THE COST OF CAPITAL AS THE KEY TO THE VALUE OF THE COMPANY

Rafał PITERA[1*], Michał GNAP[2]

[1] Kolegium Nauk Społecznych, Instytut Ekonomii i Finansów, Katedra Finansów i Rachunkowości, Uniwersytet Rzeszowski, Poland; rpitera@ur.edu.pl, ORCID: 0000-0001-9598-1240

[2] Audyt, Deloitte Audyt Spółka z o.o. Sp.k., Poland; michalgnap08@gmail.com, ORCID: 0000-0002-3419-032X

* Correspondence author

Introduction/background: The issue of company valuation is undoubtedly one of the very complex, poorly recognizable and controversial. Theories of estimating the cost of capital are characterized by high dynamics of development resulting from new experiences and challenges arising from the practice of valuation. It should be noted, however, that the application of the cost of capital in the practice of economic activity still leaves much to be desired.

Aim of the paper: This work focuses on the theoretical aspects of the cost of capital and practical issues in terms of how it is determined in developed capital markets.

Materials and methods: A company capital structure essentially – its blend of equity and debt financing – is a significant factor in valuing the business. In this research we demonstrated that the WACC method, generally reflects the return that hypothetical investors require. This work is conducted to bridge several methods: type of investment decisions, purpose of the capital, management plans.

Results and conclusions: A company's capital structure fluctuates over time as the effect of change in equity securities and its debts. We believe it is appropriate to use optimal capital structure if the business environment activity temporarily has veered off of actual capital structure.

Keywords: the value of the enterprise, the cost of capital, the structure of capital.

1. Introduction

To The concept of the cost of capital of an enterprise is one of the key issues of the theory of financial management or estimating the value of an enterprise. Decisions made as part of the management of a company are shaped by factors that are determinants of shareholder value. One of the pioneering views relating to the principle of business management may be the view of Aristotle. Its division can be made into three parts (Gnap, 2017):

1. onikonomikos, as a science of management, including the ability to earn from additional sources,
2. chermatistics, that is, the ability to obtain and accumulate money,
3. the last part refers to the science of money. This is a continuation of Xenophon's thought on how to compare the value of different goods with money.

The main link between the assessment of the effects of long-term decisions with the expected profits by investors is the cost of capital and its structure in financing business activity (Kowalik, 2010). The cost of capital could be defined in different ways:

1. this is the limit rate of return that a company should generate from its assets in order to maintain the value of the enterprise (Petty, Keown, Scott, Martin, 1993),
2. it is also defined as the minimum risk-adjusted rate of return that a company must achieve from its assets and investments in order for these projects to be accepted by the owners (Kufel, 1992),
3. it is the limit rate of return on the capital employed necessary to preserve the value of the entity for its owners (Czekała, Grześkowiak, 2007),
4. it shall be defined as the amount of the expected average rate of return on alternative ventures in assets with the same level of investment risk (Szczepanowski, 2007),
5. it is referred to as the cost of lost profits or the opportunity cost of capital employed (Zarzecki, 1999),
6. the expected rate of return required by the market in connection with a specific investment (Pratt, 2008).

In economic practice, the cost of capital is used basically in four situations (Włoszczowski, 2002):

a) a discount rate reducing the projected future cash flows achievable from the enterprise, its ventures, to their current values,
b) as a cut-off rate, necessary from the achievement of new ventures,
c) as the rate of payment of capital in the calculation of the value of economic profit,
d) when valuing the value of the company using an income and comparative approach.

According to the efficient market hypothesis, the prices of securities fully reflect all available information about them (Grossman, Stiglitz, 1980). The market refers, therefore, to investors who are rational candidates providing funds for a specific investment. In other words: "Since the cost of anything can be defined as the price that must be paid to achieve certain effects, the cost of capital is also the return that a company must promise to raise capital from the market, debt or equity" (Kaufman, 1999). In this context, the term "capital" means a component of the capital of an enterprise. The basic elements of the capital structure include (Brealey, Myers, Allen, 2014):

a) long-term debt,
b) preferred capital (shares in companies with preference characteristics),
c) ordinary capital (shares or divisions at the lowest or residual level).

Mentioned categories, may be more than one subcategory of capital. There may also be related to forms of capital, such as warrants or options. According to the authors, each of the components of the capital structure has its own unique cost, which depends primarily on the type of risk associated with the conducted business activity.

In a very simple and convincing way, the cost of capital is perceived by A. Damodaran (Damodaran, 2000): "The cost of capital is the rate that investors need from capital investment in a company." Recognizing that the cost of capital applies to both debt and equity investments, it is very accurate to say: "Both creditors and shareholders expect compensation from the investment made in one particular business instead of in another with the same level of risk" (Copeland, Koller, Murrin, 2000).

As Ibbotson put it (Ibbotson, 1999): "The cost of capital is a function of an investment, not an investor". R.A. Brealey and S.C. Meyers confirm this concept (Brealey, Meyers, 2014): "The true cost of capital depends on the purpose of the capital". It would be a mistake to judge a potential investment on the basis of the total cost of capital of the company if this investment is characterized by a more or less risky level of expected cash flows than the previous activity of the company. Each project should therefore be evaluated according to its own cost of capital (Rappaport, 1998).

The cost of capital reflects, therefore, the expectations of investors, which we can aggregate into three elements (Pratt, 2008):

a) the actual rate of return – this is the amount that a given investor receives in exchange for "allowing" the other party to use their money without incurring risk,
b) expected inflation – the expected depreciation of cash in a situation where it is not effectively allocated,
c) risk – uncertainty as to how much and in what time a given investment will bring a return.

Although these expectations may vary depending on the specific investor. According to the authors, the market has a kind of tendency to form consensus with respect to specific investments. This consensus determines the cost of capital for investments with different levels of risk. Therefore, the cost of capital should be understood as the market value of the asset and not its book value. To give a deeper view of the meaning of the above statement, the authors used the example of treasury bonds. The value should be measured on the basis of the rate of return at the time of redemption, i.e. the market price of the bond as at the closing date of the transaction and not its nominal value.

Another important issue in the context of the correct definition of the cost of equity is to determine the difference between the discount rate and the capitalization rate. The discount rate is understood as the annual cumulative rate of return, according to which the increase in cash flows is discounted to the present value. The sum of the discounted present value of the cash flows of each period equals the present value of the investment and thus reflects the expected amounts of return over the entire life of the investment (Lerch, 1990). According to the authors, in the literature on the subject, but also in economic practice, the terms "discount rate", "cost of capital", "required rate of return" are often used interchangeably. On the other hand, in the context of the cost of capital conclusions, there is a fundamental difference between the discount and the capitalization rate. The capitalization rate is merely a kind of divisor applied to one of the elements of the cost of capital to estimate its present value. The only time the discount rate is equal to the capitalization is if each subsequent year is with the same increase in expected return (Kaltman, 1995).

2. Cost of capital – interpretation

If we assume that the subject of the analysis is a company that generates a constant amount of cash flows in each subsequent year until infinity, the shares of that company have a certain market value K, while the current debt is equal to Z, the market value of the entire company V, is (Arditti, 1973):

$$V= K+Z \tag{1}$$

Including the divider r, for cash flows CF, V we can derive according to the following formula:

$$V=\frac{CF}{R} \tag{2}$$

From this equality arise four important economic interpretations for *r:*

a) referring to the formula for the discounted value of the perpetual period, the rate r we can define as a discount rate equal to the capitalization rate,
b) can be defined as the average expected global rate of return on a company's assets, because we sum up the income from all implemented investment projects and then it is divided by the sum of the funds involved,
c) this is the minimum rate of return demanded by the shareholders of the company and its creditors,
d) due to the fact that r is the expected rate of return by all parties financing the business activity of a given company, that is, by definition, the average rate of return.

By entering additional parameters P_t, q_t, Z_t and V_t, which denote respectively the price of the share, the number the shares issued, the amount of debt and the total market value of the company's debt and equity. During the period $t = 0$ we get:

$$V_0 = Z_0 + q_0 Mrs_0 \tag{3}$$

If we assume that during the period $t = 1$ the company carries out changes in the financing structure, its total value will be:

$$V_1 = Z_1 + q_1 P_1 \tag{4}$$

Regardless of whether the company changes equity to debt or vice versa, the following must be maintained:

$$(Z_1 - Z_0) + (q_1 - q_0)P_1 = 0 \tag{5}$$

This means that if the undertaking incurs a debt $(Z_1 - Z_0)$ it will use it to buy back shares $(q_1 - q_0)$ at a price P_1. If we reverse the situation and assume that the newly issued shares are the funds obtained, which were intended to repay the debt, we will get the formula:

$$V_1 - V_0 = q_0 (P_1 - P_0) \tag{6}$$

When looking for an optimal capital structure, we should focus on the average cost *r*, and then reach a level of the foreign capital/total capital ratio that it will be *r* minimized.

Another concept is the marginal cost of capital, which, unlike to the average cost of capital, is used to make investment decisions.

Because the change *V* may result from changes in both the level of debt and the price of stock quotations, from new issues of shares or debt, we can derive the following formula (Janusz, 1997):

$$DV = Dk + Dz + \mathrm{dI} \tag{7}$$

where dI – means the minimum rate of return on investment.

By entering a condition $Dk = 0$, the equation takes the form:

$$DV = Dz + \mathrm{dI} \tag{8}$$

The assumption that the risk of non-payment of the current debt to creditors is unchanged seems justified, it can be assumed that $Dz = 0$, which leads to the equation:

$$DV = \mathrm{dI} \tag{9}$$

The marginal cost of capital is, therefore, such a return on investment that meets the condition:

$$\frac{dV}{dI} = 1 \tag{10}$$

With regard to the basic valuation formula, $V = CF/y$, we can find such a rate of return dCF/dI, which satisfies the condition $dV/dI = 1$. By differential of an expression $V = CF/y$ relative to the amount of money invested dI we get:

$$\frac{dV}{dI} = \frac{1}{r}\frac{dCF}{dI} - \frac{CF}{r2}\frac{dr}{dI} \tag{11}$$

If condition (10) is met, then:

$$\frac{dCF}{dI} = r + \frac{CF}{r}\frac{dr}{dI} \tag{12}$$

The average cost of capital can be written as a differential function of business risk "c" with the distribution of cash flows that are generated by the company's assets (so-called business risk), and the financial risk associated with the use of leverage "z", the cost of capital in the form of *r* we can present as:

$$r = f(c, z) \tag{13}$$

They differentiate (13) from the new investment, we get (Arditti, 1973):

$$\frac{\mathrm{dr}}{dI} = \frac{\partial f}{\partial c}\frac{dc}{cI} + \frac{\partial f}{\partial z}\frac{dz}{dI} \tag{14}$$

If we then assume that the new investment does not cause a change in the total risk of the business (this assumption is most often accepted in the literature of finance), i.e. that $dc/dI = 0$, this $dr/dI = 0$, then the formula (12) for the marginal cost of capital is reduced to:

$$\frac{dCF}{dI} = r \tag{15}$$

The above can be interpreted as if the new investment is characterized by the same level and type of risk as the whole business, then the marginal cost of capital is equal to the average cost of capital.

Expected return on assets r, may also be expressed as a weighted average expected rate of return on gross external capital b and equity k. If the starting point is a relationship $r = CF/V$, then it should be added and subtracted dZ from CF, to obtain the following equation (Haeley, Schall, 1983):

$$r = \frac{CF - bZ}{V} + b\frac{Z}{V} \tag{16}$$

Multiplying the first expression on the right by K/K, we will receive:

$$r = \left(\frac{CF - bZ}{K}\right)\left(\frac{K}{V}\right) + b\left(\frac{Z}{V}\right) \tag{17}$$

If we define k as follows:

$$k = \frac{CF - bZ}{K} \tag{18}$$

and then we substitute into the formula (16) then we get the expected rate of return on equity, which we can express through the equation:

$$r = k\left(\frac{K}{V}\right) + b\left(\frac{Z}{V}\right) \tag{19}$$

With a tax rate equal to ∂, the expected value of net cash flows takes the following form (Henderson, 1979):

$$CFN = CF - \partial(CF - bZ) = CF(1 - \partial) + \partial Bz \tag{20}$$

At a certain level of the market value of the enterprise, the average cost of equity after tax, r_T can be defined by analogy as a pre-tax cost:

$$V = \frac{CFN}{r_T} \tag{21}$$

or:

$$r_T = \frac{CFN}{V} \tag{22}$$

or:

$$r_T = \frac{CF(1-\partial)+\partial bZ-bZ(1-\partial)+bZ(1-\partial)}{V} = \frac{(CF-bZ)(1-\partial)+bZ}{V} = k(1-\partial)\left(\frac{K}{V}\right)+\left(\frac{bZ}{V}\right) \tag{23}$$

From the above equation, the following conclusions can be drawn: r_T can be written as the weighted average cost of equity after tax, denoted k_T, and the interest rate on the debt. Going further, if we define k_T for an enterprise with a specific life cycle n years, this equation will take the form:

$$V = \sum_{i=1}^{n}\frac{CFN}{(1+r_T)^t} \tag{24}$$

The expression (24) is different from the expression (21), but it can be proved that $r_T$from equation (21) is identical to $r_T$from equation (24):

$$V = \frac{(CF-bZ)(1-\partial)+\partial A+bZ}{(1+r_T)} + \frac{V_1}{(1+r_T)} \tag{25}$$

where:
A – depreciation of the company's assets involved in operating activities,
V_1 – goodwill in the period t = 1.

Value V_1 is defined as follows:

$$V_1 = \sum_{i=2}^{n}\frac{CFN}{(1+r_T)^{t-1}} \tag{26}$$

Analogous equality can be attributed to *K*:

K=((CF-bZ)(1-∂)+∂A-(λK_0-λK_1))/((1+k_T))+K_1/((1+k_T))(27)

where:
λ – the relation of foreign capital to equity in the company (assumption about the stability of the relationship over time),
(λK_0-λK_1) – the amount of debt that has been withdrawn during the period *t = 1* in order to adjust the constant debt-to-equity ratio,
K_1 – the expected value of the company's equity in the period *t = 1*, which can be defined:

$$K_1 = \sum_{i=2}^{n}\frac{(CF-bZ)(1-\partial)+\partial A-(\lambda K_{t-1}-\lambda K_1)}{(1+k_T)^{t-1}} \tag{28}$$

Substituting the expression solution (25) for *(CF-bZ)(1- ∂)+ ∂A* to the formula (27) we will get:

$$K(1+k_T)=V(1+r_T)-V_1-bZ+K_1-\lambda K_0 + \lambda K_1 \tag{29}$$

Accordingly, there are some equalities:

$$V_1 - K_1 = Z_1 \tag{30}$$

$$Z_1 = \lambda K_1 \tag{31}$$

$$Z_0 = \lambda K \tag{32}$$

As a result, we get a transformed expression (29) in the form:

$$K(1+k_T)=V(1+r_T)-Z(1+b) \quad (33)$$

which, simplifying, takes the form of:

$$r_T = k_T\left(\frac{K}{V}\right) + b\left(\frac{Z}{V}\right) \quad (34)$$

From the above, it can be concluded that if the firm undertakes investment projects that do not change its risk. *c* and the sources of financing are at an unchanged level of the relationship, then the average and marginal cost of capital are equal.

3. Conclusions

Summarizing the theoretical considerations in the estimation of the cost of capital, we can conclude that it is a key connector to transform the stream of expected cash flows into an estimated present value. It has several key features:

a) it is driven by the market, that is, it is expressed by the expected rate of return that the investor requires to engage capital in the investment;
b) is a function of the investment and not of the investor;
c) the basis for measuring the cost of capital is its market value and not its accounting value;
d) it should be measured in nominal values;
e) it is a "bridge" between the value of expected cash flows and the current value of investments at a given date.

References

1. Arditti, F.D. (1973). The Weighted Cost of Captal: Some Questionson its Definition, Intepretation and Use. *Journal of Finance, Vol. 28 (September),* pp. 1001-1008.
2. Brealey, R.A., Myers, S.C., and Allen, F. (2014). *Principle of Corporate Finance.* New Delhi: McGraw Hill Education.
3. Copeland, T., Koller, T., and Murrin, J. (2000). *Valuation: Measuring and Managing the Value of Companies.* New York: John Wiley & Sons Inc.
4. Czekała, M., and Grześkowiak, A. (1999). Szacowanie kosztu kapitału w warunkach dużej zmienności stóp zwrotu. In T. Jajuga, and T. Słoński (eds.), *Zarządzanie finansami w transformacji przedsiębiorstw.* Wrocław: Wydawnictwo Akademii Ekonomicznej im. Oskara Langego.

5. Damodaran, A. (2000). *Investment Valuation: Tools and Techniques for Determining the Value of any assets.* New York: John Wiley & Sons Inc.
6. Gnap, M. (2017). Opcje Realne jako alternatywa w wycenie projektów inwestycyjnych. *Zarządzanie Finansami i Rachunkowość, Vol. 5, No. 2*, pp. 53-63.
7. Grossman, S.J., and Stiglitz, J.E. (1980). On the Impossibility Of Informationally Efficient Markets. *American Economic Review, Vol. 70, No. 3 (June),* pp. 393-408.
8. Healey, Ch. W., and Schall, L.D. (1983). Problems with the Concept of the Cost of Capital. In Ch.F. Lee, and Addison-Wesley (eds.), *Financial Analysis and Planning. Theory and Application. A Book of Readings.* Reading: Publishing Company.
9. Henderson, G.V. (1979). In Defense of the Weighted Average Cost of Capital. *Financial Management, Vol. 8 Autumn*, pp. 57-61.
10. Ibbotson, R.G. (1999). *Cost of Capital Workshop.* Chicago: Ibbotson Associates.
11. Janasz, W. (1997). Kształtowanie struktury kapitału. *Przegląd Organizacji*, *Vol. 10*, pp. 35-38.
12. Kaltman, T.A. (1995). Capitalization Using a Mid-Year Convention. *Business Valuation Review, Vol. 14(4),* pp. 178-180.
13. Kaufman, M. (1999). Profitability and the cost of capital. In R. Rachlin (ed.), *Handbook of Budgeting.* John Wiley & Sons Inc.
14. Kowalik, M. (2010). Struktura i koszt kapitału w przedsiębiorstwie a wartość dla akcjonariuszy. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, *Vol 836,* pp. 165-178.
15. Kufel, M. (1992). *Metody wyceny przedsiębiorstwa*. Bielsko Biała: Wydawnictwo Parki.
16. Lerch, A. (1990). Pretax/Aftertax Conversion Formula for Capitalization Rates and Cash Flow Discount Rates. *Business Valuation Review*, *Vol. 9(1),* pp. 18-22.
17. Petty, J.W., Keown, A.J., Scott, D.F., and Martin, J.D. (1993). *Basic Financial Management.* Englewood Cliffs: Prentice Hall.
18. Pratt, S.P. (2008). *Cost of Capital, Estimation and Application*. New Jersey: John Wiley & Sons Inc., Hoboken.
19. Rappaport, A. (1998). *Creating Shareholder value*. New York: The Free Press.
20. Szczepanowski, P. (2007). *Wycena i Zarządzanie Wartością Przedsiębiorstwa*. Warszawa: PWN.
21. Włoszczowski, B. (2002). Problem koncepcji średnioważonego kosztu kapitału. *Nasz Rynek Kapitałowy, Vol. 2*, pp. 81-89.
22. Zarzecki, D. (1999). *Metody Wyceny Przedsiębiorstw*. Warszawa: Fundacja Rozwoju Rachunkowości w Polsce.