Q: Please provide a copy of Dr. Cannon's paper entitled "Cost of Capital" – QSB monograph (2005).

A: The requested document is attached.

School of Business
Queen's University
at Kingston

NOTE ON COST OF CAPITAL

THE COST OF CAPITAL CONCEPT

At its simplest, the cost of capital (k) is the minimum expected rate of return necessary to attract capital to an investment. The *rate of return* includes both income received during the time the investment is held plus any capital gain or loss, realize or accruing during this period, all as a percentage of the initial investment outlay. K can be viewed from both (a) a company perspective and (b) from the investor's or capital provider's perspective. From the company's perspective, k is the minimum rate of return the company must promise to achieve for investors on its debt and equity securities in order to preserve their market values and, thereby, retain the allegiance of these investors. This, in turn, dictates that if corporate managers wish to protect the wealth of their shareholders and bondholders, they will invest only in projects that promise returns equal to or above their respective k's.

We are interested in the cost of capital, of course, because most companies, at some times during their lives, must raise financial capital to pay for their investments, and practical economic considerations dictate that the investors who provide these capital funds must be adequately compensated. Raising capital is a competitive process. Private investors are under no obligation to buy a particular firm's securities. A company will be able to secure new capital and replace maturing securities only if investors believe that they will be adequately rewarded for providing the new capital funds. That required reward, in turn, must compensate the investors for at least two things: (1) for postponing the consumption of the goods and services that they might otherwise have enjoyed had they not made the investment; and (2) for exposing their funds to the risk that they may not get all their money back or not get it back as promptly as they anticipated. The reward demanded by investors is therefore a necessary cost of doing business from the firm's point of view, just as much as the cost of labour or raw materials.

For an individual investor, his or her required rate of return on an investment is a subjective, personal judgment, based on his/her tax status and degree of risk aversion, among other things. Just as beauty is in the eye of the beholder, and not some objectively measurable characteristic, so too is k at the level of the individual investor.

From the viewpoint of investors as a group, however, k can be defined more clearly and operationalized as "the expected rate of return prevailing in the capital markets on alternative investments of equivalent risk and attractiveness." There are four concepts embedded in this operational definition:

This case was prepared by Professor William T. Cannon, Commerce'83 Teaching Fellow in Finance, as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

First, k is a *forward-looking* concept. Investment returns are inherently uncertain and the ex post, actual returns experienced by investors may differ from those that were expected ahead of time. K is therefore an *expected* rate of return.

Second, k is an *opportunity cost* concept. Investors have the opportunity to invest in a wide range of investments, so the expected rate of return from a given investment must be sufficient to compensate investors for the returns they might otherwise have received on foregone investments.

Third, k is adjudicated in the *capital markets*. This market price – expressed as the expected return per dollar of invested capital – balances the supply of, and demand for, capital for the firm.

And, fourth, k is a function of the *risk* of the investment. It reflects the expected returns on investments in the marketplace that are exposed to equivalent risks. Another way of expressing this principle is to say that k depends on the *use* of the capital – or, more precisely, the risk associated with the use of the funds – and not on the *source* of the funds. With respect to this fourth point, it is true that factors other than risk may influence a company's k; however, the relative risk of the company and its investments is the primary factor that differentiates one firm's k from another.

Now because k depends on the use of the funds, it is important to distinguish between the k for a firm, as a whole, and the k for one of its capital expenditure projects. A firm can be thought of as a composite of all its previous investments along with its existing investment opportunities. The k for the firm will then approximate the weighted average of the k's for all its constituent investments and opportunities. Within the firm, however, some of its investments may be high risk and some may be low risk. These investments will, respectively, have high and low k's, individually, and should be evaluated accordingly. That is, high-risk projects – to be worthwhile – should be expected to generate higher rates of return, while low-risk investments may be judged to be satisfactory even if they promise or produce lower returns.

THE FACTORS THAT DETERMINE A FIRM'S OVERALL COST OF CAPITAL

It is important to distinguish between the *determinants* of a firm's k and the *estimation* of this figure. Confusion between the two ideas arises because the k for a firm is often estimated using an approach that focuses on its weighted-average, overall cost of capital, where the "costs" associated with its various *sources of capital* – debt, preferred shares, and common equity – are averaged, using its capital structure proportions as the weights. Consequently, observers are often left with the impression that the firm's overall k is *determined* by its financing proportions or sources of funds. But this is *not* correct. What is correct is that we may *estimate* what a firm's overall k is, under some circumstances, by looking at its sources of financing, but the actual *determinants* of the firm's overall k are primarily factors associated with the use of the funds it raises and, in particular, the risk attached to the use of the firm's investment capital.

So what are the factors that determine a firm's or a utility's k? These can be divided into two categories – namely, those factors that play a role in determining the k for *all* companies, and those that determine the relative k's across companies.

The factors that play a role in determining the k's for all companies are primarily inflation expectations, the general level of interest rates, corporate income and capital tax rates, and the overall riskiness of the corporate sector. For rational investors who have the opportunity to invest their savings in real consumption and capital goods - such as houses, cottages, boats, recreational

vehicles, etc. – whose prices are rising with inflation, the expected return from investing in corporate stocks and bonds must necessarily exceed the expected inflation rate, which is to say it must exceed the percentage price gains that investors could otherwise achieve by investing their savings in real goods or assets. For example, if a person invests in stocks and bonds with money that he or she would otherwise have used to buy a new car, and then the price of the car rises by 10% over the ensuing year, the person will have suffered a net financial loss unless his or her investments achieve at least a 10% return over this period.

Investors also have the option of investing their savings in default-free government treasury bills and longer-term government bonds and, if they are rational, they will not consider buying risky corporate debt and equity securities unless these latter investments promise returns exceeding government bond yields.

Furthermore, for stock and bond investments that are held outside their tax-sheltered savings plans, investors recognize that they will have to pay taxes on the income they receive from these investment holdings, and they adjust their *before-tax*, expected-return requirements upward in order to preserve their after-tax return expectations. Managers of larger corporations also recognize that any investment that they undertake that appears on their firm's balance sheet will attract federal and provincial capital taxes. Consequently, k's for these investments must be ratcheted upward to reflect these capital tax liabilities.

Finally, investors' perceptions of overall corporate-sector riskiness – and hence their return requirements for investing in corporations – can be affected by changes in their expectations about national economic growth, by exchange rate changes, and by shifts in the political, legislative, and regulatory landscape, among other things.

Therefore, any general changes in inflation expectations, interest rates, corporate tax rates, and/or corporate-sector riskiness, can be expected to change the competitive attractiveness, or opportunity cost, of corporate securities and thus change the average level of corporate k's.

The primary factor determining the relative k's across firms – and hence their deviations from the corporate-sector-average k – is the relative business riskiness of these organizations as perceived by investors. Investors are generally risk averse – they require higher expected returns to be willing to invest their money in riskier firms. The relative business riskiness of a firm, in turn, is a function of many things, including: the nature of the business it is in and the products it produces and sells; its geographic location; its cyclical sales volatility; the degree to which it uses *operating leverage* (i.e., the use of production and distribution methods generating fixed as opposed to variable costs); its level of profitability; the bankruptcy riskiness inherent in its assets and investments; the size of the firm; and the quality of its management and workers. It is worth noting that most of these factors are in some way related to the firm's assets or investments, broadly speaking, consistent with the previously-articulated notion that corporate k's are determined by the use of the funds raised, and not by the source(s) of the financing.

Beyond relative business risk, a number of other factors may affect a company's k under certain circumstances. For example, if the tradable volume of a firm's securities is small, the lack of liquidity in its securities from the perspective of large institutional investors will likely elevate its k relative to otherwise-equally-risky firms or securities. Company-specific or industry-specific tax circumstances may also, of course, favourably or unfavourably affect the attractiveness of the securities of particular companies or industries, thereby either lowering or raising, respectively, their k's. And social-consciousness concerns also occasionally raise corporate k's, as in the case of

tobacco companies. The effects of these non-risk factors on corporate k's tend to be isolated and relatively small, and they are not built into any of the common quantitative models used by academics or practitioners to estimate k's.

While the earlier discussion makes it clear that a company's choice of investments, or more generally its asset management policies, can be expected to have a major impact on its k, it would generally be a mistake to think that its financing or liability management policies would have a similar effect on its overall k. For the purpose of this discussion, financing policies will include selecting the firm's target capital structure proportions and the longevity of its debt and equity securities, as well as its target dividend payout ratio.

The rationale for the muted or non-existent relationship between a firm's financing policies and its overall k is this. Given the business-risk and collateral-value characteristics of a firm's assets, there is, at any time, an *optimum* set of financing policies to support these assets that is, itself, determined by the riskiness of the business and its assets. The policies are *optimal* in the sense that they are the ones that will maximize the value of the firm to its investors. Therefore, both k and the firm's financing policies are jointly determined by the riskiness of the firm's assets, and the financing policies themselves have no independent role to play in determining the firm's overall k.

The only way in which a firm's financing policies can influence the firm's overall k is when the chosen or targeted policies deviate from those that are optimal from a value-maximization perspective. In this case, investors will perceive that the firm's securities are less attractive and the firm's k will rise because the firm's management has been revealed to be either incompetent or serving the interests of other stakeholders ahead of those of its investors, or both. In most circumstances where k calculations are called for, however, this scenario is not pertinent, as management is assumed to be competent and, subject to whatever constraints may exist, acting in the best interests of its bondholders and shareholders.

THE FIRM'S WEIGHTED-AVERAGE, OVERALL COST OF CAPITAL

From our discussion to this point, we know that a firm's overall k reflects the required return on the firm's assets as a whole. At the same time, we know that these assets are financed by a mix of debt and equity securities and therefore this overall k must be comprised of the returns required to compensate both the firm's debtholders and its shareholders – i.e., a mixture of its cost of debt capital and its cost of equity capital. Analysts have used this realization as the conceptual foundation for developing a calculation procedure – known as the *weighted-average cost of capital*, or WACC – for estimating a firm's overall k.

Using the WACC formula (to be detailed shortly) is an *indirect* approach to estimating a firm's overall k, as it relies on an assessment of the market-determined cost of the firm's *sources* of financing to *infer* the required rate of return on its assets, or its overall k. A *direct* approach to this task would focus on measuring the relative riskiness and attractiveness of the firm's assets in comparison with those of the typical corporation. It is the widespread use of the WACC technique that leads some people to assume, incorrectly, that a firm's k is determined by its sources of capital. While the popularity of the indirect WACC approach stems from the relative ease of obtaining its required market-based input values, it is vitally important for users of this approach to recognize that it is a *valid* overall k estimation procedure *only if* one can assume that the subject firm is targeting the value-maximizing capital structure proportions for financing its assets. Fortunately, if this lone assumption can reasonably be held to be true for the particular application, then the WACC approach to estimating a firm's overall k turns out to be quite robust, in the sense that the

approach can accommodate a wide variety of methods for estimating the input capital costs – especially the cost of equity.

The WACC formula, expressed on an after-tax basis, is as follows:

$$WACC \equiv (B/K)\, k_B\, (1 - \tau_I) + (P/K)\, k_P + (S/K)\, k_e + \tau_c$$

where: B/K = the firm's target future bond (B) or debt financing proportion, as a proportion of its total capitalization (K), expressed in market-value terms; B should include short-term debt and/or the capitalized value of capital leases if these are a permanent part of the firm's future financing plans.

P/K = the firm's target future preferred share (P) financing proportion, in market-value terms;

S/K = the firm's target future common share (S) financing proportion, in market-value terms, where S is composed of both accumulated retained earnings and the net proceeds of new common shares issues;

τ_I = the firm's marginal income tax rate, expressed as a percentage;

τ_c = the firm's capital tax rate, expressed as a percentage;

k_B = the firm's average, forward-looking (not embedded), before-tax cost of bond/debt financing, expressed as a percentage;

k_P = the firm's average, forward-looking (not embedded), after-tax cost of preferred share financing, expressed as a percentage; and

k_e = the firm's forward-looking, after-tax cost of equity capital, expressed as a %.

Now the theoretically correct application of the WACC approach requires the observance of a number of important principles with respect to the choice and estimation of the formula input values.

First, the financing weights or capital structure proportions must not only be the value-maximizing optimal ones, but they must be those that management is *targeting* for the foreseeable future based on the firm's present and projected asset structure. Except as they may be evidence for forecasting management's intentions for the future, the firm's current, embedded capital structure proportions are irrelevant to the WACC calculation.

Second, the capital structure or financing weights in the formula must be assessed on a market-value basis and *not* on a book value or historical-cost basis. As a firm ages, the market value of its equity often deviates from the book value of the equity recorded on its financial statements. This market-value versus book-value distinction is particularly important for "growth firms", as firms perceived to have lots of profitable "growth opportunities" with modest attendant risks will often have market-determined share prices that are 2, 3, 4, or more times their accountant-recorded book values per share. On the other hand, slow-growing firms that have all-but-exhausted their chances for profitable future growth, or firms whose risk has risen dramatically (e.g., merchant energy firms post-Enron), may have shares that trade at only a fraction of their book values.

The two reasons, then, that it is imperative to use market values – and not book values – for the WACC calculation are: (1) investors purchase a firm's securities at their reigning market values, and not at their historical book values, and these investors gauge their required returns relative to the market values they have paid for their investment stakes, and (2) when a firm's risk, and hence its k, changes, some of this change is reflected through changes in the market values of the firm's outstanding debt and equity securities, although no changes occur immediately in the book values of these securities. Unless market values are used in the up-dated WACC calculation, this aspect of the reflection of the firm's risk change on its WACC will be overlooked.

Turning to the specification of the capital-cost input values appropriate for the WACC calculation, theoretical economics would call for the use of *marginal effective* costs of capital for k_B, k_P, and k_e, with the (Pareto) optimal capital structure proportions being those where the marginal effective costs of capital across all sources are equalized. Finance academics and practitioners have long realized, however, that the economist's conception is impractical from an implementation perspective. Instead, the finance convention is to use the *nominal* costs of debt and preferred shares in the WACC formula, where nominal corresponds to the expected returns or yields to maturity that one would read in the newspaper, based on the current market values of similar-maturity and similar-risk securities to those intended to be used by the subject firm. These nominal, future-looking costs are likely to be lower than the marginal effective cost values that economists would like to focus on. The differences between the effective marginal costs and the nominal costs are often referred to as the *hidden costs* of debt and preferred share financing.

The cost of equity capital (k_e) in the WACC formula is, on the other hand, the marginal effective cost of using incremental equity financing that reflects the degree to which the uncertainty and volatility of equity returns have been *leveraged up* by the firm's use of debt and preferred share financing. In other words, properly calculated, the k_e figure will include not only the marginal cost of equity financing, alone, but all the *hidden costs* of the firm's use of debt and preferred financing.

Finally, the k_B, k_P, and k_e values should be estimates of the average *future* cost of financing from each of these capital sources and not in any way contain the *embedded* costs associated with earlier financings that are recorded on the liability side of the firm's balance sheet. These embedded costs are "water under the bridge" and have no direct relevance for the future financing costs that will have to be recovered from the earnings on future investments.

ESTIMATION OF THE COST OF EQUITY CAPITAL

The Equity Risk Premium (ERP) Method

The ERP method of estimating k_e is based on the reasonable assumption that common shares are riskier, from an investor's perspective, than debt securities. Consequently, equity investors will demand a higher prospective rate of return than the contemporaneous yield prevailing on bonds to be enticed into buying shares. This extra rate of return, or premium expected return, is called the ERP. The debt rate against which this firm-specific ERP is gauged is usually taken to be the long-term government bond yield. The formula for applying this approach is:

$$k_e = r_{LTGOVT} + ERP$$

where: k_e is the estimate of the firm's cost of equity capital; r_{LTGOVT} is the current yield on default-risk-free, long-term Canada bonds; and ERP is the estimate of the compensatory rate-of-return

premium required to attract investors to invest in the firm's shares. The ERP value itself is gauged in comparison with the return requirements evident in the marketplace for equity investments exhibiting investment risks similar to those of the subject firm. For this reason, the ERP method is also referred to as the "Risk Positioning" method in some texts.

In its generic form, the ERP method leaves unspecified the investment risks for which investors need compensation. If the company or analyst is concerned only with the return requirements of large, well-diversified, institutional investors, then the only type of risk for which the ERP will have to compensate will be *systematic market risk* or, as it is often called, *beta risk.* The reason for this narrowed focus is that investors, such as pension funds and mutual funds, are expected to be able to diversify away all other kinds of investment risk.

In this special situation, the ERP formula becomes what is known as the *Capital Asset Pricing Model* (CAPM), and the ERP term in the above k_e formula becomes $\beta \bullet MRP$, where β (or *beta*) is the forward-looking estimate of the systematic riskiness of the subject firm's shares relative to the shares of the typical, publicly-traded company, and MRP, or the *market risk premium*, is the forward-looking estimate of the expected return above government bond yields that investors require to invest in the typical equity or in the stock market in general. The level of the prospective MRP in North America is currently estimated to be somewhere between 3% and 5%.

The CAPM is only a special case of the general ERP method. For those investors in the subject company who do not hold widely and efficiently diversified share portfolios, beta risk is an *in*adequate measure of their risk exposure, and broader concepts of risk must be subsumed in the estimate of the appropriate ERP for them. The overall uncertainty of the investment return that they may or may not receive from their ownership of the firm's shares must typically be considered and compared with the corresponding risk exposure, and excess return requirements, for the shares of other publicly-traded companies. Various numerical risk proxies and historical estimation procedures are employed for this task.

The primary advantage of the ERP method for estimating a firm's k_e is that the method focuses squarely on relative risks, which, as discussed earlier, is the principal determinant of relative costs of capital. In its typical application, the analyst looks at the risk of equities in general as compared to the risk of government bonds, as well as the risk of the subject firm's shares relative to the risk associated with other share investments. Moreover, the ERP method is the only approach where the equity-risk impact of varying capital structure proportions can explicitly be accounted for. (For example, there are theories and formulas that relate beta values to debt and equity ratios.)

With respect to disadvantages, finding and correctly interpreting the historical equity capital costs that are often used to *infer* historical ERP values – for the market, for comparable industrials, or for the subject firm itself – are highly contentious undertakings and frequently embody either *circular reasoning* or the de facto substitution of some other k_e estimation procedure (such as the DCF method) for the ERP method. Even if the historical-average risk premium calculations are not invalidated by these procedural missteps, they tend to be highly sensitive to the estimation period chosen by the analyst and subject to considerable volatility from period to period.

In addition, there is disagreement among analysts with respect to the relevance of difference risk concepts for gauging relative ERP values, and sometimes there are disputes about the appropriateness of different risk proxies for the historical quantification of these various risk concepts – especially when the subject firm's shares are not publicly traded and historical beta risk and standard-deviation-of-investment-return values cannot be calculated directly.

Finally, as the ERP method requires a forward-looking estimate of the MRP and/or the firm-specific ERP, there is considerable debate and uncertainty about how, and indeed whether, historical evidence with respect to those variables can be used to forecast their likely future values, especially as there is considerable evidence that the prospective overall MRP is changing over time.

The Discounted Cash Flow (DCF) Method

The DCF approach to estimating a company's k_e is derived from a standard approach used to estimate a stock's intrinsic value – namely, the *constant dividend growth valuation model* developed by J.B. Williams and Myron Gordon over a half century ago. This model projects a firm's future dividend stream and then postulates that the firm's current share price in the marketplace will be the present value of these dividend payments into the infinite future, as discounted to the present at the firm's current k_e. Changes in the firm's share price can then take place only if investors' assessment of the size and growth trajectory of the firm's future dividends changes, or their k_e return requirements for the firm change, or both. By re-arranging terms in this traditional valuation model, we find the DCF-based k_e formula – namely,

$$k_e = E(DPS) / P + g$$

where: E(DPS) is the expected dividend payment per share over the next 12 months; P is the current market price of the firm's common shares; and g is the single percentage value that most closely approximates what investors expect the average growth rate in the firm's earning and dividend paying power to be for the infinite future.

The principal advantages of the DCF method are that it reflects investors' consensus expectations – as embodied in the current share price – and that two of the three input values are readily available in published data or may reliably be forecast from easily accessible data. In addition, the assumptions necessary to validate the underlying valuation model seem to be reasonable ones for many publicly-traded companies. These requirements for validation include: payment of a cash dividend; a fairly steady growth in dividends over time; minimal use of new external common share financing; a fairly steady financial leverage target over time; a projected growth rate in DPS payments that is less than the firm's k_e; and a valuation based on the firm's future earning power rather than, say, its asset-replacement value or liquidation value.

A major disadvantage associated with the practical application of the DCF method is the uncertainty surrounding, or speculative nature of, the forecast of the firm's infinite future growth rate. A firm's historical growth experience may *not* necessarily be indicative of its actual or expected future growth rates. Moreover, forecasting a single-number growth rate value to infinity is a highly problematic task when a company may go through phases of both rapid and slow growth in future years, before maturing and possibly ceasing to grow altogether.

Another limitation of the DCF method arises when the shares of the subject firm are *not* publicly traded and, hence, there is no direct evidence of its investor-determined share price or of its stand-alone dividend policies. Much of the appeal of the DCF approach is then lost if dividend yield values for the formula have to be inferred from "comparable" company data, and subject-firm-specific risk changes cannot be factored into the k_e estimation. Complicating this is the fact that the DCF model does not incorporate any relative risk factor directly into its model structure, but merely assumes that risk-related differences among firms will be adequately reflected in share prices.