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Research Article

Toward A Reliable Cost of Capital

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Abstract: This is study is designed to provide basis for determining a reliable cost of capital. Corporate finance textbooks typically devote several chapters to the problems of capital budgeting, cash flow estimation and the determination of a firm's cost of capital. However, it can be difficult in practice to obtain reliable estimates of the inputs required to perform capital budgeting as recommended by the textbooks. Also, the Weighted Average Cost of Capital (WACC) is commonly presented in a way that creates difficulties in calculating the estimate. The most cumbersome component of WACC estimation is the cost of capital. Practitioners therefore have to rely on more abstract and indirect methods to estimate cost of capital. In the study, we reviewed alternative methods of deriving reliable estimates of cash flow and cost of capital. Our review of relevant literature reveals procedures that will lead to methods that are less intensive in terms of the time and computations required to calculate a WACC estimate. We also establish methods that require fewer inputs and/or calculations that are based on subjective judgments of the analyst or the firm's management.

Keywords: Capital budgeting, cash flow estimation, debt capital, equity capital, net present value, WACC

INTRODUCTION

The cost of capital is the rate of return that the firm must earn on its investments in order to satisfy the required rates of return of all the firm's sources of financing (including creditors who loaned the firm money and owners who purchased shares or stocks in the company). This rate is a function of the required rates of return for all the firm's sources of financing, the corporation's tax rate and the flotation costs incurred in issuing new securities. Therefore, the cost of capital determines the rate of return that must be achieved on the company's investments, so as to earn the targeted return on the firm's investments. Furthermore, the cost of capital is also the rate of return that will leave the price of the common stock unchanged. Two objectives may be given for determining a company's cost of capital: first, the financial objective of management is to maximize the shareholders' wealth. We can increase the value of the common stock by lowering the firm's cost of capital. All else remaining the same, as the cost of capital is decreased; the value of the firm is increased; and second, the cost of capital is used as the minimum acceptable rate of return for capital investments. The value of the firm is maximized by accepting all projects where the Net Present Value (NPV) is positive when discounted at the firm's cost of capital (Pandey, 2004).

The cost of capital therefore has a pivotal role to play in corporate finance, forming the link between the investment decision and the finance decision.

Starting from the late 1940s, experts in finance recognized that intelligent manipulation of debt and equity could enhance corporate value, via producing an optimal (or near-optimal) mix of capital. Over the 1950s, 1960s and 1970s five concepts of finance theory were developed on this area: early gearing (leverage) models; the model of Modigliani and Miller (1963); Capital Asset Pricing Model (CAPM); Arbitrage Price Theory (APT) and Gordon model (Cotner and Fletcher, 2000). Finance theories have shown that any use of capital imposes an opportunity cost on investors i.e. funds are diverted from earning a return on the next best equal-risk investment. Since investors have excessive numbers of financial market opportunities, there has to be something to benchmark corporate capital against these capital market alternatives. This benchmark is provided by the cost of capital. Unless a firm can gain in excess of its cost of capital, it will not add value to its investors' wealth. A standard means of expressing a company's cost of capital is the weighted-average of the cost of individual sources of capital employed. Guidance provided by finance theory does not protect practitioners from facing a number of difficult choices when it comes to estimating a company's cost of capital using the weighted-average

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expression. The most cumbersome component of Weighted Average Cost of Capital (WACC) estimation is the cost of equity capital. While cost of debt is easily available, no observable counterpart usually exists for cost of equity. Practitioners, therefore, have to rely on more abstract and indirect methods to estimate the cost of equity capital. Most finance textbooks present the WACC calculation as:

$$WACC = Kdz\ (1-T)xD\%+KexE\% \quad (1)$$

where,

Kd = The cost of debt before taxes
T = The tax rate
D% = The percentage of debt on total value
Ke = The cost of equity
E% = The percentage of equity on total value (Easton, 2004)

All of them precise (but not with enough emphasis) that the values to calculate D% y E% are market value. Although they devote special space and thought to calculate Kd and Ke, little effort is made to the correct calculation of market values. This means that there are several points that are not sufficiently dealt with: Market values, location in time, occurrence of tax payments, WACC changes in time and the circularity in calculating WACC.

Estimating a firm's WACC is of critical importance to managers who evaluate investment projects for capital budgeting purposes as well as to investors who wish to assess the overall riskiness and expected return from a company's activities for valuation purposes. For example, corporate finance textbooks typically devote several chapters to the problems of capital budgeting, cash flow estimation and the determination of a firm's cost of capital. However, it can be difficult in practice to obtain reliable estimates of the inputs required to perform capital budgeting as recommended by the textbooks. As Fama and French (1997, 1999) point out, some of these practical difficulties exist because there is considerable uncertainty in estimating a firm's (or even an industry's) cost of capital. This uncertainty is similar to the risk faced by the firm when projecting a project's cash flow. In addition, surveys of corporate finance practitioners indicate wide variation in corporate WACC estimation methods, primarily due to managers' differences in estimating a firm's cost of equity capital (Bruner *et al*., 1998).

Flowing from the above, the study seeks to provide answers to the following questions:

- How does the choice of discount rate and cash flow estimates affect capital budgeting?
- How best should cost of equity be estimated?
- How best should WACC be calculated?

The overall objective of the study is to highlight the need and procedure for a simple parsimonious, less subjective and accurate method of estimating the WACC for a firm or industry. This will serve as a useful tool to managers interested in capital budgeting problems and investment decision making in general.

ESTIMATING COST OF EQUITY

Popular methods for computing the cost of equity include: the Dividend- Growth Model, the capital Asset pricing model and the Residual-income valuation Model (Gebhardt *et al*., 2001; Ehrhardt, 1994).

As Fama and French (1997, 2002) confirm, estimating the required return on common equity can be difficult. This is due to the statistical noise inherent in estimating an asset pricing model's time-varying factor loadings and risk premiums. Using dividend and earnings growth models, Fama and French (2002) show that the expected equity premium for 1951-2000 is probably much lower than estimates based on realized stock returns this result is due to the statistical problems associated with the use of realized returns as proxies for expected returns. Recent results reported in Elton (1999) also suggest that the use of historical returns as proxies for ex ante returns is not appropriate when one examines the long-term performance of various securities. There have been several attempts to estimate the cost of capital of companies at the industry level. Most notably, Fama and French (1997, 1999 and 2002) and Gebhardt *et al*. (2001) use different approaches to tackle the problems associated with estimating the cost of corporate capital. Using the Fama and French (1993) three-factor model, Fama and French (1997) estimated the cost of equity capital for 48 industries. They found that, on average, the excess return on equity capital (i.e., the return above the risk-free rate) is 6.64% with a large degree of variability. Indeed, the authors claim that the large degree of imprecision in the excess returns makes these estimates useless in practice for corporate discounted cash flow analysis.

Fama and French (2002) show that equity premiums based on fundamentals such as dividend and earnings growth can yield more precise estimates of equity premiums than those based on realized stock returns. This evidence from Fama and French (2002) is consistent with the findings of Ignacio and Tham (2009) that using fundamental data can lead to more precise estimates of a firm's cost of capital. Common

practice is to estimate the cost of equity applying the Capital Assets Pricing Model (CAPM). In the words of Franke (1984). "The traditional capital asset pricing model (CAPM), which is justified when equity returns are normally distributed, is commonly used to estimate the cost of equity". Though disagreements exist within and among groups on how to apply the CAPM to estimate cost of equity, the CAPM states that the required return (K) on any asset which can be expressed as:

$$K = Rr_f + \beta (R_m - R_f)$$

where,

Rr_f = Interest rate available on a risk-free bond
R_m = Return required to attract investors to hold the broad market portfolio of risky assets
β = The relative risk of the particular assets.

According to CAPM then, the cost of equity

Ke, for a company depends on three components. They are returns on risk-free bonds (Fr), the stock's equity beta which measures risk of the company's stock relative to other risky assets and the market risk premium (R_m-R_f) necessary to entice investors to hold risky assets generally versus risk-free bonds. In theory, each of these components must be a forward looking estimate (Weston and Copeland, 1992).

Among many other related works, Ignacio and Anthonio (2005) find that the great majority of the error in estimating the cost of equity capital using the CAPM is due to the risk premium estimates. Pagano (2003) shows that the cost of equity estimation can be improved in a Bayesian framework; Ruback (2000) discusses a general approach for discounting cash flows with time-varying expected returns.

The estimate of cost of equity using CAPM can be improved upon by adopting the following measures (Ignatcio and Tham, 2009):

- Using the Capital Assets Pricing Model, CAPM adjusting the betas. This is the case for a firm that is not listed on the stock exchange or if listed, is not frequently traded. It is necessary to pick a stock or industry similar to the one we are studying, (from the same industrial sector, about the same size and about the same leverage). This is called the proxy firm. Example: The beta adjustment is done with:

$$\left[\beta_m = \beta proxy \frac{1+\frac{D_{nt}}{E_{nl}}(1-T)}{1+\frac{D_{praxt}}{E_{nl}}(1-T)}\right]$$ (Hamada, 1969).

where,

β_m = The beta for the stock not registered at the stock exchange
D_{nt} = The market value of debt
E_{anb} = The equity for the stock not registered in the exchange
D_{proxy} = The proxy firm

We have to recall that the market value of equity for the non traded firm is not known. That value is what we are looking for. Hence, there will be circularity when using this approach:

- Subjectively and assisted by a methodology such as the Analytical Hierarchy Process developed by Tom Saaty and presented by Cotner and Fletcher (2000). With this approach the owner of the firm gives a leverage level estimate of the perceived risk. This risk premium is added to the risk free rate and the result would be an estimate for Ke.
- Subjectively as above, but direct. This is, asking the owner, for a given value level of debt and a given cost of debt, what is the required return to equity?
- An estimate based on book value (given that these values are adjusted either by inflation adjustments or assets revaluation, so the book value is a good proxy to the market value).
- Calculate the market risk premium as the average of R_m-R_f, where R_m is the return of the market based upon the stock exchange index and R_f is the risk free rate (say, the return of treasury bills). Then, subjectively, the owner could estimate if he prefers, in terms of risk, to stay in the actual business or to buy the stock exchange index basket. If the actual business is preferred, then one could say that the beta of the actual business is lower than 1, the market beta and the risk perceived is lower than the market risk premium, R_m-R_f. This is an upper limit for the risk premium of the owner. This upper limit could be compared with zero risk premiums, the risk free rate risk premium which is the lower limit for the risk perceived by the equity owner. If the owner prefers to buy the stock exchange index basket, we could say that the actual business is riskier than the market. Then, the beta should be greater than 1 and the perceived risk for the actual business should be greater than R_m-R_f.

ESTIMATING WEIGHTED AVERAGE COST OF CAPITAL (WACC)

When considering the effect of the different capital structures on the WACC, it is important to focus on the action of two competing forces as the company gears

up. The first force recognizes that debt finance is cheaper than equity finances; the second force focuses on the cost of equity (Ian, 2002). It is clear that the WACC lies at the heart of finance, linking together the key areas of the investment and finance decisions to measure whether the business has created or destroyed value. Most finance textbooks (Benninga and Sarig, 1997; Brealey *et al*., 1996; Copeland *et al*., 1994; Damodoran, 1996; Gallagher and Andrew, 2000; Weston and Copeland, 1992) present the WACC calculation as:

$$WACC = Kdx(1-T)xD\% + KexE\% \quad (2)$$

where,
Kd = The cost of debt before taxes
T = The tax rate
D% = The percentage of debt on total value
Ke = The cost of equity
E% =The percentage of equity on total value

All of them precise (but not with enough emphasis) that the values to calculate D% y E% are market values. Although they devote special space and thought to calculate Kd and Ke, little effort is made to the correct calculation of market values. This means that there are several points that are not sufficiently dealt with:

- Market values are calculated period by period and they are the present value at WACC of the future cash flows.
- These values to calculate D% and E% are located at the beginning of period t, where the WACC belongs.
- Kd (1-T), the after tax cost of debt, implies that the tax payments coincides in time with the tax accrual. (Some firms could present this payment behavior, but it is not the rule. Only those that are subject to tax withheld from their customers, pay taxes as soon as they invoice their goods or services).
- Because of above, the existence of changing macroeconomic environment, (say and inflation rates) WACC changes from period to period.
- That there exists circularity when calculating WACC. In order to know the firm value it is necessary to know the WACC, but to calculate WACC, the firm value and the financing profile are needed.
- That we obtain full advantage of the tax savings in the same year as taxes are paid. This means that Earnings Before Interest and Taxes (EBIT) are greater than or equal to the interest charges.
- There are no loses carried forward.
- The only sources of tax savings is interest on debt.
- That (1) implies a definition for Ke, the cost of equity, in most cases they use:

$$Ke_t\text{-}Ku_t + (Ku_t\text{-}Kd) \times (1\text{-}T) \times D\%_t\text{-}/E\%_{t\text{-}1}$$

This is the typical formulation of Ke, but it has to be said, it only applies to perpetuities and not to finite periods (Ignacio and Tham, 2009). In this expression, Ke_t, is the levered cost of equity, Ku_t is the cost of unlevered equity, Kd is the cost of debt, T is the tax rate, $D\%_{t-1}$ is the proportion of debt on the total market value for the firm, at $_{t-1}$ and $E\%_{t-1}$ is the proportion of equity on the total market value for the firm, at t-1. It can be shown that this equation results from the assumption that the discount rate for the tax savings in this case that rate is Kd is valid only for perpetuities. When working with n finite it can be shown that the expression for Ke changes for every period (Tham and Ignacio, 2004a). The assumption behind Kd as the discount rate is that the tax savings are a non-risky cash flow.

Modigliani and Miller (1958) proposed that with perfect market conditions, (perfect and complete information, no taxes, etc) the capital strcuture does not affect the value of the firm because the equity holder can borrow and lend and thus determine the optimal amount of leverage. The capital strcuture of the firm is the combination of debt and equity in it.
where, V^L the value of the levered firm is equal to V^{UL} the value of the unlevered firm:

$$V^L = V^{UL} \quad (3)$$

And in turn, the value of the levered firm is equal to $-V^{equity}$ and the value of the equity plus V^{Debt} the value of the debt:

$$V^L = V^{Equity} + V^{Debt} \quad (4)$$

This implies that if the firm has a given cash flow, the present value of it at WACC (the firm total value) does not change if the capital structure changes. If this is true, it implies that the WACC will remain constant no matter how the capital structure changes. This situation happens when no taxes exist. To maintain the equality of the unlevered and levered firms, the return to the equity holder (levered) must change with the amount of leverage (assuming that the cost of debt is constant).

One of the major market imperfections is taxes. When corporate taxes exist (and no personal taxes), the situation posited by MM is different. They proposed that when taxes exist the total value of the firm does

change. This occurs because no matter how well managed is the firm, if it pays taxes; there exists what economists call an externality. When the firm deducts any expense, the government pays a subsidy for the expense. It is reflected in less tax. In particular, this is true for interest payments. The value of the subsidy (the tax saving) is TxKdxD, where the variables have been defined above. Hence the value of the firm is increased by the present value of the tax savings or tax shield (Ignacio and Tham, 2009):

$$V^L = V^{UL}+V^{TS} = V^D+V^E \quad (5a)$$

Associated to Eq. (4) and (5a) there exists correlated cash flows, as follows:

$$FCT+TS = CFD+CFE \quad (5b)$$

where,
FCF = Free cash flow
TS = Tax savings
CFD = Cash flow to debt
CFE = Cash flow to equity

When a firm has debt there exists some other contingent or hidden costs associated to the fact to the possibility that the firm goes to bankruptcy. Then, there are some expected costs that could reduce the value of the firm. The existence of these costs deters the firm to take leverage up to 100%. One of the key issues is the appropriate discount rate for the tax shield. Ignacio and Tham (2009) asserts that the correct discount rate for the tax shield is Ku, the return to unlevered equity and the choice of Ku is appropriate whether the percentage of debt is constant or varying over the life of the project.

When calculating WACC two situations can be found: with or without taxes. In the first case, as said above, the WACC is constant, no matter how the firm value be split between creditors and stockholders. (The assumption is that if inflation is kept constant, otherwise, the WACC should change accordingly). When inflation is not constant, WACC changes due to the inflationary component and not due to the capital structure. In this situation, WACC is the cost of the assets, KA, or the cost of the firm Ku and at the same time is the cost of equity when unlevered. This means:

$$Ku_t, = KdxD_{t-1}\% + Ke \times E_{t-1}\% \quad (6)$$

(Ignacio and Tham, 2009)

This Ku is defined as the return to unlevered equity. The WACC is defined as the weighted average cost of debt and the cost of levered equity. In a MM world KU is equal to WACC without taxes. When taxes exist, the WACC calculations will change taking into account the tax savings. If it is true that the cost Ku, is constant, Ke, the cost of equity changes according to the leverage. Here for simplicity we assume that the Ku is constant, but this assumption is not necessary. If the Ku is changing then in each period, the WACC will change as well, not only for the eventual change in the financing profile, but for the change in Ku. In any case, Ke has to change in order to keep Ku constant or in order to be consistent with the changing Ku.

The cost of equity when the discount rate for the TS, Ke is:

$$Ke, = Ku_1+ (Ku_t-Kd) \times D\%_{t-1}/E\%_{t-1} \quad (7)$$

This equation is proposed by Harris and Pringle (1985) and is part of their definition of WACC. As before, it can be shown that Eq. (7) results from the assumption that the discount rate for the tax savings is Ku and it can be shown that Ke, defined in Eq. (7), is the same for finite periods and for perpetuities, (Tham and Ignacio, 2004a, 2004b). The assumption behind Ku as the discount rate is that the tax savings are strictly correlated to the free cash flow.

The WACC calculations are made by estimating the debt and equity participation in the total value of the firm for each period and calculating the contribution of each to the WACC after taxes. As a first step, we will not add up these components to find the value of WACC and we will calculate the total firm value with the WACC set to 0. We will construct each table, step by step, assuming that WACC is zero. Remember that $D_{t-1}\% = D_{t-1}/V_{t-1}$, where D is market value of debt and V is the total firm value (Ignacio and Tham, 2001a, 2001b).

It is recommended that the last arithmetic operation be the WACC calculation. It should be noted that the cost of equity and cost of debt are not calculated from the beginning because they depend on the value of the firm that will be calculated with the WACC. In this case circularity is generated. This problem is solved by the use of spreadsheet which is allowed to make enough iteration until it finds the final numbers. With the WACC values for each period the present value of future cash flows and the Net Present Value (NPV) are calculated (Ignacio and Tham, 2009).

The same result can be reached by calculating the present value of the free cash flow assuming no debt and discount it at Ku, or what is the same, as WACC before taxes and add up the present value of tax savings at the same rate of discount, Ku. (Myers, 1974) proposed and it is known as Adjusted Present Value

(APV). Myers and most finance textbooks teach that the discount rate for the tax savings should be the cost of debt. However, the tax savings depend on the firm profits. Hence, the risk associated with the tax savings is the same as the risk of the cash flows of the firm rather than the value of the debt. Hence, the discount rate should be Ku. For this reason, the tax savings are also discounted at Ku. This way, the present value for the free cash flows discounted at WACC after taxes coincides with the present value of the free cash flow assuming no debt discounted at Ku and added to the present value of the tax saving discounted at the same Ku (Ignacio and Tham, 2009).

COST OF CAPITAL AND CAPITAL BUDGETING

Cost of capital theory is based on the assumption that investors will evaluate an investment opportunity based on the expected cash flow and an appropriately specified discount rate (the cost of capital). The expected cash flow will be the probability weighted average of all possible future cash flows that the investment might generate. If actual results vary from the probability weighted outcome there is an equal probability that they will be above or below the probability weighted cash flow. There is no bias towards downside outcomes. The investor is exposed to volatility of cash flows above or below the probability weighted outcome (Price Water Coupers, 2005).

Capital budgeting is usually done by using the Net Present Value (NPV) method. This consists in discounting the expected cash flows with an appropriate risk adjusted rate. The expectation is now taken with regards to the subjective probability of the investor. The risk adjusted discount rate is given by the expected rate of return of the investment. If the discount rate is derived from an equilibrium model such as the CAPM the above problems reduces to the question under what assumptions a myopic valuation principle can be applied. This problem was considered by Fama (1977), Myers and Turnbull, (1977), Sick (1986) and Franke, (1984). In the context of the CAPM the probability distributions of the one-period returns have to be normal. The implications on the shape of the cash-flow distributions are less well known. Fama (1977) investigated the case of a single future cash-flow some periods ahead. Later Fama (1996) pointed out that in this case the distribution of cash-flows tends to become more and more skewed when the distributions of the one-period single returns are roughly symmetric. Myers and Turnbull (1977) assume a specific pattern of expectation formation that implies certain linearity in the distributions of future cash flows. They show that in this context a constant value for the risk adjusted discount rate is only obtained when the cash-flows follow a pure random walk process. Sick (1986) investigated additive or multiplicative cash-flow process. In Black (1988) both the cash-flows of the project and the cash-flows of the market portfolio are joint normal.

Where as Fama (1977), Myers and Turnbull, (1977) and Sick (1986) considered cash-flows having a particular stochastic structure, Franke (1984) instead made no assumptions for the (exogenous) dividend process except regularity conditions. Using a multiperiod exchange economy with HARA investors he derived conditions for a period-by-period application of one-period asset pricing models. Within an arbitrage model, Richter (2001) tackled the problem of constant discount rates. He used a binominal model and was able to derive equations that implied a constant discount rate for future cash-flows. Therefore, a particular stochastic structure of the cash-flows is evident. In particular, within the binominal model only one ratio of the growth rate for up-and down-movements will lead to a constant discount rate (Jorg and Andreas, 2002).

DISCUSSION

The elegance of a theory lies in its practical application. The theory of measuring cost of capital is not simple (Pandey, 2004). These difficulties are centered on the use of market values, location in time and occurrence of tax payments, circularity and estimation of cost of equity and so on. The use of book value weights in the calculation of WACC can be seriously questioned on theoretical grounds. First the component costs are opportunity rates and are determined in the capital markets. The weights should also be market determined. Second, the book-value weights are based on arbitrary accounting policies that are used to calculate retained earnings and value of assets. Thus, they do not reflect economic values. Market-value weights are theoretically superior to book value weights. They presumably reflect economic values and are not influenced by accounting policies. They are also consistent with the market-determined component costs.

The residual-income valuation model can be used to simultaneously estimate firm-specific implied long-term growth rate in abnormal earnings and cost of capital by relating earnings-to-price and book-to-market ratios in a linear fashion. This simple framework estimates investors' consensus beliefs with respect to the long-term growth rate of abnormal earnings and the

corresponding cost of capital embedded in the stock price. Empirical results show that the growth rate and cost of capital estimates obtained from this model and that of Easton (2004) exhibit desirable properties. Specifically, cost of capital estimates, controlled for growth, are predictably related to various previously documented firm-specific factors.

WACC estimates, using Economic Value Added Model are statistically more precise than those reported in prior research. The model's estimates are also more effective in generating out-of-sample forecast of future levels of industry profitability. The model can thus be used as an aid to practitioners in real world capital budgeting/security valuation problems (Pagano, 2003). What is commonly known as the weighted Average Cost of Capital (WACC) in the context of investment and financing decisions is in fact the weighted average cost of new capital given the firm's target capital structure. Therefore, WACC is also the Weighted Marginal Cost of Capital (WMCC). This is because the firm is concerned with the selection of new projects. Therefore, the relevant cost is the cost of raising new funds to finance the projects. Thus, WMCC should be used to determine the firm's optimum capital budget (Pandey, 2004).

A common issue encountered when reviewing NPV analysis is the use of 'hurdle rates" as the discount rate, as opposed to objectively determined discount rates based on weighted average cost of capital. Invariably hurdle rates are set at a level higher than the "theoretical" opportunity cost of capital. The higher hurdle rate is usually explained by the need to allow for 'risk' or to ration the available capital among competing investment opportunities. More often than not the argument for the inclusion of a risk premium in the hurdle rate is supported by a perception that it is difficult to factor risk accurately or appropriately into the cash flow forecasts. The discount rate is adjusted upwards to compensate for that. In this context 'risk' is viewed as the likelihood of actual results being worse than forecast results. It is not often in practice that risk is regarded as including the possibility of actual results exceeding forecast.

While using a hurdle rate that incorporates an 'adjustment' of risk has intuitive appeal and might be considered pragmatic, it is problematic because there is no theoretical basis for setting the rate. How much allowance for risk should be incorporated in the discount rate? How much is enough? The alternative is to use a cost of capital incorporating an orthodox cost of equity specification that is consistent with portfolio theory. This provides a rigorous basis for specifying the discount rate and importantly it dictates the basis on which the cash flow forecasts should be prepared.

The firm's WACC reflects the average risk of all projects; therefore, it can be used for investment evaluation only when the risk of the projects is equal to the firm's average 'risk. Since that is not so in practice, the firm's WACC should be adjusted for the risk characteristics of the project. This can be achieved by adopting the Risk-Adjusted Discount Rate (RADR). An alternative approach is the Adjusted Present Value (APV) method with an APV approach, project cash flows are broken down into two components: operating cash flows and certain cash flows associated with financing the project. These components then are valued so that APV = unlevered Project value plus value of project financing (Meyers, 1974). The decomposition of cash flow is undertaken so that different discount rates may be used on the components. As operating cash flows are more risky than the financing-related cash flows, they are discounted at a higher rate (Van and Wachowicz, 2005).

RECOMMENDATIONS

Flowing from the above, the following recommendations are made:

- For investment appraisal purposes, firms should use discount rates adjusted for the risk characteristics of the project. This can be achieved by adopting the Risk-Adjusted Discount Rate (RADR) method or Adjusted Present Value (APV) method.
- Where floatation costs occur, firms should adjust the investment projects cash flows for the costs and use WACC unadjusted for the floatation costs as the discount rate.
- Firms should use the intersection of the investment opportunity curve and the marginal cost of capital schedule to determine their optimum capital budget. This will enable firms maximize the NPV of all profitable projects.
- Firms should endeavor to use market values instead of book values in deriving the estimates of cost of capital and cash flows.
- WACC estimates derived from economic value added model are statistically very precise. Practitioners are encouraged to use this model in dealing with capital budgeting /security valuation problems.
- Firms quoted on the stock exchange are encouraged to use CAPM to estimate their cost of equity. While firms not listed and those listed but not frequently traded should use CAPM with adjusted betas.

CONCLUSION

This study has addressed cost of capital as an important link between the investment decisions and the finance decisions of firms. It provides the benchmark for corporate uses of capital against capital market alternatives. A standard means of expressing a company's cost of capital is the weighted-average of the cost of individual sources of capital employed. It is a common use that practitioners calculate a WACC a prior and use it independently from the firm value (that is, from FCF). In this study we show that FCF affects WACC and that this interrelationship creates circularity, but we show how it can be solved in a very easy way using modern computing resources. The 'misuse' of WACC might be due to several reasons. Traditionally there have not been computing tools to solve the circularity problem in WACC calculations. Now it is possible and easy with the existence of spreadsheets. Not having these computing resources in the previous years it was necessary to use simplifications that led to arbitrary and unreliable estimates.

The most difficult task is the estimation of Ku, or alternatively, the estimation of Ke. Here, a methodology to estimate these parameters is suggested. If it is possible to estimate Ku from the beginning, it will be possible to calculate the total and equity value independently from the capital structure of the firm, using the CCF approach or the APV approach and discounting the tax savings at Ku. All these will give managers a clear focus and understanding of the management of capital budgeting problems and investment decision in general.

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