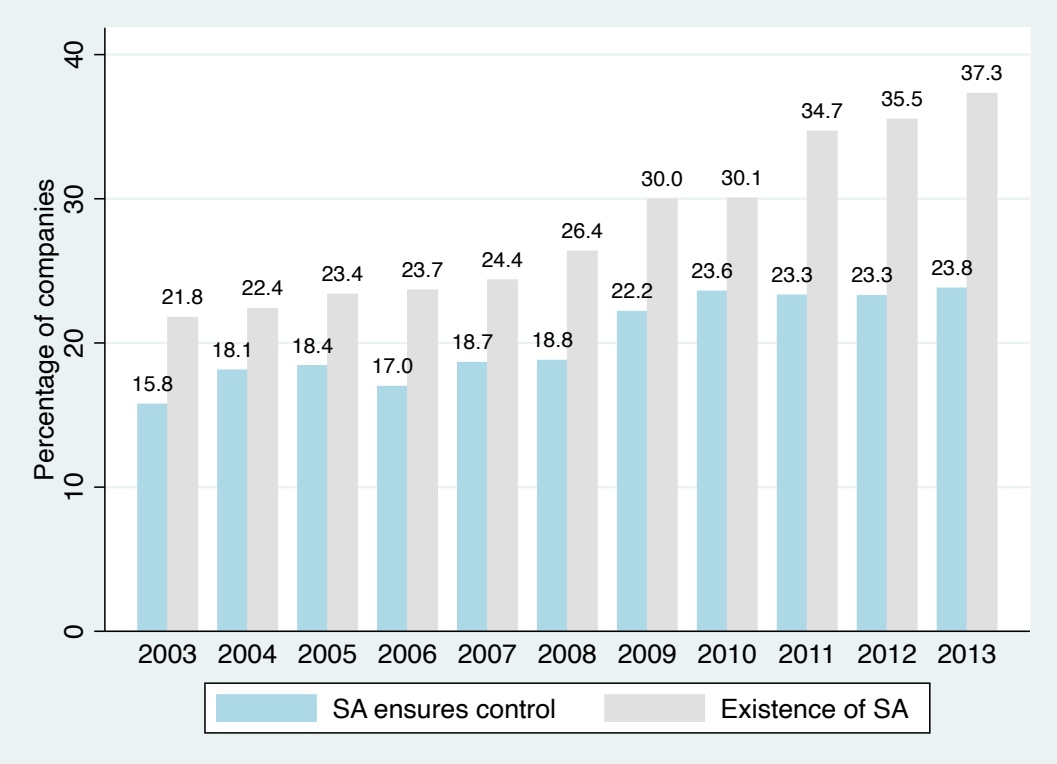
To match treated and untreated firms on the estimated propensity scores, we use the program *psmatch2* with logistic regressions, the single nearest-neighbor matching estimator within caliper, the logarithm of the odds ratios, and the region of common support. Calculation of standard errors (S.E.) does not consider that propensity scores are estimated. # treat. and # untreat. stand for the number of treated and untreated firms in the (ATET) matched sample; *vr* ≥ 75% is a dummy variable valuing 1 if the LUS voting rights is at least 75%, and 0 otherwise (for this, we consider only firms whose LUS owns at least 52.5% of the voting rights); *n_vot* ≥ 30% is a dummy variable valuing 1 if the firm issued at least 30% of their capital as non-voting shares, and 0 otherwise; # *io* ≥ 2 is a dummy variable valuing 1 if the number of intermediate firms in the indirect ownership chain is at least 2, and 0 otherwise; *dev_*10 is a dummy variable valuing 1 if the wedge between the LUS voting and cash-flow rights is at least 10%, and 0 otherwise; *fam*, *sh. ag.*, and *gov* are dummies valuing 1 if the LUS is, respectively, a family, a shareholders' agreement, and a governmental entity, and 0 otherwise.

Figure A1: Companies with Controlling Shareholder According to Control Cutoffs



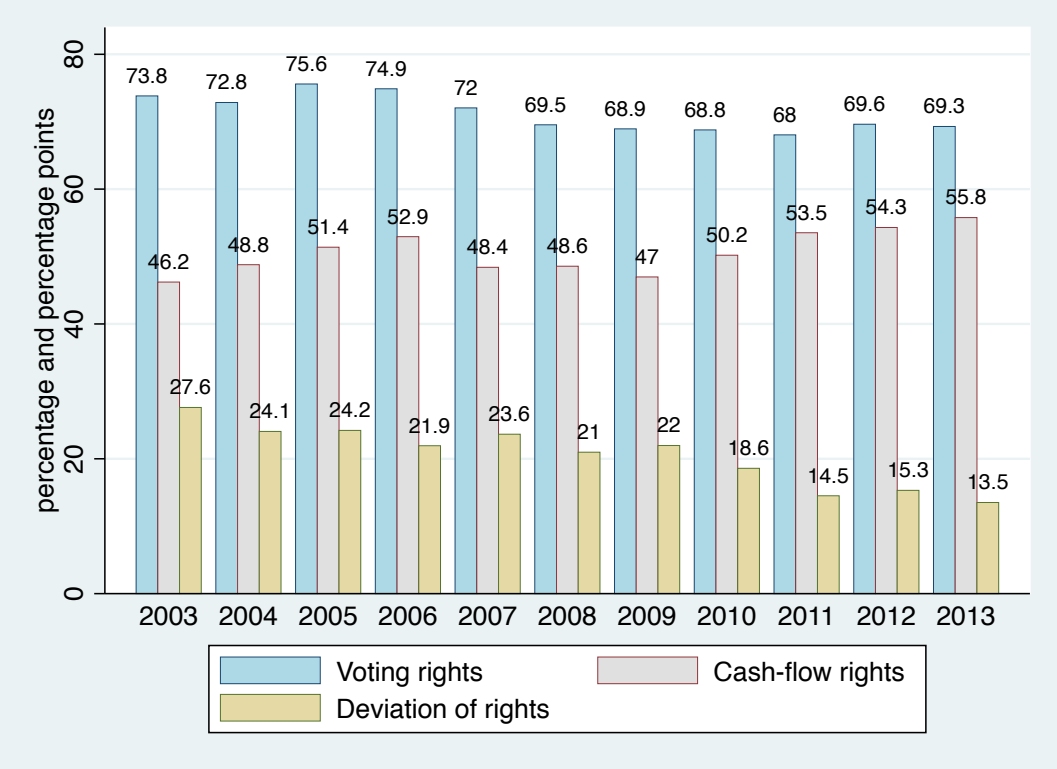
Source: Own elaboration with data from CVM. The company is considered as having a controlling shareholder if she owns 10, 20, or 40% of the voting rights.

Figure A2: Companies with Shareholders' Agreement



Own elaboration with data from CVM. Percentage of companies wherein shareholders' agreement ensures control and percentage of companies with shareholders' agreement.

Figure A3: LUS' Average Voting Rights, Cash-Flow Rights, and Deviation of Rights in Companies Reaching Control Via Shareholders' Agreement



Source: Own elaboration with data from CVM.