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A Revealed Preference Approach to Understanding Corporate Governance Problems: Evidence from Canada

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A REVEALED PREFERENCE APPROACH TO UNDERSTANDING CORPORATE GOVERNANCE PROBLEMS: EVIDENCE FROM CANADA

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A REVEALED PREFERENCE APPROACH TO UNDERSTANDING CORPORATE GOVERNANCE PROBLEMS: EVIDENCE FROM CANADA

Abstract

By studying the gap between the discount rates used by executives and shareholders, we assess the extent to which governance problems distort firm behavior. The estimation strategy recovers discount rates used by executives from the pattern of their actual investment spending. Our empirical work is based on panel data for 193 Canadian firms. For the firms most likely to be affected by Free Cash Flow agency problems, investment behavior appears to be guided by discount rates that are less than the market rate by 350-400 basis points. This wedge is reduced for firms with a concentrated ownership structure. Firms in our sample facing Free Cash Flow problems have a stock of fixed capital approximately 7 per cent to 22 per cent higher than would prevail under value maximizing behavior.

Keywords: corporate governance, business investment, discount rates.

JEL Classification: G3, E2.

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A Revealed Preference Approach To Understanding Corporate Governance Problems: Evidence From Canada

1. Introduction

This paper proposes a "revealed preference" approach for examining corporate governance problems in terms of discount rates. As established by many theories, governance problems have a direct and immediate impact on the effective discount rate guiding investment decisions made by executives. Our approach uses actual investment spending on business plant and equipment, and uncovers the discount rates guiding investment behavior. By comparing the discount rates used by executives and shareholders, we generate new evidence quantifying the extent to which governance problems distort firm behavior.

Our analysis distinguishes between discount rates used by shareholders and those used by corporate executives. Shareholders' discount rates have been studied by many researchers usually in terms of the relations among stock prices, dividends, and earnings.[1] As noted by Stein (1996) and Dow and Gorton (1997), biases in shareholders' discount rates have no necessary implications for those used by corporate executives. The latter discount rates are critical for determining investment spending, and hence are key to understanding governance issues and possible distortions of firm behavior.

This paper generates evidence bearing on governance problems by examining actual patterns of investment spending to reveal the effective discount rate used by executives. Governance problems arise from divergent incentives and asymmetric information between owners and executives. These conflicts, coupled with the impossibility of writing contracts covering all future contingencies, lead to unresolved governance problems affecting firm behavior (Hart, 1995). The Free Cash Flow model of Jensen (1986) emphasizes that executives have interests that differ from those of owners and pursue projects that, when evaluated at the market discount rate used by shareholders, have negative net present value (NPV). Such a departure from value maximization can be interpreted in terms of an effective discount rate that is low relative to the shareholders' discount rate. While acknowledging the potential difficulties caused by agency conflicts, an alternative set of theories holds that pressures operating through the capital, product, and factor markets are sufficiently strong to largely overcome these problems.[2] From the perspective of this Perfect Markets model,

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[1] For example, see Daniels and Morck (1995) for Canada, Hall and Hall (1993) for the United States, and references cited therein.

[2] See Alchian (1950), Demsetz and Lehn (1985), and Miller (1997). Relying on legal protections (possibly determined as the outcome of competition among states) to defend the interests of owners,

financial markets allocate resources efficiently and investment decisions and discount rates remain unbiased by potential governance problems. In this paper, we compare executives' and shareholders' discount rates in order to shed light on these theories of corporate governance.

The econometric equation that is the basis for our empirical work is developed in the next two sections. Section 2 begins with the net present value rule used in capital budgeting and, after suitable transformation, develops an estimating equation that links investment spending, discount rates, and governance problems. This estimating equation is equivalent to the Euler investment equation. Section 3 discusses specification issues, and shows how information from the transformed net present value rule and variation in firm-level panel data can "reveal" the effective discount rate guiding investment decisions. With adjustments for risk and depreciation, we estimate the gap between the discount rates used by executives and shareholders by sorting firms into mutually exclusive and exhaustive contrasting classes based on firm characteristics identified in the literature as indicating governance problems (e.g., firms with high free cash flow and poor investment opportunities).

Section 4 discusses the sources and construction of the variables in our panel dataset containing 193 Canadian firms. Canada is a useful "laboratory" in which to study corporate governance in light of the recent challenge to the Berle-Means perspective advanced by La Porta, Lopez-de-Silanes, and Shleifer (1999). They argue that the Berle-Means firm with widely-dispersed ownership is the exception rather than the rule for industrialized and industrializing economies. The notable exceptions are the United Kingdom and the United States where 90% and 80%, respectively, of the largest firms are widely held. These prototypical Berle-Means economies contrast with a comparable sample average of 24%.[3] However, the Canadian economy occupies an exceedingly useful middle ground with 50% of large firms being widely held. Consequently, there is a notable amount of institutional variation with which to study corporate governance issues. The existence of concentrated share ownership in Canada and interrelated groups of Canadian firms (somewhat similar to the Japanese keiretsu) allow us to assess the sensitivity of the executives' discount rates to these distinctive institutional structures.

Empirical results are contained in the next two sections. In Section 5, we reject the Perfect Markets model, but find strong support for the Free Cash Flow model. "Jensen firms" -- those firms most likely to suffer from the agency costs of free cash flow discussed by Jensen (1986) -- have risk-adjusted discount rates 350-400 basis

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Carney (1997), Easterbrook and Fischel (1991), and Romano (1993) reach a similar conclusion about the corporate governance system in the United States.

[3] The ownership figures are from La Porta, Lopez-de-Silanes, and Shleifer (1999, Table II.B).

points lower than the discount rates used by shareholders. With the economic and statistical significance of Free Cash Flow problems established, Section 6 assesses the ability of various mechanisms to attenuate these problems. We document that concentrated ownership is associated with higher (less distorted) discount rates for Jensen firms.

Section 7 applies our procedure for estimating effective discount rates to capital structure issues. In a recent survey of the literature, Myers (2001) emphasizes that a unified theory of capital structure applicable to all firms has not emerged, and lists the Free Cash Flow and Pecking Order models as two of the leading theories. Does our evidence favoring the Free Cash Flow model, preclude the empirical importance of the financing problems highlighted by the Pecking Order model? We measure the distortions associated with these models in terms of discount rates estimated from a common framework, and find that, for some firms at some times, Free Cash Flow problems are important, while at other times, perhaps for the same firm, Pecking Order problems are important.

Section 8 presents a summary and conclusions. By comparing executives' and shareholders' discount rates, we document that governance problems of the sort emphasized by Jensen's Free Cash Flow model are substantial and reduced by the close monitoring afforded by concentrated ownership. The capital stock of Jensen firms identified in this study is approximately 7% to 22% too large because of governance problems.

2. The Net Present Value Rule And The Euler Investment Equation

The general principle guiding our estimation strategy is to infer discount rates used by corporate executives from the patterns of their actual investment spending. The estimating equation is based on the net present value (NPV) rule used in capital budgeting that links investment spending, discount rates, and corporate governance problems. This section shows how a simple transformation of the NPV rule generates the Euler equation usually derived from the standard intertemporal model of real investment spending found in the economics literature.

We begin with the fundamental capital budgeting decision rule that identifies positive NPV projects by comparing the marginal costs and benefits from acquiring an additional unit of capital,

$$p^I_t \leq \sum_{j=0}^{\infty} ICF_{t+j} R^j, \tag{1}$$

$$R \;/\; 1 / (1+r), \tag{2}$$

where p^I_t is the price of the investment good at time t, the ICF's are the incremental cash

flows per unit of capital accruing in current and future periods, and R is the real discount factor defined in terms of the real risk-adjusted discount rate, r.[4] The firm should continue to acquire capital until (1) is satisfied with equality.

An important element not recognized in (1) is that adjusting the capital stock is a costly activity. These costs typically depend on the level of investment (I_t) being undertaken in a given period, and can be incorporated into the NPV rule by allowing the price of investment goods to depend on investment, $p^I_t[I_t]$.

To derive the Euler investment equation from the NPV rule, we begin by assuming that the marginal investment equates benefits and costs, and hence (1) can be analyzed as an equality for period t as follows,

$$p^I_t[I_t] = \sum_{j=0}^{\infty} ICF_{t+j} R^j = ICF_t + \sum_{j=1}^{\infty} ICF_{t+j} R^j. \tag{3}$$

Consider the NPV rule in period t+1 and, to facilitate eventual cancellation, multiply both sides by R and redefine the j index appropriately,

$$R\, p^I_{t+1}[I_{t+1}] = R \sum_{j=0}^{\infty} ICF_{t+1+j} R^j = \sum_{j=1}^{\infty} ICF_{t+j} R^j. \tag{4}$$

All future ICF's can be eliminated by subtracting (4) from (3) and rearranging,

$$ICF_t - (p^I_t[I_t] - R\, p^I_{t+1}[I_{t+1}]) = 0. \tag{5}$$

Equation (5) is the Euler investment equation describing optimal investment behavior and the intertemporal tradeoff between costs and benefits of acquiring an additional unit of capital. To obtain an intuitive understanding of the Euler equation, assume that the firm is currently on the path of optimal capital accumulation. Along this path, the firm will be indifferent to an increase in capital by 1 unit in period t and a decrease of 1 unit in t+1, thus leaving the capital stock unaffected from period t+1 onward. The benefit of this hypothetical change is represented by ICF_t. Changing the capital stock is costly, and the Euler investment equation sets ICF_t equal to the marginal investment cost ($p^I_t[I_t]$) incurred in t minus the marginal investment cost saved in t+1 (this saving arises because the firm does not now need to acquire an additional unit of

[4] For expositional convenience, the derivations in this section are based on the assumptions of a constant discount rate and non-depreciating capital. These assumptions can be relaxed if the estimating equation is derived from a dynamic optimization problem with variational methods. See Chirinko (1993) for a formal analysis of the Euler equation. Risk-adjustment is discussed in Section 4.2 and Appendix B.

capital to remain on its optimal accumulation path). The t+1 saving is placed on a present value basis by the firm's effective one-period discount factor, R.

3. The Econometric Equation And Estimation Strategy

3.1. Variables In The Econometric Equation

The econometric equation used in estimation is based on the transformed NPV rule (or Euler equation) with the following definitions of the variables appearing in (5). The ICF_t is relabeled as the marginal product of capital ($MPK_{i,t}$) because the incremental revenues are tied directly to a production function. $p^I_{i,t}[I_{i,t}]$ is redefined as the marginal investment cost, $MIC_{i,t}[I_{i,t}/K_{i,t}]$, equaling the sum of the purchase price of a unit of new capital relative to the price of output ($p^I_{i,t}$) and the marginal adjustment cost ($MAC[I_{i,t}/K_{i,t}]$) increasing in the investment/capital ratio,

$$MIC_{i,t}[I_{i,t}/K_{i,t}] \;/\; p^I_{i,t} + MAC[I_{i,t}/K_{i,t}]. \tag{6}$$

All variables are adjusted for taxes.[5] An error term ($e_{i,t}$) is added to the econometric equation.[6] These considerations lead to the following estimating equation that is the basis for the empirical results,

$$MPK_{i,t} - (MIC_{i,t}[I_{i,t}] - R_{i,t}\, MIC_{i,t+1}[I_{i,t+1}]) = e_{i,t}\,, \tag{7}$$

where $R_{i,t}$ is the discount factor to be discussed below in Section 3.2.

In order to estimate (7), we need to specify $MAC[I_{i,t}/K_{i,t}]$ (appearing in (6)) and $MPK_{i,t}$. (The $p^I_{i,t}$ variable is discussed in Section 4.1.) As in the standard investment model, we assume that marginal adjustment costs depend on the investment/capital ratio ($(I_{i,t}/K_{i,t}) / INVT_{i,t}$), and define $MAC[INVT_{i,t}]$ by the following second-order Taylor expansion,

$$MAC[INVT_{i,t}] = \alpha_0 + \alpha_1 INVT_{i,t} + \alpha_2 INVT_{i,t}^2. \tag{8}$$

With respect to the $MPK_{i,t}$, assume for the moment that the production function exhibits constant returns to scale, product markets are perfectly competitive, and adjustment costs are absent. In this special case, the marginal product of capital equals the average product of capital, where the latter is defined as total revenues less total variable costs, all divided by the capital stock. We adopt less restrictive assumptions by allowing the production function to be homogeneous of degree ξ (where ξ is not

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[5] See Section 4.1 for details about tax adjustments.

[6] If the Euler equation is derived from a formal dynamic optimization problem, this stochastic error term is linked directly to expectation errors and technology shocks.

necessarily equal to unity, the value defining constant returns to scale) and the product markets to be imperfectly competitive. Rewriting the revenue function (which includes both the production and adjustment cost functions) using Euler's Theorem on Homogeneous Functions, and rearranging terms to isolate the marginal product of capital, we obtain the following specification,

$$MPK_{i,t} = \psi * REV_{i,t} - COST_{i,t} - MAC[INVT_{i,t}]*INVT_{i,t}, \qquad (9)$$

where $REV_{i,t}$ and $COST_{i,t}$ are revenue and variable costs, respectively, divided by the capital stock, $MAC[INVT_{i,t}]$ is defined in (8), and ψ is a parameter capturing the combined effects of non-constant returns to scale and imperfect competition. Increasing returns to scale implies that $\psi > 1$. Decreasing returns to scale or non-competitive product markets imply that $\psi < 1$. In the special case described above, ψ equals one, $MAC[INVT_{i,t}]$ equals zero, and equation (9) would equate marginal and average products. The ψ parameter and the $MAC[INVT_{i,t}]*INVT_{i,t}$ term in (9) account for adjustment costs and departures from constant returns to scale and perfectly competitive product markets.

3.2. The Discount Factor And The Estimation Strategy

The discount factor used by firm i at time t ($R_{i,t}$) contains three components: the shareholders' discount rate ($r^S_{i,t}$, equal to the risk-adjusted real market interest rate), a firm-specific geometric depreciation rate (δ_i),[7] and the gap (possibly equal to zero) between the discount rates used by executives ($r^E_{i,t}$) and shareholders. This latter gap is represented by a parameter, ϕ.

The quantitative impact of governance problems on firm behavior is assessed by *comparing* the investment behavior of contrasting classes of firms and using that information to infer the discount rates being used by executives. Classes are defined by characteristics identified previously in the literature as indicating governance problems. For example, the governance problems emphasized by Jensen may occur for firms with high free cash flow and poor investment opportunities. Since some of these characteristics may change for a given firm over time, we evaluate the sorting criteria and form our contrasting classes for each firm/year observation. In computing the estimates, we recognize the possibility that factors other than governance problems may affect discount rates, and capture the impact of these factors by including an additional term in the discount rate, ζ, common to all firms in the sample. With the sorted samples, distortions due to governance problems are measured by the parameter ϕ, which is estimated only for the class associated with a particular governance problem. These considerations lead to the following formulation of the discount factor,

[7] With depreciating capital, the saving in marginal investment costs in period t+1 is lowered to only $(1-\delta)$ units of surviving capital.

$$R_{i,t} \;/\; (1-\delta_i) \;/\; ((1+r^S_{i,t})\,(1 + \zeta + \Gamma_{i,t}*\phi)) \,. \tag{10a}$$

$$\phi \;/\; (r^E_{i,t} - r^S_{i,t}) \,. \tag{10b}$$

where $\Gamma_{i,t}$ is an indicator variable -- 1 if a firm falls into a particular class (e.g., high free cash flow and poor investment opportunities), 0 otherwise. Conditional on systematic risk and depreciation (which differ among firms) and the common factor affecting all firms, our measure of corporate governance problems, ϕ, is the gap between the executives' and shareholders' discount rates.

Lastly, regarding estimation, the Euler equation contains contemporaneous and future variables that may be correlated with the error term. An additional correlation with the error term might arise because of measurement or specification error. Consequently, an instrumental variables estimation technique is required. We use the Generalized Method of Moments technique (GMM) because it delivers consistent parameter estimates and allows for a general pattern of conditional heteroscedasticity in the residuals.[8]

4. The Canadian Dataset

4.1. Financial Statement Data

Our empirical work is based on a balanced panel of 193 Canadian firms for the period 1973 to 1986. Various computations and the presence of variables dated t+1 in the estimating equation reduce the period used in estimation to 1975 to 1985. The basic sources are the CANSIM, Laval, and Financial Post databases. The latter two are comparable to the often used CRSP and COMPUSTAT databases, respectively, for United States firms.

The estimating equation (7) requires data for investment, revenues, costs, and the physical capital stock. Three series are drawn directly from the Financial Post Annual Corporate Database. Investment (INVT) is gross capital expenditures on property, plant and equipment. Revenue (REV) is net sales. Cost (COST) is revenue minus operating income, where operating income is the income derived from the principal activities of a business after deducting all operating expenses except depreciation, depletion and

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[8] See Hansen (1982). The instruments are a constant, $REV_{i,t-1}$, $COST_{i,t-1}$, $INVT_{i,t-1}$, $INVT^2_{i,t-1}$, $p^I_{i,t-1}$, $R_{i,t-1}(1-\delta_i)p^I_{i,t-1}$, $R_{i,t-1}(1-\delta_i)INVT_{i,t-1}$, $R_{i,t-1}(1-\delta_i)INVT^2_{i,t-1}$, time (t), time squared (t^2), and $\Gamma_{i,t}$ (cf. (10)). All variables are adjusted for taxes as discussed in Section 4.1. The instruments are primarily lagged values of the terms in the Euler equation (7) and the auxiliary relations ((6), (8), (9), and (10)). Such instruments are chosen because they are valid (uncorrelated with the error term) and relevant (correlated with the variables appearing in the regression). We also use a constant time, and time squared, which are attractive instruments because they are unequivocally exogenous. It proved difficult to estimate γ_0; instead, we undertake a grid search, choosing the value γ_0 that minimizes the GMM criterion.

amortization, interest expense and miscellaneous expenses included in the other income/expense category. All three series are divided by the capital stock.

The capital stock (K$) for a given firm is constructed in two steps. The first step estimates the depreciation rate (δ). We calculate firm-specific depreciation rates based on the firm's reported depreciation. The details are based on the procedure used by Salinger and Summers (1983). A recursive formula is then used to calculate the replacement value of the capital stock, which evolves as $K\$_{i,t} = (K\$_{i,t-1}+I\$_{i,t})*(p'^{I}_{t}/p'^{I}_{t-1})*(1-\delta_i)$, where p'^{I}_{t} is the implicit price index for business investment in machinery and equipment (CANSIM series D11123).

The tax-adjusted relative price ratio, $p^{I}_{i,t}$, also enters the estimating equation, and equals $((1-itc_t-\tau_{i,t}z_t)/(1-\tau_{i,t})) * (p'^{I}_{t}/p^{o}_{t})$. The tax terms are the sum of federal and provincial corporate income tax rates ($\tau_{i,t}$, incorporating variation across time and industries), the investment tax credit rate (itc_t), and the present value of tax depreciation allowances (z_t). The output price (p^{o}_{t}) is the implicit price index for final domestic demand (CANSIM series 11130).

Variables defining the contrasting classes will be discussed below.

4.2. The Market Discount Rate

The discount factor ($R_{i,t}$, defined in (10)) depends on, inter alia, the shareholders' real risk-adjusted discount rate, $r^{S}_{i,t}$, defined as follows:

$$r^{S}_{i,t} = ((1+i_{i,t}) / (1+\pi^{e}_{t})) - 1.0. \qquad (11)$$

This rate discounts annual cash flows from the middle-of-period t to the middle-of-period t+1. (See Appendix B for specific details concerning variable construction and data sources.) The components of $r^{S}_{i,t}$ are defined as follows. The one year expected inflation rate is represented by π^{e}_{t}, which equals actual inflation.. If the firm is operating in the interests of shareholders, it will use the nominal discount rate defined by $i_{i,t}$,

$$i_{i,t} = \lambda_i(1-\tau_{i,t})i^{DEBT}_{t} + (1-\lambda_i)i^{EQUITY}_{i,t}, \qquad (12)$$

where λ_i is the firm-specific leverage ratio, $\tau_{i,t}$ is the marginal rate (federal and provincial) of corporate income taxation, i^{DEBT}_{t} is the nominal, one year, Commercial Paper rate, and $i^{EQUITY}_{i,t}$ is the nominal, short-term, risk-adjusted cost of equity capital,

$$i^{E}_{i,t} = i^{F}_{t} + \sigma_i, \qquad (13)$$

where i^{F}_{t} is the nominal, one year risk-free Treasury Bill rate, and σ_i is the equity risk premium estimated by either the CAPM or the Fama-French three-factor model (see Appendix B for details).

4.3. Summary Statistics

Summary statistics are presented in Table 1 for all 193 firms. Column 1 is for the full sample. Columns 2-3 and 4-5 are sorted by characteristics defining Jensen firms that will feature prominently in the empirical results.

Table 1
Summary Statistics

The entries are the median, [mean], and (standard deviation) of the indicated variable calculated from 1975 to 1985 for 193 Canadian firms. COST is variable costs (sales minus operating income) divided by K$, the current dollar replacement cost of the fixed capital stock. DEBT is short and long term debt divided by K$. FCF_1 is free cash flow defined as cash flow (revenues less cash expenses including tax and interest payments) less dividends (all for the previous year) divided by K$. FCF_2 is an alternative definition of free cash flow defined as cash flow less dividends (averaged for the previous two years) all divided by K$. INVT is plant and equipment investment divided by K$. p^I is the tax-adjusted price of investment goods relative to the price of output. Q is the Brainard-Tobin Q, the financial value of the firm less the tax depreciation bond less K$ (adjusted for taxes) all divided by the fixed capital stock valued in terms of the price of output (see footnote 10 for details). r^{CAPM} and r^{FF3} are the real risk-adjusted market discount rates defined in Section 4.2 and Appendix B with the equity risk premia estimated by the CAPM and Fama-French three-factor (FF3) models, respectively. REV is revenues divided by K$. SIZE equals K$ stated in millions of Canadian dollars. N is the number of firm/year observations. Column 1 is for all firms in the sample. Columns 2 and 3 are sorted by whether a firm's primary operations are in the oil industry, TSE Industry 300; columns 4 and 5 are sorted by whether firm/year observations for Free Cash Flow (FCF_1) are in the top 2/3 of their industry in a given year and firm/year observations for investment opportunities (Q) are in the bottom 2/3 of their industry in a given year. For further details about data definitions and the sorting variables, see Sections 4 and 5, respectively.

	All Firms	Oil Industry		High Free Cash Flow & Poor Investment Opportunities	
		Yes	No	Yes	No
	(1)	(2)	(3)	(4)	(5)
COST	2.406	1.223	2.609	2.174	2.538
	[4.195]	[2.993]	[4.382]	[3.575]	[4.656]
	(6.096)	(5.546)	(6.158)	(4.484)	(7.026)
DEBT	1.001	0.671	1.046	0.809	1.258
	[1.559]	[1.228]	[1.611]	[1.074]	[1.920]
	(1.978)	(1.888)	(1.987)	(0.971)	(2.411)

	All Firms	Oil Industry		High Free Cash Flow & Poor Investment Opportunities	
		Yes	No	Yes	No
	(1)	(2)	(3)	(4)	(5)
FCF_1	0.071	0.071	0.071	0.083	0.055
	[0.069]	[0.076]	[0.068]	[0.090]	[0.054]
	(0.063)	(0.054)	(0.064)	(0.039)	(0.073)
FCF_2	0.067	0.069	0.067	0.078	0.055
	[0.067]	[0.072]	[0.066]	[0.083]	[0.056]
	(0.053)	(0.044)	(0.055)	(0.038)	(0.060)
INVT	0.170	0.201	0.166	0.151	0.187
	[0.248]	[0.260]	[0.246]	[0.192]	[0.289]
	(0.350)	(0.224)	(0.366)	(0.205)	(0.423)
p^I	0.952	0.955	0.951	0.965	0.940
	[0.979]	[0.986]	[0.979]	[0.988]	[0.973]
	(0.168)	(0.171)	(0.168)	(0.166)	(0.170)
Q	-0.409	-0.128	-0.455	-0.905	0.203
	[0.688]	[0.287]	[0.750]	[-0.897]	[1.865]
	(5.911)	(1.897)	(6.309)	(1.651)	(7.460)
r^{CAPM}	0.040	0.050	0.038	0.036	0.043
	[0.040]	[0.049]	[0.039]	[0.037]	[0.043]
	(0.036)	(0.034)	(0.036)	(0.033)	(0.038)
r^{FF3}	0.032	0.041	0.030	0.027	0.035
	[0.035]	[0.043]	[0.033]	[0.031]	[0.037]
	(0.039)	(0.039)	(0.039)	(0.037)	(0.040)
REV	2.834	1.474	3.067	2.510	3.059
	[4.733]	[3.373]	[4.945]	[3.964]	[5.304]
	(6.577)	(5.987)	(6.640)	(4.719)	(7.625)
SIZE	62.783	80.438	60.575	65.147	61.129
	[323.956]	[466.056]	[301.833]	[370.240]	[289.567]
	(689.773)	(989.789)	(627.847)	(783.628)	(608.836)
N	2123	286	1837	905	1218

5. Assessing Corporate Governance Problems

In a classic paper, Jensen (1986) argues that executives are more likely to squander resources on negative NPV projects when a firm has substantial free cash flow and poor investment opportunities. He identified the oil industry from 1973 to the mid-1980's as being particularly susceptible to these preconditions. We therefore begin by comparing the investment behavior and effective discount rates used by firms in the oil industry to the remaining firms. (Note that here and throughout the remainder of the paper, effective discount rates are adjusted for systematic risk.) A firm is classified as an "oil firm" if it belongs to Toronto Stock Exchange (TSE) industry 300.[9] Our estimates suggest that the discount rate used by oil industry executives is about 260 basis points lower than the shareholders' discount rate (r^S). The gap between r^E and r^S is statistically significant at the 10% level. These results are consistent with Jensen's conjecture that, during our estimation period 1975-1985, oil firms suffered from unresolved governance problems and overinvestment in fixed capital.

Table 2
Assessing Governance Problems

GMM estimates of equation (7); discount factor defined in equation (10). The parameters in columns 1 and 3 are estimated based on the Fama-French three-factor (FF3) estimate of the equity risk premium; columns 2 and 4 are based on the CAPM estimate of the equity risk premium. Contrasting classes are defined in the rows as follows: row 1, firms with their primary operations in the oil industry (TSE industry 300); row 2, firm/year observations for which Free Cash Flow (FCF_1) is in the top 2/3 of their industry in a given year intersected with the firm/year observations for which investment opportunities (Q) are in the bottom 2/3 of their industry in a given year; row 3, the same procedure as used in row 2 with FCF_1 replaced by Averaged Free Cash Flow (FCF_2); row 4, the same procedure as used in row 2 with FCF_1 replaced by the investment/capital ratio (INVT). Variables are defined in Table 1; see Section 4 and Appendix B for more extensive definitions. $(r^E - r^S) = \phi$ is the gap between the discount rates used by executives and shareholders for firms indicated by the row label. ψ is the parameter capturing deviations from constant returns to scale or perfect competition. A value of ψ less than unity is consistent with decreasing returns to scale regardless of the competitive nature of output markets or increasing returns and a sufficient degree of imperfect competition to force the marginal return to capital below its average return. In either case, it implies that the firms are earning positive economic rents. The instruments are listed in footnote 8. Standard errors are in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% levels, respectively.

[9] In terms of the estimating equation (11), Γ equals one for oil firms; zero for all other firms.

Table 2
Assessing Governance Problems
(Continued)

Contrasting Classes	Estimated Parameters			
	Gap Between Executives' And Shareholders' Discount Rates $(r^E - r^S) = \phi$		Measure Of Economic Rents ψ	
	FF3	CAPM	FF3	CAPM
	(1)	(2)	(3)	(4)
1. Oil Firms	-0.026*	-0.028*	0.955***	0.956***
	(0.014)	(0.014)	(0.004)	(0.004)
2. High Free Cash Flow & Poor Investment Opportunities	-0.035**	-0.040***	0.953***	0.954***
	(0.015)	(0.015)	(0.004)	(0.004)
3. High Averaged Free Cash Flow & Poor Investment Opportunities	-0.034**	-0.040***	0.953***	0.954***
	(0.015)	(0.015)	(0.004)	(0.004)
4. High Investment & Poor Investment Opportunities	-0.034***	-0.023*	0.953***	0.954***
	(0.013)	(0.013)	(0.004)	(0.004)

The specifications reported in row 1 of Table 2 differ only by the method of risk-adjustment, either the Fama-French three-factor model (FF3) in column 1 or the CAPM in column 2. The gap between executives' and shareholders' discount rates is very similar regardless how we adjust for risk. Based on FF3, oil industry executives use a discount rate 260 basis points lower than that used by shareholders; based on CAPM, the comparable figure is 280 basis points. Thus the two methods of risk adjustment yield estimates of the gap between r^E and r^S that are within 20 basis points of each other. This is a general finding throughout our empirical results: the estimates of $r^E - r^S$ based on the FF3 are always close to those based on the CAPM, never diverging by more than on standard error. The following discussion will focus primarily on the results based on the FF3 risk adjustment.

Table 2 also displays estimates of ψ, the parameter capturing deviations from

constant returns to scale in production and perfect competition in the product market. This parameter is estimated precisely, and its value is always less than unity. A value of ψ less than unity is consistent with decreasing returns to scale regardless of the competitive nature of output markets or increasing returns and a sufficient degree of imperfect competition to force the marginal return to capital below its average return. In either case, it implies that the firms are earning positive economic rents. As shown in the model in Appendix A, such rents are important because governance problems can exist in equilibrium only if the firm earns positive economic profits that allow it to "indulge" in sub-optimal investment.

A second way of identifying Jensen-type governance problems is to focus on those firms with high free cash flow and poor investment opportunities. Free cash flow (FCF_1) is defined as cash flow (revenues less cash expenses including tax and interest payments) less dividends, all for the previous year, divided by the replacement value of fixed capital. Investment opportunities are measured by the Brainard-Tobin Q.[10] With these definitions, contrasting classes are formed in a three-step process. First, we find the firm/year observations for which FCF_1 is in the top 2/3 of their TSE industry in a given year. Second, we find the firm/year observations for which Q is in the bottom 2/3 of their TSE industry in a given year. Third, we form the intersection of these two sets (which contains approximately one-half of the sample) to identify Jensen firms. As shown in row 2 of Table 2 for the FF3 risk adjustment, our estimate suggests that the executives of firms with high free cash flow and poor investment opportunities use a discount rate 350 basis points lower than the discount rate of shareholders. This gap between r^E and r^S is statistically significant.

As a check of the robustness of our results, we also consider a second measure defined by free cash flow in the previous *two* years (FCF_2). The results displayed in row 3 of Table 2 indicate that the gap between r^E and r^S remains economically and statistically significant.

The above sortings are based on preconditions for the emergence of governance problems associated with free cash flow. An additional test can be constructed based on a symptom of governance problems. Firms that have poor investment opportunities but nonetheless continue to investment substantial sums in fixed capital are likely to be

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[10] Q is defined for the beginning of the period as follows, $Q / [(E + D - TDB)/p^Y - p^I(1-\delta)K] / [(1-\tau)(1-\delta)K]$, where E is the market value of the firm's equity at the beginning of period t, D is the market value of existing short-term and long-term debt, TDB is the tax depreciation bond representing the present value of all tax depreciation allowances claimed in the current period on existing capital (Hayashi, 1982), p^Y is the price deflator for output, $p^I K$ is the current dollar replacement value of capital stated in terms of the price of capital goods relative to the price of output (adjusted for the investment tax credit and tax depreciation per Section 4.1), δ is the rate of economic depreciation, and τ is the corporate income tax rate reflecting federal and provincial tax rates. The TDB series (as well as the present value of depreciation allowances on a unit of new capital) is calculated using the method suggested by Salinger and Summers (1983).

suffering from unresolved governance problems. We thus create contrasting classes by sorting firm/year observations for which Q is in the bottom 2/3 of their industry in a given year, constructing a separate sorting for firm/year observations for which investment spending (relative to the replacement value of the capital stock) is in the top 2/3 of their industry in a given year, and then forming the intersection of these two sets. For these Jensen firms, executives use a discount rate that is 340 basis points lower than that used by shareholders (row 4 of Table 2).

The results presented in Table 2 have two implications for governance problems. First, the economically and statistically significant gap between r^E and r^S that emerges from a variety of sortings strongly indicate the importance of governance problems highlighted by the Free Cash Flow model. Based on the average of the eight estimated gaps between r^E and r^S, the discount rate guiding investment decisions for Jensen firms is 325 basis points lower than that used by shareholders.[11] All of the estimates in Table 2 are statistically significant at conventional levels. Second, the Perfect Markets model holds that markets are largely able to overcome corporate governance problems and hence that there will not be any systematic gaps between r^E and r^S based on the different classifications considered here. This key implication is decisively rejected in Table 2.

6. Curing Free Cash Flow Problems?

The results in Section 5 indicate that governance problems associated with the Free Cash Flow model loom large for several classes of firms. Quantifying governance problems in terms of discount rates presents an opportunity to evaluate the effectiveness of various corporate control mechanisms in reducing the agency costs of free cash flow. In his initial article on free cash flow, Jensen (1986) emphasized that leverage is a key financial control mechanism and thus that the increased debt loads borne by major American companies were beneficial as a corporate control device disciplining executives. While not discounting the benefits of leverage, Jensen's (1993) Presidential Address to the American Finance Association highlighted the role of strong institutions in curbing managerial abuses. These institutional control mechanisms can be assessed with our data because of the presence of interrelated groups and concentrated ownership for many Canadian firms.

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[11] The conclusion that effective discount rates are low relative to market rates seems to stand in contrast to previous studies that have quantified discount rates by surveying corporate executives (e.g., Blume, Friend, and Westerfield (1980, especially Tables 17 and 18) and Poterba and Summers (1995)). The latter authors received completed questionnaires from 228 U.S. firms and, among other findings, report that hurdle rates are "distinctly higher than equity holders' average rates of return and much higher than the return on debt during the past half-century" (p. 43). Apart from any differences in methodology (survey responses vs. actual spending patterns), these numbers are not comparable to our results because they apply to all firms, while our estimating strategy focuses specifically on subsets of firms most likely to be affected by a particular governance problem.

This section focuses exclusively on those firms suffering from Free Cash Flow problems, and quantifies the extent to which these problems are attenuated by various control mechanisms. We construct the sample used in this section from the full sample of 193 firms by identifying those firm/year observations with high free cash flow and poor investment opportunities. These are the same firm/year observations discussed in Section 5 for which the estimates presented in row 2 of Table 2 show that executives use a lower discount rate than shareholders. In this section, we simply refer to these firm/year observations as "Jensen firms." Our estimation strategy determines whether this discount rate gap ($r^E - r^S$) for one class of Jensen firms differs systematically from that for a contrasting class of Jensen firms influenced by a particular control mechanism. We refer to this "difference-in-the-gaps" as χ. Contrasting classes of firms are formed by three control characteristics -- debt, group membership, and concentrated ownership.

Many authors have emphasized that increased debt loads could serve as a useful control device.[12] In principle, debt finance could curb the temptation to squander resources in several ways: by withdrawing cash from the hands of misbehaving executives, by increasing the danger that executives might lose control of the firm in a period of financial distress, or by forcing firms into external capital markets where effective monitoring is undertaken by knowledgeable outsiders. To examine the effectiveness of debt as a control mechanism, we classify firm/year observations as high-debt firms if their short-term and long-term debt normalized by the replacement value of fixed capital (DEBT) is greater than the median for their industry in a given year. If debt is an effective control mechanism, then, among Jensen firms, higher debt should be associated with higher discount rates. In this case, the gap between executives' and shareholders' discount rates should be reduced. Since χ equals $[(r^E_{\text{High Debt Jensen}} - r^S_{\text{High Debt Jensen}}) - (r^E_{\text{Low Debt Jensen}} - r^S_{\text{Low Debt Jensen}})]$ and the gaps ($r^E - r^S$) are negative, χ will be positive *if* debt is an effective control mechanism. However, as shown in row 1 of Table 3, the χ's are very close to zero, and there is no evidence suggesting that debt reduces governance problems.

Table 3
Curing Free Cash Flow Problems?

GMM estimates of equation (7); discount factor defined in equation (10). The parameters in columns 1 and 3 are estimated based on the Fama-French three-factor (FF3) estimate of the equity risk premium; columns 2 and 4 are based on the CAPM estimate of the equity risk premium. All of the results in this table are based on the

[12] Among other studies analyzing debt and control, see Grossman and Hart (1982), Harris and Raviv (1990), and Aghion and Bolton (1992).

following "Jensen" sub-sample of firm/year observations constructed from the full sample: the firm/year observations for which Free Cash Flow (FCF_1) is in the top 2/3 of their industry in a given year intersected with the firm/year observations for which investment opportunities (Q) are in the bottom 2/3 of their industry in a given year. Based on this Jensen sub-sample, contrasting classes are defined in the rows as follows: row 1, firm/year observations for which debt (DEBT) is greater than the median for their industry in a given year; row 2, firms related to a Canadian group that brings together many distinct enterprises with their own publicly-traded shares; row 3, firms that either have one shareholder having 50% or more of the shares or that are effectively controlled by another firm. Variables are defined in Table 1; see Section 4 and Appendix B for more extensive definitions. χ is the parameter measuring the difference between (r^E - r^S) for one class of Jensen firms influenced by the control mechanism indicated by the row label and (r^E - r^S) for a contrasting class of Jensen firms without the control mechanism. ψ is the parameter capturing deviations from constant returns to scale or perfect competition. A value of ψ less than unity is consistent with decreasing returns to scale regardless of the competitive nature of output markets or increasing returns and a sufficient degree of imperfect competition to force the marginal return to capital below its average return. In either case, it implies that the firms are earning positive economic rents. The instruments are listed in footnote 8. Standard errors are in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% levels, respectively.

Contrasting Classes	Estimated Parameters			
	Reduction In The Gap Between Executives' And Shareholders' Discount Rates		Measure Of Economic Rents	
	χ		ψ	
	FF3	CAPM	FF3	CAPM
	(1)	(2)	(3)	(4)
1. High Debt	-0.006	-0.005	0.963***	0.963***
	(0.022)	(0.020)	(0.006)	(0.006)
2. Group Membership	0.021	0.019	0.963***	0.962***
	(0.023)	(0.024)	(0.006)	(0.006)
3. Concentrated Ownership	0.048**	0.039**	0.963***	0.963***
	(0.020)	(0.020)	(0.006)	(0.005)

The second control mechanism we examine is based on an institutional characteristic of the Canadian economy. While Canada does not have a direct analogue to the Japanese keiretsu (cf. Hoshi, Kashyap, and Scharfstein, 1990), several major Canadian industrial groups involve ownership or other connections among many distinct enterprises with their own publicly traded shares. A firm is classified as having "group membership" if it is related to a Canadian conglomerate that brings together many distinct enterprises with their own publicly-traded shares.[13] Each firm is effectively controlled by the group, typically through equity ownership. Many of the groups are associated with a particular family or individual (e.g., Black, Bronfman, Reichman), but not all (e.g., Bell Canada, Canadian Pacific).

Group membership has uncertain effects as a governance mechanism. For firms in an interrelated group, long-term relations and frequent dealings -- between the lead firm and affiliates and among affiliates -- arguably create incentives for effective monitoring. However, recent work casts doubts on this sanguine conclusion. The theoretical analysis of Bebchuk, Kraakman, and Triantis (2000) highlights weaknesses with a cross-ownership structure as a control mechanism. Relative to executives in a dispersed ownership firm, the controllers of a firm with a cross-ownership structure are entrenched; relative to an owner with a very large equity stake, cash flow rights (and hence the incentive to create value) are low. Consequently, governance problems for group firms may be greater than for other firms.

Among firms with high free cash flow and poor investment opportunities, there is some evidence that group membership is associated with better performance. In row 2 of Table 3, the gap between executives' and shareholders' discount rates is about 200 basis points narrower for Jensen firms that are group members than for Jensen firms that are independent. However, as measured by χ, the difference is not statistically significant at conventional levels, a result that may be partly due to the somewhat small sub-sample of Jensen firms belonging to a group with which the estimates are computed.

Concentrated shareownership is the third control mechanism we examine. In Canada, unlike the United States, a substantial proportion of the firms traded on the main stock exchange are majority-owned or controlled by a single shareholder. For a sample of firms with sales in excess of 2 billion US dollars, Rao and Lee-Sing (1995, p. 89) report that 58% of Canadian companies are concentrated (per the above definition), while the proportion drops to 9% in the United States. Similar proportions are reported by La Porta, Lopez-de-Silanes, and Shleifer (1999, Table II.B). Nearly half of the firms in our full sample have concentrated ownership defined as either one shareholder having 50% or more of the shares or as the firm being effectively controlled by another firm. (For example, Brascan was effectively controlled by the Bronfman family, although they only owned 43% of the shares.)

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[13] Data on group membership, as well as concentrated ownership discussed below, are obtained from Statistics Canada's *Intercorporate Ownership 1984.*

The role of concentrated ownership in resolving corporate governance problems is also ambiguous. By internalizing the costs of exercising control, concentrated ownership eliminates free-rider problems, and thus provides controlling owners with the incentive to expend resources to monitor and discipline management. For Jensen firms, this additional monitoring would tend to reduce the gap between executives' and shareholders' discount rates and thus be reflected in a positive χ. However, for substantial levels of concentration, firm resources may be directed for the owner's private benefit, as suggested by the premium paid on large blockholdings (Barclay and Holderness, 1989). The adverse effects of concentration may be particularly acute in Canada because many large ownership stakes are inherited. Morck, Strangeland, and Yeung (2000) document the detrimental effects of this particular type of ownership (dubbed the "Canadian Disease") on firm performance. In this case, we would expect χ to be negative.

The empirical results presented in row 3 of Table 3 indicate that concentrated shareownership is associated with fewer governance problems. The gap between executives' and shareholders' discount rates shrinks by more than 300 basis points for Jensen firms with concentrated ownership (relative to Jensen firms with dispersed ownership), effectively eliminating the gap. These estimated χ's are statistically significant at the 5% level.

7. Capital Structure And Discount Rates

In a recent survey of the literature, Myers (2001) lists the Free Cash Flow and Pecking Order models as two of the leading theories of capital structure. Does the evidence presented so far, which favors the Free Cash Flow model, preclude the empirical importance of the financing problems highlighted by the Pecking Order model? Not necessarily, since some firms may be constrained by a Pecking Order while others face Free Cash Flow problems.[14] Even for a given firm, these problems may vary over time. For example, with unexpected variation in product demand, a firm may have insufficient inside funds to finance its positive net present value projects, and face relatively higher costs when securing outside finance. At another point in time, the same firm may find itself with modest investment opportunities, surplus cash flow, and a substantial temptation to squander resources. Such time-varying changes in circumstances are at the core of Stulz's model of capital structure in which the relative costs of governance and finance problems determine the optimal mix of debt and equity (Stulz, 1990). Measuring these costs in terms of discount rates estimated from a common framework generates insights into this theory of optimal financial policy and,

[14] Myers (2001, p. 81), specifically argues that "The free cash flow theory is designed for mature firms that are prone to overinvest."

more generally, the factors affecting capital structure.[15]

Higher costs of outside finance arise when suppliers of external finance cannot assess the quality of firms and their investment projects (Myers and Majluf, 1984).[16] Given an inability to discriminate between high and low quality firms, shareholders add a "lemons premium" to the cost of outside finance. Adverse selection occurs because high quality firms tend to avoid external capital markets, reducing the quality of the pool of borrowers and creating a sustainable positive difference between the costs of inside and outside funds. This difference creates a financial hierarchy or Pecking Order (in which firms exhaust inside funds before using relatively expensive outside funds), and depends on the limitations firm face in accessing external capital markets.

This section focuses on those firms most likely to both need outside finance and face a relatively higher cost for outside funds (thereby using a higher effective discount rate) as predicted by the Pecking Order model. Our strategy for assessing financing problems is similar to that for governance problems: we identify a subset of firms likely to face finance constraints and, based on their pattern of investment spending, estimate the difference in discount rates between outside and inside finance. We use two characteristics to define contrasting classes of firm/year observations. Firms with good investment opportunities are more likely to exhaust internal sources of finance and rely more heavily on external sources where financing problems may arise. We identify these firms by sorting the firm/year observations for which Q is in the top 2/3 of their industry in a given year. The second characteristic is based on the higher financing costs faced by firms with limited access to external capital markets. Limited access is measured in three ways: by the absence of a bond rating (measured by an indicator variable taking the value of one if the firm does not have a bond rating, zero elsewise; data are obtained from the Canadian Bond Ratings Service and Dominion Bond Ratings Service),[17] by the two-thirds of firm/year observations with the highest values of DEBT (short-term and long-term debt normalized by the replacement value of fixed capital) in their industry in a given year, or by the two-thirds of the smallest firms (measured by SIZE defined in terms of the replacement value of the fixed capital stock). Firms that are

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[15] The close relation between governance and finance problems has been noted in the survey of Shleifer and Vishny (1997, p. 773): "Corporate governance deals with the agency problem: the separation of management and finance."

[16] See Hubbard (1998) for a recent survey and the work of Hubbard and Kashyap (1992), Whited (1992), and Ng and Schaller (1996) for related analyses.

[17] If high quality Canadian firms prefer to obtain funds from the larger US market, these firms might obtain bond ratings only from US rating agencies. In this case, our procedure, which is based on ratings by Canadian rating agencies, will misclassify these high quality firms with ready access to external capital markets. There are no firms in our sample that are not rated by a Canadian rating agency but are rated by S&P or Moody's. Thus, there does not appear to be a flight of high quality borrowers to the larger US market and its rating agencies.

more likely to require high-cost outside finance are defined by the intersection of firm/year observations with good investment opportunities and limited access to external credit markets, the latter measured by one of the three preceding characteristics. In each case, we contrast these firms with the remaining firms in the sample.

Table 4 contains the results for sortings by finance problems. In all three cases, the results clearly indicate the presence of economically important financing problems. All estimates of differences (labeled ρ) between the cost of outside and inside funds are statistically significant at the 1% level. The difference between the discount rates for outside and inside funds is estimated at 900 basis points when we focus on the lack of a bond rating as a measure of the difficulty of accessing outside funds, 760 basis points when we focus on high levels of debt, and 910 basis points when we focus on smaller firms. As with Free Cash Flow governance problems, we find strong evidence that financing problems are economically and statistically significant. These results suggests that, consistent with the model of Stulz (1990), capital structure choices are determined by a mixture of governance and finance problems whose applicability varies by firm and, for a given firm, across time.

Table 4
Capital Structure And Financing Problems
GMM estimates of equation (7); discount factor defined in equation (10). The parameters in columns 1 and 3 are estimated based on the Fama-French three-factor (FF3) estimate of the equity risk premium; columns 2 and 4 are based on the CAPM estimate of the equity risk premium. Contrasting classes are defined in the rows as follows: row 1, the firm/year observations for which investment opportunities (Q) are in the top 2/3 of their industry in a given year intersected with the firms that do not have a bond rating; row 2, the same procedure as used in row 1 with the absence of a bond rating replaced by the firm/year observations for which debt (DEBT) is in the top 2/3 of their industry in a given year; row 3, the same procedure as used in row 1 with the absence of a bond rating replaced by the firms for which size (SIZE) is in the bottom 2/3 of the sample. Variables are defined in Table 1; see Section 4 and Appendix B for more extensive definitions. $(r^O - r^I) = \rho$ is the difference between the discount rates on outside and inside funds for firms indicated by the row label. ψ is the parameter capturing deviations from constant returns to scale or perfect competition. A value of ψ less than unity is consistent with decreasing returns to scale regardless of the competitive nature of output markets or increasing returns and a sufficient degree of imperfect competition to force the marginal return to capital below its average return. In either case, it implies that the firms are earning positive economic rents. The instruments are listed in footnote 8. Standard errors are in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% levels, respectively.

Contrasting Classes	Estimated Parameters			
	Difference Between Discount Rates On Outside And Inside Funds		Measure Of Economic Rents	
	$(r^O - r^I) = \rho$		ψ	
	FF3	CAPM	FF3	CAPM
	(1)	(2)	(3)	(4)
1. No Bond Rating & Good Investment Opportunities	0.090***	0.095***	0.954***	0.954***
	(0.017)	(0.016)	(0.004)	(0.004)
2. High Debt & Good Investment Opportunities	0.076***	0.074***	0.956***	0.957***
	(0.016)	(0.016)	(0.004)	(0.004)
3. Small Size & Good Investment Opportunities	0.091***	0.089***	0.956***	0.957***
	(0.016)	(0.016)	(0.004)	(0.004)

8. Summary And Conclusions

This paper sheds new light on long-standing corporate governance issues. We use information from a transformed NPV rule and variation from firm-level panel data to uncover effective discount rates. In this revealed preference approach, effective discount rates guiding investment decisions are inferred from the pattern of investment spending. The gap between the discount rates used by executives and shareholders is our measure of governance problems. The empirical work is based on panel data for 193 Canadian firms. Distinctive institutional features, such as interrelated groups of Canadian firms and concentrated share ownership, allow us to quantify the sensitivity of discount rate gaps and governance problems to these institutional control mechanisms.

Our key finding is that the governance problems highlighted in Jensen's Free Cash Flow model prove to be economically and statistically significant. Among other results, executives of firms with high levels of free cash flow and poor investment opportunities use effective discount rates that are 350-400 basis points below shareholders' discount rates. Moreover, the key implication of the Perfect Markets model -- that there should not be any systematic bias in discount rates -- is decisively rejected.

With this documentation of the problems associated with the Free Cash Flow model, we then investigate possible cures for Jensen firms -- those with high free cash flow and poor investment opportunities. In our data, neither debt nor membership in an interrelated group of firms has any statistically significant effect in attenuating free cash flow problems. However, the gap between executives' and shareholders' discount rates

is effectively eliminated for Jensen firms with concentrated share ownership. These results suggest that institutional arrangements can be effective in curbing corporate control problems, and are consistent with Shleifer and Vishny's (1997, p. 769) conclusions concerning the prominent role played by large shareholders in promoting good corporate governance.

Lastly, we use our revealed preference approach to consider two prominent capital structure models. For some firms at some times, Free Cash Flow problems are important. At other times, perhaps for the same firm, Pecking Order problems are important. Thus, explanations of capital structure choices will have to rely on several theories depending on circumstances that vary across firms and, for a given firm, over time.

Apart from evaluating hypotheses, the parameter estimates permit us to quantify the impact of corporate governance problems on capital accumulation. The Jorgensonian user cost of capital is the relevant price variable determining capital accumulation, and depends on the discount rate guiding investment decisions.[18] When executives use a discount rate that is below that of shareholders, the Jorgensonian user cost will be distorted. Combining the Jorgensonian user cost with an assumption about the price elasticity of the demand for capital, we can estimate the extent to which Free Cash Flow problems lead firms to hold too much fixed capital. With executives using discount rates 330 basis points lower than shareholders (the arithmetic average of the estimates in Table 2), the user cost of capital falls by 29.5%. If the price elasticities of capital range from -0.25 to -0.75, firms suffering from unresolved governance problems have approximately 7% to 22% too much capital.[19]

Our conclusions are that Free Cash Flow problems are quantitatively important for some firms at some times, and can be ameliorated by concentrated ownership.

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[18] The Jorgensonian user cost of capital is defined as follows: $UC = (r+\delta)*p^I$, where r is the discount rate (either the shareholders' (r^S) or executives' (r^E) discount rate), δ is the depreciation rate, and p^I is the price of investment goods relative to the price of output, adjusted for corporate income taxes, investment tax credits, and the present value of tax depreciation allowances (Hall and Jorgenson, 1971). Intuitively, this user cost is the rate for renting a capital good for one period. This rental rate includes a "nonrefundable security deposit" reflecting that only a fraction of the rented capital good will be returned because of depreciation (δ). Representing the value of economic depreciation by δ in the user cost formula is equivalent to calculating the present value of a stream of deductions for a capital good depreciating according to a declining-balance formula at rate δ.

[19] The percentage change in the capital stock ($\Delta K/K$) equals the percentage change in the Jorgensonian user cost of capital ($\Delta UC/UC$) multiplied by the price elasticity ($-\theta$). $\Delta UC/UC = (r^E-r^S)*p^I / (r^S+\delta)*p^I = -0.033 / (0.032 + 0.080) = -0.295$, where the value for r is obtained in Table 1 for r^{FF3} and δ equal to 0.08 is an average of our estimates of firm-specific depreciation rates computed with firms' reported depreciation and the procedure in Salinger and Summers (1983). $\Delta K/K = \Delta UC/UC * (-\theta)$ $= -0.295 * (-0.50) = 0.148$ based on a value of θ of 0.50.

Whether these results extend to other countries, other legal frameworks, and other institutional settings are topics for future research.

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Appendix A

Departures From Value Maximization

To further motivate our revealed preference approach, this Appendix examines the implications for discount rates of departures from value maximization by utility maximizing executives. A parsimonious model links governance problems to the gap between the discount rates used by executives and shareholders. The version of the Free Cash Flow model presented here emphasizes the utility that executives receive from empire-building.

Consider the following model of a Jensen firm, defined as a firm where executives obtain utility from both shareholder value and the size of the firm. Profit (π) equals revenues ($f[K,L]$) less labor costs ($w*L$) less capital rental costs ($(r+\delta)*K$),

$$\pi = f[K,L] - w*L - (r+\delta)*K, \qquad \text{(A-1)}$$

where $f[K,L]$ is a production function depending on capital (K) and labor (L), and w is the wage rate. The user cost of capital equals ($r+\delta$), where r is the real risk-adjusted cost of funds and δ is the rate of depreciation (see footnote 18 for further discussion of the user cost of capital). (The roles of taxes and relative prices have been omitted.) For the standard neoclassical firm, the user cost of capital is the appropriate discount rate. Consistent with the Free Cash Flow model, executives obtain utility from profit and some other characteristic of the firm, such as size. The objective function for a Jensen firm is as follows,

$$U = U[\pi,K]. \qquad \text{(A-2)}$$

We specify U[.] as a Cobb-Douglas function, which provides a succinct way of representing the differing weights placed on profit ($0<\beta<1$) and size ($0<\gamma<1$),

$$U = \pi^{\beta}*K^{\gamma}. \qquad \text{(A-3)}$$

The first-order condition for utility maximization with respect to the choice of K by a Jensen firm is as follows,

$$0 = \beta*\pi^{\beta-1}*K^{\gamma}*(f_K[K,L]-(r+\delta)) + \gamma*\pi^{\beta}*K^{\gamma-1}. \qquad \text{(A-4)}$$

Rearranging (A-4), we obtain the following equation for the marginal product of capital (MPK / $f_K[K,L]$) that implicitly determines the optimal capital stock,

$$MPK^J = MPK^N + \phi, \quad \text{(A-5a)}$$
$$\phi = -(\gamma/\beta)*(\pi/K) \leq 0. \quad \text{(A-5b)}$$

where MPK^J and MPK^N are the MPK's determined by optimizing behavior by Jensen and standard neoclassical firms, respectively. The key relations in (A-5) are robust to alternative utility functions. When the Cobb-Douglas specification in (A-3) is replaced by a CES (with substitution elasticity η) or a linear function with π and K as arguments, the ϕ in equation (A-5b) becomes $-(\gamma/\beta)*(\pi/K)^\eta$ and $-(\gamma/\beta)$, respectively.

There are several interesting features to this model highlighted by (5). Apart from adjustments for depreciation and risk, MPK^N is the discount rate required by shareholders, and hence ϕ in (A-5a) is equal to $(r^E - r^S)$. If the firm is operating in a perfectly competitive environment with constant returns to scale (π=0), then $\phi = 0$, and we obtain the standard neoclassical relation equating the marginal product of capital to its user cost. This result reflects that Jensen-type governance problems can exist in equilibrium only if some rents accrue. The discount rate gap will also be zero if executives receive utility only from profit (γ=0) or if executives obtain perquisite utility only from variables not entering the value maximization problem, such as an honorary seat on a local arts council. However, such a seat is more likely to be offered the larger the size of the firm. For the Jensen firm, the standard neoclassical relation fails to hold because executives obtain perquisite utility (γ>0) in a non-competitive environment (π>0). It is precisely these effects that are captured by our estimates of $(r^E - r^S)$.

Appendix B
The Real Risk-Adjusted Market Discount Rate:
Variable Construction And Data Sources

The discount factor ($R_{i,t}$, defined in (10)) depends on the real, risk-adjusted market discount rate, r_t, defined in the text (11) as follows,

$$r^S_{i,t} = ((1+i_{i,t}) / (1+\pi^e_t)) - 1.0. \quad \text{(B1)}$$

This rate discounts annual cash flows from the middle-of-period t to the middle-of-period t+1. The equity risk premium is estimated by the CAPM or the Fama-French three-factor (FF3) models. The components of r_t are defined and constructed as follows,

$i_{i,t}$ = Nominal, short-term, risk adjusted company cost of capital from the middle-of-period (MOP) t to the MOP t+1,
= $\lambda_i (1-\tau_{i,t})\, i^{DEBT}_t + (1-\lambda_i)\, i^{EQUITY}_{i,t}$.

i^{DEBT}_t = Nominal, one year, Commercial Paper rate from the MOP t to the MOP t+1. This rate is constructed from monthly data for the

Canadian 90-day Commercial Paper Rate, average of daily rates (CANSIM series B14017). These monthly data are converted into beginning-of-period (BOP) monthly data for January, April, July, and October by averaging the monthly data in the preceding and current months. For example, the January BOP rate is the arithmetic average of the monthly December and January rates. The BOP rates are represented as $i^{DEBT}_{t,JAN}$, $i^{DEBT}_{t,APR}$, $i^{DEBT}_{t,JUL}$, and $i^{DEBT}_{t,OCT}$. The one year MOP rate is constructed from these BOP rates as follows,

$= [(1+i^{DEBT}_{t,JUL})\,(1+i^{DEBT}_{t,OCT})\,(1+i^{DEBT}_{t+1,JAN})\,(1+i^{DEBT}_{t+1,APR})]^{.25} - 1.$

$i^{EQUITY}_{i,t}$ = Nominal, short-term, risk adjusted cost of equity capital from the MOP t to the MOP t+1.

$= i^{F}_{t} + \sigma_i.$

i^{F}_{t} = Nominal, one year, risk free Treasury Bill rate from the MOP t to the MOP t+1. This rate is constructed from monthly data for the Canadian 90-day Treasury Bill Rate, average yields at weekly auctions (CANSIM series B14007). These monthly data are converted into BOP monthly data for January, April, July, and October by averaging the monthly data in the preceding and current months. For example, the January BOP rate is the arithmetic average of the monthly December and January rates. The BOP rates are represented as $i^{F}_{t,JAN}$, $i^{F}_{t,APR}$, $i^{F}_{t,JUL}$, and $i^{F}_{t,OCT}$. The one year MOP rate is constructed from these BOP rates as follows,

$= [(1+i^{F}_{t,JUL})\,(1+i^{F}_{t,OCT})\,(1+i^{F}_{t+1,JAN})\,(1+i^{F}_{t+1,APR})]^{.25} - 1.$

π^{e}_{t} = One year inflation rate from the MOP t to the MOP t+1 constructed from monthly All Items Consumer Price Index data (CANSIM series P700000). These monthly data are converted into BOP monthly data for July by averaging the monthly data in June and July, and are represented as $CPI_{t,JUL}$. The one year MOP inflation rate is constructed from these BOP rates as follows:

$= (CPI_{t+1,JUL} / CPI_{t,JUL}) - 1.0.$

σ_i = Equity risk premium. The methods used to estimate σ_i are discussed below.

$\tau_{i,t}$ = Marginal rate of corporate income taxation (federal and provincial) incorporating variation across time and industries.

λ_i = Firm specific leverage ratio calculated as the time-average of bonds / (bonds + equity), where bonds are at book value and equity at market value.

Two methods are used to estimate the equity risk premium, σ. Under the CAPM,

$$\sigma_i = \beta_i (\mu^{EQUITY} - \mu^F), \qquad \text{(B2)}$$

β_i = CAPM β from Hatch and White (1988, Table 5-36). These industry β's are assigned to firms on the basis of the Toronto Stock Exchange's industry classification.

μ^{EQUITY} = Total return on equities from 1950-1986: 0.1148. The source is Hatch and White (1988, Table 5-15).

μ^F = Total return on risk free Treasury bills from 1950-1986: 0.0584. The source is Hatch and White (1988, Table 5-5).

We also measure the equity risk premium using the Fama and French (1993) three-factor model (FF3),

$$\sigma_i = \beta_i^{EMR} \mu^{EMR} + \beta_i^{SMB} \mu^{SMB} + \beta_i^{HML} \mu^{HML}, \qquad \text{(B3)}$$

where μ is a mathematical expectation, EMR is the excess market return (value-weighted market return minus risk-free rate), SMB is the size risk factor, and HML is the book-to-market risk factor. β^{EMR}, β^{SMB}, and β^{HML} are the firm-specific factor loadings on these three risk factors.

The portfolios are constructed as follows: firms were included in the sample in a given year if: 1) book equity (common stock capital, plus deferred income taxes if available) and market equity for the end of the previous year were available in the Financial Post dataset; and 2) returns data for the current year were available from the Toronto Stock Exchange (TSE)-Western dataset. All firms in the sample in a given year were ranked on size (using market equity) and split into small and big (S and B) depending on whether they were above or below the median. All firms in the sample in a given year were then ranked by the ratio of book equity to market equity with breakpoints for the bottom 30% (Low), middle 40% (Medium), and top 30% (High). Six portfolios (S/L, S/M, S/H, B/L, B/M, B/H) were constructed from the intersection of the

two size and three book-to-market categories, and monthly value-weighted returns on the six portfolios were calculated for each calendar year.

SMB is defined as the difference, each month, between the simple average of the returns on the three small firm portfolios (S/L, S/M, and S/H) and the corresponding simple average of the returns on the three big firm portfolios. HML is defined as the difference, each month, between the simple average of the returns on the two high-book-to-market portfolios and the corresponding simple average of the returns on the two low-book-to-market portfolios.

The factor loadings were estimated from a regression of excess returns for firm i on the three risk factors at a monthly frequency. μ^{EMR}, μ^{SMB}, and μ^{HML} are the annualized geometric means of the three risk factors over all months from 1973 to 1986 inclusive.

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