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ESTIMATION OF WEIGHTED AVERAGE COST OF CAPITAL

ВИЗНАЧЕННЯ СЕРЕДНЬОЗВАЖЕНОЇ ВАРТОСТІ КАПІТАЛУ

ANNOTATION

The article presents a summary of approaches of the calculation of weighted average cost of capital. It is suggested to estimate the cost of equity in accordance with the classic principles of the capital asset pricing model, applying appropriate adjustments. The publication describes main approaches of the determination of the after-tax cost of debt. Moreover, the methodology for the estimation of the target capital structure is presented in the Article.

Key words: WACC, cost of equity, CAPM, cost of debt, target capital structure.

АНОТАЦІЯ

У статті розглянуто основні підходи до визначення середньозваженої вартості капіталу. Запропоновано оцінювати вартість власного капіталу відповідно до класичних принципів моделі оцінки фінансових активів із застосуванням відповідних коригувань. У публікації описані головні підходи до визначення вартості боргового капіталу після сплати податків. Представлено методологію визначення цільової структури фінансування компанії.

Ключові слова: середньозважена вартість капіталу, вартість власного капіталу, модель оцінки фінансових активів, вартість боргового капіталу, цільова структура фінансування.

АННОТАЦИЯ

В статье рассмотрены основные подходы к определению средневзвешенной стоимости капитала. Предложено оценивать стоимость собственного капитала в соответствии с классическими принципами модели оценки финансовых активов с применением соответствующих корректировок. В публикации описаны главные подходы к определению стоимости долгового капитала после уплаты налогов. Представлена методология определения целевой структуры финансирования компании.

Ключевые слова: средневзвешенная стоимость капитала, стоимость собственного капитала, стоимость долгового капитала, модель оценки финансовых активов, целевая структура финансирования.

Formulation of the problem. Regardless of the fact that the weighted average cost of capital (further – “WACC” or “cost of capital”) calculation is a debated topic in the field of the corporate finance, in practice there is no other way to assess the company’s opportunity cost of capital. Hence, it becomes even much more crucial and significant for current management of the companies to defend their projects’ implementation, which are expected to earn a return that is forgone by shareholders, lenders and/or bondholders to invest in these projects rather than in comparable financial securities or financial assets with similar level of risk.

Analysis of recent research and publications. Studies of many foreign and national scientists were devoted to the topic of the cost of capital analysis. For instance, N. Kashchena [1] proposes a conceptual valuation model of retail companies’ cost of capital. B. Vovk [2] analyzes the

process of managing the cost of equity and the cost of debt. L. Selivestrova [3] analyzes existing approaches how to manage companies’ cost of capital, substantiates their possible applications in the national practice and suggests an approach of the optimization of a company’s cost of capital. T. Hryhorash [4] analyzes the methods for evaluating the weighted average cost of capital, applying the methods by the EY Company.

Separation of previously unresolved parts of the common problem. However, in the aforementioned articles the approaches of the estimation each of the components of the cost of capital was not analyzed to the full extent.

The purpose of the article is not only to provide the list of the main components of the cost of capital calculation, but also to update and describe best practice approaches of estimation of the WACC, putting the accent on the adjustments that have to be applied to the valuation of the cost of equity (e.g., adjustments to the risk-free rate etc.) as well as approaches of the determination of the target capital structure.

Presentation of the main material of the study. To start with, the most basic principle of finance has to be reminded: a dollar today is worth more than a dollar tomorrow. This principle is applied in determining the present and future value of money. These types of calculations are widely used by financial specialists in securities analysis to value and select investments. For instance, they derive the net present value of a company’s business from discounting the future cash flows by the discount rate called WACC. In fact, WACC is applied as a discount rate not only in valuation of the enterprise value, but also in the evaluation of worthiness of business plans, future projects, companies’ operational segments etc. Thus, the Article is solely focused on the estimation of WACC, since it is also a useful instrument in managing decision-making process, reflecting the signal of higher risk associated with a company’s operations.

Murray Z. Frank and Tao Shen consider WACC as a composed of the cost of equity and the cost of debt that are weighted to reflect corporate leverage, where debt is adjusted for corporate tax [8, p. 301]. Thus, WACC reflects the company’s cost to borrow money or the average rate of return which all investors in a company expect to earn for their investments in a particular business.

WACC may be simply represented by the following formula:

$$WACC = \frac{ME}{ME + MD} \times k_e + (1 - T_m) \times k_d \times \frac{MD}{ME + MD},$$

where:

ME – market value of equity (not book value);

MD – market value of debt;

T_m – company's marginal income tax rate;

k_e – cost of equity;

k_d – cost of debt;

$(1 - T_m) \times k_d$ – after-tax cost of debt.

Thus, WACC has three main components: the cost of equity, the after-tax cost of debt, and the company's target capital structure. Hence, let's take a closer look to each element.

The cost of equity is determined by estimating the expected return on the market portfolio, adjusted for the risk of the company being valued. To the economists, the capital asset pricing model (further – “CAPM”) is the most widely used instrument on estimation a company's risk adjustment factor.

The CAPM adjusts for company-specific risk through the use of beta, which measures how a company's stock price responds to movements in the overall market. Since a high correlation between a stock and the market increases the volatility of the market portfolio, investors require a high return to hold that stock. Consequently, stocks with high betas have expected returns that exceed the market return; the converse is true for low-beta stocks. Only beta risk is priced. Any remaining risk, which academics call idiosyncratic risk, can be diversified away by holding multiple securities.

In practice, measurements of beta are highly imprecise. Therefore, a set of Peer Company betas adjusted for financial leverage should be used to estimate a company's beta [11, p. 270].

CAPM that may be represented by the following formula:

$$CAPM = R_f + \beta \times [E(R_m) - R_f] + OR,$$

where:

R_f – risk free rate;

β – beta;

$E(R_m)$ – market equity risk premium;

OR – other risks.

According to EY research, the government bond yields are frequently used as a proxy for risk-free rates and are critical in calculating the cost of capital. Starting in 2008, significant volatility in yields presented values with a real challenge. The volatility in the risk-free rate, if left unadjusted, leads to volatile costs of capital and volatile value that is not always appropriate.

In order to avoid inappropriate movement and step changes in value, a combination of the following approaches might be considered in order to build a more robust framework in estimating the risk-free rate:

– using an average yield as a proxy for the risk-free rate;

– assessing the risk-free rate by reference to government bond yields in another country where there has been less volatility in yields;

– adjusting the market equity risk premium to compensate for movements in spot government bond yields;

– considering a specific risk premium or discount in addition to the spot Government bond yield [6, p. 3–12].

According to Aswah Damodoran, there are three main approaches estimating of the market risk premium. The logic of these approaches is summarized in the table 1.

Table 1

The approaches of the market risk premium estimation [5, p. 98]

Main approaches	Description
Survey approach	Investors or managers are asked to provide estimates of the equity risk premium for the future.
Historical return approach	The premium is based upon how well equities have done in the past.
Implied approach	The focus is on the future cash flows or observed bond default spreads in order to estimate the current equity risk premium.

The security's contribution to the risk of a well-diversified portfolio depends on how the security is liable to be affected by a general market decline. This sensitivity to market movements is known as beta (β). Beta measures the amount that investors expect the stock price to change for each additional 1% change in the market. The average beta of all stocks is 1.0. A stock with a beta greater than 1 is unusually sensitive to market movements; a stock with a beta below 1 is unusually insensitive to market movements. The standard deviation of a well-diversified portfolio is proportional to its beta [10, p. 179].

The other risks which can be incorporated into the CAPM include size risk premium, country risk premium, currency risk premium or specific company's risk premium (expert opinion). Such risks are applied when they have their rationale.

The second step is the estimation of the required rate of return for lenders – the cost of debt. It may seem easy, but it is often very problematic in the practice. The company uses different types of debt with different effective interest rates. Even when investment plans are made, the managers do not know exactly what will be the cost of debt and how it will change due to the financial market variability until the maturity of debt that needs to be refinanced.

When the cost of debt is calculated, it has to be considered the marginal required rate of return, i.e. the cost of the last unit of obtained capital. Therefore, the cost of a new debt has to be considered rather than existing cost of debt; this holds at least for new investments.

If the company in the past issued bonds and if these bonds are listed/quoted on financial market, we can use as a cost of debt the yield to maturity of the outstanding bonds, as it reflects the current cost of companies' debt.

In developing financial markets companies rarely issue bonds to fulfil the funding needs, and even if they do, they are not liquid (thus the price does not reflect the current yield-to-maturity). In this case, yield-to-maturity of a bond issued by a similar company can be used (especially if they have a similar operating and financing risk).

Given that companies rarely use bonds, there are only few or no outstanding liquid bonds on developing financial markets. Consequently, the alternative solution is to use an alternative cost of debt (either on domestic sovereign securities or on foreign corporate bonds) and an appropriate mark-up (i.e. adequate risk premium) for the company in question (comparing, say, credit rating and maturity) [7, p. 63–64].

Once the costs of equity and debt are estimated, they should be weighted based on the proportions used of each to estimate WACC.

According to Aswath Damodaran, the debt ratio, at which the WACC is minimized, will be considered as the optimal.

In this approach, the effect on firm value by changing the capital structure is isolated by keeping the operating income fixed and varying only the cost of capital. In practical terms, this requires making two assumptions. First, the debt ratio is decreased by raising new equity and retiring debt; conversely, the debt ratio is increased by borrowing money and buying back stock. This process is called recapitalization. Second, the pre-tax operating income is assumed to be unaffected by the firm's financing mix and, by extension, its bond rating. If the operating income changes with a firm's default risk, the basic analysis will not change, but minimizing the cost of capital may not be the optimal course of action, since the value of the firm is determined by both the cash flows and the cost of capital. The value of the firm will have to be computed at each debt level and the optimal debt ratio will be the one that maximizes firm value [9, p. 566].

Additionally, the same approach is applied by Tim Koller, Marc Goedhart and David Wessels. Therefore, the cost of capital should rely on target weights, rather than current weights, because at any point, a company's current capital structure may not reflect the level expected to prevail over the life of the business. The current capital structure may merely reflect a short-term swing in the company's stock price, a swing that has yet to be rebalanced by management.

Many companies are already near their target capital structure. In the simplest scenario, the company will rebalance immediately and maintain the new capital structure. In this case, using the target weights and a constant WACC (for all future years) will lead to a reasonable valuation.

If the rebalancing is expected to happen over a long period of time, then a different mix of cost of capital should be used each year, reflecting the capital structure at the time.

In practice, to estimate the target capital structure from an external perspective, firstly the company's current market-value-based capital structure should be estimated. Next, the benchmark of the capital structure of comparable companies should be performed. Finally, management's implicit or explicit the approach to financing and its implications for the target capital structure has to be examined [11, p. 295].

Conclusions. WACC calculation still remains a debated topic in the field of finance. However, the approaches mentioned in the Article will lead to the cost of capital that is reliable and reasonable. Furthermore, as the main principle of the corporate finance says: "Companies that grow and earn a return on capital that exceeds their cost of capital create value". However, managers of the companies, the board of directors and even investors often forget about this simple principle that causes disastrous consequences. For instance, managers of the investment banks that were solely focused on the short-term profit generation not only destroyed the value of their companies, but also caused the financial crisis of 2007–2008 and the global economy collapse. Thus, gained understanding in the cost of capital valuation will be crucial for young generation of financial specialists to become top-managers that will definitely not make value-destroying decisions.

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