

# APPROACH OF THE COST OF CAPITAL AS A WEIGHTED AVERAGE COST AND AS A MARGINAL COST

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**Abstract:** This paper treats a very delicate and actual problem what appear in corporate finance, namely cost of capital. So, after a short introduction where I present some of reasons what give consistency of this work, I present the cost of capital viewing as a weighted average cost and as a marginal cost. Also, I put in light the main models to calculate the equity cost and the debt cost. Finally, I present some conclusions concerning this subject.

## 1. Introduction

The **problem of the cost of capital** is extremely important in the whole business world, for **three main reasons**, which are:

- in order to maximize the market value of the company for which they work for, the managers have to minimize the costs of all entries, therefore including the cost of capital, and for minimizing the cost of the capital, the managers must be able to measure this cost.
- managers of the financial departments need an estimation of the cost of capital and based on this estimation they can take correct decisions.
- many other decisions taken by the managers of the financial departments, including those related to leasing, bonds redeem, circulating funds policy, are based on the estimation of the capital cost.

The capital of the firm is formed from different components, each with its own cost. In an economy like ours, in full process of reorganization and re-technology, the base idea is to assure the necessary capitals with the lower cost possible. This is the reason for which the managers must be capable to learn and then to use the modern methods of establishing the cost of the capital.

## 2. Weighted average cost and marginal cost of capital

The capital is an absolutely necessary production factor and, as any other factor it has a cost. The cost of each component is named the *component cost* represented by that specific capital type (in the specialty literature, these components are also known as *expected return*. I consider this to be a very correct terminology, starting from the premise that the one who invests has to support an opportunity cost and, therefore he claims a profit resulted from the invested sum). Therefore, whenever we want to determine the cost of the capital of a company we have to take into consideration two parameters: the cost of each financing source and the share of each source in the total of the invested capitals. Thus, *the cost of the total capital of the company appears as a weighted average cost corresponding to the cost of all sources of which the company disposes*.

*The weighted average cost of capital (WACC) also known as the composite cost of capital* is calculated after the following relation:

$$WACC = R_c \cdot \frac{C}{C + D} + r_d \cdot \frac{D}{C + D} \quad (1)$$

where:

$R_c$  = cost of equity;

$r_d$  = cost of debt;

C = equity, which can be of internal or external nature;

D = debt.

**The cost of equity** is equal with rate of return that investors require to hold the stock, otherwise is rate of return what must be realized by firm to maintain the value of business. If rate of return is smaller than opportunity cost then the value of business is diminished and if rate of return is bigger than opportunity cost then the value of business will grow.

The size of equity cost depends of a lot of factors, like follows:

- the size of future profit and what establish the Shareholders' General Assembly concerning proportion to distribute the net profit for dividends, i.e. expected dividends;

- the surplus value;
- the current price of the stock;
- the free risk rate;
- the assumed risk by investor.

The equity cost take all equity into account indifferently of them origin, i.e. external or internal.

To determine equity cost we used, mainly, **two models**:

- dividend discounted model;
- capital asset pricing model.

**Dividend discounted model (DDM)** is traditional model to calculate equity cost what used discounted dividends without look at risk in a explicit manner.

Starting from basic DDM we can obtain the different types of tractable DDMs which reflect different sets of assumptions about dividend growth rates: the constant growth model; the zero growth model; the multiple growth; the two-stage and three stage models.

From these, often is used **the constant growth model (Gordon and Shapiro model)**. So, if dividends are expected to grow indefinitely at a constant rate  $g$ ,  $R_c$ , is calculated with formula:

$$R_c = \frac{D_1}{P_0} + g \quad (2)$$

or, if dividend of current year is not distributed, we will obtain:

$$R_c = \frac{D_1}{P_0 - D_0} + g \quad (3)$$

In other words, the expected return on equity is equal to the dividend yield plus the expected perpetual growth rate in dividends,  $g$ . Remember that the constant-growth formula will get you into trouble if you apply it to firms with very high current rates of growth. Such growth cannot be sustained indefinitely.

**Capital asset pricing model, or CAPM** distinguish the link between the return and the risk, as follows:

$$R_c = R_F + \beta_S(R_M - R_F) \quad (4)$$

where:

$R_F$  = risk-free rate;

$\beta_S(R_M - R_F)$  = risk premium of the investment (asset);

$\beta_S$  = beta;

$(R_M - R_F)$  = market risk premium;

$R_M$  = expected market return.

**Debt cost** can be calculate by discounted cost used to select between more opportunities of debt.

The discounted cost of debt is that discounted rate,  $r_d$  what make debt,  $D$ , equal with discounted annuities, as follows:

$$D = \sum_{i=1}^n \frac{A_i}{(1 + r_d)^i} \quad (5)$$

Debt cost calculated depending of the probable cost of the borrowings after the taxation of the firm.

This cost, when we refer to only one borrowing, represents the instalment of the interest for the obtained credit,  $r$ , from which we deduct the tax economy ( $r.T$ ) which results due to the fact that the interest is a deductible expense for fiscal purposes;

Two remarks must be done regarding the relation (1):

- Both the specific costs of each financing source and the their shares have an *historical character* and it is considered that adopting new investments will not modify significantly these variables;

- Both the sum of the personal capitals and the sum of debts would be recommendable to be expressed in market values. More, if the company is quoted on the exchange, for the personal capitals is taken into account the stock capitalization, and if the debts are from bonds,  $D$ , is the multiplication between the number of bonds issued and the current price of the bond. Unfortunately, nevertheless, the instability and the unavailability of information regarding the market values conduct, many times, at the utilization of the accounting values.

The cost of capital for a certain investment **represents** the economic cost of drawing and maintaining the capital in a competitive environment where the investors analyse carefully and compare all the opportunities for investment.

When a company needs new capital in order to finance new investments projects (development financing) and wishes to maintain in balance its financial structure, the new funds must be obtained, partially from borrowed capital and partially from its own capital, in accordance with the financial structure at the company level. One thing is, although, clear. Even if, the company wishes this thing, it is very difficult to do it. Usually, the financing is made in discreet amounts, reaching that a certain project to be financed in different percentages by the financial structure of the company, this implying the fact that the following project to be financed in other proportions.

Also, WACC represents the marginal cost of capital because it refers to the incremental or marginal cost of the funds necessary for financing an investment project.

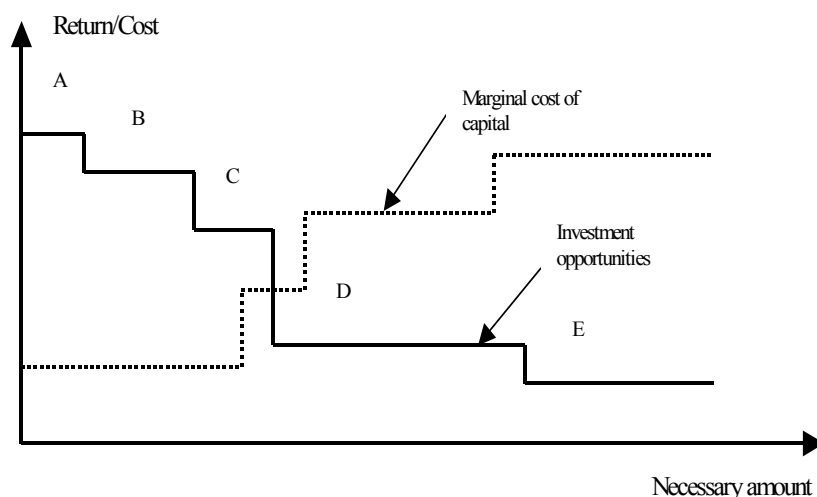
The approach of the cost of capital both as a weighted average cost and as a marginal cost has the following explanation: the weighted average cost of the capital reflects the opportunity cost or the marginal cost of each specific source of funds used by the company. Form this point of view, this is a marginal concept. However, being given the fact that the company uses these funds in certain proportions, valid, as we shown, on long term, for financing the investments, the calculation of the weighted

average cost of capital is made by determining the weighted average of the specific marginal costs that will be used. *Because the weighted average cost of capital is a weighted average of the marginal costs of each financing source, represents itself also a marginal cost.*

**Marginal cost of capital (MCC)** – is defined as being that cost necessary to be met in order to obtain an additional monetary unit of capital and increases as the capital needs increase.

Has to be noted the fact that a company can obtain *limited amounts* of new funds with a constant cost rate. This, because, as the company wishes to obtain higher and higher sums in a certain period, the costs corresponding to the different sources begin to increase and implicitly the WACC for each monetary unit newly obtained will increase. Therefore, the capital can not be obtained in unlimited amounts at a constant price. After a certain threshold (limit), the cost of each additional monetary unit will increase.

In figure 1. we make a comparative analysis of the marginal cost of capital and of the investments opportunities.



**Fig. 1: The marginal cost of capital and investment opportunities**

The marginal cost of capital shows the cost of capital of the additional sum, while the investment opportunity shows the available incomes of the different investments. The company can decide which one of these opportunities to chose. The wealth of the shareholders will increase only when the cost of the capital is lower that the income expected form investments. The projects A, B and C are acceptable because their expected income is higher that the cost of the capital. The projects D and E will not be accepted because the cost of the capital is higher that the expected income. If only the projects A and B will be taken into consideration, we will use, in a simplified way, only WACC. Being given the fact that the company has investment opportunities which require additional funds from much expensive sources, then an analysis of the marginal cost is necessary. To be remembered is the fact that the project D is accepted from the WACC point of view, but not also from the MCC point of view.

The point in which the cost of the capital increases is called **critical point**. This point appears each time when occurs an increase in one of the components of the capital. *The critical point of a certain capital type (of a certain source)(PC<sub>i</sub>) is found by*

dividing the total amount from that type of capital available to be obtained for a certain cost ( $ST_i$ ) to the share that this type of capital holds in the total capital structure ( $p_i$ ). Therefore:

$$PC_i = \frac{ST_i}{p_i} \quad (6)$$

**WACC presents a special importance, it represents the acceptance or reject rate of the new investment projects, and it is part of the calculation of the net updated value as updating rate and considered the most recommended rate of updating.** This is justified also by the fact that, through its structure, WACC comprise both the cost of the personal capitals and the cost of the borrowed capitals. Or the financing of the investments projects, as we already specified, in most of the cases, implies both personal capital and borrowed capital.

The advantage of using as a updating rate of the weighted average cost of capital, calculated at the level of the company, is the one of simplicity; in addition, this cost once it is calculated, it will change only when the financial or economical conditions are modified in an significantly (considerable) measure. Its use appears to be justified when the investment project dose not affect significantly the level of the risk bear by the company, including the economic risk, which refers to the variability of the exploitation result of the company, and also the financial risk bear by the shareholders and which depends by the company's debt rate.

Starting from the facts presented till now, a **set of characteristics of the cost of capital can be drawn:**

- The cost of capital is the *expected rate of return* which is requested by the market in order to attract funds for a certain investment. It is base on the expectances of the investors. Past return or that at the moment of analyse is relevant in the estimation of the cost of capital only if it is representative for the future expectations;
- The cost of capital *depends of the investment* and of the investor, otherwise said it depends on the investment risk rather than the characteristics of the investor;
- In economic terms, the cost of capital is an *opportunity cost* (the rule of the equivalent risk at the most higher profitableness or equivalent profitableness at the lower risk possible);
- The cost of capital is based on a principle known in evaluation as the *substitution principle*, this principle having in this case the following development: an investor will not invest capital in a certain asset if there is another alternative more attractive on the market;
- The cost of capital *derives from the market* in the meaning that it represents a competitive profitableness rate available on the market compared with the comparable alternative investments;
- The cost of capital is *closely connected with the risk*, namely the possibility to occur undesirable results, the investor not to realize the expected profitableness in the expected time.
- *There is a cost for each component of the capital* which forms the financial structure of the company (personal capitals and debts).

### 3. Conclusions

The main criticism brought to the weighted system for the calculation of the cost of the capital, and to its use in the selection of the investment projects, is the one that

refers to the acceptance as being implicit the hypothesis that the financial structure of the company will remain unchanged. Or, as we already underlined, many times, the company resorts to specific financing for implementing an investment project. Therefore, the updating rate used in the criteria for selecting the investment projects will take into account the cost of the new financing sources and not the cost of the ones used in the past by the company.

Synthesizing, the weighted average cost of capital has many significations:

- Updating rate in the evaluation of the cash flows of a company;
- Minimum threshold of the total profitableness that a company has to obtain from the use of its assets in order to maintain the value of the invested capital;
- Minimum threshold of the profitableness requested for each investment of the company characterised through a risk identical to the one of the company on the whole, financed in its structure of capitals.

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