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Relation of Cost of Capital and Life Cycle Analysis

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Abstract:

"Cost of capital" is defined as "the opportunity cost of all capital invested in an enterprise." Opportunity cost is what you give up as a consequence of your decision to use a scarce resource in a particular way. All capital invested is the total amount of cash invested into a business. In an enterprise this refers to the fact that we are measuring the opportunity cost of all sources of capital which include debt and equity. An organization's cost of capital is the cost it must pay to raise funds. This item defines and explains cost of capital, with examples, along with similar and related terms. Very briefly, however, these similar-sounding terms are defined as follows: Cost of Capital is the cost an organization pays to raise funds (e.g., through bank loans or issuing bonds), expressed as an annual percentage. Organizations typically define their own cost of capital in one of two ways.

- Cost of capital may be taken simply as the financing cost the organization must pay when borrowing funds, either by securing a loan or by selling bonds, or equity financing. In either case, cost of capital would be expressed as an annual interest rate, such as 6%, or 8.2%.
- Alternatively, when evaluating a potential investment (e.g., a major purchase), the cost of capital is considered to be the return rate the company it could earn if it used money for an alternative investment with the same risk. That is, the cost of capital is essentially the opportunity cost of investing capital resources for a specific purpose.

life cycle analysis is often used for option evaluation when procuring new assets and for decision-making to minimize whole-life costs throughout the life of an asset. It is also applied to comparisons of actual costs for similar asset types and as feedback into future design and acquisition decisions.

The primary benefit is that costs which occur after an asset has been constructed or acquired, such as maintenance, operation, disposal, become an important consideration in decision-making. Previously, the focus has been on the up-front capital costs of creation or acquisition, and organizations may have failed to take account of the longer-term costs of an asset. It also allows an analysis of business function interrelationships. Low development costs may lead to high maintenance or customer service costs in the future. When making this calculation, the depreciation cost on the capital expense should not be included

In many organizations cost of capital (or, more often weighted average cost of capital) serves as the discount rate for discounted cash flow analysis of proposed investments, actions or business case cash flow scenarios. Cost of capital (or weighted average cost of capital) is also used sometimes to set the hurdle rate, or threshold return rate that a proposed investment must exceed in order to receive funding. Cost of capital percentages can vary greatly between different companies or organizations, depending on such factors as the organization's life stage. A company at initial stage want to run business on least cost so he could choose risky source of capital but when organization on growth stage then he organization run business on less risky source so these two things are inter related.

Keywords: Life Cycle analysis, Capital Structure, Financing Decision, Weighed Average cost of capital

1. Introduction

During the life of the asset, decisions about how to maintain and operate the asset need to be taken in context with the effect these activities might have on the residual life of the asset. If by investing 10% more per annum in maintenance costs the asset life can be doubled, this might be a worthwhile investment.

Other issues which influence the lifecycle costs of an asset include:

- Site conditions,
- Historic performance of assets or materials,
- Effective monitoring techniques,
- Appropriate intervention strategies.

Although the general approach to determining whole-life costs is common to most types of asset, each asset will have specific issues to be considered and the detail of the assessment needs to be tailored to the importance and value of the asset. High cost assets (and asset systems) will likely have more detail, as will critical assets and asset systems.

Maintenance expenditure can account for many times the initial cost of the asset. Although an asset may be constructed with a design life of 30 years, in reality it will possibly perform well beyond this design life. For assets like these a balanced view between maintenance strategies and renewal/rehabilitation is required. The appropriateness of the maintenance strategy must be questioned, the point of intervention for renewal must be challenged. The process requires proactive assessment which must be based on the performance expected of the asset, the consequences and probabilities of failures occurring, and the level of expenditure in maintenance to keep the service available and to avert disaster. According to the firm life cycle theory of dividends, a young firm faces a relatively large investment opportunity set, but is not sufficiently profitable to be able to meet all its financing needs through internally-generated cash. In addition, it faces substantial hurdles in raising capital from external sources. As a result, the firm will conserve cash by forgoing dividend payments to shareholders. Over time, after a period of growth, the firm reaches a stage of maturity in its life cycle. At this point, the firm's investment opportunity set is diminished, its growth and profitability have flattened, systematic risk has declined, and the firm generates more cash internally than it can profitably invest. Eventually, the firm begins dividend payments in order to distribute its earnings to shareholders. The extent to which a mature firm distributes earnings to shareholders instead of investing them internally will be a function of the extent to which the interests of its managers are aligned with those of its shareholders.

Cost of capital is very important factor for deciding our capital structure because a good capital structure help us for taking the financial decision concerning capital structure is important for a firm because of the effective design of capital, the financial risk borne by shareholders, and the return on equity and its effect on the value of firm. Similarly, the choice of appropriate source of fund for capital structure is one of the major policy decisions taken by a business enterprise. Generally, the term „capital structure“ represents the proportionate relationship between the different forms of financing. However, sometimes a distinction is drawn between financial structure and capital structure. The term “financial structure” refers to the entire capital and liability side of the balance sheet. On the other hand, the term „capital structure“ refers to the composition of the long- term funds, which consist of equity capital, preference capital, reserves and surplus, debentures, borrowings from banks, financial institutions etc. Capital structure decisions have great impact on the firm's financial performance. Exactly how firms choose the amount of debt and equity in their capital structures remains an enigma. Generally, it consists of debt and equity used to finance the firm. The effective financing decision determines the optimal mix of debt and equity, with respect to the relative numbers of shareholders and debt holders, and the distribution of investment proceeds between dividends, interest and capital gains. To be specific, “capital structure decision is not only based on the internal environment of the company but also on external environment of the firm including corporate governance, legal framework and institutional environment of the countries in which the firm operates”. Capital structure is the combination of debt and equity that finance the organization's strategic plan. The effective strategic management of capital structure ensures the availability of required fund to finance the future growth and enhance the financial performance. The debt equity relationship is depends upon the nature of industries involved like company's line of business and its development. A company is said to be highly leveraged, if it includes the maximum debt source of finance in its capital structure, which results, the company find its freedom of action restricted by its creditors and may have its profitability affected with the payment of high interest costs. Similarly, one of the basic issues relating to the capital structure decision is whether change in the financing mix affects the valuation of a firm and cost of capital. Therefore, the cost of capital is considered as an important determinant of capital structure. The cost of capital helps the management of an organization move towards its target capital structure, provided there exists relationship between the two. In making up its capital structure over a period of time, a firm will adopt that line of financing during a given time which involves minimum cost to the firm. Capital structure give a huge effect on earning per share and highest earning per share is the main aim of organization effect of capital structure we can show by this example:-

Let A Ltd. and B Ltd. are two company which is similar at all except their capital structure B Ltd. issued debenture while A Ltd. issued equity share so capital structure are as under:-

- Capital structure of both company are as under

	A.Ltd	B Ltd.
Equity Share Capital	7000	5000
10% Debenture		2000

- Income Statement are as under

	A Ltd.	B Ltd.
Sale	5000	5000
Less:- Variable Cost	3500	3500
Contribution	1500	1500
Less:- Fixed Cost	500	500
Earning before Interest and tax	1000	1000
Less:- Interest	0	200
Earning before tax	1000	800
Less:- Tax	300	240

Earning After tax	700	460
Less:- Preference dividend	0	0
Profit Available for Equity Share	700	460
Number of Share	70	50
Earning per Share	10	9.2

In the given Example both A Ltd. and B Ltd. earn same profit but their earning per share are not same due to different capital structure. The essence of firm life cycle theory suggests that the investment and financing decision and the operating performance of the firm are greatly influenced by the change in the firm's organisational capabilities (life cycle stages). Recent research in finance and accounting that confirms the unique role of the firm life cycle stage in the functioning of a firm.

2. Review of Literature

Toy (1974) reported that companies having higher operating risk showed higher the debt ratio. They found that there was positive relationship between debt ratios and growth related to growth typically measured as sales growth and return on investment was negatively related to debt ratio and growth also depended on life cycle of product. Bhatt (1980) in his paper concludes that the leverage ratio is very much influenced by business risks measured in term of variability in earnings, profitability, debt service capacity, and dividend payout ratio. *The Theory of the Growth of the Firm* (Penrose 1959) which proposes that the growth of the firm depends on the efficient and effective interaction of the firm's resources and management (human beings). Thus, the evolution of the firm's competitiveness, in terms of its resource base and capabilities, is the foundation of the firm's life cycle. Leverage did not exhibit a definite relationship with growth and profitability, although all the three variables moved in the same direction. He also found that a majority of the profitability and growth oriented companies were within the narrow bands of leverage due to there stage of life cycle Management accounting literature (Rappaport 1981; Richardson and Gordon 1980) provides evidence that performance measures differ across life cycle stages. In a recent paper, DeAngelo et al. (2010) demonstrate that the corporate life cycle has a significant influence on the probability that a firm will engage in secondary equity offerings. Other studies (e.g., Fama and French 2001; DeAngelo et al. 2006; Coulton and Ruddock 2011; Bulan et al. 2007) acknowledge the role of the firm life cycle in determining the dividend payout policy. Berger and Udell (1998), in a related study, view the firm through a financial growth cycle paradigm in which different capital structures are optimal at different points in the cycle. Evidence in the accounting literature also suggests that investors' valuation of firms is a function of the life cycle stage of the firm (Anthony and Ramesh 1992). Based on the above theoretical framework in strategic management and subsequent application of life cycle theory in accounting and finance

3. Objective of the Study

Our study contributes to the literature in several ways. *First*, in this paper, we extend life cycle literature to cover a key input in the firm's financial decision making by directly examining the role of the firm life cycle in influencing the cost of equity. While prior research investigates the role of the firm life cycle in dividend and capital structure decisions, little attention has been paid to the role of the firm life cycle in determining the cost of equity capital. Even though Easley and O'Hara's (2004) model predicts that the "life cycle of a firm may also influence its cost of capital. In particular, it seems reasonable that a firm with a long operating history will be better known by investors ... the greater the prior precision, the lower the cost of capital", they have not examined the validity of this prediction empirically. This paper attempts to fill that gap in the literature. *Second*, the cost of equity represents the return that the investors require on their investment in the firm and thus it is a key factor in firms' long-term investment decisions. Examining the link between the firm life cycle and the cost of equity, therefore, should help managers understand the effect of the life cycle on firms' financing costs, and hence this study has important implications for strategic planning. Indeed, the cost of equity capital could be the channel through which capital markets encourage firms to reach and maintain maturity, the prime stage, in their life cycle. *Third*, given the importance of the firm life cycle and the cost of equity capital in the literature, and the longstanding interest in trying to understand their determinants, an empirical study on the association between corporate life cycle and cost of equity is timely. Among those who believed that cost of capital has declined in India, around 50% felt that it has decreased by less than 2%. Around one third in this category believed that the fall is between 2%-4%. The view that cost of capital has increased in India is largely in line with inflation trends in India. Given below is the 5-year trend seen in year-on-year movements in Consumer Price Index (CPI) in India, Germany, UK and USA. It can be seen that inflation rates in India are higher by 600-1100 basis points as compared to the other developed countries. These could either be in the form of debt or equity raised outside

India, or financing for international acquisitions. The respondents were asked about the difference they perceived in the cost of capital in India vis-à-vis developed countries. 84% of the respondents perceived India's cost of capital to be higher than in the developed countries. Among these, more than three-fourths believed that the difference was in the range of 2%-7%. On an overall basis, the average difference in cost of capital for investment in India developed countries is around 3.6%. An important variable to assess is whether the respondents were measuring the differential cost of capital in a common currency (say dollar) or in the respective domestic currencies. If the differences are being measured in a common currency the results are largely in line with cost of equity differentials suggested by corporate finance academics. For instance, the equity market risk premium estimated by Professor Aswath Damodaran for India and some developed countries is tabulated below:

Country	Market risk premium
India	8.3
Germany	5
United kingdom	5.6
USA	5

Basis of estimating cost of capital Weighted average cost of capital is a very important tolls for measure cost of capital in this approach we give equal importance to cost of capital and cost of equity so WACC is used to measure the overall cost of capital. We calculate WACC by using formula:-

$$WACC = (V_e/V_e+V_d)K_e+(V_d/V_e+V_d)K_d(1-T)$$

- V_e =Value of equity
- V_d =Value of Debts.
- K_e = Cost of Equity
- K_d = Cost of debts.

3.1. Cost of debts

Cost of debts is the cost which paid by organization for money borrow from outside party whether from loan or debenture. Debts is a cheap source of finance but it is very risky the company should always pays the interest whether it earn or not so debts is a risky source of finance

$$K_d = \text{Interest/Net proceeds} (1-\text{Tax Rate})$$

If we want to calculate cost of redeemable debenture it include two cost one is Interest cost and other capital cost so we calculate cost of debenture by this formula

$$K_d = \frac{\text{Interest} (1-\text{Tax Rate}) + (\text{Redeemable Value} - \text{Net proceeds})/n}{(\text{Redeemable Value} + \text{Net proceeds})/2}$$

3.2. Cost of convertible Debenture calculate

- If conversion is not expected then we calculate by using IRR method
- If conversion is expected then IRR method is also used but in place of number of redeem year we took number of year in which debenture convert.
- Expected Value= $P_0(1+g)^n$ *number of share issued

3.3. Cost of Preference Share

Cost of preference share means % of dividend payable to preference share now company can not issue irredeemable preference share so cost of preference are calculate by this formula

$$K_d = \frac{\text{Dividend} + (\text{Redeemable Value} - \text{Net proceeds})/n}{(\text{Redeemable Value} + \text{Net proceeds})/2}$$

3.4. Cost of equity

A company's cost of equity (COE) is a measure of the returns that the stock market demands for investors who will bear the risks of ownership. Cost of equity is a part of a company's capital structure. (along with preferred stock, common stock, and cost of debt).

A high cost of equity indicates that the market views the company's future as risky, thus requiring greater return rates to attract investments. A lower cost of equity indicates just the opposite. Not surprisingly, cost of equity is a central concern to potential investors applying the capital asset pricing model (CAPM), who are attempting to balance expected rewards against the risks of buying and holding the company's stock.

3.5. The two most familiar approaches to estimating cost of equity are illustrated here:

3.5.1. Dividend Capitalization Model Approach

Cost of equity = (Next year's dividend per share + Equity appreciation per share) / (Current market value of stock) + Dividend growth

Consider for example, a stock whose current market value is \$8.00, paying annual dividend of \$0.20 per share. If those conditions held for the next year, the investor's return would be simply $0.20 / 8.00$, or 2.5%. If the investor requires a return of, say 5%, one or two terms of the above equation would have to change:

- If the stock price appreciates 0.20 to 8.20, the investor would experience a 5% return: $(0.20 \text{ dividend} + 0.20 \text{ stock appreciation}) / (8.00 \text{ current value of stock})$.

- If, instead, the company doubled the dividend (dividend growth) to 0.40, while the stock price remained at 8.00, the investor would also experience a 5% return.

3.5.2. Capital asset pricing model (CAPM) approach

Cost of equity = (Market risk premium) x (Equity beta) + Risk-less rate

Consider a situation where the following holds for one company's stock:

Market risk premium: 6.0%

Equity beta for this stock: 0.50

Risk free rate: 5.0%

Cost of equity = (6 x 0.50) + 5 = 8%

In the CAPM, beta is a measure of the stock's historical price changes compared to price changes for the market as a whole. A beta of 0 indicates the stock tends to rise or fall independently from the market. A negative beta means the stock tends to rise when the market falls and the stock tends to fall while the market rises. A positive beta means the stock tends to rise and fall *with* the market.

- Nature of Projects and Required Return

Nature of Project	Level of Risk	Required Return
Replacement	Low risk	Less than WACC
Expansion	Medium risk	Equal to or slightly more than WACC
Diversification	High risk	More than WACC

From the above table we come to know that Loan is cheap instrument of source of finance but it is very risky because whether it is profit or loss the firm has to pay interest all the case while dividend on equity share the firm has pay when there is profit and in loss condition there is no need to pay dividend

4. Conclusion

There is great relation between life cycle analysis and cost of capital because at initial stage a firm do not run there business with debenture or loan because at initial stage firm there is little possibility of profit so firm not in position to run there business on debenture or loan while on growth stage firm profit is high so firm can run there business on debenture. An optimal capital structure is usually defined as one that will maximizing shareholder's wealth by minimize the firm's cost of capital. Capital structure decisions have great impact on the firm's financial performance. In the recent time, financial manager always plans an optimum capital structure for his company to obtain the higher market value per share. Thus, the financing decisions have no affect on firm value, as it is the residue of the more important investment decisions. Therefore, firms, managers, and investors, devote more time and resources to making the financing decisions about dividends and capital structure. Because companies are becoming the risk averse with passage of time, therefore the company is using maximum equity financing in the recent period as compared to previous period. In the initial period, the maximum interest of the companies were to raise maximum debt fund and to reduce the cost of capital but the result was, financial risk of the company also start rising. Similarly the analysis of the study evident the implications of Traditional approach of capital structure in the later stage in the company's financial planning. At last it can be said that the cost of capital is an important factor to determine the optimal capital structure to have the maximum firm value. Low-risk projects include replacement and modernization projects. The decision maker can estimate the benefits (increase in revenue and/or reduction in costs) of replacement/ modernization projects with relative accuracy. Thus, the required rate of return of replacement and modernization projects may be less than the firm's WACC. Medium-risk projects include the investments for expansion of the current business. Although revenue and cost estimate are relatively difficult to make, yet the decision-maker is familiar with the nature of business. Therefore, using his experience and judgment, he can have a reasonable idea of the variability of cash flows. Since most of these projects may have risk equal to the firm's average or slightly more, their required rate of return may be equal to or slightly more than the firm's WACC. High risk projects include diversification into new businesses. As the decision-maker has no or little idea of new businesses, he would find great difficulty in estimating cash flows. Cash flows would contain greater amount of risk. Projects with greater risk will be evaluated using higher risk adjusted discount rate. Thus, the required rate of return of diversification projects will be higher than the firm's WACC. The risk adjustment factor can be determined by the decision-maker on the basis of his experience and judgment or finding out the weighted average cost of capital for the companies in equivalent risk business.

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