

Ownership Structure and Risk: A Canadian Empirical Analysis

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This study attempts to relate ownership structure to changes in corporate risk behavior for Canadian firms using seven competing risk measurement models and three ownership structure indicators selected to reflect the roles of the firm major players. Univariate and multivariate cross-sectional tests are conducted using a sample of 569 Canadian non-financial listed firms. This study tests the hypothesis that ownership structure of the firm is negatively related to its level of risk and that this relation is a complex and nonlinear one. We provide evidence that the ownership structure can explain the cross-sectional variation in the firm level of risk. A nonlinear relationship between managerial ownership and both total risk and systematic risk is uncovered, with higher risk-taking at lower and very high ownership levels, consistent with evidence of Chen and Steiner (1999) for U.S. non-financial firms.

Introduction

Most previous studies on corporate governance and ownership structure examine the problem of separation between ownership and management (e.g., Jensen and Meckling, 1976; Fama and Jensen, 1983a, 1983b). In particular, they relate the relationship between the ownership concentration and other variables such as firm performance (e.g., Morck, Shleifer, and Vishny, 1988), value (e.g., Slovin and Sushka, 1993), competitiveness (e.g., Gadhoum, 1999), and its usual financial decisions or policies (e.g., Stulz, 1988). Surprisingly, one issue has received little attention: the influence of corporate ownership on the risk-taking behavior of non-financial firms. Previous studies have failed to explicitly account for the potential association between measures of ownership dispersion and the firm's underlying risk

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exposure. Some studies, however, indicate a possible link between these two variables (e.g., Galai and Masulis, 1976; Smith and Stulz, 1985; Aggrawal and Mandelker, 1987). They show that when ownership is diffuse, for example, firm managers may tend to pursue strategies that do not maximize the wealth of shareholders. Such behavior eventually will impact the firm's operating risk (through the inefficient use of resources) as well as its financial risk exposure, given sub-optimal investments are made.

It is worth noting that the link between ownership structure and firm risk-taking was first evoked by Berle and Means (1932) and theorized by Mosen and Downs (1965) and Mosen et al. (1968). They argue that ownership-management separation leaves room for conflicting goals between owners and managers to arise because of the asymmetry between risk-taking and rewards. This asymmetry appears to take the form of greater incentives and expectation of rewards for the owners than for the managers in terms of risk-taking. Managers will opt to invest in less risky projects to protect their invested non-diversifiable human capital in the firm. Conversely, owners favor more risky projects to maximize the call option value embedded in their equity holding. Hence, it can be argued that the nature of and changes in corporate governance have potential implications for the firm's riskiness.¹ Such relationship is potentially valuable internally for firm managers and shareholders. It is even more useful externally for the active portfolio manager who adjusts his or her risk exposure to changes in the firm's risk-taking behavior in order to optimize his or her hedging related activities.

Despite the obvious importance of agency costs and their effect on firm risk-taking, little is known about the influence of managers and insiders on corporate risk-taking. To the best of our knowledge, only a few papers have directly addressed this issue for non-financial firms (e.g., Amihud and Lev, 1981; Chen and Steiner, 1999; Wright et al., 1999). We do note extensive research on this topic for financial firms such as banks (e.g., Saunders et al. 1990; Demsetz et al., 1997; Anderson and Fraser, 2000), depository institutions (e.g., Chen et al., 1998), savings and loans (S&Ls, e.g., Cebenoyan et al. 1995), thrifts (e.g., Cebenoyan et al., 1999), and insurance companies (e.g., Joan and Starks, 1993). Most of these papers have focused on the impact of management equity stakes on the performance and risk of the institution. In this context, this paper complements previous research in the U.S. It seeks to provide a comprehensive analysis of the relationship between the ownership struc-

¹ Furthermore, La Porta et al. (1998) and Stulz and Williamson (2001) document that other variables (legal system origins, culture, openness, and religion) are important factors in explaining shareholder rights, protection, and differences in corporate governance around the world. Roe (2000) argues that agency costs have been higher in social democracies favoring low-risk expansion and the avoidance of risky organizational change. Hence, the corporate risk-taking in a country could be related to its legal system type, culture, religion, democratic traditions, etc.

ture of non-financial Canadian firms and their underlying risk exposure, using different measures for both variables and controlling for their common variation under several specifications. Our investigation is interesting, given that ownership structure is concentrated in Canada whereas it is proven that U.S. firms are widely held.² The current research provides direct empirical evidence of the relationship between risk and ownership concentration variables by applying univariate and multivariate frameworks to Canadian data. In particular, we use a flexible and robust estimation methodology, Hansen's (1982) generalized method of moments (GMM). This approach does not require specific distributional assumptions on the variables (such as normality) and can handle both conditional heteroskedasticity and serial correlation in residuals. Our results indicate that the risk-exposure of a firm is negatively related to its ownership structure and that this relationship is highly driven by two specific measures: the historical variance and voting rights of the largest shareholders. Moreover, the relationship between risk and ownership is nonlinear (quadratic or cubic) where high-order moments of ownership variables impact the firm's level of total and systematic risk exposure.

Literature Review

Firm risk-taking is a central theme in corporate finance. Many financial scholars have argued that agency conflicts may significantly influence firm risk-taking. These conflicts stem from the separation of corporate ownership from control. This issue finds its genesis in Berle and Means (1932), which has generated much research on corporate governance. The striking feature that arises from the separation is the divergence of interests between control stake holders and cash-flow stake holders.

The nature and extent of those conflicts have been examined in the context of a variety of corporate features. For instance, researchers tried to demonstrate theoretically and empirically the motivational impact of the separation of ownership and control on risk-taking behavior. Monsen and Downs (1965) argue that the separation of ownership and control results in conflicting motivations among owners and managers, because of the asymmetry between risk and rewards. This asymmetry appears to take the form of greater incentives and rewards for the owners than the managers in terms of risk-taking. In addition, Monsen and Downs (1965) reason that the self-interest of managers in managerially oriented firms lies in maximizing the managers' utility functions. Managers pursue personal agendas where remuneration, power,

² Rao and Lee-Sing (1995) document a concentrated ownership for Canada. They show that 55 percent of Canadian firms in all size classes and in most industry groups are legally controlled by one or a small group of shareholders owning, directly or indirectly, more than 50 percent of the voting shares. In contrast, La Porta et al. (1998, 1999), Claessens et al. (2000, 2001), Faccio, Lang, and Young, (2001), and Stulz and Williamson (2001) provide evidence that U.S. firms are widely held.

security, and status are essential and may affect the firm's strategy choice and ultimately its risk behavior in the marketplace.

Demsetz and Lehn (1985) argue that within firms facing more uncertain environments, insiders' actions are less observable and thus the benefits of ownership are greater. For example, if information asymmetry is an increasing function of the uncertainty, it would suggest a positive relationship between business risk-taking and insider ownership. Accordingly, Amihud and Lev (1981) find that insiders with large stakes of corporate capital are less motivated by considerations of risk-aversion when evaluating merger opportunities. Further, Shleifer and Vishny (1986) suggest that equity blockholders theoretically can maximize value through the promotion of firm risk-taking. Hill and Snell (1988) provide evidence of a negative relation between corporate diversification and insider ownership, and consequently a positive relation between the latter and the firm's overall level of risk. According to different psycho-social studies,³ because insiders have invested much of their own human capital in the same firm, the risk-diversification pertaining to their human capital investment is almost nonexistent. It is not surprising that they opt for low-risk strategies that do not necessarily converge with shareholders' interests. Moreover, the time horizon for insiders is limited to the duration of their position, which is on average ten years, while the time horizon is unlimited for shareholders because of title transference. It is clear that insiders are inclined to establish investment strategies that will be effective and less risky during their tenure.

Other studies have documented that insider ownership is directly related to firm risk-taking. For instance, Wright et al. (1996) examine the influence of equity ownership structure on corporate risk-taking and report that insider holdings affect corporate risk-taking. Their results support the entrenchment hypothesis and the premise that financial and non-financial benefits and costs can induce corporate choices inconsistent with growth-oriented risk-taking. In this sense, insiders may promote risk-taking behavior to capitalize on industry growth opportunities. Chen and Steiner (1999) find that managerial ownership is a significant and positive determinant of the level of risk. In addition, Downs and Sommer (1999) find a significant positive relation between managerial ownership and risk.

Similarly, in a banking context, the empirical tests show mixed results on the relationship between managerial ownership and risk. In effect, Saunders et al. (1990) report positive linear relation between managerial ownership of large banks and their stock price volatility. In the same vein, Anderson and Fraser (2000) show that bank specific risks are significantly related to managerial holding. Similarly, Demsetz et al. (1997) document a statistically significant positive relationship between market-

³ Durkheim (1893) and Weber (1922) study the ownership structure and its consequences from a psycho-social point of view. More recently, Grabb (1990) following Porter's work (1956, 1957) examines the problem of ownership concentration in terms of equality or inequality of sharing economic wealth in the particular case of Canada.

based risk measures and managerial shareholding at the bank level. This evidence is reversed by the findings of Chen et al. (1998) suggesting inverse relationship between managerial ownership and various market-based risk measures. This supports the management's risk-averting behavior following an increase in their ownership within the institution. More recently, Attig, Fischer, and Gadhoun (2002) document that controlling shareholders tend to adopt aggressive risk-taking behavior to maximize the value of default options inherited to affiliated firms. Moreover, they can reduce their sensitivity to negative shocks caused by eventual losses, by increasing the number of layers separating them from such affiliates.

Indirect evidence on the effect of ownership on risk might be found in the empirical literature on stock liquidity. In fact, riskier stocks are less liquid. For instance, Easley et al. (1996) argue that high volume stocks tend to have a higher arrival rate of informed traders as well as uninformed traders, hence it is less risky. Chiang and Venkatesh (1988) report a positive relationship between insider ownership and spreads. In contrast, Glosten and Harris (1988) report an insignificant relationship between spreads and insider ownership. More recently, Sarin et al. (1997) document that higher insider and institutional ownership are both associated with wider spreads and smaller quoted depth. They suggest that the loss of liquidity is a consequence of adverse selection costs for insiders, while for institutional holdings it is a result of higher inventory carrying costs. More recently, Attig, Gadhoun, and Lang (2003) examine the association between block ownership and bid-ask spread and report a positive and significant relationship.

Overall, a positive relationship between firm risk-taking and the level of insider holdings might be expected. It supports the argument that corporate insiders may promote risk-taking decisions to capitalize on opportunities and, eventually, expropriate outsiders. Moreover, as insider ownership increases, corporate diversification is reduced. Consequently, this leads to a higher risk posture (e.g., Hill and Snell, 1988). On the other hand, as their stakes increase, insiders might not find it desirable to promote corporate risk-taking. Due to both financial and non-financial private benefits of control, insiders may inhibit risk-taking decisions. Inherent to financial benefits of control (mainly for entrenched insiders) are the threat of employment income loss and the risk of a non-diversified personal portfolio. Non-financial rewards may include the desire to enhance control on firm-investment, the desire to maintain a good reputation on the managerial market, even the appointment and attractiveness of the staff (e.g., Jensen and Meckling, 1976). In short, both pecuniary and non-pecuniary benefits of control may inhibit insiders' predisposition to undertake higher-risk strategies. It would be naïve to suppose, however, that insiders passively submit to these imposed disciplines. Because they serve as an interface between different partners because they have the ability to understand the aspirations of heterogeneous, uninformed partners, they can create an adversarial relationship

among partners by applying Machiavelli's divide and conquer principle, which may serve as an entrenchment strategy to escape control.

On balance, the influence of insider holdings on corporate risk-taking is somewhat ambiguous. Accordingly, the purpose of this paper will be to provide further insights into the association between corporate risk-taking and equity holding by insiders.

Methodology and Data

Our objective is to analyze the impact of the ownership structure on common risk measures and higher moments of return distributions. First, we outline the main hypotheses and define the relevant variables. Second, we present the proposed testing methodologies and describe the sample and its construction process.

Hypotheses

The conducted tests examine whether there exists a relationship or an association between the ownership structure of a company and its underlying level of risk. In other words, we investigate the question: Does the ownership structure explain the cross-sectional variation in the company risk level? To this end, we test two hypotheses on the relationship between ownership and risk:

- H1: The ownership structure of the firm is negatively related to its level of risk.
- H2: The relation between the ownership structure and risk-taking behavior of the firm is complex and nonlinear.

Definition of Variables

To analyze these issues, three ownership concentration measures are used (Gadhoun, 1999):

1. Ownership concentration (CONC) is measured by the sum of the voting rights held by the five largest shareholders:

$$CONC = \sum_{i=1}^5 \alpha_i \quad (1)$$

where α_i represents the voting rights of the shareholder i . Other measures of the concentration such as the Herfindahl measure, the entropy, or Gini indices are either less useful or impossible to use when one considers the empirical data used.⁴

2. Percentage of voting rights of outstanding common shares held by the largest shareholder (BLCL).

⁴ Unreported tests using the Herfindal measure (sum of the square of the holdings of the five largest shareholders) produce virtually the same results. Several studies such as Demsetz and Lehn (1985) and Bergstrom and Rydqvist (1990) use both measures and find no differences in results. They argue using the simple summation of ownership. We followed their path.

3. Percentage of voting rights of outstanding common shares held by the insiders, i.e., shareholders, who are executives or directors (INSIDE).

On the risk side, we use several measures to reflect the total, systematic, and idiosyncratic risks. Our objective is to examine different dimensions of risk and to assess the sensitivity of the results to several specifications. They are selected based upon modern portfolio theory, portfolio and risk management practices (e.g., Markowitz, 1991), and their application in similar contexts. Moreover, empirical evidence demonstrated that some of these measures proxy the true underlying risk of a company. Their construction relies on the CAPM and the single-index model and on the asset returns distributions.

1. The historical variance or volatility of asset return (HVAR) proxies the total risk and is computed as the variance of the monthly returns over the chosen period. We also use four alternative measures of total risk (coefficient of variation, skewness, kurtosis, and mean absolute deviation) as a test of robustness for potential association between ownership and total risk.⁵

2. The coefficient of variation (CV) is a second estimate of total risk. It is interpreted as a standardized measure of volatility and is defined as the ratio of historical standard deviation to the average return.

3. Skewness (SKEW) is a third estimate of total risk and a measure of asymmetry. Early tests of the extended CAPM by Kraus and Litzenberger (1976) have shown that this variable can significantly explain the cross-sectional variation in expected returns. Harvey and Siddique (2000) confirm this finding recently by using the flexible stochastic discount factor approach.

4. Kurtosis (KURT) is a fourth estimate of total risk and a measure of peakedness. If the company return variance varies from month to month (time-varying), the return distribution will have a higher peak and fatter tails, i.e., higher kurtosis. Fang and Lai (1997) provide evidence of the importance of this variable to explain the cross-sectional variation in expected returns. Their result is corroborated by Dittmar (2002) using a nonlinear asset pricing kernel that accounts for the fourth moment in asset return distribution that is consistent with intuitive preference restrictions (positive marginal utility and risk aversion, decreasing absolute risk aversion, augmented by decreasing absolute prudence).

5. Mean absolute deviation (MAD) is a fifth estimate of total risk. It is a measure of total variability and is computed as the average of the absolute deviations between the firm return and the average return.

6. Beta (BETA) is an estimate of the systematic risk. It is derived from the market model regression of the firm monthly excess (of one month Treasury-bill rate) return on a constant and on the monthly excess return of the value-weighted TSE

⁵ Chung et al. (2001) show that a high-order moment framework is appropriate when the asset return distribution diverges from normality.

index over a period of 60 months. Adjustments for infrequent trading effects, as suggested by Scholes and Williams (1977), are incorporated.

7. Residual variance (RESDV) is an estimate of the idiosyncratic risk. It is computed as the variance of the residual terms from the market model regression of the firm excess return on a constant and on the excess return of the value-weighted TSE index.

8. Control variables (TAILM, NBANM) are included to control for the common variation in the ownership and risk variables.⁶ They are selected based on their use in similar studies. The first variable represents the size of the firm, measured by the average value of the total assets. It has been used by Saunders et al. (1990), Chen et al. (1998), Chen and Steiner (1999), and Cebenoyan et al. (1999). The second variable indicates the number of analysts following the activities of the firm. Merton (1987) argues that such variable proxies the degree of asymmetric information and is relevant to explain the cross-sectional variation in expected returns.

Testing Methodologies

We examine the hypotheses using three empirical methodologies:

1. Univariate (parametric and non-parametric) correlation analysis on the ownership and risk measures to detect any significant association between these two variables. Although the results may convey some information on the nature of the relationship between the two variables, they should not be used to draw any serious inferences without further analysis. With the different estimates of each variable, this approach provides a robustness test of any potential relationships.

2. Multivariate canonical correlation analysis to identify and quantify the association between the two variables (Anderson, 1984).⁷ In addition, a correlation analysis was performed between these canonical variables and the original variables in each linear combination. This measure indicates the importance and significance of each variable in this multivariate framework.

$$\text{Corr}(U, V) = \frac{A' \Omega_{12} B}{(A' \Omega_{11} A)^{1/2} (B' \Omega_{22} B)^{1/2}} \quad (2)$$

where:

$U = A'Y$, $V = B'X$, $\Omega_{11} = \text{Cov}(Y)$, $\Omega_{22} = \text{Cov}(X)$, $\Omega_{12} = \Omega'_{12} = \text{Cov}(Y, X)$, Y , and X represent, respectively, the sets of the risk and ownership variables, and A and

⁶ We did consider adding the leverage to the set of control variables, but we found that leverage is not related to the three ownership variables in our sample.

⁷ It focuses on the correlation between a linear combination of the dimensions of the ownership structure and a linear combination of the dimensions of the risk (e.g., Fong and Vasicek, 1997). We determined which pair of linear combinations (canonical variables) had the maximum correlation. They measure the strength of any potential association.

B are, respectively, vectors of coefficients in each linear combination (canonical coefficients).

3. Simple and multiple regression models in order to test whether the ownership variables explain the cross-sectional variation in risk measures. This framework is extended with two control variables related to the size of the firm and the degree of the complexity in the decision process (also proxy for information completeness). Moreover, we explore the hypotheses of nonlinear association between risk and ownership variables by performing quadratic and cubic regressions. The results from these regressions will be analyzed with links to the nonparametric correlation analysis. We propose to test the following cross-sectional specifications:⁸

$$\text{Basic Models 1: } Y_i = \gamma_0 + \gamma_1 \text{CONC}_i + \varepsilon_{1i}, \quad (3)$$

$$\text{Basic Models 2: } Y_i = \beta_0 + \beta_1 \text{BLCL}_i + \varepsilon_{2i}, \quad (4)$$

$$\text{Basic Models 3: } Y_i = \lambda_0 + \lambda_1 \text{INSIDE}_i + \varepsilon_{3i}, \quad (5)$$

$$\text{Quadratic models 1: } Y_i = a_0 + a_1 \text{CONC}_i + a_2 \text{CONC}_i^2 + v_{1i}, \quad (6)$$

$$\text{Quadratic models 2: } Y_i = b_0 + b_1 \text{BLCL}_i + b_2 \text{BLCL}_i^2 + v_{2i}, \quad (7)$$

$$\text{Quadratic models 3: } Y_i = c_0 + c_1 \text{INSIDE}_i + c_2 \text{INSIDE}_i^2 + v_{3i} \quad (8)$$

$$\text{Cubic models 1: } Y_i = a_0 + a_1 \text{CONC}_i + a_2 \text{CONC}_i^2 + a_3 \text{CONC}_i^3 + e_{1i} \quad (9)$$

$$\text{Cubic models 2: } Y_i = b_0 + b_1 \text{BLCL}_i + b_2 \text{BLCL}_i^2 + b_3 \text{BLCL}_i^3 + e_{2i}, \quad (10)$$

$$\text{Cubic models 3: } Y_i = c_0 + c_1 \text{INSIDE}_i + c_2 \text{INSIDE}_i^2 + c_3 \text{INSIDE}_i^3 + e_{3i} \quad (11)$$

where $Y \in \{\text{HVAR}, \text{RESDV}, \text{BETA}, \text{CV}, \text{MAD}, \text{SKEW}, \text{KURT}\}$ is the set of risk dependent variables and $i = 1, \dots, L$ where L stands for the number of companies in the sample. All of the above models are further extended by introducing the two control variables TAILM and NBANM.⁹

All the error terms may not be *iid* (identically and independently distributed) and are allowed to have general forms of autocorrelation and conditional heteroske-

⁸ Our study relies only on cross-section data and does not use time-series observations across firms. Consequently, there is no need to test for firm-specific effects, which is also not feasible given the data available. Besides, Zhou (2001) argues that fixed effects have not to be included because ownership is stable over time.

⁹ We did consider accounting for industry effects in our specifications. To test the industry effect on ownership, we classify firms of our sample in 17 industries and we run three tests: the statistic of Wilks, Kruskal-Wallis test and the Scheffe test. The three tests converge to show little, if any, impact of industry on ownership. We do not report these tests herein to conserve space. Industry effect on risk is captured by the variable NBANM used in the regressions. NBANM is industry specific and may be enough to capture the industry effects; analysts follow more complex and riskier firms.

dasticity. The parameters of all equations are estimated using Hansen's (1982) generalized method of moments (GMM).¹⁰ The point estimates are identical to those that could be obtained with the least squares method. The constructed t-statistics are robust to heteroskedasticity and autocorrelation of unknown forms (e.g., Newey and West, 1987).¹¹

Sample Description and Construction

A sample of 569 publicly traded Canadian companies is constructed based upon two types of information. The first one is related to the ownership structure over the period 1989-1991 and includes the three mentioned variables (CONC, BLCL, and INSIDE).

There is no viable database on ownership of Canadian firms. Data on the identity and size of holdings of the five largest shareholders are collected manually. Six hundred Canadian firms are randomly selected from a databank named *Stock-Guide*. The following are eliminated: 21 foreign firms, 18 firms which had priced only preferential shares, and five mutual funds. Of the 556 remaining firms, information which pertained to the identity and percentage of voting rights held by the five largest shareholders is obtained from three sources: (1) *The Financial Post* (FP), "Survey of Industrials" and "Survey of Mines and Energy Resources," 1989, 1990, 1991; (2) *Stock-Guide* (where information is collected from proxy circulars), under the heading "Corporate Profile," 1989, 1990, 1991; (3) *Intercompany Ownership in Canada* (LP) from Statistics Canada, 1989 and 1991.

The information is processed in two stages. In the first stage we verify whether the three sources concurred with both the principal shareholder's identity and the size of each block of shares owned or controlled. Each time the sources held contradictory information on the identity or the size of the block, the data are treated in a second stage. The objective in this second stage is to reconcile disagreements among information sources through additional research. The procedure is to reverse the process while checking whether the shareholder participated in the firm.

After the second stage, the number of observations that satisfied our sample criteria is 338 for the year 1989, 365 for 1990, and 348 for 1991. The percentage of

¹⁰ This general and flexible technique has become the common approach to estimate and test asset pricing models that imply conditional moment restrictions, even in the presence of nonstandard distributional assumptions. It is an alternative to the maximum likelihood approach with no requirement to specify the law of motion of the underlying variables.

¹¹ The estimation of the parameters is conducted by minimizing a quadratic form based on the vector of moment conditions constructed using the risk and ownership variables and a well-defined optimal weighting matrix. The goodness of fit of the estimation is computed using the J-statistic. It is the minimized value of the constructed quadratic form (See Hansen, 1982 for more details).

rejections corresponds, respectively, to 40 percent, 35 percent, and 37 percent, with the average equal to 37 percent.

The second type of data relates to firm and market returns over 1989-1993. Because of gaps in the information, some screening rules are applied to all series to ensure reliable estimates of the designed variables (means, medians and higher moments). These are obtained from the TSE Western database. The “individual firm return” is the fully adjusted (for distributions) return based on purchasing a share at last month’s closing price and selling it at this month’s closing price. The market return is a return on a value-weighted index of all common stocks in the database. Returns used in this index are also fully adjusted for distributions. In addition, two control variables are selected. The first one is the size of the company measured by the average of total assets, taken from Stock-Guide. The second one is the number of financial analysts who follow the firm’s progression, extracted from the Institutional Brokers’ Estimate System (I/B/E/S).

Empirical Results

Descriptive Statistics

Table 1 reports the summary statistics for the whole sample regarding the intensity and identity of the average ownership in Canada, as well as several risk measures. It indicates that the concentration of ownership is high in Canada. The five largest shareholders own about 54 percent of all voting rights, whereas the largest shareholder owns on average more than 43 percent of the voting rights making him or her very powerful. In 50 percent of the cases, the largest shareholder holds more than 40 percent of the firm’s voting rights. Only 13 percent of the sampled firms are manager controlled. Within this group, the principal shareholder holds less than 15 percent of the voting rights (results not reported). Table 1 also reveals that the principal shareholder is almost in all cases an insider (CEO, chairman, honorary chairman, or a key executive officer). Data not reported here show a 96 percent significant correlation between ownership and voting rights. Gadhoum (1999) used a two-factor ANOVA to test the stability of ownership concentration over time. He found conclusive results about intra-period variability whereas the inter-period variability is small.

For the various risk measures, the historical variance shows consistent patterns over the three time periods. During the 1989-1993 period, the annual historical variance (HVAR3) ranges from 1.08 percent to 287.76 percent, with an average of 2.64 percent. During the same period, the average residual risk is 2.52 percent per annum between a minimum of 0.96 percent per annum and a maximum of 284.16 percent per annum. Statistics on the coefficient of variation (average of 5.48) and the mean absolute deviation (average of 11.52 percent per annum) are also provided. Moreover, the return distribution statistics (skewness and kurtosis) indicate that on average the distribution is slightly positively skewed (skewness equals 0.7734) with

fat tails (kurtosis equals 2.3678). The only systematic risk measure, the beta, shows an average of 1.41 that ranges from a minimum of -8.34 to a maximum of 15.98. Finally, the normality test of Jarque-Bera based on chi-square statistics with two degrees of freedom indicates significant deviations of all the series distributions from normality. This is consistent with previous empirical evidence on the non-normality of equity returns distribution (e.g., He and Leland, 1993).

The number of observations already differs from one year to another. When we use the three years at the same time N can be bigger than the N of each year (because an observation eliminated in one year following our criteria can be not eliminated in an other year because the same criteria are then respected) but must be less than 556. And when it comes to test for association of the ownership with another variable, N will be obviously the minimum of observations for each couple of variables. This intersection will differ every time we change variables. The only alternative to this is to choose the same N for all the study which give us fewer degrees of freedom and may create some selection bias.

Table 1—Descriptive Statistics

This table reports descriptive statistics for the ownership and risk measures. The ownership variables include CONC (sum of the voting rights held by the five largest shareholders), BLCL (percentage of voting rights of outstanding common shares held by the largest shareholder), and INSIDE (percentage of voting rights of outstanding common shares held by the insiders). They are estimated over the period 1989 to -1991. Seven measures of total risk are constructed, the historical variance (HVAR1, HVAR2, HVAR3, estimated over three time horizons 1989-1991, 1989-1992, and 1989-1993, respectively), the coefficient of variation (CV), the mean absolute deviation (MAD), and the skewness (SKEW) and kurtosis (KURT) of asset returns. The last four measures are estimated over 1989-1993. The residual variance RESDV is an estimate of non-systematic risk obtained using the market model. The beta measure of the systematic risk is estimated using the market model with an adjustment for infrequent trading suggested by Scholes and Williams (1977). The Jarque-Bera normality test is based on chi-square statistic with two degrees of freedom. The total number of observations varies across the different variables reflecting adjustments for missing return information

Variable	Mean	Standard Deviation	Minimum	Maximum	Jarque-Bera*	N
CONC (%)	53.7940	23.5630	0.0000	100.0000	10.15	477
BLCL (%)	41.4770	23.4290	0.0000	100.0000	17.64	477
INSIDE (%)	39.4530	29.4050	0.0000	100.0000	26.59	476
HVAR1	0.0022	0.0036	0.0007	0.2999	5283.99	220
HVAR2	0.0023	0.0034	0.0009	0.2477	1787.13	214
HVAR3	0.0022	0.0031	0.0009	0.2398	2325.81	210
CV	5.4764	53.4438	-438.2357	403.6100	15563.00	210
MAD	0.0092	0.0051	0.0229	0.2806	93.86	210
SKEW	0.7734	0.9010	-0.7492	5.7597	233.56	210
KURT	2.3678	4.2608	-0.7934	39.4033	7200.54	210
RESDV	0.0021	0.0030	0.0008	0.2368	2120.37	401
BETA	1.4090	2.2351	-8.3424	15.9799	2488.87	401

* Normality test. All the variables are significant at the 0.01 percent level

Correlation Analysis

Table 2 reports the Pearson and Spearman correlations between the different measures of ownership concentration and risk for all the selected firms. They show consistent patterns of significant negative association between the total risk measures (historical volatility, mean absolute deviation, and skewness) and the three ownership variables. In particular, the firm's historical variance is a decreasing function of the voting rights held by the largest shareholder (-0.144 at the 5 percent level) or those held by insiders (-0.155 at the 5 percent level). When concentration increases, i.e., when shareholders have sufficient incentives to efficiently and directly control managers, the firm total risk as measured by the mean absolute deviation is expected to decline. The parametric correlations, however, indicate the absence of any relationship between concentration and the systematic or the idiosyncratic risks (all the coefficients are non-significant).

Table 2—Parametric and Non-Parametric Correlation between Ownership Concentration and Risk Measures

This table reports parametric and non-parametric correlations between the three ownership variables and the nine risk measures. The ownership variables include CONC (sum of the voting rights held by the five largest shareholders), BLCL (percentage of voting rights of outstanding common shares held by the largest shareholder), and INSIDE (percentage of voting rights of outstanding common shares held by the insiders). They are estimated over the period 1989-1991. The nine risk measures of total, systematic, and non-systematic risk are constructed over three time horizons, 1989-1991, 1989-1992, and 1989-1993. They are: HVAR1, HVAR2, HVAR3, CV, MAD, SKEW, KURT, RESDV, and BETA. The total number of observations varies across the different calculations reflecting the differences in terms of the number of common observations and is given below the correlations in parentheses

Variable	Parametric Correlations			Non-Parametric Correlations		
	CONC	BLCL	INSIDE	CONC	BLCL	INSIDE
HVAR1	-0.029 (202)	-0.059 (202)	-0.053 (201)	-0.090 (202)	-0.140** (202)	-0.033 (201)
HVAR2	-0.018 (194)	-0.046 (194)	-0.069 (193)	-0.106 (194)	-0.151** (194)	-0.059 (193)
HVAR3	-0.103 (193)	-0.144** (193)	-0.155** (192)	-0.161** (193)	-0.208*** (193)	-0.095 (192)
CV	-0.053 (193)	-0.014 (193)	-0.043 (192)	-0.056 (193)	0.117 (193)	-0.096 (192)
MAD	-0.144** (193)	-0.207*** (193)	-0.162** (192)	-0.188*** (193)	-0.233*** (193)	-0.106 (192)
SKEW	-0.063 (193)	-0.136* (193)	-0.158** (192)	-0.061 (193)	-0.131 (193)	-0.102 (192)
KURT	0.000 (193)	-0.042 (193)	-0.085 (192)	0.079 (193)	-0.034 (193)	-0.010 (192)
RESDV	-0.031 (374)	-0.087 (374)	-0.127 (373)	-0.132 (374)	-0.170** (374)	-0.082 (373)
BETA	0.006 (374)	-0.010 (374)	0.036 (373)	0.049 (374)	0.034 (374)	0.113** (373)

* Correlation is significant at the 10 percent level (two-tailed)

** Correlation is significant at the 5 percent level (two-tailed)

*** Correlation is significant at the 1 percent level (two-tailed)

When non-linearities are assumed in this relationship, the negative association is confirmed with higher significance levels. In particular, the firm's non-systematic risk is negatively related to the level of ownership held by the largest shareholder. In contrast, when the insider shareholder's ownership level increases, the firm's market risk (beta) also increases. Such surprising results could be explained by the fundamental and crucial role played by executives or directors in making risk-taking decisions. Thus, increasing levels of ownership (convergence of management and control within the firm) may produce negative effects on the small shareholders' interests. A negative market perception (reaction) is then expected to cause an increase in the firm's systematic risk level.

Canonical Correlation Analysis

Table 3 summarizes results of the canonical correlation analysis. It indicates a significant maximum canonical correlation of 0.3869 between two linear combinations of the risk and ownership concentration variables. Three individual dimensions of each variable are selected: all the concentration measures and a set representing one estimate for each type of risk (total, systematic, and idiosyncratic). These linear combinations are dominated, respectively, by the concentration measures of the voting rights for the five largest shareholders (positive standardized canonical coefficient equals 0.8116) and the historical variance estimated over 1989-1993 (negative standardized canonical coefficient equals -0.9992). In contrast, the systematic risk measure plays little role in the constructed risk linear combination. Moreover, both linear combinations have the highest correlation with these two canonical variables (0.9766 for CONC and -0.9922 for HVAR3). But the ownership linear combination is negatively correlated with all three risk canonical variables (-0.4022, -0.0276, and -0.1405). These results produce evidence of a significant negative association between the firm ownership concentration and its underlying risk exposure, which is mainly driven by the CONC and HVAR3.

Regression Results

Different regression models are tested. Our dependent variables consist of several measures of risk, whereas the independent variables include the ownership concentration. The results in Table 4 indicate that the ownership variables (BLCL and INSIDE) explain the cross-sectional variation in the level of the firm's total risk as measured by the historical variance estimated over 1989-1993, HVAR3. The slope coefficients estimated using the generalized method of moments (GMM) are negative and significant. (The standard errors are adjusted for heteroskedasticity and serial correlation.) The same results persist using the mean absolute deviation, but they are not significant with the coefficient variation. (The regression statistics are not reported.) When the systematic risk variable (beta) is used, however, none of the ownership variables is significant. Such results are consistent with the linear correla-

Table 3—Canonical Correlation Analysis

Three ownership concentration measures and three risk variables are retained for the canonical correlation analysis. The ownership variables include CONC (sum of the voting rights held by the five largest shareholders), BLCL (percentage of voting rights of outstanding common shares held by the largest shareholder), and INSIDE (percentage of voting rights of outstanding common shares held by the insiders). They are estimated over the period 1989-1991. The risk measures are the total variance (HVAR3), the residual variance (RESDV), and the beta (BETA), estimated over 1989-1993. This technique provides the correlation between a linear combination of the ownership concentration measures and a linear combination of the risk variables

	Canonical Correlation	Adjusted Canonical Correlation	Approximate Standard Error
	0.4054*	0.3869	0.0598
Variables	Standardized Canonical Coefficients	Correlation with their Canonical Variables	Correlation with the Alternative Canonical Variables
CONC	0.8116	0.9766	0.3959
INSIDE	0.0026	0.6908	0.2800
BLCL	0.2698	0.7620	0.3089
HVAR3	-0.9992	-0.9922	-0.4022
RESDV	0.1250	-0.0680	-0.0276
BETA	-0.0495	-0.3465	-0.1405

* Correlation is significant at the 0.01 percent level

tion analysis. Furthermore, when the two control variables are added to the regression models, the size and the number of analysts have negative coefficients with significant impact on risk. These results confirm the fact that as the insiders' holdings increase, they will not find it desirable to promote corporate risk-taking. As previously explained, both financial and non-financial private benefits of control may create incentives for corporate insiders that are inconsistent with higher-risk strategies.

In the light of these results and in order to investigate our assumptions of a nonlinear association between risk and ownership, we conduct several quadratic and cubic regressions. Only the significant ones (where F test is significant) are reported in Table 5.¹³ The results confirm our hypothesis. The volatility of firm returns is a cubic function of the percentage of voting rights of outstanding common shares held by insiders (shareholders who are executives or directors). This relationship is robust across the three time periods. On the other hand, the beta is a quadratic and a significant function of both the percentage of voting rights of outstanding common shares held by the largest shareholder and the percentage of voting rights of outstanding common shares held by the insiders. This corroborates the evidence provided by the nonparametric correlation analysis of significant positive association between systematic risk and INSIDE.

Table 4—Regression Analysis

Several regression models are proposed and tested using the generalized method of moments (GMM). The dependent variables include the historical variance estimated over the three horizons (HVAR1, HVAR2, and HVAR3) and the beta. The independent variables are the three ownership concentration measures: CONC (sum of the voting rights held by the five largest shareholders), BLCL (percentage of voting rights of outstanding common shares held by the largest shareholder), and INSIDE (percentage of voting rights of outstanding common shares held by the insiders). They are estimated over the period 1989-1991. Extended regression equations are also tested with two additional variables: TAILM (the average value of the total assets or firm size) and NBANM (the number of analysts following the firm) that control for the firm size and any information effects, respectively. The associated t-statistics are presented in parentheses below. The coefficient estimates are robust to heteroskedasticity and serial correlation of unknown forms (Newey and West, 1987). The J-test is constructed using the optimal weighting matrix proposed by Hansen (1982)

	Constant	CONC	BLCL	INSIDE	TAILM ^a	NBANM	N	J-test
HVAR1	0.0225*** (3.5612)	-0.0000 (-0.3112)					202	0.000
	0.0239*** (4.1936)		-0.0001 (-0.5961)				202	0.000
	0.0228*** (5.4320)			-0.0001 (-0.6097)			201	0.000
	0.0241*** (3.4010)	-0.0001 (-0.4436)			-2.6900*** (-2.7988)		188	0.000
	0.0213*** (3.9497)	0.0001 (0.1102)				-0.0007*** (-2.6941)	126	0.000
	0.0193*** (3.4991)	0.0000 (0.3811)			-0.2850 (-1.1620)	-0.0007** (-2.2970)	118	0.000
	0.0228*** (3.5612)	-0.0000 (-0.3112)					194	0.000
HVAR2	0.0241*** (4.6239)		-0.0001 (-0.4829)				194	0.000
	0.0243*** (6.0071)			-0.0001 (-0.7868)			193	0.000
	0.0251*** (4.0163)	-0.0001 (-0.5023)			-2.7500*** (-3.1143)		186	0.000
	0.0189*** (4.1674)	0.0000 (0.6954)				-0.0006** (-2.4870)	124	0.000
	0.0188*** (3.8406)	0.0000 (0.5356)			0.2450 (-0.9415)	-0.0006** (-2.4790)	119	0.000
	0.0275*** (4.7746)	-0.0001 (-1.2970)					193	0.000
	0.0286*** (6.4322)		-0.0002** (-2.2333)				193	0.000
HVAR3	0.0271*** (6.1730)			-0.0002** (-2.1814)			192	0.000
	0.0305*** (5.1424)	-0.0002* (-1.6781)			-2.9800*** (-3.8844)		190	0.000
	0.0224*** (3.6284)	0.0000 (0.2310)				-0.0008** (-2.6305)	122	0.000
	0.0234*** (3.4206)	0.0000 (0.0629)			-0.2940 (-0.6213)	-0.0008*** (-2.5028)	120	0.000

Table 4 (cont.)—Regression Analysis

BETA	1.3230*** (4.1633)	0.0005 (0.1069)			374	0.000
	1.3888*** (5.4009)		-0.0009 (-0.1999)		374	0.000
	1.2440*** (6.7984)			0.0028 (0.8841)	373	0.000
	1.3470*** (3.6425)	-0.0014 (-0.2508)		-86.1000* (-1.9200)	322	0.000
	0.9670*** (5.0793)	0.0063*** (2.4396)		-0.0148* (-1.8046)	175	0.000
	0.9949*** (4.6179)	0.0070** (2.4137)		-12.5000 (-0.5984)	159	0.000
				-0.0162* (-1.7983)		

^a All the TAILM coefficients are multiplied by 10¹⁰

* Correlation is significant at the 10 percent level (2-tailed)

** Correlation is significant at the 5 percent level (2-tailed)

*** Correlation is significant at the 1 percent level (2-tailed)

Conclusion

Relatively little attention has been devoted in the literature to the relationship between the firm's level of risk and its underlying ownership structure. This study examines the potential association between the ownership dispersion of a company and its underlying risk in Canada. Using a robust estimation methodology, the generalized method of moments (GMM), we find evidence that the risk of a firm is negatively related to its ownership structure and that this relationship is highly driven by two measures: the historical variance and the sum of the voting rights held by the five largest shareholders. Moreover, the relationship between risk and ownership is nonlinear (quadratic or cubic) where high-order moments of ownership impact the firm's levels of total and systematic risk.

Overall, our results reveal that diffuse firms have higher risk as suggested by larger historical variance of stock returns. A plausible explanation for such results stems from the fact that corporate ownership in Canada is concentrated. Indeed, controlling shareholders, holding non-diversifiable invested wealth, may avoid risky projects that are desirable from the perspective of minority interests to protect their family's dynasty and personal utility. The upshot is that, in Canada, diffused ownership is associated with higher risk and eventually with high corporate value. Our results corroborate those obtained by Chen and Steiner (1999) for U.S. non-financial firms where managerial ownership is positively associated with risk-taking, but we cannot draw clear implications from this relation. Much more research is needed to assess the effect of ownership on risk.

Nevertheless, our results emphasize the importance of further research regarding the influence of corporate ownership structure on firm risk-taking. For instance, the analysis of ultimate ownership structure should provide further insight into how corporate risk-taking is contingent upon the presence of the ultimate owner's stakes and their types. Exploring the association between the separation of ultimate control

Table 5—Selected Quadratic and Cubic Regression Models

This table reports results on selected regression models estimated using the generalized method of moments (GMM). The dependent variables include the historical variance estimated over the three horizons (HVAR1, HVAR2, and HVAR3) and the beta (BETA). The independent variables are the two ownership concentration measures, their squares, and their cubic: BLCL (percentage of voting rights of outstanding common shares held by the largest shareholder) and INSIDE (percentage of voting rights of outstanding common shares held by the insiders). They are estimated over the period 1989-1991. Only the significant results are presented. The associated t-statistics are presented in parentheses below. The coefficient estimates are robust to heteroskedasticity and serial correlation of unknown forms (Newey and West, 1987). The J-test is constructed using the optimal weighting matrix proposed by Hansen (1982)

	Constant	BLCL	BLCL ²	INSIDE	INSIDE ² ^a	INSIDE ³ ^a	N	J-Stat
HVAR1	0.0193*** (5.8315)			0.0014** (2.4322)	-0.0050** (-2.5984)	0.0000** (2.5566)	201	0.000
HVAR2	0.0220*** (5.7714)			0.0009* (1.6491)	-0.0030* (-1.9015)	0.0000* (1.9320)	193	0.000
HVAR3	0.0225*** (5.5060)			0.0011** (2.0974)	-0.0030** (-2.2359)	0.0000** (2.1438)	192	0.000
BETA	0.9886*** (3.1697)	0.0242* (1.8565)	-0.0003** (-1.9829)				374	0.000
	1.0218*** (6.2814)			0.0262*** (2.4857)	-0.0290** (-2.1290)		373	0.000
	0.8893*** (6.4400)			0.0684* (2.0405)	-0.1600 (-1.6185)	0.0010 (1.3697)	373	0.000

^a All the INSIDE² and INSIDE³ coefficients are multiplied by 10³

* Significant at the 10 percent level (2-tailed)

** Significant at the 5 percent level (2-tailed)

*** Significant at the 1 percent level (2-tailed)

from the ultimate ownership and corporate risk-taking may provide interesting results. Such a relation is currently under investigation.

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