PYRAMID GROUPS AND FIRM PERFORMANCE: EMPIRICAL EVIDENCE FROM CANADIAN CORPORATIONS

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Abstract

Using data of Canadian corporations in 1994 and 2003, this study analyzes whether controlling shareholders of corporate pyramid groups, with substantial divergences in ownership and control, negatively or positively impact firm performance. We find some evidence that the combination of ownership concentration and pyramidal structure would lead to inferior firm performance and valuation, but little evidence concerning tunneling within groups. We argue the robust legal environment in Canada that encourages shareholder value maximization could mitigate the negative impact of control enhancing mechanisms on minority public investors.

Keywords: Corporate governance, pyramid groups, ownership, firm performance, family firms

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I. Introduction

The connection between ownership structure and firm performance has been a hot topic for both academics and the general public. The assumption of diffuse atomistic shareholders, in the classic finance theory and the "theory of the firm" in economics (e.g. Berle and Means, 1932; Jensen and Meckling, 1976), turns out to be generally valid only in the large corporate sectors of the United States and the United Kingdom *(see endnote 1)*. La Porta *et al*. (1999) find widely dispersed ownership structures to be quite rare in most countries. Belying the characterization of the typical firm in standard finance textbooks around the world, many large firms in most countries have controlling equity block holders. These are typically shares owned by another company, which in turn has yet another company as its controlling shareholder. These chains of corporate control organize the large firms of most countries into *corporate pyramid groups*, with control extending downward from a relatively small number of ultimate owners.

The key issue we investigate in this paper is whether ultimate owners of corporate pyramid groups, with substantial divergences in ownership and control, negatively or positively impact firm performance and valuation. In this context, Canada provides an ideal laboratory because of the marriage between two unique features. First, like the United States, Canada has a fairly robust legal regime that encourages firms to maximize shareholder wealth. Second, in comparison to the United States, Canada has higher corporate ownership concentration and more obvious presence of control pyramid groups.

Most of prior studies on divergences in ownership and control usually focus on East Asia, Europe, and emerging markets (e.g. Claessens *et al*., 2000; Faccio and Lang, 2002; and Khanna and Palepu, 2000 & 2001). However, these regions either have poor legal safeguards to protect shareholder rights, or the firm's objective is not necessarily to maximize shareholder value (e.g. German firms with labour union board seats would seek to protect employee rights).

In the United States, pyramid groups are almost unknown *(see endnote 2)*. Domestic subsidiaries are virtually always either 100% owned by the parent or unlisted joint ventures with other firms. U.S. firms also generally have only one class of common share.

In the United States, corporate governance problems primarily stem from the conflicts between managers who own few shares (agents) and millions of diffused shareholders (principals). This is the classic, or Type I, agency problem discussed in standard finance textbooks.

In Canada, the situation is far more complicated – a large number of big Canadian firms are organized into control pyramid groups (e.g. La Porta *et al.,* 1999; Daniels *et al.*, 1995; and Morck *et al.,* 2000), with the ultimate owners being wealthy families in many cases. In addition, Canadian stock exchanges do not discourage the use of super-voting shares or equity cross-holdings, both of which are found to exist within Canadian corporate pyramids (e.g. Morck *et al.* 2005). Many private firms are also scattered throughout Canadian pyramid groups, further complicating the matter.

To illustrate the difference between the United State and Canada, we compare in Figure 1 the simplified ownership structures of Minnesota Mining & Manufacturing Limited (3M) in the United States, and Brascan Limited in Canada, both based on 1994 ownership data. Brascan belonged to the control pyramid group of Edward & Peter Bronfman family, with a control chain of 16 tiers and containing more than 500 firms.

[Figure 1 goes here]

Having a controlling shareholder is potentially costly to minority public investors. In a control pyramid, the ultimate owner controls all firms in the group, but has a diminishing real economic interest in the cash flows of firms closer to the bottom of the control pyramid. Pyramidal ownership structure could thus incentivize the ultimate owner to divert resources from firms far away from him/her (i.e. firms closer to the bottom of the pyramid) to firms in which he/she has higher cash-flow claims (i.e. firms closer to the apex of the pyramid). This potentially creates a different type of agency problem, or Type II shareholder-shareholder agency problem as referred to by Villalonga and Amit (2006).

There are, of course, potential benefits to having a controlling shareholder, especially when this ultimate owner is associated with the founding family. The ultimate owner may have a longer-term perspective than outsider minority shareholders, actively monitor managers to reduce manager-shareholder conflicts, utilize political connections with governments as a competitive advantage, or allow group member firms to share risks so that they are less vulnerable than stand-alone companies to negative shocks of external capital markets (e.g. Stein, 1997; McConaughy *et al*., 1998; James, 1999; Anderson and Reeb, 2003; and Claessens *et al.*, 2006).

We test whether pyramidal structure is better or worse for minority public investors, at the aggregate level. We contribute to the existing research on the following dimensions. First, we distinguish the effect of concentrated ownership from the use of control-enhancing pyramidal structure on firm performance. Second, we directly test the tunneling hypothesis by linking a pyramid group firm's performance to its position within the pyramid. Third, we highlight a dramatic decrease of the presence of pyramid groups in Canada between 1994 and 2003, which prior studies have failed to reveal. We examine the potential impact of ownership *change* on firm performance, using sub-samples of firms that either entered or exited from corporate pyramid groups over the decade. Fourth, compared to other studies in Canada, such as Klein *et al.* (2005), Attig (2005), and King and Santor (2008), we consider not only large publicly traded companies but also small firms and firms that are privately owned.

Our findings can be summarized as follows. First, we find in 1994 about 27% of our sample firms belong to pyramid groups, with 11% belonging to family-controlled corporate pyramids. In 2003, pyramidal ownership becomes less substantial in Canada: only 20% of the sample firms belong to pyramid groups, with 6% belonging to family-controlled corporate pyramids. Second, we distinguish the effect of concentrated ownership and the use of control enhancing pyramidal structure. Compared to widely held companies and firms having ultimate owners but not through pyramids, Canadian pyramid group firms are larger, use more debt financing, and invest less in research and development. After controlling for firm-level characteristics and industry effects, we find some evidence that pyramid group membership is negatively associated with accounting returns and Tobin's Q ratio. In addition, the association is more profound if we compare pyramid group firms against widely held companies than if we compare pyramid group firms against firms with stand-free ultimate owners. Third, we find that within family-controlled pyramid groups, firms closer to a pyramid's base tend to perform worse than firms closer to the pyramid's apex. The results, however, are not statistically strong enough to support tunneling. Fourth, to examine whether changes in ownership have any material impact on firm performance, we investigate two sub-samples in which firms either belonged to certain pyramid groups but later exited and became independent, or were initially widely held without controlling shareholders but later acquired by corporate pyramids. We find that disappearance of (family-controlled) pyramidal structure improves a firm's accounting rates of return, but little impact on its market valuation.

The rest of the paper is organized as follows. Section II outlines our data selection process, provides descriptive statistics, and discusses the ownership structure of Canadian corporations. Section III presents main hypotheses, key variables, and the methodology used in this paper. We summarize key empirical findings in Section IV, and conclude with Section V.

II. Ownership Structure of Canadian Corporations

2.1 Sample and data sources

Our empirical analyses utilize two years' data, 1994 and 2003. In the univariate analysis below, we report summary statistics for 1994 and 2003 separately and provide anecdotes concerning changes of corporate ownership structure over the decade.

We chose these two years for two reasons. First, Canadian corporations were subject to loose governance and disclosure rules until early 1995, and compulsory disclosure on governance became general practice afterward. In 1994, in an effort to ensure that investors had information necessary to properly evaluate a company's corporate governance system, the Toronto Stock Exchange (TSX) established the Committee on Corporate Governance. *The Dey Report*, issued by the committee, proposed 14 guidelines on good governance practice, which in 1995 became part of the reporting requirements for all TSX-listed companies. Corporate governance in Canada has since become increasingly important. Investors, both individuals and institutions, have paid more attention than before to the possible effect of governance on a firm's financial profitability, stock-price performance and valuation. We examine company ownership and performance both before and after this regime change, which allows us to assess both the changing nature of corporate pyramids in Canada, and the impact of pyramidal structure on firm performance.

Second, 1994 is a year in which extensive use of corporate pyramids can be identified from our ownership databases. As discussed in detail later, we observe much fewer companies controlled by pyramid groups in 2003 than in 1994. This provides us some insights into how Canadian pyramid groups evolved in recent times.

Our ownership data comes from Statistics Canada's *Inter-Corporate Ownership (ICO)* and the *Financial Post Historical Reports*. The *ICO* data identify most inter-corporate equity holdings in all business groups in Canada, including control pyramids. *ICO* shows the portion of voting rights of a corporation owned or held by another corporate body or group of related individuals. We use a second source because, in some cases, the *ICO* data does not include the identity of the ultimate owner *(see endnote 3)*.

Firm-level financial data are extracted from the *Report on Business (ROB)* Database. Some of the data entries for private and crown corporations are missing. We use annual reports to correct some typos and other omissions in *ROB*.

2.2 Corporate pyramid groups in Canada, 1994

We begin with 2,144 companies that have annual financial data in the 1994 *ROB* database. The sample contains widely held companies without controlling shareholders, pyramid group firms, firms controlled by wealthy families and individuals but not through control pyramids, subsidiaries of other corporations, foreign-controlled companies, and firms without reliable ownership data. Similar to Morck *et al.* (2005) and others, we further classify pyramid group companies into three categories: family-controlled, government-controlled, and corporate-controlled, depending on the identities of their controlling owners.

We follow the methodology used by La Porta *et al.* (1999), Claessens *et al.* (2000), and Morck *et al.* (2000) in determining controlling ownership. We look at all shareholders who control at least 5% of voting equity in order to analyze both ownership rights and control rights. We choose 10% voting equity as the threshold in defining the controlling owners. For comparison purpose, we also provide the breakdown of our sample using 20% voting equity threshold, which represents "significant influence" according to *ICO* database *(see endnote 4)*.

Table 1 Panel A summarizes the incidences of firms in each ownership category, and Panel B reports the use of dual-class shares and the average ownership-to-control ratio for different category of firms *(see endnote 5)*.

Excluding foreign companies and firms without reliable ownership data, our sample in 1994 includes 1,546 firms, with 36% (549 companies) being widely held without controlling shareholders, 37% (568 firms) having controlling owners without involving pyramidal structure, and 27% (429 firms) being pyramid group firms. Among the pyramid group firms, 11% (174 firms) are controlled by wealthy individuals or families.

Divergences of ownership and control can be further enhanced when one combines pyramidal structure and dual-class shares, as superior voting classes of shares are typically held in greater proportion by controlling shareholders. Some of the biggest names in corporate Canada have dual-class structures, such as Onex Corp., Power Corp., Bombardier Inc., and Magna International. There are 130 firms employing dual-class structures, with 32 belonging to family-controlled pyramid groups (representing 29% of all family-controlled pyramid group firms).

Family-controlled pyramid group firms on average have much larger divergences of ownership and control than other types of firms, with the cash flow ownership rights to control rights ratio averaging 0.565. For firms having ultimate owners without through pyramidal structure, the average ownership-to-control ratio is 0.867, predominantly due to the use of dual-class shares. The average ratio is close to

1.000 (i.e. no divergence) for other types of companies.

[Table 1 goes here]

2.3 Evolution of pyramid groups, 1994 to 2003

There are 2,163 firms that have annual financial data in the 2003 *ROB* database. We follow the same selection procedure described previously to construct our sample in 2003. Table 2 summarizes the descriptive statistics of the 2003 sample, organized in the same fashion as the 1994 sample. We observe a noticeable shrink of pyramid groups. Among the 1,834 non-foreign firms with reliable ownership data, 41% (753 firms) are widely held without controlling shareholders, and 39% (712 firms) have stand-free controlling owners. Only 20% (369 firms) sample firms belong to pyramid groups, with firms controlled by wealthy families through complex control chains accounting for merely 6% (110 firms).

The pattern of using dual-class shares in 2003 is largely consistent with that in 1994. The only noticeable difference is, proportionately, more family-controlled pyramid firms employ both types of controlling enhancing mechanism – pyramid control chains and the dual-class shares. As a result, the average ownership-to-control ratio dropped to 0.469 for family-controlled pyramid group firms, but remained largely constant for other types of companies.

The proportion of pyramid group firms in our sample is higher than some existing Canadian studies, while lower than others. For instance, King and Santor (2008) report that on average 56% of their sample firms are widely held, and 32% are family-controlled; while Attig (2005) finds only 28% of their sample firms are widely held, and 53% are in pyramid group firms. While those studies focus only on samples of publicly traded firms, this paper investigates a much larger sample including both public and private companies.

[Table 2 goes here]

What happened to corporate Canada over the decade of 1994 to 2003? Appendix 1 briefly discusses three anecdotal examples to illustrate ownership changes that had occurred to some family-controlled pyramid groups between 1994 and 2003. Canada experienced an economic recession in the early 1990s, during which several of the country's largest corporate groups were badly damaged. The controlling families had to either liquidate almost all their assets, or to pass effective control to professional management teams. Between 1994 and 2003, Canada also observed increasing investor awareness toward good corporate governance practices. Historically, Canadian corporations were subject to segmented securities regulations and very loose governance requirements. Commencing with fiscal years ending on or after June 30, 1995, the TSX required listed firms to report on their corporate governance practices. Having been revised a few times afterward, the TSX governance guidelines have become a benchmark and standard for corporations in Canada. Though these guidelines largely focus on board efficiency, investors have also become increasingly aware of other aspects of governance, including the ownership structure. Improved corporate governance practice and Canada's robust legal environment, in turn, may have alleviated, if not eliminated, any possible expropriation of minority shareholders by whoever effectively controls a pyramid group firm *(see endnote 6)*.

2.4 Related Canadian empirical studies

There have been some studies examining concentrated corporate ownership in Canada, especially family ownership, and its impact on firm performance and valuation. The empirical results are in general mixed. For instance, Morck *et al.* (2000) find a negative relationship between firm performance and corporate control by heirs of wealthy families. Attig (2005) reports a negative association between firm's valuation and pyramid group membership, based on a sample of 478 publicly traded Canadian firms in 1997. Ben-Amar and Andre (2006) examine the value created in mergers and acquisitions and ownership structure. They do not find any negative impact of a controlling family on announcement-day abnormal returns. They argue that, though large shareholders might expropriate small shareholders through channels such as tunneling earnings, these large shareholders might also add value by providing competencies to the firm, and the monitoring role they play. The study closest to our own is King and Santor (2008), who examine the impact of family ownership on firm performance and capital structure using a sample of 613 publicly traded Canadian firms between 1998 and 2005. They find that family ownership alone does not affect firm's financial or market performance, but the *combination* of family ownership and dual-class shares leads to inferior market valuation. These studies, however, do not directly test whether tunnelling theory holds in Canada, nor do they specifically examine how the improvement of corporate ownership in Canada affects firm performance and valuation. This study aims to address these issues in more detail.

III. Hypotheses, Variables, and Model Specification

3.1 Summary of testable hypotheses

Our empirical tests focus on whether the controlling owner of a corporate pyramid group, with divergence in ownership and control, negatively or positively

affects the performance of firms he/she controls. In particular, we test the following hypotheses:

- (H1): Pyramidal structure destroys firm value: if true, one would expect pyramid group firms to under-perform companies that are not controlled by pyramid groups.
- (H2): Pyramidal structure facilitates tunneling of wealth: if true, one would expect pyramid group firms closer to the bottom of a group to under-perform firms closer to the apex of the group.
- (H3): Changes in ownership structure affect firm performance: if true, one would expect improved performance when a firm exits from its pyramid group, and distressed performance when a firm joins a pyramid group.

3.2 Description of key variables

Our dependent variables, which measure firm performance and valuation, include accounting return on assets (*ROA*), return on equity (*ROE*), and average Tobin's Q ratio (*AVQ*). ROA is defined as earnings before interest, depreciation, and amortization divided by total assets. ROE is defined as net earnings divided by total book equity. AVQ is computed as the ratio of the sum of market value of equity and book value of debt over book value of total assets, where market value is calculated as the year-end price of common equity times the year-end shares outstanding.

Consistent with existing studies on the association between corporate ownership and performance, we consider five firm-level control variables: *size, leverage, R&D, risk* and *growth*. Size is defined as the natural logarithm of total assets; leverage is defined as the ratio of long-term debt to total assets; R&D is defined as research and development expenditures divided by total assets *(see endnote 7)*; risk is defined as the sum of squared standard errors of a market model using both the Canadian and U.S. market returns (taking into account \$US/\$C exchange rates); and growth is the firm's annualized profit growth rate over the past five years. All numerical variables are winsorized at 99% and 1% tails. Industry classification is based on the TSE300 sector classification. In the statistical analysis that follows, we also include two dummy variables, *FINANCIAL* and *UTILITIES*, for heavily regulated industries.

Table 3 summarizes the mean and median values of firm-level control variables, and reports Pearson correlations among them, based on pooled data. Compared to widely held firms without controlling owners, pyramid group firms are bigger, use more debt financing, and invest less in research and development. Profit growth and firm-specific risk are comparable across different types of companies. Among pyramid group firms, those owned by governments are the largest, but family-controlled pyramid group firms are the most levered and spend the least on research and development.

[Table 3 goes here]

3.2 Model specification

To test (H1), whether pyramidal structure on average creates or destroys value, we rely on the following multiple regression framework:

$$Performance_i = \alpha_i + \delta Pyrmid + \beta_i X_i + \varepsilon_i \quad (1)$$

where variable *Pyramid* is used to indicate pyramid group membership. The binary variable equals one if a firm belongs to a pyramid group, and zero otherwise. A significant negative coefficient on *Pyramid* would indicate that pyramid group firms on average under-perform their stand-alone counterparts.

Concentrated ownership can be observed in two categories of firms: those controlled by wealthy families/individuals through pyramid groups, and those controlled by stand-free ultimate owners who do not employ pyramids. Concentrated ownership alone, however, does not necessarily lead to inferior firm performance. To disentangle concentrated (family) ownership and the use of pyramidal structure to enhance the ultimate owner's control, we repeat the regression tests with an alternative benchmark. This time, binary variable *Pyramid* equals one for family-controlled pyramid group firms, and zero for firms having ultimate owners without using corporate pyramids. A significant negative coefficient on *Pyramid* would indicate that, beyond the effect of ownership concentration, control-enhancing pyramidal structure is associated with poor firm performance and lower valuation.

To test (H2), the presence of tunnelling of wealth within pyramid groups, we first define the position of each pyramid group firm within its group, because the ultimate owner controls all companies in the group but his/her ownership stake diminishes moving down the control chain. The layer of the pyramid in which the firm is located is a rough measure. *LEV*, the first position variable, is defined as the natural logarithm of the number of tiers of the pyramid between the firm in question and the ultimate owner. Firms nearer the pyramid's apex have smaller *LEV*s, and *LEV* is zero for the apex firm of the group.

Divergences of ownership and control can be complicated by the use of super-voting shares, equity cross-holdings, and the existence of numerous private firms within corporate pyramids. The second measure of position, *RATIO*, is the ratio of percentage ownership rights to percentage control rights the ultimate owner has in each pyramid group firm he/she controls. Firms nearer the pyramid's apex have *RATIO*s closer to one, while firms nearer the pyramid's bottom have *RATIO*s closer to zero *(see endnote 8)*. This approach is used in studies such as Daniels *et al.* (1995), La Porta *et al.* (1999), Morck *et al.* (2000), Claessens *et al.* (2000), and Faccio and

Lang (2002). We then test the following pooled regression model:

$$Performance_i = \rho_i + \lambda Position + \gamma_i X_i + \mu_i \quad (2)$$

where the degree of ultimate owner's divergence between ownership and control is captured with variable *Position*. A significant negative coefficient on this variable means poor performance for firms in lower tiers of pyramids, and is consistent with the tunnelling hypothesis.

To test (H3), the impact of changes in ownership structure on firm performance, we form two sub-samples: firms that have exited from their respective pyramid group by 2003 (exit firms), and firms that were initially widely held but later acquired by pyramid groups (entry firms). We examine two cross-sectional regressions:

$$Performance_{i,2003} = \alpha_i + \phi_1 Entry + \phi_2 Entry \times Family + \theta_i X_i + \upsilon_i \quad (3.1)$$

$$Performance_{i,2003} = \alpha_i + \theta_1 Exit\phi_2 + \theta_2 Exit \times Family + \theta_i X_i + \upsilon_i \quad (3.2)$$

where binary variable *Entry* equals one for an entry firm, and zero if the company remains stand-alone; binary variable *Exit* equals one for an exit firm, and zero if a firm remains in its pyramid group; binary variable *Family* captures any additional impact of family control. If pyramidal structure harms firm performance, and if changes in ownership have material impact on firm performance, we would expect coefficient on *Entry* to be negative and significant, and coefficient on *Exit* to be positive and significant. If family-controlled pyramid group firms behave somewhat differently than other types of pyramid group firms, we would expect significant coefficients on the interaction terms.

IV. Empirical Findings

4.1 Does pyramidal structure destroy value?

We begin our empirical tests with Cochran means and non-parametric median scores of firm performance measures across different types of companies. Results are summarized in Table 4. Compared to widely held firms, companies controlled by (family) pyramid groups have significantly lower ROA, ROE and AVQ. Without considering firm-level characteristics and industry effects, pyramid group firms on average under-perform widely held firms based on both accounting returns and Tobin's Q ratio.

[Table 4 goes here]

Table 5 summarizes multiple regression results comparing family-controlled pyramid group firms and widely held independent companies *(see endnote 9)*. Model 1 is a simple stepwise ordinary least square regression; model 2 controls for heavily regulated industries; model 3 is a generalized least square model that is heteroskedasticity-consistent and takes into account industry fixed effect; model 4 is similar to model 3 but with the Heckman (1979) correction term. A firm's performance often determines its strategy, given its resources and the conditions prevailing in its industry. To address potential self-selection bias, we employ Heckman's (1979) 2-stage model, in which pyramidal structure is determined in the first stage as an endogenous choice rather than exogenous effect, and performance measures are analyzed in the second stage. We choose to include the difference between this year's firm size and last year's size as the instrumental variable, given its insignificant correlation (not reported) with firm valuation. The details of Heckman's procedure are included in Appendix 2.

Large firms are associated with lower accounting returns and market valuation, while R&D investment tends to be positively related to firm performance. Regression coefficients on *Pyramid,* the membership binary variable for family-controlled pyramids, are insignificant in all ordinary least squares models. Heckman (1979) 2-staged model offers several observations. First, we find that financial firms are more likely to have controlling owners who organize corporate pyramids, whereas fast-growing firms are less likely to belong to pyramid groups. Second, Heckman's Lambda for ROE is negative and significant, indicating firms that are more likely to belong to pyramid groups tend to yield lower return on equity. Third, we find a negative significant coefficient on *Pyramid* in the AVQ regression, but negative and insignificant coefficients in regressions of accounting returns.

[Table 5 goes here]

Table 6 presents the comparison between family-controlled pyramid group firms and firms having ultimate owners but not through pyramids. The regression coefficients on *Pyramid* are negative and marginally significant in regressions of accounting returns, but insignificant in the AVQ regression. We interpret the results as indicating that the use of control-enhancing corporate pyramids, in addition to simple concentrated ownership, harms firm's financial performance. Results in tables 5 and 6 are somewhat consistent with (H1) that, compared to stand-alone companies, (family-controlled) pyramid group firms generate lower returns and thus suffer a valuation discount.

[Table 6 goes here]

4.2 Does tunneling exist within Canadian pyramid groups?

Tunneling, or self-dealing called in Canadian securities law, means that a controlling shareholder, through the group apex firm he/she controls, diverts resources from lower-tier firms in which he/she has a

smaller equity stake. More straightforward diversion implies that resources from lower-tier firms end up being used disproportionately to generate utility for the controlling shareholders, rather than dividends for outside public investors. In terms of empirical evidence, if tunneling exists within Canadian pyramid groups, we would expect high-tier (low-tier) pyramid group firms to perform significantly better (worse) than benchmark widely held companies. Both ROA and ROE can be used to detect income shifting. If resources are tunneled from the bottom toward the apex of a pyramid group, we should observe significant inequality of these variables within the group. Thus, we form two sub-samples of family-controlled pyramid groups firms, based on their positions within their respective group. A high-tier pyramid group firm is required to have *LEV* smaller than median *LEV* (0.602), and to have *RATIO* higher than median *RATIO* (0.650). Similarly, a low-tier firm is the one with both above-median *LEV* and below-median *RATIO*.

Table 7 Panel A compares firm performance of 56 high-tier family-controlled pyramid group firms to that of 66 low-tier firms. Performance measures of widely held companies are presented as a benchmark. Regression results are reported in Table 7 Panel B. Considering the insignificant regression coefficients of some firm-level characteristics, we only control for firm size, leverage, R&D investment and fixed effects.

The performance measures of high-tier pyramid firms are uniformly higher than those of low-tier pyramid firms, with the difference in AVQ significantly different from zero. This is consistent with the shareholder-shareholder conflicts (i.e. Type II agency problem). However, high-tier pyramid firms still on average under-perform their widely held counterparts. In the regression models, *LEV* is negatively related to accounting returns and firm valuation, while *RATIO* is positively related to all performance measures. However, the regression coefficients on *LEV* and *RATIO* are significant only for Tobin's Q, indicating pyramid group firms closer to the pyramid's apex are valued higher than firms closer to the bottom of the pyramid. The insignificant empirical findings on ROA and ROE suggest that income shifting, or tunneling (H2), should not be a major concern for average investors who put money into pyramid groups.

[Table 7 goes here]

4.3 Does ownership change affect firm performance?

Comparison between tables 1 and 2 is consistent with the argument that, with the combined effect of robust legal environment and improved governance practice, the presence of corporate pyramid groups has decreased over time in Canada. The natural question we then ask is whether ownership *changes* have any material impact on firm performance. We compare firms that have exited from (family-controlled) pyramid groups against those that have stayed; and we compare firms that have entered (family-controlled) pyramid groups against those that have remained independent. Due to missing ownership information, we identify only 49 exit firms and 25 entry firms.

Table 8 summarizes our findings. The main messages are that family control seems to have some impact on firm performance in addition to ownership changes, and that disappearance of pyramidal structure improves firm's financial performance. On average, firms exited from (family-controlled) pyramid groups have returns on equity (0.038) 0.030 percentage point higher than those stayed within the groups. There is little difference in performance between firms acquired by corporate pyramids and companies that remained widely held.

[Table 8 goes here]

4.4 Alternative monitoring mechanisms: board of directors

The possibility of expropriation of minority outside shareholders by the controlling shareholders, or costs of the Type II agency problem, might be mitigated by some factors not yet covered in our analyses. These factors include overall legal environment (external monitoring) and board monitoring (internal monitoring). Regarding the legal environment, we argue that, even though companies in Quebec are under a somewhat different legal regime than the rest of Canada, a cross-sectional variation in legal environment is not likely to substantially change our results. All companies, as long as they are listed on the TSX, are subject to the same set of disclosure rules and governance guidelines. Besides, federal and provincial securities authorities have been trying to harmonize various requirements in terms of securities trading and investor protection.

With regard to the board's monitoring role, a first difficulty of controlling for this effect is, as discussed in Section 2, that Canada lacked uniform board governance practices prior to 1995. And even after TSX governance guidelines came into effect, companies still have some degree of flexibility in determining how their boards are formed and what information they disclose to outside investors. Given the apparent failure of boards in scandals such as Hollinger International (controlled by Lord Conrad Black, who formed a powerful pyramid group in Canada since the late 1970s, and later renounced his Canadian citizenship and moved to the United Kingdom), one cannot help questioning how effective board members are in monitoring the apex shareholders and top corporate executives. Nonetheless, we included the Board Composition Score, extracted from the *Global and Mail's Board Games* governance ranking (2003), as an additional

control variable for some large companies, either owned by family-controlled pyramid groups or freestanding without apex shareholders. This board variable does not seem to have material impact on our results.

V. Conclusion

A central topic in corporate governance is how firms are owned and controlled, and how competitive firms are under various ownership mechanisms. This paper attempts to develop some insights into one particular ownership structure, the corporate control pyramid, which has been used extensively throughout the twentieth century in Canada.

Both Canada and the United States have strong legal safeguards of shareholder rights, but the U.S. essentially limits severe divergences in ownership and control through listing requirements and tax policy, making it difficult to disentangle the effects of regulatory regime and control enhancing mechanisms. Canada thus offers a much better laboratory to address the issue of how control enhancing mechanisms, pyramidal structure in particular, affect minority public shareholders in a robust legal environment.

We find, in 1994, a large fraction of Canadian firms have controlling shareholders owning at least 10% of voting equities, and some of these firms (27% of the sample) are organized into control pyramid groups, through which the ultimate owners control a large amount of resources with only limited cash flow spending. The presence of control pyramids, however, has decreased somewhat dramatically in the last decade of the century. By 2003, only 20% of Canadian companies belonged by pyramid groups.

With respect to the specific hypotheses we set out to test, we find some evidence supporting (H1), that the average performance of group-affiliated firms is poorer; little evidence concerning (H2), that pyramidal ownership structure facilitates tunneling; and no significant evidence for (H3), that changes in ownership leads to changes in market valuation. In particular, compared to freestanding companies without ultimate owners, pyramid group firms, especially the ones controlled by wealthy families and individuals, have poor accounting returns and lower Tobin's Q ratio. After firm-specific characteristics and industry effects are controlled for, we still observe some negative association between family-controlled pyramidal structure and firm valuation. Within family-controlled pyramid groups, we find that firms nearer the pyramid's bottom are valued much lower than those closer to the pyramid's apex. However, we do not detect significant relationship between a pyramid group firm's position and its accounting returns, which would indicate expropriation of minority public investors by the controlling shareholders (i.e. costs of Type II agency problem). When a (family-controlled) pyramid group firm exits from the group and becomes widely held, its return on equity improves but there is little change to its market valuation; when a previously independent firm joins a (family-controlled) pyramid group, there is no change to its financial returns or valuation.

How do we interpret these empirical findings? Concentrated ownership may affect firm performance both negatively and positively. On one hand, resources, in practice, might not always be allocated efficiently among group member firms. In a control pyramid group, the ultimate owner enjoys more controlling power compared to his/her cash flow commitment in firms belonging to his/her group. Such divergence of ownership and control rights could incentivize the ultimate owner to extract private benefits of control at the expense of minority public investors. On the other hand, as argued by Stein (1997), Anderson and Reeb (2003), and Claessens *et al.* (2006), the existence of a ultimate (family) owner might benefit group member firms because of reduced manager-shareholder conflicts, uses of internal capital markets and risk sharing among member firms, and the long-term perspective of the ultimate owners.

In countries with weak legal safeguards of investor rights and loose governance practice, such as those in East Asia, the issue of expropriation of minority public investors might be of primary concern of control pyramids. Corporate Canada also features concentrated ownership and pyramidal structure. Our empirical results indicate, however, only limited negative impact of control pyramidal structure on firm performance and valuation.

We argue this is related to the robust investment environment of the country. Canada, like the United States, has probably the best securities regulation and enforcement in the world; Canada scores high in global shareholder rights ratings (e.g. GMI Corporate Governance Score); it also enjoys a relatively low level of corruption (e.g., Transparency International). All of these factors may have played a role in explaining why corporate Canada, with many corporations controlled by pyramids, does not suffer much to the Type II agency costs discussed in other countries with similar organizational structures.

Our study examines how corporate pyramid groups evolved in Canada over the ten-year period of 1994 to 2003, and whether pyramidal structure imposes significant agency costs on minority shareholders who own but do not control firms they invest in. We, however, do not attempt to measure what common factors drive changes in corporate ownership structure. In fact, as indicated in our anecdotal examples, different groups evolve due to different reasons, either internal such as strategic refocus or external such as adverse macro economic conditions. Our study is also limited to a specific country and time period, and it may not be generalizable to other contexts.

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Endnotes

[1] Some recent studies challenge the notion of diffused ownership even for the United States and UK. For instance, Anderson and Reeb (2003) argue that about one third of S&P500 companies can be classified as "family-controlled" firms. They define a firm to be family controlled "when founding families hold shares in the firm or when founding family members are present on the board of directors." This definition is somewhat less restricted than the definition of family control based solely on ownership of voting stocks.

[2] The United States, according to Becht and DeLong (2004), had pyramid groups historically.

[3] We thank Michael King at the Bank of Canada for helping identify some inaccuracy problems with *ICO*. For example, Magna International is defined by *ICO* as an independent widely held firm. However, the company's founding chairman, Mr. Stronach, controls about 70% of voting interests in Magna through a trust. We re-classify Magna International as a company controlled by a wealthy family.

[4] Some empirical papers concerning ownership structure in Canada, such as King and Santors (2008), use 20% equity cutoff. Our main regression analyses are based on 10% threshold. As a robustness check,

we also repeat all tests using 20% voting equity threshold, and the results are mostly qualitatively consistent with those reported in the paper.

[5] Different mechanisms, including stock pyramids, cross-ownership, and dual-class shares, can be used to achieve the separation of control rights from ownership rights, as argued by papers such as Bebchuk *et al.* (2000). In Canada, the latter two mechanisms are utilized within the control pyramids, and dual-class shares can also be found in family-controlled group that not necessarily use pyramidal structure.

[6] In explaining the evolution of business groups in Canada, some scholars have emphasized the importance of pressure from domestic competition and the need for protection against foreign competition (e.g. Bliss 1987), others have argued for a tax regime with respect to inter-company dividends and inheritance tax, and pyramid groups' ability to better position to lobby the government (e.g. Morck and Yeung 2005). Since the last decade of the twentieth century, we observe increased integration of international capital markets and trades. The Canadian government has also relaxed its restrictions on foreign ownership and investments in Canada. Some of the legendary Canadian business families have gradually shifted away from Canada to the United States or other countries, attempting to better position themselves in the new global economy. We do not observe significant changes in the Canadian tax system between 1994 and 2003. We thus argue that these two factors, competition and corporate tax, are not likely to be the driving force behind the diminishing trend of corporate pyramid groups in Canada.

[7] Many companies do not report R&D separately. R&D is set to be zero in such cases.

[8] *RATIO* is calculated as follows. First, we define ownership rights as the fraction of the firm's cash flow to which the controlling owner is entitled. This is the sum of any direct ownership by the controlling owner himself or herself, by firms fully owned by the controlling owner, and through firms controlled by him/her via the control pyramid. The last is the product of the fractional equity stakes that connect the firm to the controlling owner of the pyramid. If several chains of inter-corporate equity holdings connect the firm to the controlling owner, these are combined. Second, for each firm, we define control rights as the fraction of votes the ultimate controlling owner casts in the firm's shareholder meetings. This is the sum of his/her direct voting rights and indirect voting rights in the firm, which is defined as the minimum votes along the combination of all control chains.

[9] Because pyramid group firms controlled by government agencies and other corporations tend to behavior similarly to widely held companies in terms of ownership concentration (e.g., there is little divergence of ownership and control rights), we focus on family-controlled pyramid group firms. We have also compared widely held companies to all pyramid groups firms, and the results (not reported here) are qualitatively the same as but weaker than those presented in Table 5.

Appendix 1. Evolution of (family-controlled) Pyramid Groups between 1994 and 2003

Example 1: Edward & Peter Bronfman (Edper) Group and Brascan

The once-almighty Edper Bronfman family group gradually faded in corporate Canada after the economic recession of 1992-93. Even prior to the recession, the Edper group was already in serious trouble, partly due to the high level of debt accumulated during the group's rapid expansion between the late 1970s and 1980s. After the recession, Edward Bronfman decided to pass on the control of the group to the Limited Partnership, comprised primarily of the senior management team, so that he could spend more time in philanthropic activities, which had been his great passion for many years. The Limited Partnership owned roughly 17% of voting equity in Brascan Corporation, the first-tier public company of Edper group in 2003. Brascan, directly and indirectly, owned more than 20% of equity in firms including Brascan Financial, Noranda Inc., Brookfield Properties Corp., and Nexfor Inc. At the 10% voting-equity cutoff we chose, Brascan is considered a company within a pyramid group with a wealthy family (i.e. Bronfman family) as apex shareholder. If, however, we increase the threshold to 20%, Brascan is considered widely held but with the Partnership as its largest shareholder.

Example 2: Reichmann Family and Abitibi-Price

The company ran into serious trouble during the 1992-93 recession, and partly caused by a miserable failure in its UK Canary Wharf investment. In 1992, Olympia and York collapsed under approximately $20 billion in debt. The Reichmann family had to liquidate its controlling stakes in almost all of its companies, including Abitibi-Price, and Gulf Canada. Firms associated with Reichmann family were thus pyramid group firms in 1994 but no longer so in 2003.

Example 3: Thomson Group and Hudson's Bay

The Thomson family, through its publicly traded Thomson Corp. and private investment arm Woodbridge Co., acquired 75% of the Hudson's Bay Company (HBC), Canada's oldest public company, in the late 1970s. HBC, which then had diverse investments in oil and gas, financial services, and a distillery, was transformed into a more focused operation. In 1992 the Thomson group reduced its interest in HBC to 25% then, in 1997, the family finally reduced its remaining 21% of ownership in HBC through a secondary equity offering. The

Thomson family remained focused on its media business and gradually moved into providing specialized information on legal, investment, and medicine through electronic formats. Hudson's Bay is therefore treated as a pyramid group firm in 1994, but widely held in 2003.

Appendix 2. Heckman 2-stage Self-Selection Model

A firm's performance often determines its strategy, given its resources and the conditions prevailing in its industry. In particular, a firm that performs poorly in the past may choose to join a business group. The apex shareholder of the group may then place the firm at a particular place within his/her control pyramid. Simple OLS regressions do not correct for this self-selection bias. To address this issue, we employ Heckman's (1979) 2-stage model.

In this model, pyramid group ownership is first determined as an endogenous choice rather than exogenous effect, and performance measures are analyzed in the second stage. *Lambda*, the Heckman correction term, is introduced to control for the effect of sample-selection bias induced by the decision to make the firm a member of a pyramid group.

The first-stage model estimates the probability that a firm joins a pyramid group. An important issue in Heckman's technique is the choice of instruments in the selection equation and the performance equation. Many researchers suggest that the ideal instruments should be exogenous characteristics that affect selection but are not closely related to the specific firm's valuation (e.g., Greene, 1997). The firm-level variables in the system, such as financial leverage and historical growth rates, are likely to affect its performance. We choose to include the difference between this year's firm size and last year's size as the instrumental variable, given its insignificant correlation (not reported) with firm valuation.

The *initial Performance* regression is:

$$Y_i = \alpha + \beta' X_i + \delta O(Pyramid)_i + \varepsilon_i \quad \text{(A.1)}$$

where X_i is a set of exogenous firm-level variables; O_i is a dummy variable that equals one for pyramid group firms and zero otherwise; $\{\alpha, \beta, \delta\}$ is a vector of parameters to be estimated; and ε_i is an error term. The estimated parameter δ measures the relation between becoming a pyramid group member and firm performance, but since the pyramid firm's decision to join might depend on past performance, O_i and ε_i are not independent, and δ may be biased. I assume that the decision about a firm's *Joining* a pyramid is determined as:

$$O_i^* = \gamma' Z_i + \eta_i$$
$$O_i = 1 \ \ if \ \ O_i^* \geq 0$$
$$O_i = 0 \ \ if \ \ O_i^* < 0 \quad \text{(A.2)}$$

where O_i^* is an unobserved latent variable; Z_i is a set of variables that affect the decision; and η_i is an error term. Assuming that the two error terms, $\{\varepsilon_i, \eta_i\}$, are bivariate normally distributed with means zero, standard deviations σ_ε and σ_η, and correlation ρ, the expected performance measure of a firm that joins a pyramid group and of the firm that does not become:

$$E[Y_i \mid O_i = 1] = \alpha + \beta' X_i + \delta + \rho\sigma_\varepsilon \lambda_{1i}(\gamma' Z_i)$$
$$E[Y_i \mid O_i = 0] = \alpha + \beta' X_i + \rho\sigma_\varepsilon \lambda_{2i}(\gamma' Z_i)$$

where $\lambda_{1i}(\gamma' Z_i)$ is the Inverse Mills' Ratio and is computed as $\phi(\gamma' Z_i) \big/ \psi(\gamma' Z_i)$, and $\lambda_{2i}(\gamma' Z_i)$ is computed as $-\phi(\gamma' Z_i) \big/ [1 - \psi(\gamma' Z_i)]$.

The first step of the Heckman (1979) procedure is to obtain estimates of γ using a Probit model. The variables include firm-level variables discussed in Section 2.3.3. These consistent estimates can then be used to compute values for λ_{1i} and λ_{2i}. The second step estimates performance using an OLS framework, but with an extra variable, Heckman's lambda (λ_i), computed as $\lambda_{1i}(\gamma' Z_i) L_i + \lambda_{2i}(\gamma' Z_i)(1 - L_i)$, to correct for self-selection.

The *corrected Performance* equation now becomes:

$$Y_i = \alpha + \beta' X_i + \delta O_i + \delta_\lambda \lambda_i + \varepsilon_i$$

where the new parameter, δ_λ, is related to the correlation between the error terms in equations (A.1) and (A.2).

Figure 1. Ownership Structure: United States vs. Canada, 1994

Figure 1 illustrates the difference in ownership structure between an archetypical U.S. firm and an archetypical Canadian firm.

A. The Ownership Structure of a Typical Large US Firm

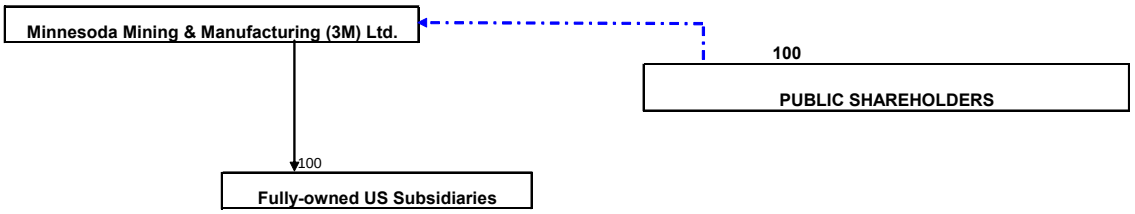

FIGURE B IS PART OF THE PYRAMIDAL STRUCTURE OF EDPER BRONFMAN GROUP.
The number attached to each firm represents the percentage ownership rights (O) and control rights ©. held by its upper-level company.

B. The Ownership Structure of a Typical Large Canadian Pyramidal Firm

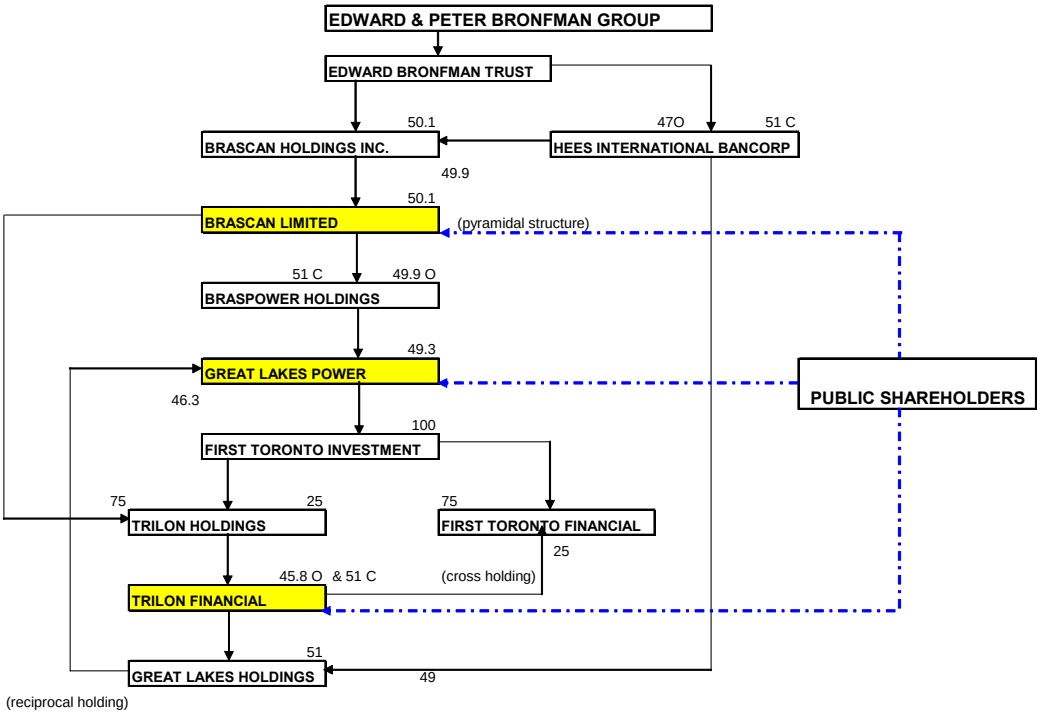

Table 1. Sample Selection Procedure and Distribution, 1994 Sample

Note: this table summarizes our 1994 sample, based on the *Report on Business* (*ROB*) database. The initial full sample contains 2,144 companies that have financial records in the *ROB*. Ownership and control data are collected mainly from Statistics Canada *Inter-Corporate Ownership Directory (ICO),* and *Financial Post Survey of Industries*. Panel A displays sample selection criteria, and the number of companies in each ownership category. Panel B reports the incidences of single-class stocks, dual-class stocks, and also presents the divergence of ownership and control rights for sample firms. Ownership-to-control ratio is defined as the percentage of ownership rights the controlling owner has in each firm divided by the control rights he/she has in that firm.

Panel A: Sample Selection and Distribution, 1994

	10% cutoff		20% cutoff	
Selection criteria	**Number**	**Percentage**	**Number**	**Percentage**
Full Sample -- All firms in ROB 1994	**2144**	**100%**	**2144**	**100%**
Firms without ownership data	**226**	**11%**	**226**	**11%**
Firms controlled by foreign investors	**372**	**17%**	**351**	**16%**
Firms in the sample	**1546**	**72.1%**	**1567**	**73.1%**
	10% cutoff		**20% cutoff**	
Analysis of the sample	**Number**	**Percentage**	**Number**	**Percentage**
Firms in the sample	**1546**	**100%**	**1567**	**100%**
Widely held firms without controlling owners	**549**	**36%**	**740**	**47%**
Firms with controlling shareholders				
Firms controlled by stand-free controlling owners	**568**	**37%**	**440**	**28%**
Firms controlled by ultimate controlling owners through pyramids	**429**	**27%**	**387**	**25%**
Firms controlled by wealthy families or individuals	174	11%	154	10%
Firms controlled by corporations or institutions	187	12%	168	11%
Firms controlled by government agencies	68	4%	65	4%

Panel B: Sample Distribution Based on Stock Classes, 1994

10% cutoff	**Single class stocks**	**Voting vs. Non-voting stocks**	**Multiple vs. Subordinate voting stocks**	**Other Types**	**Ownership-to-control Ratio**	**Total**
Widely held firms without controlling owners	**490**	**1**	**3**	**55**	**1.000**	**549**
Firms controlled by stand-free controlling owners	**428**	**32**	**54**	**54**	**0.867**	**568**
Pyramid firms controlled by wealthy families or individuals	**110**	**17**	**15**	**32**	**0.565**	**174**
Pyramid firms controlled corporations or institutions	**126**	**6**	**2**	**53**	**0.955**	**187**
Pyramid firms controlled by government agencies	**58**	**0**	**0**	**10**	**0.982**	**68**
total	**1212**	**56**	**74**	**204**	**0.896**	**1546**

Table 2. Sample Selection Procedure and Distribution, 2003 Sample

Note: this table summarizes our 2003 sample, based on the *Report on Business* (*ROB*) database. The initial full sample contains 2,163 companies that have financial records in the *ROB*. Ownership and control data are collected mainly from Statistics Canada *Inter-Corporate Ownership Directory (ICO),* and *Financial Post Survey of Industries*. Panel A displays sample selection criteria, and the number of companies in each ownership category. Panel B reports the incidences of single-class stocks, dual-class stocks, and also presents the divergence of ownership and control rights for sample firms. Ownership-to-control ratio is defined as the percentage of ownership rights the controlling owner has in each firm divided by the control rights he/she has in that firm.

Panel A: Sample Selection and Distribution, 2003

	10% cutoff		20% cutoff	
Selection criteria	**Number**	**Percentage**	**Number**	**Percentage**
Full Sample -- All firms in ROB 1994	**2163**	**100%**	**2163**	**100%**
Firms without ownership data	**126**	**6%**	**126**	**6%**
Firms controlled by foreign investors	**203**	**9%**	**203**	**9%**
Firms in the sample	**1834**	**85.5%**	**1834**	**85.5%**
	10% cutoff		**20% cutoff**	
Analysis of the sample	**Number**	**Percentage**	**Number**	**Percentage**
Firms in the sample	**1834**	**100%**	**1848**	**100%**
Widely held firms without controlling owners	**753**	**41%**	**1092**	**59%**
Firms with controlling shareholders				
Firms controlled by stand-free controlling owners	**712**	**39%**	**459**	**25%**
Firms controlled by ultimate controlling owners through pyramids	**369**	**20%**	**297**	**16%**
Firms controlled by wealthy families or individuals	110	6%	85	5%
Firms controlled by corporations or institutions	206	11%	165	8%
Firms controlled by government agencies	53	3%	47	3%

Panel B: Sample Distribution Based on Stock Classes, 2003

@ 10% cutoff	**Single class stocks**	**Voting vs. Non-voting stocks**	**Multiple vs. Subordinate voting stocks**	**Other Types**	**Ownership-to-control Ratio**	**Total**
Widely held firms without controlling owners	**701**	**1**	**1**	**50**	**1.000**	**753**
Firms controlled by stand-free controlling owners	**573**	**33**	**54**	**52**	**0.873**	**712**
Pyramid firms controlled by wealthy families or individuals	**59**	**17**	**11**	**23**	**0.469**	**110**
Pyramid firms controlled corporations or institutions	**123**	**6**	**8**	**69**	**0.921**	**206**
Pyramid firms controlled by government agencies	**44**	**0**	**0**	**9**	**0.983**	**53**
total	**1500**	**57**	**74**	**203**	**0.909**	**1834**

Table 3. Summary Statistics of Key Variables by Types of Company

Note: this table summarizes the key firm-level variables, and their correlation with each other, using pooled sample. Panel A reports mean and median values of these variables, and Panel B outlines the Pearson correlation matrix. All financial data are collected from the *Report on Business (ROB)* database. The number of companies for each type may be smaller than the total number of companies belonging to that type due to missing values. The key firm-level control variables are Size, Leverage, R&D, Risk and Growth Rate. Size is defined as the logarithm of total assets; Leverage is defined as the ratio of long-term debt to total assets; R&D is defined as research and development expenditures divided by total assets; Risk is defined as the sum of squared standard error of the market model (taking into account $US/$C exchange rates) estimates; and Growth Rate is the firm's annualized growth rate of profits over the past five years. All variables are winsorized at 99% and 1% level.

Panel A **Summary Statistics of Firm-level Variables**

		MEAN				
Category	OBS	*Size*	*Leverage*	*R&D*	*Risk*	*Growth*
Widely held firms without controlling owners	1229	7.34	0.14	2.34	0.08	5.89
Firms controlled by stand-free controlling owners	777	7.29	0.17	1.28	0.08	6.04
Firms controlled by pyramid groups						
Wealthy Families or Individuals	168	9.33	0.31	0.36	0.07	5.41
Government Agencies	88	9.64	0.28	1.05	0.06	6.85
Corporations and Insitutions	329	8.27	0.18	1.17	0.08	3.41
Total / Overall Average	2591	8.38	0.22	1.24	0.08	5.52
		MEDIAN				
Category	OBS	*Size*	*Leverage*	*R&D*	*Risk*	*Growth*
Widely held firms without controlling owners	1229	7.72	0.16	0.05	0.07	0.61
Firms controlled by stand-free controlling owners	777	7.40	0.26	0.00	0.07	1.61
Firms controlled by pyramid groups						
Wealthy Families or Individuals	168	9.76	0.28	0.00	0.06	1.27
Government Agencies	88	10.10	0.27	0.00	0.06	2.01
Corporations and Insitutions	329	8.38	0.23	0.00	0.06	1.02
Total / Overall Average	2591	8.67	0.24	0.01	0.06	1.30

Panel B **Pearson Correlation Matrix**

	Size	Leverage	R&D	Growth	Risk
Size	1.000	0.237	-0.052	0.188	-0.122
Leverage		1.000	-0.104	0.060	-0.088
R&D			1.000	0.031	0.042
Growth				1.000	0.009
Risk					1.000

Table 4. Mean and Median Scores of Firm Performance Measures

Note: This table describes mean values and median scores of various performance measures across different types of firms. Return on Asset (ROA) is defined as income before depreciations, interests and taxes over total assets; Return on Equity (ROE) is defined as net income divided by book value equity; Tobin's Q (AVQ) is approximated as the sum of the market value of stocks and book value of debt divided by total assets. Membership in family-controlled pyramid groups is determined using 10% voting equity threshold. All variables are winsorized at 99% and 1% level.

All Pyramid Firms vs. Widely Held Firms	OBS	Mean	Median Scores	Maximum	Mininum
Return on Asset (ROA)					
Widely held firms	1229	0.21	0.53	0.98	-0.05
Pyramid firms	585	0.15	0.49	0.84	-0.03
Difference		**0.06**	**0.04**	0.14	-0.01
t-stat / z-stat		2.71	2.16		
Return on Equity (ROE)					
Widely held firms		0.18	0.53	1.86	-0.65
Pyramid firms		0.12	0.49	1.84	-0.53
Difference		**0.06**	**0.04**	0.02	-0.12
t-stat / z-stat		3.03	2.16		
Average Q Ratio (AVQ)					
Widely held firms		2.10	0.53	9.99	0.33
Pyramid firms		1.87	0.43	9.25	0.09
Difference		0.23	**0.09**	0.74	0.24
t-stat / z-stat		1.50	2.59		

Family-controlled Pyramid Firms vs. Widely Held Firms	OBS	Mean	Median Scores	Maximum	Mininum
Return on Asset (ROA)					
Widely held firms	1229	0.21	0.53	0.98	-0.05
Family pyramid firms	168	0.11	0.44	0.53	-0.01
Difference		**0.10**	**0.09**	0.44	-0.04
t-stat / z-stat		3.24	4.21		
Return on Equity (ROE)					
Widely held firms		0.18	0.54	1.86	-0.65
Family pyramid firms		0.09	0.45	1.73	-0.50
Difference		**0.09**	**0.09**	0.13	-0.15
t-stat / z-stat		3.91	3.89		
Average Q Ratio (AVQ)					
Widely held firms		2.10	0.53	9.99	0.33
Family pyramid firms		1.44	0.45	5.95	0.12
Difference		**0.66**	**0.08**	4.03	0.21
t-stat / z-stat		2.17	2.00		

Table 5. The Effect of Membership in Pyramid Groups on Firm Performance

Note: this table reports multiple regression results of membership in pyramid groups on firm performance, after controlling for firm-specific characteristics (Size, Leverage, R&D, Risk and Growth Rate) and fixed effects. Dummy variable *Pyramid* equals one if a firm belongs to a family-controlled pyramid group, and zero if the company is widely held without controlling owner. Model 1 is stepwise OLS regression; model 2 includes two industry dummy variables – Financial and Utilities – to control for heavily regulated sectors; model 3 is the generalized linear model that is heteroskedasticity-consistent and takes into account industry fixed effect, Model 4 is Heckman (1979) model that controls for self-selection bias. The 1st-stage Probit regressions estimate the probability that a firm joins a pyramid group, and the 2nd-stage regression estimates the performance impact of pyramidal structure. Chi-squared and t-statistics are reported below coefficients. The Instrumental Variable for the Heckman (1979) model, IV, is defined as the difference between this year's firm size and last year's firm size.

Family-controlled Pyramid Group Firms vs. Widely Held Companies without Controlling Shareholders

	ROA					ROE					AVQ				
	model (1)	model (2)	model (3)	model (4)	1st-stage Probit: Ownership	model (1)	model (2)	model (3)	model (4)	1st-stage Probit: Ownership	model (1)	model (2)	model (3)	model (4)	1st-stage Probit: Ownership
Constant	**0.163**	**0.179**	**0.180**	**0.170**	**-3.619**	0.128	**0.155**	0.122	0.098	**-3.882**	**0.788**	**0.628**	**0.821**	**1.346**	**-0.963**
	3.88	4.62	4.33	4.40	52.32	1.65	2.41	1.48	0.79	27.68	4.65	3.22	5.26	9.59	15.53
Pyramid (family-controlled)		-0.047	-0.050	-0.067			-0.037	-0.026	-0.035			-0.384	-0.927	**-1.227**	
		-1.33	-1.66	-1.34			-0.84	-0.92	-1.24			-1.57	-1.83	-3.23	
Lambda / Instrument				-0.061	-0.116				**-0.196**	**-0.330**				0.221	**-0.177**
				-0.37	1.91				-3.05	3.04				0.09	2.88
Size	**-0.048**	**-0.049**	**-0.049**	**-0.027**		**-0.061**	**-0.108**	**-0.066**	-0.032		**-0.124**	**-0.220**	**-0.128**	**-0.136**	
	-3.57	-4.11	-3.09	-2.20		-4.66	-5.44	-4.31	-1.70		-3.00	-4.86	-3.29	-5.33	
Leverage	**0.251**	**0.216**	**0.155**	**0.100**		0.097	0.099	0.105	0.068			-0.044	-0.093	-0.077	
	3.09	3.39	3.22	2.13		1.25	1.03	1.65	0.83			-0.31	-0.61	-0.54	
R&D	**0.069**	**0.069**	**0.066**	**0.076**		**0.103**	**0.109**	0.099	0.065		**0.101**	**0.095**	**0.092**	0.066	
	2.02	2.11	1.99	2.90		2.33	2.87	1.87	1.09		3.06	2.40	2.17	1.60	
Risk		0.033	0.051	0.023			-0.001	-0.050	-0.004			-0.554	-0.663	**-1.492**	
		0.20	0.32	0.28			-0.02	-0.25	-0.05			-1.41	-1.66	-4.31	
Growth		0.037	0.020		**-0.100**		0.022	-0.001		0.010		-0.008	-0.002		-0.053
		1.59	1.25		2.14		1.40	-0.26		0.08		-1.11	-0.33		1.76
Financial		-0.036			**0.124**		-0.009			**0.101**		0.971			**0.219**
		-0.32			5.99		-0.06			4.89		1.14			5.55
Utility		0.070			**0.120**		0.110			0.078		0.344			0.077
		0.09			4.47		0.59			1.83		0.46			1.11
Fixed Effect	NO	NO	YES	YES		NO	NO	YES	YES		NO	NO	YES	YES	
OBS	1362	1362	1362	1362		1362	1362	1362	1362		1362	1362	1362	1362	
Adjusted R2	**0.287**	**0.233**	**0.237**	**0.231**		**0.172**	**0.178**	**0.153**	**0.149**		**0.232**	**0.212**	**0.237**	**0.393**	

Table 6. Concentrated Ownership vs. Pyramidal structure

Note: this table reports multiple regression results of membership of pyramid groups on firm performance, after controlling for firm-specific characteristics (Size, Leverage, R&D, Risk and Growth Rate) and fixed effects. Dummy variable *Pyramid* equals one if a firm belongs to a family-controlled pyramid group, and zero if the company has a controlling owner who does not employ pyramidal structure. Model 1 is stepwise OLS regression; model 2 is the generalized linear model that is heteroskedasticity-consistent and takes into account industry fixed effect, and Model 3 is Heckman (1979) model that controls for self-selection bias.

Family-controlled Pyramid Group Firms vs. Firms with Stand-free Ultimate Owners

	ROA				ROE				AVQ			
	model (1)	model (2)	model (3)	1st-stage Probit: Ownership	model (1)	model (2)	model (3)	1st-stage Probit: Ownership	model (1)	model (2)	model (3)	1st-stage Probit: Ownership
Constant	**0.156**	**0.175**	**0.170**	**-2.818**	0.104	0.102	0.087	**-3.318**	**0.822**	**0.901**	**0.946**	**-1.263**
	2.69	3.88	3.21	33.80	1.65	1.48	0.67	31.37	5.22	6.71	6.90	22.75
Pyramid (family-controlled)		-0.049	-0.087			-0.010	-0.054			-0.327	-0.633	
		-1.27	-1.93			-0.30	-1.89			-0.79	-1.62	
Lambda / Instrument			-0.004	0.210			-0.136	**-0.399**			0.220	**-0.247**
			-0.05	1.09			-1.18	3.98			0.09	3.99
Size	**-0.043**	**-0.040**	**-0.017**		**-0.051**	**-0.057**	-0.021		0.064	**0.128**	0.103	
	-2.90	-2.68	-1.47		-3.40	-4.22	-1.24		1.28	2.29	1.65	
Leverage	0.151	**0.196**	0.008		0.094	0.149	0.083			-0.083	-0.066	
	1.88	2.37	0.48		1.44	1.97	1.23			-0.50	-0.35	
R&D	0.059	0.046	**0.080**		**0.114**	0.095	**0.085**		**0.100**	**0.093**	**0.095**	
	1.80	1.41	2.93		2.65	1.67	3.31		2.85	2.30	2.31	
Risk		0.050	0.024			0.052	0.008			-0.363	**-1.219**	
		0.37	0.28			0.25	0.07			-0.96	-3.75	
Growth		0.020		0.011		0.022		**0.113**		0.009		0.013
		1.19		0.73		1.38		2.82		0.73		0.75
Financial				**0.101**				**0.089**				**0.280**
				3.87				3.03				8.91
Utility				0.087				**0.158**				0.107
				1.79				5.21				1.43
Fixed Effect	NO	YES	YES		NO	YES	YES		NO	YES	YES	
OBS	1987	1987	1987		1987	1987	1987		1987	1987	1987	
Adjusted R2	**0.199**	**0.219**	**0.225**		**0.184**	**0.145**	**0.172**		**0.313**	**0.368**	**0.337**	

Table 7. The Effect of Position within Pyramid Groups on Firm Performance

Note: this table summarizes the impact of position of a pyramid group firm on its performance. Panel A presents t-test results of firm performance between high-tier and low-tier family-controlled pyramid group firms. The division is based on both LEV and RATIO. LEV is defined as the natural logarithm of a pyramid firm's position on the control chain, and RATIO is defined as the percentage ownership rights of the controlling shareholder in a pyramid firm divided by his/her control rights in the firm. High-tier firms are those with below-median LEV (0.602) and above-median RATIO (0.650), and low-tier firms are those with above-median LEV and below-median RATIO. All numerical variables are defined as previously.

Panel A: Comparison of Firm Performance

	OBS	ROA	ROE	AVQ
High-tier pyramid group firms	56	0.118	0.096	1.654
Low-tier pyramid group firms	66	0.103	0.085	1.258
Difference in Performance		0.015	0.011	**0.396**
T-value		0.79	1.02	2.10
Widely-held Firms	1229	0.210	0.180	2.100

Panel B: Position and Performance of Family-Controlled Pyramid Group Firms

	ROA	ROE	AVQ		ROA	ROE	AVQ
LEV	-0.070	-0.080	**-0.499**	**RATIO**	0.087	0.098	0.355
	-0.82	-0.24	-2.33		0.99	0.37	1.90
Size	**-0.024**	**-0.039**	-0.050	**Size**	**-0.023**	0.014	-0.107
	-2.46	-2.65	-0.78		-2.13	0.95	-1.06
Leverage	0.091	0.029	**-0.391**	**Leverage**	0.085	0.010	0.026
	1.93	0.44	-4.18		1.77	0.39	0.64
R&D	**0.045**	0.064	0.069	**R&D**	**0.070**	**0.086**	0.049
	2.02	1.73	0.53		4.43	2.72	0.53
OBS	122	122	122	OBS	122	122	122
R2	**0.217**	**0.098**	**0.198**	**R2**	**0.237**	**0.171**	**0.113**

Table 8. The Effect of Changes in Ownership on Firm Performance

Note: this table reports the cross-sectional regression results concerning the impact of ownership changes on firm performance, using a threshold of 10% voting equity. Binary variable Entry equals one for a pyramid group firm in 2003 that was initially widely held, and zero if the company remains stand-alone; binary variable Exit equals one for a firm that has exited from a pyramid group, and zero if the firm remains in its pyramid group; binary variable Family equals one for family-controlled pyramid group firms, zero otherwise. All numerical variables are as described previously.

Changes in Ownership and Firm Performance

	ROA	ROE	AVQ		ROA	ROE	AVQ
Constant	**0.161**	**0.112**	**1.303**	**Constant**	**0.221**	**0.197**	**1.972**
	4.22	3.33	5.35		6.63	4.82	12.44
Exit	0.060	**0.030**	-0.469	**Entry**	-0.042	-0.013	0.055
	1.17	2.27	-1.79		-0.61	-0.29	0.07
Exit * Family	0.010	0.008	0.033	**Entry * Family**	0.009	-0.019	-0.063
	0.69	0.77	0.23		0.92	-1.12	-0.42
Size	**-0.021**	**-0.029**	0.051	**Size**	-0.020	-0.013	0.127
	-2.13	-2.57	0.78		-1.89	-1.30	1.19
Leverage	-0.097	0.033	-0.139	**Leverage**	-0.086	0.020	-0.126
	-1.95	0.50	-1.52		-1.77	0.44	-1.63
R&D	0.035	**0.084**	0.072	**R&D**	**0.062**	**0.077**	0.059
	1.68	2.24	0.66		3.81	1.99	0.59
OBS	385	385	385	OBS	471	471	471
R2	**0.167**	**0.128**	**0.105**	**R2**	**0.311**	**0.173**	**0.211**