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Abstract

This paper estimates the implied cost of equity for Canadian and U.S. firms using a methodology based on the dividend discount model and utilizing firms' current stock price and analysts' forecasted earnings. We find that firm size and firm stock liquidity are negatively related to cost of equity, while greater firm financial leverage and greater dispersion in analysts' earnings forecasts are associated with a higher cost of equity. Moreover, longer-term sovereign bond yields also seem to play a role in a firm's cost of equity. After controlling for several factors, both at a firm-level and at an aggregate level, we find that the cost of equity for Canadian firms is 30-50 bps higher than that of U.S. firms during 1988-2006. Because our estimates may not fully account for factors such as currency risk, inflation uncertainty, degree of market integration, personal taxes, and differences in regulatory environments, we might shed further light on these results by incorporating proxies for these factors and perhaps extending our comparison to more countries.

JEL classification: G30, G38
Bank classification: Financial markets; International topics

Résumé

En faisant appel à une méthodologie basée sur le modèle d'actualisation des dividendes et en exploitant des données relatives au prix actuel des actions et aux bénéfices anticipés par les analystes, les auteurs estiment le coût implicite des capitaux propres des firmes canadiennes et américaines. Ils constatent que la taille des sociétés et la liquidité des actions varient en sens inverse du coût des capitaux propres, alors que l'ampleur de l'endettement des entreprises et de la dispersion des prévisions de profits émanant des analystes est en relation positive avec des coûts élevés. Il semble, en outre, que les rendements des obligations d'État à long terme aient une incidence au chapitre du coût des fonds propres. Après avoir pris en compte plusieurs facteurs à l'échelle des entreprises individuelles aussi bien qu'au niveau agrégé, les auteurs concluent que le coût des capitaux propres des firmes canadiennes dépasse de 30 à 50 points de base celui supporté par les entreprises américaines entre 1988 et 2006. Comme l'étude peut ne pas tenir pleinement compte de facteurs tels que le risque de change, l'incertitude liée à l'inflation, le degré d'intégration des marchés, l'impôt des particuliers et les différences entre les cadres réglementaires, il pourrait s'avérer utile d'incorporer des variables d'approximation à l'égard de ces facteurs et, peut-être, d'étendre la comparaison à d'autres pays.

Classification JEL : G30, G38
Classification de la Banque : Marchés financiers; Questions internationales

1. Introduction and Motivation

The cost of equity capital is an important component to Canada's economic growth since it affects firms' cost of investment funding.[1] Policymakers in Canada have developed the view that financing costs are persistently higher in this country than in the United States and other countries. For example, the Capital Markets Leadership Task Force begins its 2006 report with the premise that the cost of capital in Canada needs to be reduced in order to effectively compete with the United States.[2] Similarly, the Report of the Task Force to Modernize Securities Regulation in Canada (2006) reinforces the notion of a "made-in-Canada" risk premium that increases the cost of equity capital in Canada and which discounts the price by which Canadian shares trade.[3] Regardless of whether or not there is a difference between the United States and Canada, policy makers should focus on improving the Canadian investment environment by removing any frictions that are contributing to higher costs of equity financing. This can ultimately benefit both Canadian firms and economic growth in Canada.

The cost of equity (COE) can be defined as the return expected on a firm's common stock in capital markets.[4] It represents the compensation demanded by shareholders for providing capital and assuming the risk of waiting for this return. This implies that cost of equity reflects the opportunity cost of investing in a firm's stock as opposed to other potential investments with similar risks. Because this return is uncertain, the cost of equity incorporates an equity risk premium - the incremental payoff from holding a risky equity security rather than a risk-free security.

Estimation of the cost of equity is not straightforward, and the difficulties are compounded when international comparisons are made at an aggregate level. Different assumptions and methodologies often result in different answers. This paper estimates

[1] For example, for Canadian corporations, Serletis and Pinnoi (2006) find that equity financing contributed 11% (12%) of investment funding, versus 8.7% (15%) for bond financing, when measured by net (gross) flow-of-funds between 1970-2002.
[2] See Boritz (2006).
[3] The Report cites the findings of Hail and Leuz (200) and King and Segal (2003, 2006).
[4] This return is typically expressed on an annual basis. For a definition, see Ross, Westerfeld, Jaffe, and Roberts (2005).

and compares the cost of equity for Canadian and U.S. firms using forward-looking information and by explicitly controlling for firm-level and industry-level effects.

A review of empirical work to date shows mixed evidence as to whether Canada has a higher cost of equity capital than the United States. For the most part, the two countries are relatively close on a world-wide scale. Yet, small differences in the cost of equity capital can translate into very large values when multiplied by the annual amount of equity financing in Canada.[5]

Many limitations can be identified with the empirical literature. First, only recently has a true forward-looking, firm-specific approach to estimating the cost of equity been applied to Canada. Due to an insufficient amount of firm-level data before the mid-1990s, most estimates are based on historical market rather than firm-level returns. Second, research to date has not been focused on making a thorough comparison between Canada and the United States. Rather, the cost of equity has been estimated as a preliminary step to answering other questions (such as whether there are differences in corporate practices and country legal environments). As a result, these cost of equity comparisons do not account for firm-specific characteristics and differences in macro-economic factors across countries. Lastly, although the cost of equity and the equity risk premium are linked, generally the empirical literature does not probe this relationship. Most work on the equity risk premium focuses on determining its magnitude and the rationale behind investors' valuation assumptions. Given the cost of equity definition contains a risk-free rate plus a risk premium, it may also be insightful to consider the interest rate environment and how this affects individual firm financing costs.

We address all of these issues by implementing a forward-looking approach to estimation and by taking advantage of firm-level data. We compare these estimates for Canadian and U.S. firms over the 1988-2006 period, first at a top-level and then controlling for firm characteristics, industry effects, and business cycle effects in panel regressions. Given that there are many factors to control for, both at a firm level and at an aggregate level,

[5] As of 31 December 2006, the market capitalization of the TSX was just over $2 trillion. During 2006, TSX firms raised over $41 billion. Source: http://www.tsx.com.

the main focus is not the numerical value of the estimates, but whether significant differences exist between Canada and the United States.

Our results indicate that over the full 1988-2006 sample period, the cost of equity implied by stock prices and analyst forecasts is higher in Canada than in the United States. Controlling for factors such as firm size, leverage, corporate taxes, firm stock liquidity, industry membership, and business cycles, we find a difference of 30-50 bps between Canadian firms and similar U.S. firms. In addition the cost of equity for both countries appears to have decreased over the last 18 years.

When we explicitly account for risk-free rates in the two countries, we find that the Canada-U.S. cost of equity difference is smaller for the 1998-2006 period. We attribute this to the different interest rate regimes occurring in the first versus second half of our sample period: the Canada-U.S. yield differential was large and positive in the earlier period, but since 1997 government bond yields have been relatively similar. This suggests that policy makers might continue to focus on anchoring inflation expectations and pursuing a low debt-to-GDP ratio in order to maintain competitive government bond yields and to positively impact the environment for investment financing in Canada.

The remainder of this paper is organized as follows: section two outlines the implied approach of estimating the cost of equity; section three reviews prior research related to cost of equity; section four discusses our methodology and data; section five presents our estimation results; section six makes concluding comments.

2.0 Estimating the Cost of Equity Capital

Estimating the cost of equity involves estimating the expected return on a firm's common stock. The cost of equity includes a risk premium to compensate shareholders for holding a risky equity security rather than a risk-free security:

$$COE_i = E(r_i) = r_f + rp_i \tag{1}$$

where COE_i = firm i's cost of equity,
$E(r_i)$ = the expected future return on firm i's equity, where returns include capital gains and dividends,
r_f = the risk-free rate, and
rp_i = the equity risk premium for holding firm i's stock.

There are two general approaches for estimating the cost of equity at a firm level. We use an implied approach which measures the cost of equity as the internal rate of return that equates the present value of forecasted future cash flows to equity holders with the current stock price. In comparison, the realized returns approach uses information in realized ex-post stock returns to generate a cost of equity (e.g., the CAPM). In this section we discuss the different implied cost of equity models and explain our choice of the implied approach over the realized returns approach.

2.1 Implied Approach

Determining the cost of equity using the implied approach is analogous to determining the nominal yield to maturity on a bond; i.e., finding the discount rate that sets the bond's price equal to the present value of future cashflows. Similarly, the implied cost of equity is the discount rate that sets the current stock price equal to the present value of expected future dividends per share. The relation between the current stock price (P_0), the cost of equity (r), and future expected dividends per share (d_1, d_2, d_3, …) is represented by the dividend discount model (DDM):[6]

[6] The cost of equity can be expressed in nominal or real terms depending on whether nominal or real dividends per share are used.

$$P_0 = \frac{d_1}{(1+r)} + \frac{d_2}{(1+r)^2} + \frac{d_3}{(1+r)^3} + ... \quad (2)$$

In practice, determining a bond's nominal yield to maturity is easier, since future coupon and principal payments are known. Finding the implied cost of equity is much more difficult since future dividends must be forecasted into infinity. The various implied models differ in terms of how this stream of dividends evolves.

2.1.1 Gordon Dividend Growth Model

The simplest form of the DDM, the Gordon Dividend Growth Model, assumes a constant perpetual rate of growth (g) in expected dividends per share. With this assumption, dividends are an infinite geometric series, and the cost of equity can be written as a function of the dividend yield plus the constant growth rate:

$$r = \frac{d_1}{P_0} + g \quad (3)$$

Two problems are encountered when estimating the cost of equity using the Gordon Dividend Growth Model. First, it is difficult to estimate a long-term growth rate as typically only shorter-term forecasts are available. In practice, many use the five-year dividend growth rate as a proxy for the long-term rate. Second, in the Gordon Model it is possible to specify that dividends grow at a rate that is greater than economic growth, which implies that dividends will be larger than the economy at some future point. We do not use the Gordon Growth Model in our analysis, but discuss it here to provide a simple intuition as to how growth and dividend assumptions impact the cost of equity.

2.1.2 Residual Income Valuation Models

Residual income valuation (RIV) models address the difficulties in estimating a long-term growth rate by utilizing accounting information. These models equate the current share price to the sum of two components: (1) the present value of expected dividends per share over a short or medium-term horizon (N); and (2) a discounted terminal value, which is the present value of the expected share price at the end of the forecast period, assuming that dividends then grow at a constant rate (g_L) in perpetuity:

$$P_0 = \sum_{t=1}^{N} \frac{d_t}{(1+r)^t} + \frac{d_{N+1}}{(r-g_L)(1+r)^N} \tag{4}$$

RIV models assume clean surplus accounting which requires that earnings are fully allocated between dividends and retained earnings; i.e., whatever portion of earnings that is not paid out in dividends is added to book value of equity. Hence, book value per share (bv_t) evolves according to the following equation:

$$bv_{t+1} = bv_t + e_{t+1} - d_{t+1} \tag{5}$$

and as roe_t = return on book equity
= e_t / bv_{t-1}

then $$bv_{t+1} = bv_t(1 + roe_{t+1}(1 - \frac{d_{t+1}}{e_{t+1}})) \tag{6}$$

Assuming that return on book equity and the dividend payout ratio after time N+1 remain constant, the following constraint is imposed on the long-term growth rate of dividends per share (g_L) in Equation (4):[7]

$$g_L = roe_{N+1}(1 - \frac{d_{N+1}}{e_{N+1}}) \tag{7}$$

Claus and Thomas (2001) implement the RIV model using a four-year forecasting horizon (N=4) and set the growth rate (g_L) equal to the expected inflation rate (p_e) in order to calculate a nominal cost of equity.[8] Dividends per share in year five are backed out from Equation (6) as follows:

$$d_5 = e_5(1 - \frac{g_L}{roe_5}) = e_5(1 - \frac{p_e}{roe_5}) \tag{8}$$

[7] This relation is called the sustainable growth rate formula and is prescribed in many finance textbooks, such as Ross, Westerfield, Jaffe, and Roberts (2005).
[8] They argue that the inflation rate must be the upper bound on the growth rate as, based on the accounting literature, abnormal earnings grow at a rate less than inflation. Abnormal earnings (ae) are earnings above the firm's cost of equity times its book value per share: $ae_{t+1} = e_{t+1} - r(bv_t)$.

So the cost of equity in the Claus and Thomas model is the value of r that solves the following equation:

$$P_0 = \sum_{t=1}^{4} \frac{d_t}{(1+r)^t} + \frac{d_5}{(r - p_e)(1+r)^4} \qquad (9)$$

If dividends are all positive and the cost of equity is greater than the expected inflation rate, there is only one value of r that will solve this equation.

The RIV model by Lee, Ng, and Swaminathan (2004)[9] shares many characteristics with the Claus and Thomas model, with two main differences. First, where Claus and Thomas have a four-year forecast horizon, Lee, Ng and Swaminathan have a forecast horizon of fifteen years. To forecast earnings, they use analyst estimates for the first two years. Thereafter, they fade the earnings growth to the real, long-run growth in GDP by year fifteen. Requiring only two years of analyst forecasts is an advantage, since earnings estimates over a five-year horizon are inherently less accurate and are not available for many firms. The second difference between the two models is that Lee, Ng, and Swaminathan assume that competition for investment projects and equity capital will drive the return on book equity towards the cost of equity, so that they are equal by the end of the forecast period. Because of this assumption, current book value is not required in the Lee, Ng, and Swaminathan model. In their implementation, Lee, Ng, and Swaminathan also fade the dividend payout ratio to the terminal payout ratio, calculated using the sustainable growth rate equation and substituting in the cost of equity for the terminal return on book equity.

2.1.3 Abnormal Earnings Growth Models

Another class of implied models assumes that the change in abnormal earnings from year to year grows at a constant rate into perpetuity. This is similar to assuming that the

[9] Their model is a slight modification of earlier models by Gebhardt, Lee, and Swaminathan (2001) and Gordon and Gordon (1997). It is more appropriate for international usage, as it imposes less stringent data requirements.

forecasted change in dividends grows at a constant rate, if the change in dividends is calculated as:

$$d_2 - d_1 = (e_2 - e_1) - g_L(e_1 - d_1) \tag{10}$$

In the Ohlson and Juettner-Nauroth (2003) version, a closed form solution for the cost of equity can be backed out from the following relation between price, next years earnings per share estimate and next year's expected dividends per share:

$$P_0 = \frac{d_1}{r - g_L} + \frac{e_1(g_S - g_L)}{r(r - g_L)} \tag{11}$$

where g_S = short-term dividends per share growth rate
= $(e_2 - e_1)/e_1$
g_L = a long-term dividends per share growth rate

Gode and Mohanram (2003) implement this theoretical model of Ohlson and Juetnner-Nauroth by assuming that the short-term growth rate (g_S) is equal to the average of the forecasted growth rate between year one and year two and the average five-year growth rate provided by analysts. Furthermore, they assume that the long-term growth rate (g_L) is equal to expected inflation for all firms.

Easton's (2003) model, called the Modified-PEG ratio model,[10] is just a special case of the Ohlson and Juettner-Nauroth model, where the growth rate in the *change* in dividends is set equal to zero ($g_L = 0$) so that dividends grow by the same dollar amount every year into perpetuity. The current stock price is related to the cost of equity, the next two year's forecasted earnings, as well as the next year's dividend:

$$P_0 = \frac{d_1}{r} + \frac{e_1 g_S}{r^2} \tag{12}$$

The advantage of the Easton and Ohlson-Juettner-Nauroth models over RIV models is that they yield simple formulas for the cost of equity. RIV models have more terms because they explicitly forecast variables over the short-term before calculating a terminal value. In contrast, the abnormal earnings growth models make assumptions so

[10] The modified PEG model is a special case of the PEG model, so named because the discount rate is equal to the square root of the inverse of the PEG ratio (i.e. the Price/Earnings to Growth ratio).

that the terminal value is calculated immediately, which allows them to be easily inverted to solve for the cost of equity.

2.2 Considerations with the Implied Approach

2.2.1 Model Identification

Each of the implied models assumes a different pattern of growth in future cash flows beyond the forecasting horizon. This raises the question of which implied model best approximates the market's expectation of these future cash flows. Previous work shows that there is a considerable correlation among the cost of equity estimates derived from the different implied models, but there is no consensus as to which is the best measure. For example, Easton and Monahan (2003) use a return decomposition method to evaluate measurement error vis-à-vis future one-year returns and find that a simple model based on the forward price-earnings ratio has the lowest measurement error. Botosan and Plumlee (2005) test the different implied cost of equity methods by seeing which ones have the appropriate loading on five proxies for firm risk and find that the cost of equity estimate based on Gordon and Gordon (1997)[11] dominates. Indeed, Hail and Leuz (2006) just take a simple average of several implied measures in their work, because they have no reason to choose one measure over another.

2.2.2 Analyst Forecast Properties

The implied models rely on the assumption that analyst earnings forecasts are a reasonable proxy for the market's expectations for future earnings. Research suggests that information in analyst earnings forecasts is incorporated in stock prices and that these forecasts perform better than time series models of earnings.[12] However, analyst forecasts could be both biased and sluggish relative to market expectations. Forecast bias

[11] The Gordon and Gordon model is similar in spirit to Lee, Ng, and Swaminathan (2003) in that the return on book equity is assumed to equal the cost of equity at the forecasting horizon.
[12] See Brown et al (1985), and Conroy and Harris (1987).

may exist in order to gain an underwriting relationship, to generate trading commissions, or to gain preferential access to management.[13]

In the context of a Canada-U.S. cost of equity comparison, these properties of analyst forecasts will be problematic only if analyst forecasts are significantly different between the two countries. Given that the analysts in the two countries are likely to be subject to the same incentives and practices, this should not be a source of difference in cost of equity estimates.

2.2.3 Sample Selection Issues

The implied approach to estimating the cost of equity requires expected future cash flows, which are usually derived from analyst forecasts. Analysts are more likely to cover larger firms and firms that do not have a family/management control block which both reduces the sample size and introduces a possible sample selection bias.[14] A smaller sample size and smaller dispersion in the type of firm covered may make it difficult to draw inferences using the implied method. Sample size tends to be an issue for Canada since a relatively small number of predominantly large Canadian firms tend to be covered by analysts. However, we attempt to control for these effects in our panel regression analysis by including several control variables, such as firm size and leverage.

Sample restrictions also arise with all implied valuation models due to their formulation. All require positive earnings and positive growth in earnings, to generate meaningful cost of equity estimates. In addition, they all require that the cost of equity is greater than the long-term growth rate. Furthermore, the Claus and Thomas model requires that terminal return on book equity is greater than the long-term growth rate, and the Ohlson and Juettner-Nauroth model requires that the short-term growth rate is greater than the long-term growth rate. Therefore, choosing a higher long-term growth rate reduces the sample size significantly for some of these models and biases the sample towards more profitable

[13] O'Brien, McNichols, and Lin (2005); Darlin (1983); Das, Levine, and Sivaramakrishan (1996); Ang and Ciccone (2001); McNichols and O'Brien (1997); and Matsumoto (1999) are a few of the many papers discussing analyst forecast bias.
[14] See Bhushan (1989), Brennan and Hughes (1991), and Lang, Lins, and Miller (2004).

firms. This restriction is more likely to affect the sample in weaker economic times when it is more likely that earnings forecasts may be negative.

2.3 Comparison to Realized Returns Approach

Despite some potential difficulties, using an implied approach to estimate firms' cost of equity has many advantages over using a realized returns approach.[15] The cost of equity is a forward-looking measure representing the expected rate of return. Because there is no basis, other than convenience, to expect that future returns will repeat past performance, as is implicit in the use of CAPM models, it is logical to use the information currently available to shareholders (forecasted cashflows and current stock prices) to derive this expected rate of return rather than basing it on realized past stock price movements. Moreover, it is difficult to get precise estimates of betas[16] and expected risk premiums[17] used in the realized returns method. Furthermore, when trying to compare cost of equity estimates across countries, the choice of realized returns model (e.g. CAPM vs. International CAPM) will also affect the results. For these reasons, we favour the implied approach for estimating the cost of equity.[18]

2. Empirical Evidence

There have been only a handful of studies over the last fifteen years that relate to the cost of equity for Canada. Motivated by inflation and taxation issues, most research from the 1990s did not employ firm-level models to estimate different cost of capital measures. Instead, market-level earnings and prices are used to generate a proxy for the cost of

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[15] Realized returns models use information in past equity returns to estimate the expected returns to equity holders (i.e., the cost of equity). These include the capital asset pricing model (CAPM), the international CAPM, and multi-factor models. Bruner, Eades, Harris, and Higgins (1998) find that the majority of corporations use the CAPM to estimate their cost of equity, but they also find that there is a wide variation in how it is implemented.

[16] See, for example, Fama and French (1993, 1997).

[17] Elton (1999) provides evidence of "risky" assets that underperform the risk-free rate over long periods of time (up to 50 years) and suggests that realized returns are a poor proxy for expected returns.

[18] There is also an empirical relation between the implied approach and the realized returns approach. Gordon and Gordon (1997), Gode and Mohanram (2003), Easton and Monahan (2003), and Harris et al (2003) all find that implied COE measures have a statistically significant, positive relation to CAPM beta. Gebhardt, Lee and Swaminathan (2001) are the exception who find no significant relation between beta and their implied measure.

equity.[19] An interest in overall financing costs and the absence of firm-level data during this period diminished specific attention to firm-level cost of equity.[20] Overall, this early period of research downplayed concerns about Canada's relative cost of capital, but did not completely dispel the belief that the cost of equity was higher in Canada than in the United States.

Since the late 1990s, the literature can be categorized into those studies which examine the cost of equity and the factors that influence it, and those which estimate the equity risk premium. Since these two measures are related, by definition, conclusions about the relative size of Canada's equity risk premium have implications for Canada's cost of equity and vice versa.

3.1 Estimating an Implied Cost of Equity for Canada

In the context of multi-country comparisons, only a few studies use an implied approach to estimate the cost of equity for Canada. Moreover, most of this work examines the influence of shareholder information and protections at a country level, and thus the focus is not on producing precise, firm-level cost of equity estimates.

As part of their 22 country study of capital market governance and market performance, Daouk, Lee, and Ng (2005) estimate the implied cost of equity for Canada and the United States during 1969-1998 using a constant-growth dividend discount model. Their methodology uses country-level performance data on stock indices and dividend indices, and assumes that the future dividend growth rate is equal to the current rate. They find a country-level average cost of equity of 5.4% for Canada versus 8.3% for the United

[19] For example, Department of Finance Canada (1991), Fillion (1992), Canada Consulting Group (1992), Ando et al (1997).
[20] For example, Ando et al (1997) decided that the number of individual companies reporting to Compustat was too small at that time to generate reliable firm-level cost of equity estimates.

States.[21] Although the authors admit to some imprecision in their cost of equity estimates, they do not consider this material from a cross-country perspective.[22]

More sophisticated methodologies are utilized by Claus and Thomas (2001) and Hail and Leuz (2006), which produce much smaller differences between Canada and the United States. Claus and Thomas estimate the cost of equity using a residual income valuation model (introduced in Section 2.1.2) over the period 1985-1998. Seeking to prove that traditionally high equity risk premia estimates are not applicable to more recent times, Claus and Thomas infer the cost of equity for six countries using stock prices and forecasted earnings that are aggregated across firms in each country. They report a nominal cost of equity for Canada with a mean of 10.8% over the period, 20 bps lower than that of the United States.[23]

Using a later sample period, Hail and Leuz (2006) examine the impact of differences in disclosure, securities regulation, and legal systems on the cost of equity for forty countries over 1992-2000. Using an average from four different implied models, the authors estimate a cost of equity that is implied by stock prices and analyst forecasts. Their analysis starts with a nominal cost of equity of 10.5% for Canada versus 10.2% for the United States. Because the focus of their study is on cross-country comparisons, Hail and Leuz use only country-level variables to test whether different legal systems and disclosure requirements are related to cost of equity. Moreover, they do not refine these individual country cost of equity estimates by controlling for inflation and exchange rate effects as well as firm-specific factors. As discussed in Section 4, we account for both firm-specific variables as well as certain country-level variables in order to compare U.S. and Canadian cost of equity.

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[21] Jog (1997) also employs a dividend growth model in estimating cost of equity for the telecom industry over 1988-94. He finds the cost of equity for this sector is 7.7% in Canada, about 2% greater than that of the U.S.

[22] The authors also use a realized returns approach to estimate cost of equity which produces a very different result of 10.8% for Canada, 20 bps higher than that of the U.S. Differences in these market performance measures do not result in materially different estimates in their overall analysis of capital market governance.

[23] These estimates do not address exchange rate effects. In their paper, the cost of equity is only an interim step to calculating the equity risk premium, so currency impacts residing in both the cost of equity and the risk-free rate cancel out in the final analysis.

3.2 The Implied Equity Risk Premium for Canada

Estimation of the equity risk premium via implied methodologies is closely related to work on the cost of equity, because the risk premium is calculated as the remainder after deducting a risk-free rate. If the interest rate environment is similar across countries, a higher equity risk premium for Canada implies a higher cost of equity. Only three studies (two of which were introduced in Section 2.3.2.) use an implied approach to produce firm-level equity risk premium estimates on which Canada and the United States can be compared.[24]

Khorana, Moyer and Patel (2000) use analyst forecasts of firm earnings growth in a constant-growth dividend discount model to estimate an expected return for the TSE 300 index over 1987-1996. They aggregate forecasted growth rates based on firm market values, which gives larger and more mature firms a proportionately greater weight and put a downward bias on expected return. Their market risk premium estimate for Canada is 5.45% over the period, 160 bps lower than that of the United States.

In their 2001 paper, Claus and Thomas estimate the implied equity risk premium for Canada, for the years 1985-1998. Although their cost of equity estimate for this period is only slightly lower than that of the United States, once higher Canadian interest rates are taken into account a much larger difference in equity risk premia of 1.2% results. They estimate an equity risk premium for Canada of 2.2% versus 3.4% for the United States.[25]

Lee, Ng, and Swaminathan (2004) also estimate forward-looking equity risk premia, both at a country and industry level, across G-7 countries between 1990 and 2000. Comparing larger Canadian firms with similar-size U.S. firms, they find the opposite – the equity risk premium averages 7.7% for Canada versus 4.3% for the United States.[26] Their results

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[24] In related work, Hannah (2000) develops an adjusted dividend growth model that incorporates a "near-term super normal growth in dividends." Based on market-level price and dividend pay-out at the time, Hannah's model produces an equity risk premium for Canada that is roughly between 2-3%, about 10-20 bps higher than that of the United States.

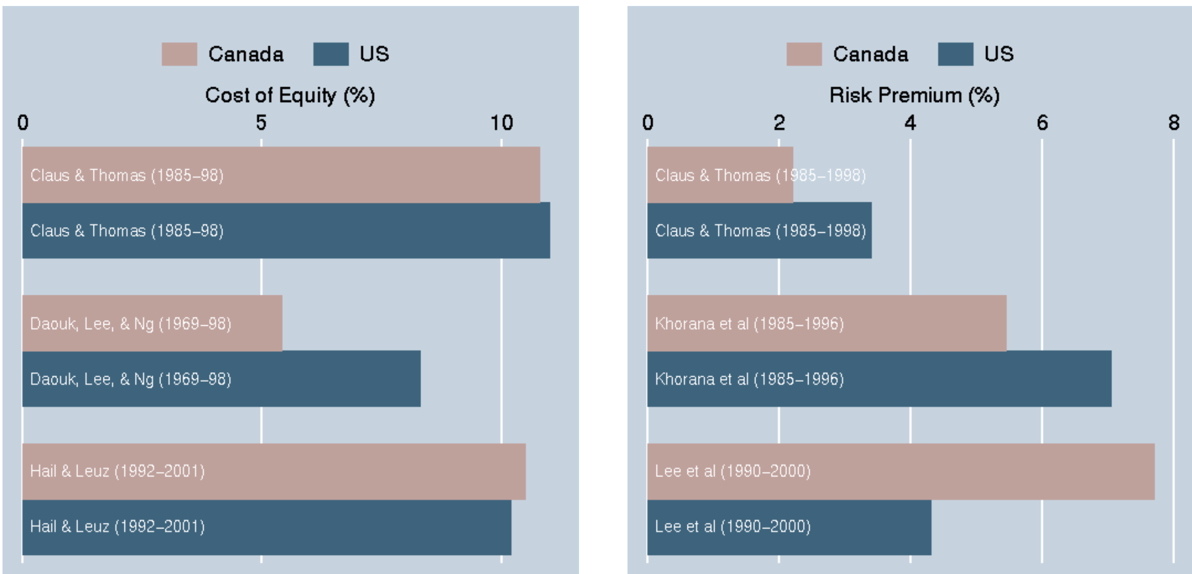
[25] Using Claus and Thomas' estimates as the market equity risk premium in a CAPM-type model, King and Segal (2003) find a cost of equity difference of -.006 between a matched set of Canadian and U.S. firms. over 1991-2000.

[26] These cost of equity estimates are calculated on a value-weighted basis using USD converted data. On an equal-weighted basis, the estimated cost of equity is 10.1% for Canada versus 8.2% for the United States.

suggest that Canada has a cost of equity advantage over the United States in only a few industries – entertainment, real estate, tobacco and transportation equipment.

As the chart below indicates, results from implied methodologies vary. This is likely due to the incorporation of more variable firm-level data over different sample periods as well as differences in the models themselves.

Chart 1: Empirical Evidence, Implied Methodologies



3.3 Empirical Studies for Canada using a Realized Returns Approach

Although two studies implement an asset pricing model to approximate a cost of equity for Canadian firms,[27] for the most part, the realized returns approach has been used to estimate the equity risk premium. Based on historically lower stock market returns and higher bond yields, these studies tend to find a lower equity risk premium in Canada than in the United States. Booth (2001) reviews the long term performance of equities versus bonds over 1926-2000 and finds that the realized equity risk premium is lower in Canada by approximately 1.3-1.8%. Under the presumption that a true riskless asset may not exist

[27] In his review of Canadian pulp and paper firms, Jog (1997) finds a cost of equity of 12.95% for this industry during 1989-94, about 2% greater than this industry's cost of equity in the United States. Daouk et al (2005) find Canada's cost of equity is 10.8% over the period 1969-1998, about 20 bps higher than that of the United States.

over such extensive periods of time, Jorion and Goetzmann (2000) substitute physical inflation rates for the risk-free rate and approximate an equity risk premium equal to the long-term, average, real return on equity in U.S. dollars. Their approach also indicates that Canada's equity risk premium is lower, by 1%, than that for the United States over 1921-96. Estimating the equity risk premium over more recent sample periods, Kasa (1997), Hodrick, Ng, and Sengmueller (1999), and Hannah (2000) produce Canada-U.S. differences in a similar range of 1.3 -2.6%.

3.4 Higher Cost of Equity: Perception or Fact?

Although there is an enduring belief that the cost of equity capital is high in Canada, the review of empirical work does not provide clear evidence on this. First, the magnitude of the estimated cost of equity ranges from 5.4% to 10.8%. Second, these studies disagree on how Canada compares with the United States. Some estimate a slightly higher cost of equity in Canada; some estimate that Canada's cost of equity may be as much as 2.9% lower. Third, estimates of the equity risk premium are equally inconclusive. The implied equity risk premium for Canada ranges between 2 and 8%, and is either 1% better or 3% higher than in the United States. Clearly, there is a need to definitively settle this issue.

A closer look at the research to date can account for much of the discrepancy. The cost of equity is a firm-specific measure and for that reason, firm-specific factors should be considered before making broader conclusions at a country level. Although many studies using the implied approach do utilize firm-level data, they do not exploit fully the available information. For example, Claus and Thomas (2001) aggregate data across firms before making their cost of equity estimates. In addition, none of these studies control for firm characteristics that are known to affect the cost of equity. Therefore differences across studies could be attributed to different characteristics of the individual firms in each sample. This might be exacerbated by a relatively small sample of firms in the Canada compared to the United States.[28]

[28] For example, Claus and Thomas (2001) use 1355 firm-year observations for Canada and 33,389 for the U.S.; Lee et al (2004) include 1052 firm-year observations for Canada vs. 21,492 for the U.S.; Hail and Leuz (2005) have 1560 firm-year observations for Canada vs. 4267 for the U.S.

In addition to firm-level factors, there will be aggregate-level factors that influence each firm's cost of equity, and these also should be considered when making cross-country comparisons. Claus and Thomas (2001) and Hail and Leuz (2005) do not control for the effects of inflation and exchange rates on their estimates. Canada's macroeconomic environment over the last twenty years has endured changes in national government finances, and Quebec-related political uncertainty as well as the evolution of credible inflation targeting, and this would be reflected in inflation and exchange rate expectations over the period. In order to make a relevant comparison between Canada and the United States, at a minimum these issues should be addressed by converting input data to the same currency. In addition, care must be taken to ensure that forward-looking conclusions are not based upon circumstances in different time periods that may no longer be relevant.

Until fairly recently, it was difficult to examine the cost of equity at a firm-level due to data limitations. However, accounting data as well as forecasted earnings data are now available for a sizable number of firms over many years, not only for the United States, but also for Canada. By focusing on forward-looking information on which investors make individual investment decisions, and by explicitly controlling for firm-level, industry-level, and country-level differences, we will implement an implied approach to obtain a superior cost of equity comparison between Canada and the United States.

3. Methodology and Data

We start our analysis by estimating the implied cost of equity for Canada and the United States for each individual firm over each year of our sample (1988-2006), using firm-level data. We use the models discussed in Section 2.3, as suggested by Claus and Thomas (r_ct);[29] Lee, Ng, and Swaminathan (r_lns); Ohlson and Juettner-Nauroth (r_oj); and Easton MPEG (r_mpeg). Since no model is clearly superior, our analysis focuses on the average of these four measures (r_ave). (See Appendix A1 for details on the calculations for each model.)

[29] As only a small proportion of Canadian firms has a 5 year growth rate forecast, we modify the Claus and Thomas model to incorporate 2 years of forecasted dividends after which a terminal value is calculated.

We compare this average cost of equity estimate for Canadian and U.S. firms with previous empirical estimates for the two countries, accounting for similarities and differences. After looking at the difference between the simple average cost of equity across countries, we apply more refined methodologies that take into account firm/country level characteristics. To enable a more relevant comparison, we match Canadian firms with U.S. firms based on size and industry and statistically test for differences in the cost of equity between the two countries. Finally, we use a panel regression analysis to identify the effects of various firm-level and country-level variables on the cost of equity for our sample of firms.

4.1 Data Required for Cost of Equity Measures:

Our sample contains Canadian and U.S. nonfinancial firms covered by I/B/E/S and Compustat over the period 1987-2006. The two datasets are merged together using the firm's six digit CUSIP, and the fiscal year in Compustat is matched with the year of the fiscal year-end in I/B/E/S prior to the forecast date. These matches are then hand-checked using company names. We end up with a Canadian sample of 3,419 observations, and a U.S. sample of 31,005 observations. We also identify Canadian firms that are crosslisted on a major U.S. exchange by examining whether they are included in the CRSP dataset of U.S. firms.

The cost of equity calculations require the following variables: current share price (P_0); one-year and two-year ahead earnings per share forecasts (e_1 and e_2); payout ratio (d/e); book value per share (bv_0); long-term growth rate in earnings per share (g_L); and one-year and two-year ahead forecasted exchange rates.

We extract the current share price and the median earnings per share forecasts from I/B/E/S.[30] We use the forecast that is made six months before the fiscal year-end on the basis that the prior-year earnings results should be available by this time.

[30] We only consider forecast data that is either in USD or CAD. Many Canadian firms, especially those that are crosslisted, have forecast data that is in USD.

Each firm's book value of equity and payout ratio are retrieved from Compustat. For consistency purposes, the book value of equity is converted to a per share figure by dividing by the number of shares (from I/B/E/S.) The payout ratio is the average historic payout ratio over the previous three year period,[31] restricted to be between zero and one; otherwise, we treat it as missing. The firm's future payout ratio is assumed to equal the firm's average payout ratio over the prior three years. If the firm's payout ratio is missing for each of the prior three years, the future payout ratio is assumed to equal the country's mean payout ratio in that year.

To obtain nominal cost of equity estimates in a common currency, we follow Lee, Ng, and Swaminathan (2004) and convert Canadian dollar earnings and prices into USD. We estimate expected exchange rates via the Purchasing Power Parity relation, using inflation forecasts from Consensus Economics.[32] Later, we check for robustness to different conversion methods and find similar results.

As an estimate of the long-term growth rate in earnings per share, we follow prior studies and use the expected U.S. inflation rate from Consensus Economics (since all cash flows are in USD). We also include year dummies in our regression analysis, so any mismeasurement of the expected inflation rate should not affect our results. Later, we provide a sensitivity analysis to show that our results hold for reasonable differences in long-term growth rates across the two countries.

4.2 Control Variables, Regression Analysis

Differences in the median cost of equity between Canada and the United States can be partially explained by firm-specific characteristics as well as by other factors. Generally, the more these variables increase the perceived (non-diversifiable) risk of future returns

[31] This is calculated as (dividends + repurchases) ÷ earnings per share. Dividends is Compustat Data#26 and earnings per share is Compustat Data#58. If dividends are missing, we assume that the firm pays $0 in dividends in that year. Repurchases is ΔCompustat#226 as in Fama and French (2001). Our results also hold if repurchases are calculated as Compustat#115 + ΔCompustat#56, as in Grullon and Michaely (2002), or if we exclude repurchases altogether.

[32] Using the one year ahead CPI forecast provided in January as a measure of expected inflation, we calculate the one-year ahead USD-CAD exchange rate by multiplying the current rate by $(1+CPI_{US})/(1+CPI_{CAN})$. The two-year ahead USD-CAD exchange rate is calculated by multiplying the one-year ahead rate by $(1+CPI_{US})/(1+CPI_{CAN})$.

to shareholders, the more shareholders will demand to be compensated for this risk, and the higher will be the firm's cost of equity. We discuss the expected effects of these factors on a firm's cost of equity along with the measures used in our analysis.

Firm Size: ***Firm size should be negatively related to the cost of equity.***

There tends to be more information available for larger firms, given they are generally more transparent and have a greater analyst following. This reduces agency costs: when investors have more information regarding a firm's management and potential earnings, returns are less uncertain. In return for this perceived lower risk, shareholders will demand a lower return, effectively reducing the firm's cost of equity. In addition, large firms are more liquid which also decreases the cost of equity. (See discussion of liquidity, below.) In order to capture differences in size, we use the logarithm of the firm's book value of total assets (Compustat Data#6). We prefer book value over market value due to the endogenous relationship between market value and cost of equity.

Financial Leverage: ***Greater financial leverage should increase the cost of equity.***

An increase in financial leverage will increase the return required by all investors. As the proportion of debt in the capital structure increases, fixed interest costs rise, so there is more risk to debt holders. But there is also more risk to equity holders: since payments to debt holders have priority, returns to equity holders will be more sensitive to changes in earnings and, in this sense, are more risky.[33] We measure financial leverage using the firm's debt/equity ratio (Compustat Data#9/Compustat Data#60).[34]

Corporate Taxes: ***Corporate taxes should be negatively related to the cost of equity.***

Because interest payments to borrowers are tax-deductible, corporate taxes reduce the effective cost of debt and, in turn reduce the impact that financial leverage has on the cost of equity; i.e., although the expected return on equity still rises as debt increases, it increases by less than in the case of no taxes (see Equation (13)). Thus, with corporate taxes, leverage provides a riskless tax shield, such that the overall risk of the firm is lower for the same amount of financial leverage. Firms can manage their tax burden through

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[33] See Brealey, Myers, Marcus, Maynes, and Mitra (2006).

[34] To eliminate the impact of outliers, we exclude observations above the 99th percentile for the following variables: Debt/Equity Ratio, Forecasted Growth Rate (g_S), Turnover, and Forecast Dispersion.

various tax shields, including depreciation, and this can result in significant variation in effective tax rates across firms.[35]

$$COE_{i,levered} = COE_{i,unlevered} + \frac{D_i}{E_i}[COE_{i,unlevered} - COD_i](1-t) \quad (13)$$

To control for corporate taxes, we use the firm's effective tax rate (Compustat Data#16 / Compustat Data#170). If this is outside the range of zero and one, we consider this a missing value.

Firm Stock Liquidity: *Greater **liquidity should be associated with lower cost of equity***. All else equal, investors require extra compensation to account for the costs of buying and selling a security. According to Amihud and Mendelson (1985), less liquid securities have higher transaction costs and will command a higher cost of equity. Fanto and Karmel (1997) show that many Canadian firms cite increased liquidity as a reason for crosslisting, so one might expect crosslisted firms to have a lower cost of equity.[36] As a proxy for firm-level liquidity, we use the firm's yearly share turnover (Compustat Data#28/Compustat Data#25). We also include dummy variables to indicate whether the firm is a crosslisted Canadian firm and whether the firm is a U.S. firm.

Forecast Dispersion: ***Greater forecast dispersion should increase the cost of equity.*** Gebhardt, Lee and Swaminathan (2001) and Gode and Mohanram (2003) show a positive relation between earnings variability and the implied cost of equity. By extension, higher variability in earnings forecasts for a firm would increase its cost of equity. Many studies have found that providing both increased disclosure and better quality disclosure results in a lower cost of equity. As disclosure improves, information asymmetry and uncertainty decrease, reducing the risk premium and the returns required by equity holders.[37]

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[35] See, for example, Modigliani and Miller (1958). This does not imply that higher tax rates are desirable. Higher taxes also decrease the future cash flows of the firm, so the net effect of the decreased cash flows and lower cost of equity would be a lower firm value.

[36] Many studies have found that international cross-listing increases trading volumes as well as the visibility of the firm. This not only lowers trading costs, but also enables more information to be reflected in a firm's shares, lowering the equity risk premium and the cost of equity. See, for example, Errunza and Miller (2000), Koedijk and Van Dijk (2004).

[37] For theoretical work, see Lambert, Leuz, and Verrecchia (2006). Empirical studies include those by Bhattacharya, Daouk, and Welker (2002);Botosan (1997);Botosan and Plumlee (2003);Berger, Chen and Li (2006);Chua, Eun, Lai (2006);and Hail and Leuz (2005).

Although we cannot measure this directly, we include the cross-sectional standard deviation of analysts' earnings per share estimates (from I/B/E/S) as a proxy for disclosure, on the basis that greater disclosure would be reflected by smaller forecast dispersion.[38] However, forecast dispersion may also capture other effects not related to disclosure such as analyst ability and resources, variability of a firm's underlying earnings, and corporate governance (e.g., the effectiveness of the audit committee).

Industry Effects: *The cost of equity should vary by industry.*
Firms in some industries may have a higher cost of equity due to the nature of their business. For example, firms in natural resource and other industries that are more cyclical and that have greater fixed costs should have a higher cost of equity. To control for industry effects, we group firms into seven industries based on the firm's two-digit SIC code (Compustat Data#324) and include dummy variables in our regression analysis to indicate industry membership.

Economic Conditions*:* *The cost of equity should be affected by changes in the economy.***.**
For the equity market as a whole, Fama and French (1989) show that expected returns are counter-cyclical: they are higher under weak economic conditions and lower under strong economic conditions. We include yearly dummy variables in our regression analysis to control for global economic conditions.

After controlling for the above variables, any observed differences between U.S. and Canadian firms may still be due to other factors. Possible omitted variables (which may be addressed in future work) include financial market segmentation,[39] currency risk, inflation uncertainty, differences in personal taxes, and differences in legal and regulatory environments, including enforcement.

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[38] I/B/E/S does not calculate a standard deviation unless at least two analysts to follow the stock.

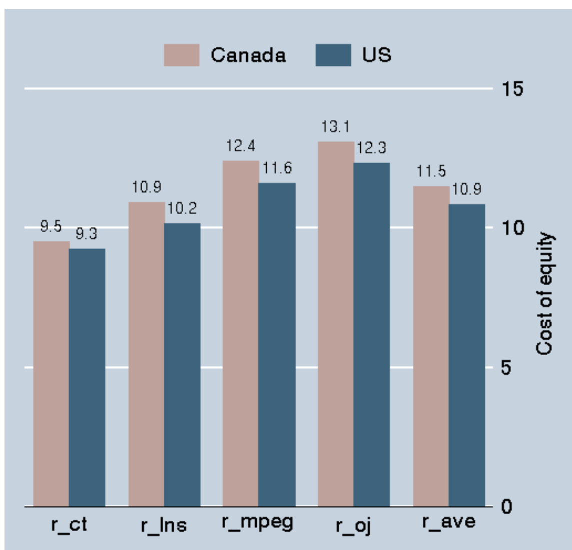
[39] Evidence on integration between Canada and the United States is mixed. On the one hand, a large number of Canadian firms are cross-listed in the United States, which is supportive of integration. On the other hand, pension funds and RRSPs have historically imposed restrictions on the holdings of foreign assets. Using A CAPM regression, Mittoo (1992) finds evidence in favour of segmentation during 1977-1981 and evidence in favour of integration during 1982-1986 for cross-listed and non-cross-listed stocks. Using a multi-factor model, only the cross-listed stocks appear to be integrated in the later period.

4. Results

5.1 Canada-U.S. Comparison:

As a first cut, we perform a top-level comparison of the cost of equity in Canada and the United States over the period from 1988 to 2006, without controlling for any factors that might affect these results. Depending on the model, the median cost of equity across Canadian firms is in the range of 9.5% to 13.1% over the entire sample, and is between 20 and 80 bps greater than that of the United States. (See Chart 2.) The average of the four models indicates a cost of equity that is higher by 60 bps for Canada. As in previous studies, there is also considerable correlation between the measures. (See Appendix A2.)

Chart 2: Cost of Equity, Implied Models



In comparing our results with those from earlier studies, we find some similarities but also some differences. For example, Claus and Thomas (2001) find a cost of equity of 10.8% for Canadian firms, 20 bps below the U.S. cost of equity. Using their model, we also find a difference of 20 bps between the two countries. But our estimate for Canada, at 9.5%, is 20 bps above the U.S. cost of equity estimate. This discrepancy might stem from sample differences: their study contains a relatively smaller number of Canadian firms and covers an earlier time period with a distinct macroeconomic environment.[40] In comparison, Hail and Leuz (2005) compile an average cost of equity estimate over a later period and find a difference of 30 bps for Canadian firms above U.S. firms. We find a slightly larger difference of 60 bps using an average of four different models (which is comparable to their approach).[41]

Given our cost of equity estimates likely reflect characteristics of the firms in each country, we test whether there are significant differences between our Canadian and U.S. samples. (See Table 1, Panel A.) The mean difference in cost of equity between Canadian and U.S. firms is higher than the median difference, and both are significant according to an adjusted t-test and a Wilcoxon Signed Rank test. The average Canadian firm also has a higher earnings yield and a higher forecasted earnings growth rate compared to the average U.S. firm. Both of these variables are components of our cost of equity calculation, so it is not surprising that we find a higher average cost of equity for our Canadian sample. Our tests also show that U.S. firms are larger, have higher turnover, and have lower analyst forecast dispersion when compared to the Canadian firms.

We also examine differences within the Canadian sample by comparing crosslisted and non-crosslisted Canadian firms (See Table 1, Panel B.) Overall, crosslisted firms have a cost of equity that is about 70 bps below non-crosslisted Canadian firms. This likely is the result of sample composition, since the crosslisted firms are much larger and have more liquidity and visibility than non-crosslisted firms.

Focusing on firm size, Canada and the United States are different not only across samples but also across time. Chart 3 shows that the median firm size in the United States

[40] There are also slight differences in methodologies. For example, Claus and Thomas aggregate firm-level data before estimating the cost of equity; data valuation points are different; and long-term growth rates are calculated differently.
[41] Again, there are methodological differences. For example, Hail and Leuz estimate a cost of equity in local currency; they include 3 years of earnings per share estimates; valuation methods for price, analyst forecasts, and growth rates are slightly different.

increases over 1988-2006, particularly towards the end of the dot-com era.[42] In contrast, the Canadian sample shows a decrease. Part of this may be explained by the fact that I/B/E/S coverage in the early part of the period focused on large, well-known Canadian firms. Only later were smaller Canadian firms added. Chart 4 shows the size-weighted average cost of equity for Canada and the United States on a yearly basis. In both countries, the cost of equity appears to decrease over time. Also, since the early 1990s, the cost of equity is higher in Canada in every year. However, these results are affected by the changing sample composition from predominantly large firms at the beginning of the period towards smaller Canadian firms later in the period; whereas the opposite is the case for the United States. This partially explains why the decline in the Canadian cost of equity is not as dramatic as in the United States.

Chart 3: Median Firm Size by Year

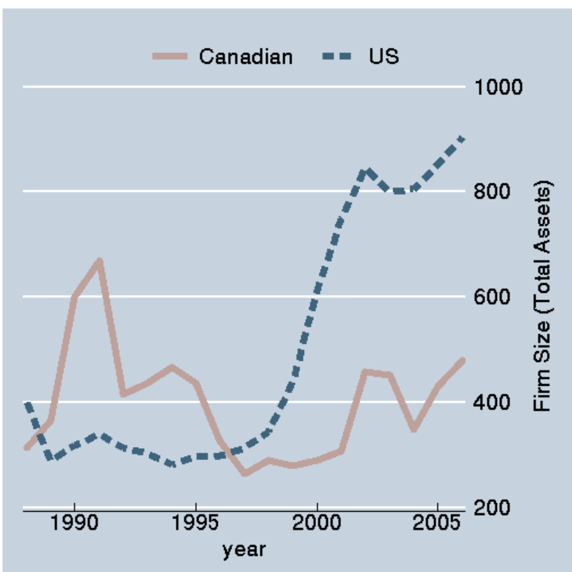
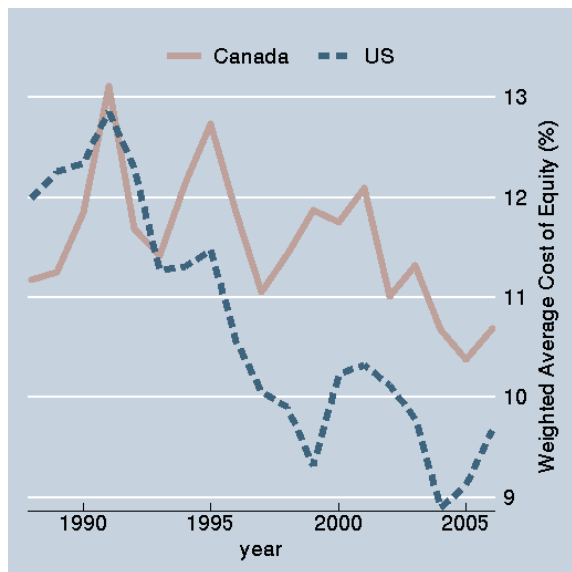


Chart 4: Yearly Cost of Equity



5.2 Matched-Firm Analysis:

We control for some of the differences in firm-level characteristics by performing a matched-firm analysis based on industry and size (total assets). For each Canadian observation we screen for all U.S. observations that fall within the same year and industry

[42] Sample size in both countries also increases with the dot-com boom in the late 1990s, then declines around 2001.

(based on their two-digit SIC code). Then, to match on size, we select the U.S. firm with the closest book value (USD) of total assets to that of the Canadian firm. If no U.S. match is found within 35% of the Canadian firm's total assets, the Canadian firm observation is dropped.

We test the significance of the mean difference between the Canadian and U.S. matched sample using an adjusted t-test and a Wilcoxon Signed-Rank test. (See Table 2.) Our matching procedure performs well, because the U.S. matched sample is similar to the Canadian sample not only in terms of firm size, but also in terms of leverage and effective tax rate. However, firms in the U.S. matched sample have lower analyst forecast dispersion and higher turnover so conclusions based on the matching analysis alone may be affected by these differences. Nonetheless, after performing the match, Canadian firms have a cost of equity that is about 50 bps higher than that in the United States.

5.3 Panel Regression Analysis:

To more fully account for firm characteristics as well as other factors in each country, we also employ a regression analysis to examine differences between the cost of equity in Canada and the United States. We explicitly control for: firm size, as measured by book value of total assets (BV); financial leverage (LEV); effective corporate tax rates (TAX); analyst forecast dispersion (DISP); and firm stock-liquidity, using yearly turnover (TURN). We control for business cycle effects and industry effects by including year ($YEAR_t$) and industry dummy ($IND_{i,k}$) variables. The model also includes dummy variables denoting whether a firm is a U.S. firm (US_i) and whether the firm is a crosslisted Canadian firm ($XLIST_{i,t}$). Given that we have a panel dataset with time-invariant (dummy) variables, we use the approach outlined in Krishnakumar (2003). This methodology yields similar results on the U.S. dummy variable compared to other techniques.[43]

[43] Other options include Pooled OLS, Random Effects and Instrumental Variables Fixed Effects. See Pluemper and Troeger (2004) for a discussion of the problems with these other methods. Pooled OLS and Random Effects yield similar coefficients for the U.S. dummy variable. However, pooled OLS suffers from omitted variable bias and is rejected using a Breusch and Pagan (1980) test. Also, a Hausman (1978) test suggests that the Random Effects coefficients are inconsistent and likely biased. Random Effects assumes exogeneity of the dependent variables and zero correlation between the dependent variables and

Our setup assumes common coefficients for all of the firms in our sample, so results may be misleading if the coefficients for Canadian firms are actually different from those for U.S. firms.[44] Also, we do not account for possible non-linear effects of our variables on the cost of equity. For example, a one cent change in forecast dispersion may have a greater impact on the cost of equity of a firm with low forecast dispersion than it may have on a firm with high forecast dispersion.[45]

The Krishnakumar approach is a two-stage method. In the first stage, a fixed-effects model is run using the time-varying independent variables:

$$\begin{aligned} COE_{i,t} &= a + b_{XLIST} XLIST_{i,t} + \sum_{t=1989}^{2006} b_{YEAR\_t} YEAR_{i,t} + b_{BV} BV_{i,t} \\ &\quad + b_{LEV} LEV_{i,t} + b_{TAX} TAX_{i,t} + b_{DISP} DISP_{i,t} + b_{LIQ} LIQ_{i,t} + u_i + e_{i,t} \end{aligned} \tag{14}$$

In the second stage, a weighted least squares model is run[46] which regresses the firm fixed-effect coefficient (u_i) from the first stage regression on the time-invariant independent variables (the U.S. and industry dummy variables) as well as the firm averages of the time-varying independent variables:

$$\begin{aligned} \hat{u}_i &= w + b_{US} US_i + \sum_{k=1}^{K} b_{IND\_k} \overline{IND}_{i,k} + g_{XLIST} \overline{XLIST}_i + \sum_{t=1989}^{2006} g_{YEAR\_t} \overline{YEAR}_i \\ &\quad + g_{BV} \overline{BV}_i + g_{LEV} \overline{LEV}_i + g_{TAX} \overline{TAX}_i + g_{DISP} \overline{DISP}_{i,t} + g_{LIQ} \overline{LIQ}_{i,t} + v_i \end{aligned} \tag{15}$$

The averages of the time-varying independent variables are included to control for correlation between these variables and the firm fixed effects. We perform our regressions using the average cost of equity measure, r_ave. (See Table 3, Model 1.)
The regression results indicate that almost all of the control variables are statistically significant and have the expected sign. Greater firm size is associated with a lower cost of equity, which is consistent with previous findings. Furthermore, the cost of equity

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the unit effects. We do not perform the Hausman and Taylor (1981) test due to the weak instruments and because the results are sensitive to which variables are specified as endogenous and exogenous.

[44] In a test that interacts the U.S. dummy with all of the variables, only two of the time-varying coefficients are significant at the 5% level or better.

[45] Accounting for nonlinear effects in forecast dispersion (by including a square term or splitting the sample into firms with low (<.05) and high (>= .05) dispersion) yields a slightly smaller U.S. dummy coefficient.

[46] This is to account for unbalanced panels. However, OLS is also consistent and yields similar results.

should increase with leverage, decrease with the marginal tax rate, and decrease with firm-level stock liquidity, which is what we find. Our regression results also indicate that analyst forecast dispersion has a large and positive effect on the cost of equity for firms. Furthermore, crosslisting appears to reduce the cost of equity by about 20 bps after controlling for other effects; however, this coefficient is not statistically significant. Since only a few firms change their crosslisting status during the sample period, this is a low power test, and definitive conclusions about crosslisting's impact on the cost of equity cannot be made. After controlling for these factors, plus industry and year effects, the cost of equity for non-crosslisted Canadian firms is about 50 bps above that of the United States,[47] which is similar to what we found after our matched-company analysis. However, the R-squared of the second-stage regression is small, so other factors that we are not controlling for may be influencing our results.

A few interesting observations can be highlighted from these results. First, firm size has a significant impact on the cost of equity. Given differences across the U.S. and Canadian samples, smaller firm size adds a significant amount to the financing costs of Canadian firms. Thus, Canadian policies that encourage firm growth could have the benefit of reducing the cost of equity. Forecast dispersion has an even greater impact on the cost of equity. For example, a one standard deviation decrease in forecast dispersion would represent almost a 70 bps reduction in the cost of equity according to the regression results. If better firm disclosure contributes to better forecasting abilities of analysts, then improved disclosure regulation and practices in Canada may contribute to a lower cost of equity for its firms overall. Analyst forecast dispersion may also be capturing other effects such as analyst ability and resources and variability of a firm's underlying earnings. Last, after accounting for a number of firm and aggregate-level factors, U.S. firms still appear to have an advantage over Canadian firms in terms of equity financing.

[47] For each of the four individual cost of equity models, the coefficient on this variable is also significant and ranges from 36 bps to 58 bps. Furthermore, the coefficient on this variable is 43 bps if our sample is restricted to stocks followed by a minimum of three analysts and 54 bps if the sample is restricted to stocks with a minimum of four analysts.

5.4 Robustness Checks:

Although we have tried to control for various firm-level and aggregate-level factors,[48] other factors could also help to explain the difference in the cost of equity between Canadian and U.S. firms. Alternatively, there may be measurement issues associated with forecast variables. It is beyond the scope of this paper to investigate these broader effects. However, robustness checks are performed to determine whether the results so far may be affected by currency conversion, by our assumptions about long-term dividend growth rates, or by differences in risk-free interest rates across the two countries.

5.4.1 Currency Measurement

As shown in Table 3, we modify our regressions in an attempt to examine whether different methods of currency conversion have an impact on our results. First, we use exchange rate forecasts from the Economist Intelligence Unit to convert Canadian dollar expected earnings into USD. Model 2 shows that the results are similar to our initial results in Model 1.[49] Next we assume a random walk for exchange rates where the expected exchange rate one year and two years ahead is equal to the current exchange rate. Using this conversion (under Model 3), the U.S. coefficient is slightly smaller, but is still statistically significant. This is not surprising: the conversion methods under Models 1 and 2 both predict, on average, a small appreciation in the Canadian dollar. This leads to higher USD earnings per share growth (and a slightly higher cost of equity) for Canadian firms relative to conversion using a random walk.

However, our conversion approach under all three models assumes zero covariance between the Canadian dollar earnings of Canadian firms and the exchange rate. If this covariance is negative (i.e., Canadian dollar earnings fall when the Canadian dollar strengthens), then the coefficient on the U.S. dummy variable will be negatively biased

[48] Our results are also similar using other proxies for our variables. For example, measuring size using the logarithm of Equity Book Value, or using the logarithm of Sales yields similar results on the size coefficient and on the U.S. dummy coefficient. Scaling forecast dispersion by equity book value per share yields similar results. Also, running the regressions without the Effective Tax Rate variable yields similar results on the other variables.

[49] EIU provides one and two year ahead exchange rate forecasts that are made late in the calendar year, so alignment with our forecast data will not be perfect. This may not be a fair comparison as observations prior to 1996 are removed from this sample due to data availability.

and the cost of equity difference between non-crosslisted Canadian firms and U.S. firms will be overstated. Given trade linkages between the two countries, a zero covariance assumption may not be plausible.

5.4.2 Growth Rates

Our analysis assumes that the long-term growth rate in dividends for both countries is equivalent to the expected U.S. inflation rate. As a check, we examine the sensitivity of our regression results with respect to different long-term growth rates between Canadian and U.S. firms. Chart 5 shows the coefficient on the U.S. dummy variable under different growth scenarios, where different growth rates for Canadian firms are listed on the left-hand side and U.S. rates are listed across the top. When both U.S. and Canadian long-term growth rates are equal (along the diagonal), the coefficient is around -.5, which is consistent with our earlier results. Reading across the rows, it appears that every 100 bp increase in the U.S.-Canadian growth differential results in about a 30 bp reduction in the cost of equity differential between U.S. and Canadian firms. However, there needs to be a large positive difference in long-term growth rates for the cost of equity difference between Canada and the United States to disappear.

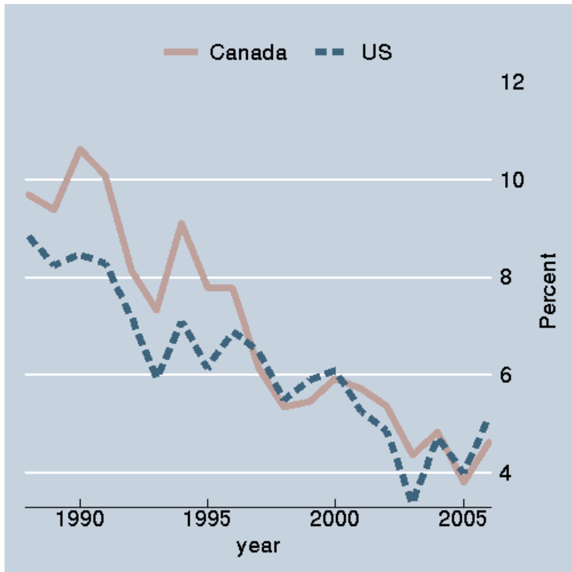
Chart 5: U.S. Coefficient under Relative Growth Assumptions

		U.S. Long-term Growth Rate			
		1%	**2%**	**3%**	**4%**
Canadian Long-term Growth Rate	**1%**	-0.47	-0.10	0.22	0.52
	2%	-0.82	-0.47	-0.13	0.18
	3%	-1.16	-0.83	-0.49	-0.20
	4%	-1.44	-1.10	-0.80	-0.50

5.4.3 Risk-Free Rates

Our regression analysis does not control for differences in risk-free rates between the two countries, essentially assuming that any differences in the cost of equity are generated by differences in the equity risk premium. Because sovereign bond yields are typically used as a measure of the risk-free rate, different interest rate environments across countries may not allow for a fair cost of equity comparison. Chart 6 shows that the downward trend found in our cost of equity estimates parallels the downward trend in ten-year Government bond yields in both countries over the sample period. In addition, yields were much higher in Canada in the first half of the period.

Chart 6: 10-Year Government Bond Yields



One way to control for differences in risk-free rates is to focus on the equity risk premium. To calculate a risk premium for each firm, we subtract the risk-free rate proxied by nominal ten-year Government bond yields from the firm's nominal cost of equity.[50] With this approach, we do not need to convert earnings figures into U.S. dollars. Instead, we calculate a nominal cost of equity in the reporting currency, using inflation in the reporting currency as a measure of the long-term growth rate in dividends per share. Although we eliminate noise from the USD conversion, different estimates of long-term growth rates (i.e., inflation) will itself introduce some noise into our estimates.

Using the same matching technique employed in our cost of equity analysis, we test for differences in the implied risk premium between Canadian and U.S. firms. Based on an adjusted t-test, there is no significant difference in equity risk premiums for the Canadian

[50] We use the currency in which earnings forecasts are made to determine which country's bond yields apply. Ideally we would like a nominal risk-free rate that is risk-free in real terms. However, government bond yields will contain an inflation risk premium. In addition, other factors may influence differences in yields across countries.

and U.S. matched sample (results not presented). This would suggest that a large portion of the difference in the cost of equity between Canadian and U.S. firms is due to differences in the risk-free rate (nominal ten-year sovereign bond yields).

To determine the relation between yields and cost of equity in our sample, we use the nominal cost of equity, in local currency, as our dependent variable, and add the nominal ten-year Government bond yield as an additional right-hand side variable. (See Table 4, Column 1.) This results in a coefficient on the ten-year yield variable that is almost 20 bps and statistically significant, indicating that Government bond yields do have an impact on firms cost of equity.[51] In this model, the cost of equity for Canadian firms is about 10 bps larger than similar U.S. firms. However, the U.S. dummy coefficient is not statistically significant, so we cannot conclude definitively that there is a difference between Canadian and U.S. firms.

Another approach to addressing differences in risk-free rates is to split our sample into two equal time periods and explicitly control for ten-year Government bond yields in our regression. In the early period, 1988-1997, ten-year Government yields were much higher in Canada; in the latter period, 1998-2006, there were relatively small differences in yields between the two countries. By performing a cost of equity regression over each of these two periods, we can tease out the effects of these different interest rate environments, particularly for the latter period where the effects of the risk-free rate on the cost of equity are minimized given similar Government yields.[52] (See Table 4, Columns 2 and 3.)

Under this formulation, all of the control variables have the same sign, although the magnitude and statistical significance of some of the control variables are slightly different depending on the time period. For the first period, the coefficient on the U.S. dummy variable is very close to our original result in terms of sign, size, and significance. The coefficient for the latter period is smaller, about 20 bps. However, our

[51] Note that the year dummy variables capture part of the effect of bond yields as well. Without these dummies, the coefficient is closer to 40 bps.
[52] Results are similar if this split is made in 1995, 1996, 1998, or 1999.

tests are not capable of establishing statistical significance for a coefficient of this size.[53] These robustness checks suggest that longer-term sovereign bond yields are a factor in explaining cost of equity across the two countries.

5. Conclusions

In this paper, we provided an overview of the implied approach to estimating the cost of equity. This approach reflects current market views about the future by estimating an cost of equity derived from the current stock price and analysts' forecasted earnings. We examine four different models which basically assume different patterns in the growth of future earnings and dividends. Although it has some disadvantages, given the forward-looking nature of the cost of equity and the recent availability of a sufficient amount of firm-level data for Canada, we employ an implied approach in our own estimation.

In examining the empirical literature, estimates of Canadian versus U.S. cost of equity vary greatly. This is likely related to the fact that firm-level and country-level factors which affect the cost of equity have not been adequately addressed. Rather than attempting to simply produce a cost of equity estimate for Canada, we instead focus on determining whether significant differences in the cost of equity exist between Canada and the United States.

We estimate the cost of equity for Canadian firms and U.S. firms over the period 1988-2006 using the average of four implied measures. At a top level, not controlling for factors that could potentially affect our cost of equity measures, the average estimate from these models produces a median cost of equity for Canada that is 60 bps greater than that of the United States. It also appears that the cost of equity for both countries has decreased over the last 18 years. When we refine this measure by matching on size and industry membership, we find that Canadian firms have a cost of equity that is about 50 bps higher than similar U.S. firms.

[53] Although not presented here, we also find a greater cost of equity difference in the first rather than the second sample period using a random walk as a currency conversion method.

In order to address other firm characteristics and aggregate-level factors, we employ a regression analysis that controls for firm size, financial leverage, corporate taxes, firm stock liquidity, forecast dispersion, and yearly variations in market conditions as well as industry effects and whether or not the Canadian firm is crosslisted. We find that firm size and firm stock liquidity are negatively related to cost of equity, while greater financial leverage and dispersion in analyst forecasts are associated with a higher cost of equity. We also find that the cost of equity for Canadian firms is 30-50 bps higher than that of similar U.S. firms over the 1988-2006 sample period. This is robust to different methods of exchange rate conversion and different assumptions regarding relative long-term earnings growth rates.

Given the definition of cost of equity as a risk-free rate plus an equity risk premium, we extend our analysis to account for differences in risk-free rates across Canada and the United States. Examining relative ten-year Government bond yields over time, our proxy for the risk-free rate, two distinct periods are evident which could affect the evolution of our cost of equity estimates. Before 1997 the Canada-U.S. differential for ten-year Government yields was large and positive; whereas yields have been much closer since that time. When our sample is split along these lines, Canada has a higher cost of equity in the earlier period, but in the post-1997 period it appears that differences in the implied cost of equity for Canada and the United States are smaller. In addition, we also find ten-year yields to have an impact when they are included in a regression analysis over the entire sample period. From this we conclude that interest rates (longer-term sovereign bond yields) matter. By extension, anchoring inflation expectations and pursuing a low debt-to-GDP ratio can not only help maintain lower government borrowing costs but can also benefit firms in their financing abilities.

Our findings have other policy implications. For example, our regressions indicate that higher analyst forecast dispersion is associated with a higher cost of equity for firms. Because the forecasts of analysts likely improve with more and better quality information, improvements to disclosure rules in Canada, which are in large part derived from securities regulation, could ultimately reduce the cost of equity for Canadian firms.

We would, however, like to point out that, these cost of equity estimates are rather noisy, so we emphasize our results as a range of values. Much of the variance in firm-level cost of equity remains to be explained. In order to refine our estimates further, other factors could be considered (for example differences in regulatory environments and personal taxes). By incorporating proxies for other factors and perhaps extending our comparison to more countries in future work, we might shed further light on the cost of equity for Canadian firms and what drives it.

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8. Tables and Figures

Table 1: Summary Statistics This table presents summary statistics for our sample. Each observation represents a firm-year so, for example, there are 3,419 firm-years of data on Canadian firms. CoE is the cost of equity, calculated using the average of four individual implied measures. (See Appendix A1 for details.) Debt/ Equity is calculated using book values of long-term debt and equity. Total Assets is also calculated using book values from Compustat and is converted into USD. Effective Tax Rate is the ration of income taxes to pre-tax income, and is restricted to be in the range of 0 and 1. Forecast dispersion is the cross-sectional standard deviation of analyst earnings forecasts in USD. Turnover is the number of shares traded in the previous year divided by the total number of shares outstanding in Compustat. Forecasted Growth is the projected growth rate between year 1 and year 2 projected earnings per share: g1 = (e2-e1)/e1. Payout Ratio is the three-year historic payout ratio and is the ratio of dividends plus repurchases to earnings. The mean difference is tested using a t-test that adjusts for heteroskedasticity of errors at a firm level. The Canadian sample contains 3,419 observations, of which 1,233 are crosslisted. The U.S. sample contains 31,005 observations.

Panel A: U.S. vs. Canada

	U.S.		Canada		Mean Difference	Median Difference
	Mean	**Median**	**Mean**	**Median**	**t-test**	**Wilcoxon Ranked Sum**
CoE	11.77	10.86	12.59	11.49	-.83***	-0.64***
Debt / Equity	0.59	0.33	0.58	0.36	.01	-0.03***
Total Assets	2842.4	446.8	1539.9	364.2	1302.5***	82.7***
Effective Tax Rate	34.4	36.7	32.9	35.1	1.46***	1.62***
Forecast Dispersion	0.05	0.03	0.10	0.06	-.05***	-0.03***
Stock Turnover	1.34	0.94	0.41	0.30	.92***	0.64***
Payout Ratio	0.21	0.10	0.17	0.09	.04***	0.01***
Earnings Yield (%)	6.35	6.02	6.75	6.31	-.41***	-0.29***
Forecasted Growth	0.30	0.20	0.35	0.22	-.05***	-0.02***

Panel B: Crosslisted vs. Non-crosslisted

	Crosslisted		Non-crosslisted		Mean Difference	Median Difference
	Mean	**Median**	**Mean**	**Median**	**t-test**	**Wilcoxon Rank Sum**
CoE	12.15	10.98	12.84	11.75	-.69**	-0.77***
Debt / Equity	0.62	0.37	0.55	0.36	.07	0.01***
Total Assets	2929.4	869.0	756.2	256.9	2173.2***	612.1***
Effective Tax Rate	30.5	32.3	34.3	36.5	-3.83***	-4.22***
Forecast Dispersion	0.12	0.07	0.09	0.05	.03***	0.02***
Stock Turnover	0.50	0.36	0.36	0.28	.14***	0.08***
Payout Ratio	0.19	0.11	0.17	0.07	.02	0.03***
Earnings Yield (%)	5.93	5.62	7.22	6.74	-.1.29***	-1.12***
Forecasted Growth	0.39	0.24	0.34	0.22	.05**	0.02***

Table 2: U.S. vs. Canada Matched-Firm Analysis, Cost of Equity This table compares the cost of equity for observations (firm-years) in the Canadian sample and a matched sample of observations in the United States. CoE is the cost of equity, calculated using the average of four individual implied measures. (See Appendix Al for details.) Matching is performed by selecting the US observation that is closest total assets (USD, book value) and is in the same industry and year as the Canadian observation. If the matched US firm's total assets value is not within 35% of the Canadian firm, the observation is dropped. The sample contains 3151 matched observations (firm-years). We test for significant differences in firm characteristics across this matched sample. The mean difference is tested using a t-test that adjusts for heteroskedasticity of errors at a firm level. The median difference is tested using the Wilcoxon Signed-Rank Test.

	U.S. (Matched)		**Canada**		**Mean Difference**	**Median Difference**
	Mean	**Median**	**Mean**	**Median**	**t-test**	**Wilcoxon Sign Rank**
CoE	11.91	10.89	12.45	11.34	-.54***	-0.45***
Debt / Equity	0.59	0.35	0.58	0.38	.01	-0.03***
Total Assets	1592.5	403.6	1596.9	406.4	-4.4	-2.8***
Effective Tax Rate	33.8	36.7	33.1	35.1	.71	1.65***
Forecast Dispersion	0.05	0.03	0.10	0.06	-.05***	-0.03***
Stock Turnover	1.33	0.95	0.41	0.30	.92***	0.65***
Payout Ratio	0.21	0.09	0.18	0.10	.03***	-0.01***
Earnings Yield (%)	6.30	5.93	6.76	6.33	-.46***	-0.41***
Forecasted Growth	0.33	0.20	0.34	0.22	-.01	-0.02***

Table 3: Regression Analysis: Cost of Equity This table presents results for the following 2-stage regression involving the USD nominal cost of equity for Canadian and U.S. firms:

$$COE_{i,t} = a + b_{XLIST} XLIST_{i,t} + \sum_{t=1989}^{2006} b_{YEAR\_t} YEAR_{i,t} + b_{BV} BV_{i,t} + b_{LEV} LEV_{i,t} + b_{TAX} TAX_{i,t} + b_{DISP} DISP_{i,t} + b_{LIQ} LIQ_{i,t} + u_i + e_{i,t} \quad (1)$$

$$\hat{u}_i = w + b_{US} US_i + \sum_{k=1}^{K} b_{IND\_k} \overline{IND}_{i,k} + g_{XLIST} \overline{XLIST}_i + \sum_{t=1989}^{2006} g_{YEAR\_t} \overline{YEAR}_i + g_{BV} \overline{BV}_i + g_{LEV} \overline{LEV}_i + g_{TAX} \overline{TAX}_i + g_{DISP} \overline{DISP}_{i,t} + g_{LIQ} \overline{LIQ}_{i,t} + v_i \quad (2)$$

In the first column, the nominal cost of equity is measured using forecasted cash flows from I/B/E/S earnings forecasts that are converted to USD using PPP and inflation figures from Consensus Economics. In the second column, Canadian dollar earnings per share forecasts are converted to USD using EIU forecasts. Finally, in the third column, the exchange rate is assumed to follow a random walk. Absolute value of t statistics are in parentheses and are adjusted for heteroskedasticity of errors at a firm level (* significant at 10%; ** significant at 5%; *** significant at 1%).

	(1)	**(2)**	**(3)**
STAGE 1 REGRESSION			
	CoE (USD - PPP)	**CoE (USD - EIU)**	**CoE (USD - Random Walk)**
Book Value of Total Assets	-0.247	-0.170	-0.242
	(3.87)***	(1.71)*	(3.79)***
Leverage	0.640	0.480	0.641
	(12.43)***	(7.59)***	(12.46)***
Tax Rate	-0.009	-0.013	-0.009
	(3.45)***	(3.71)***	(3.53)***
Stock Liquidity	-0.101	-0.061	-0.103
	(2.69)***	(1.34)	(2.75)***
Forecast Dispersion	8.506	6.911	8.469
	(13.94)***	(7.71)***	(13.82)***
Canadian Cross-listed	-0.186	-0.951	-0.351
	(0.28)	(1.42)	(0.58)
Constant	12.015	11.718	11.972
	(26.21)***	(17.24)***	(26.17)***
Year Dummies	YES	YES	YES
Observations	34424	19304	34404
Within R-squared	0.09	0.06	0.09
STAGE 2 REGRESSION			
	u_i	**u_i**	**u_i**
U.S. Dummy	-0.465	-0.446	-0.327
	(3.40)***	(2.79)***	(2.39)**
Industry Dummies	YES	YES	YES
Means of Time-Varying X Variables	YES	YES	YES
Number of Firms	6226	4851	6224
R-squared	0.15	0.19	0.15

Table 4: Regression Analysis: Controlling for 10 Year Yields In the first column, the nominal CoE is regressed on the control variables plus the 10-year yields. The last two columns repeat the original CoE regression from Table 3 for two different sample periods. Absolute value of t statistics are in parentheses and are adjusted for heteroskedasticity of errors at a firm level (* significant at 10%; ** significant at 5%; *** significant at 1%).

	(1)	**(2)**	**(3)**
STAGE 1 REGRESSION			
	CoE (Local Currency, Nominal)	**CoE (USD – PPP) Pre-1997**	**CoE (USD – PPP) Post-1997**
Book Value of Total Assets	-0.231	-0.311	-0.169
	(3.63)***	(2.82)***	(1.48)
Leverage	0.632	0.736	0.506
	(12.43)***	(8.92)***	(6.99)***
Effective Tax Rate	-0.010	-0.004	-0.014
	(3.76)***	(1.02)	(3.62)***
Stock Liquidity	-0.105	-0.069	-0.067
	(2.79)***	(1.05)	(1.37)
Forecast Dispersion	8.402	9.951	5.923
	(13.76)***	(12.26)***	(6.41)***
Canadian Cross-listed	-0.026	-0.453	-0.605
	(0.04)	(0.19)	(0.67)
10 Year Yields	0.167		
	(3.78)***		
Constant	11.096	12.791	11.819
	(21.95)***	(18.22)***	(15.04)***
Year Dummies	YES	YES	YES
Observations	34363	17563	16861
Within R-squared	0.09	0.10	0.06
STAGE 2 REGRESSION			
	$\mathbf{u_i}$	$\mathbf{u_i}$	$\mathbf{u_i}$
U.S. Dummy	-0.108	-0.503	-0.198
	(0.54)	(2.60)***	(1.18)
Industry Dummies	YES	YES	YES
Means of Time-Varying X Variables	YES[a]	YES	YES
Number of Firms	6223	4325	4468
R-squared	0.12	0.11	0.18

a: Excludes the mean of 10 Year Yields because this is an economy-wide measure and is not firm-specific.

Appendix: Evaluating the Implied COE Measures

A1: Summary of Implied COE Calculations

r_ct: Claus and Thomas (2001) implied COE is the value of r that solves:

$$P_0 = \frac{dp*e_1}{1+r} + \frac{dp*e_2}{(1+r)^2} + \frac{e_3(1-\frac{g_L}{roe_3})}{(1+r)^2(r-g_L)}, \text{ where } roe_3 = \frac{e_3}{bv_0 + (e_1+e_2)(1-dp)}$$

r_lns: Lee, Ng, and Swaminathan (2004) implied COE is the value of r that solves:

$$P_0 = \frac{dp*e_1}{1+r} + \frac{dp*e_2}{(1+r)^2} + \sum_{t=3}^{15}\frac{dp_t*e_t}{(1+r)^t} + \frac{e_{16}}{r(1+r)^{15}}$$

For t > 3: $e_{t+1} = e_t(1+g_S\frac{g_L}{g_S}^{\frac{t-2}{13}})$ and $dp_t = (1-\frac{t-3}{13})dp + \frac{t-3}{13}(1-\frac{g_L}{r})$

Earnings growth is faded towards the long-run earnings growth and the dividend payout ratio is faded towards the long-run dividend payout ratio by year 16.

r_oj: Ohlson and Juettner-Nauroth (2000) implied COE is the value of r that solves:

$$P_0 = \frac{dp*e_1}{(r-g_L)} + \frac{e_1(g_S-g_L)}{r(r-g_L)}$$

r_mpeg: Easton (2004) implied COE is the value of r that solves:

$$P_0 = \frac{dp*e_1}{r} + \frac{e_1 g_S}{r^2}$$

Variables across all models:

P_0	= Current market price.
e_t	= Expected future earnings per share t periods ahead, converted into USD. (In the CT and LNS model, $e_3 = e_2 * (1+g_S)$).
g_S	= Short-term growth rate, or $(e_2-e_1)/ e_1$
g_L	= Long-term growth rate, using inflation forecasts from Consensus Economics.
dp	= Dividend payout ratio, using the average historic payout ratio (dividends plus repurchases, divided by earnings) over the previous three years. If unavailable, the mean country payout ratio in that year is used.
bv_0	= Current book value per share.

A.2 Discussion

The cost of equity is calculated for each firm-year observation using the four different implied models outlined in Table A1, and Table A2 provides overall (pooled Canada and U.S.) sample summary statistics for each of these different cost of equity measures. The first two methods, which are based on RIV models, deliver average nominal cost of equity estimates in the 10% to 12% range while the other two methods deliver a cost of equity closer to 13%. These figures seem large relative to the historic equity premium, especially since we are examining only those firms with analyst coverage (i.e., larger, less risky firms). There are a number of reasons why these figures would be different from an expected market return. First, this is a simple average and therefore smaller firms will be weighted more than their proportion in the market. Second, these estimates are derived from analyst forecasts, which could have an upward bias relative to market expectations. Third, these figures extrapolate earnings growth based upon first year earnings growth, which may bias the figures upward. Fourth, these measures require positive earnings growth, which may also result in a sample that is not representative of the market.

Table A2: Descriptive Statistics (Canada and U.S. Pooled)

Summary Statistics						
	Mean	Median	Sd	Min	Max	N
r_ct	9.78	9.28	3.07	2.13	24.81	34424
r_lns	11.85	10.22	6.00	2.08	49.60	34424
r_mpeg	12.53	11.68	3.98	3.16	28.90	34424
r_oj	13.24	12.40	4.12	2.05	29.95	34424

Correlation Matrix				
	r_ct	r_lns	r_mpeg	r_oj
r_ct	1.000			
r_lns	0.707	1.000		
r_mpeg	0.848	0.855	1.000	
r_oj	0.812	0.859	0.995	1.000

All measures have a correlation greater than 70%, which is not surprising given the similarity of the underlying models. Although the choice of measure affects the level of the cost of equity, it seems to have a smaller effect on the dispersion, or ranking of cost of equity amongst firms. For much of our analysis, we follow Hail and Leuz (2005) and use an average of these four measures (r_ave).

Using future five year returns as a proxy for expected returns, we test to see whether there is a positive relation between r_ave and expected returns.[54] To eliminate firm-

[54] We conduct the analysis using U.S. firms only because there are not enough Canadian firms to generate reasonably sized portfolios in a Canadian only sample (results for a U.S.-Canadian pooled sample are similar to the results that are discussed in this appendix).

specific noise, we perform this analysis at a portfolio level. Each year, we rank firms by their cost of equity (r_ave) and sort them into five quintiles. We also sort firms into five quintiles based on their book value (in USD), since size may affect future returns as well. Then, twenty-five unequal-sized portfolios of firms are created based on the intersection of these quintiles. For each of these portfolios, we compute future five-year returns as the average of its firms' future five-year returns.

Chart A1: Cost of Equity vs. Future Returns

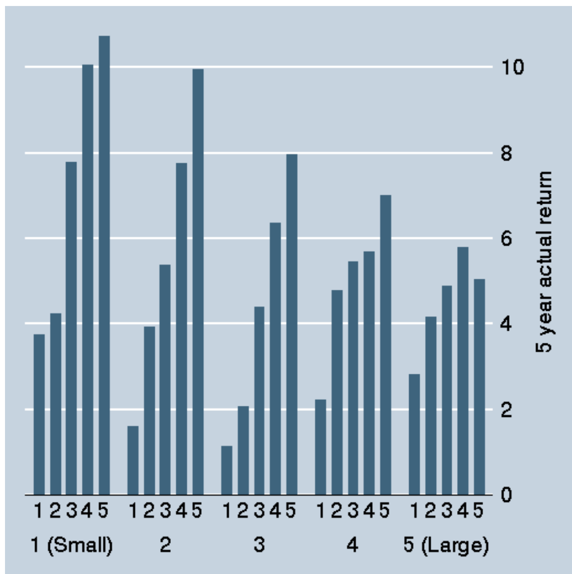

Chart A1 shows future returns for each portfolio. The portfolios are grouped by size quintile first, with those in the smallest quintile on the left and those in the largest quintile on the right. Future returns are larger in the smaller size quintiles, which is consistent with prior evidence. Within each of these size quintiles, we also show five portfolios sorted on their cost of equity quintile. Those in the lowest cost of equity quintile are on the left (1) and those in the highest quintile are on the right (5). Future returns monotonically increase as the cost of equity increases within most of the size groupings. This is consistent with Gebhardt, Lee, and Swaminathan (2001) and Gode and Mohanram (2003) who also find a positive relation between future portfolio returns and portfolio ranking, but inconsistent with Easton and Monahan (2003) who find no relation between future one-year returns and the implied cost of equity after controlling for cash flow and expected return news.