Problems justifying the discount rate in emerging capital markets

N V Voronina 1 *, V G Zaretskaya 2

1Pacific National University, 136, Tihookeanskaya street, Khabarovsk, 680035, Russia
2Financial University under the Government of the Russian Federation, Kursk branch, 3, Lomonosov street, Kursk, 305016, Russia

E-mail: nat_vnv@mail.ru

Abstract. The article discusses the methods of calculating the discount rate when evaluating the investment projects’ effectiveness. The authors have studied the problems of its justification taking into consideration the peculiarities of emerging capital markets. The identified problems are aimed at improving the projects cost-effectiveness calculating accuracy.

Introduction

The justification for the discount rate is based on the common statement of the investment analysis theory, declaring the investment project to be attractive to the investor if its rate of the return exceeds any other way of capital investing with a similar risk. Thus, the justification of the discount rate can be considered as the justification of the capital return for the investor.

Many economic processes in Russia are very strictly regulated by the government. In particular, the economic calculations related to the investments’ justification are regulated by the exact number of documents [1, 2, 3, 4].

In accordance with the Guidelines on evaluating the investment projects’ effectiveness, the following discount rates should be distinguished [1].

Commercial discount rate is used to assess the commercial effectiveness of the project. It is determined taking into account the alternative (i.e. related to other projects) capital utilization efficiency. It is set taking the risk into account.

Project participant discount rate reflects the participation effectiveness of all the companies (or other partners) in the project. The choice is performed by the participants. In the absence of clear preferences, they can use the commercial discount rate.

The social discount rate is used in calculation of social efficiency indexes and characterizes the minimum requirements of the society to the projects’ social efficiency. It is considered to be a national parameter and should be established centrally by the national economic authorities of Russia in accordance to the country’s development strategy. Its reference point can be the discount rate of the Central Bank of the Russian Federation, which also reflects the financial interests of the state as well. In this regard, it is possible to focus on it only as the top value of this discount rate.

Budget discount rate is used in the calculation of budgetary efficiency indicators and reflects the budgetary funds’ opportunity cost. It is established by federal or regional authorities, which instruct how to assess the budgetary efficiency of the project. According to the general investment theory, the
budget discount rate cannot be less than the cost of the investment resources for the budget, that is, not less than the coupon rate of government and municipal bonds.

Different approaches and methods are used to justify various discount rates when investing in real assets. These approaches depend on the purpose of the assessment, as well as the structure, novelty, and riskiness of the project. All these methods have their advantages and disadvantages. Many of them are described in the papers of Russian and foreign scientists. However, the developing Russian stock market is characterized with the high price volatility and yield of securities, low rate of capitalization, high proportion of raw material companies in the market, imperfect competition of investors; all these peculiarities do not fully allow to use existing methods objectively [1, 3, 4, 5, 6, 7, 8]. While using these methods, some essential problems were faced and we are going to analyze them in this research.

Method based on weighted average cost of capital (WACC)

This method is perhaps the most “popular”, it is proposed by most famous scientists as the main one [5, 6, 7, 8]. This method is supported by the number of regulations on calculating the efficiency of investment projects in the Russian Federation, taking into account the government financing, as well as general recommendations [1, 4].

Let’s speak about the capital price (cost). For the equity capital it is undoubtedly the ratio of paid dividends by the average annual cost of equity capital. For banking credit, it is the crediting rate respectively, and it is needed to make average calculations of the borrowed capital value and the cost per year. For bond loan it is the coupon rate. The formula for calculation is presented below.

\[ WACC = \sum w_i c_i \]  

(1)

Where: \( c_i \) is the cost of various capital components, and \( w_i \) is their share in the total amount of capital. The full name of indicator itself is Cost of Capital or Weighted Average Cost of Capital. As far as a part of the payments for borrowed sources are related to expenses, when WACC calculating, the tax offset \( (1 - T) \) is applied, where \( T \) is the effective tax rate for profits.

But, unfortunately, the practical application of weighted average cost of capital in emerging markets often leads to the governmental difficulties for the analyst.

First of all, there is a question what amount of WACC should be taken to the calculations: correctly established for the reporting period, the average for several periods of the enterprise or predicted. Forecasting cost of equity capital can be regarded as a “normative” or average, that is to emerge objectively due to the average characteristics of the market at this stage.

Here it is necessary to mention that there is no universal solution to this issue. If the working conditions of the enterprise are close to the average, “normal”, then it is probably obligatory to focus on the market. But, on the other hand, when making decisions about investing in a specific production, being in an imperfect market and having limitations in the allocation of capital, we will have to use the capital price for a given project at a given enterprise. This brings us to the necessity to calculate WACC of actually existing conditions for the firm.

Let’s consider the difficulties might be faced during this process.

A significant number of the limited liability companies and even joint-stock companies do not pay dividends, or do it irregularly. After the period of property privatization on developing markets, a problem of sizable capital concentration appeared, large owners are insiders, the rights of minority shareholders are poorly protected. Accordingly, the decisions to pay dividends are often non-profitable for the insiders.

We are also confronted with discontinuous data on the ratio of dividends to equity capital. So, after analysis of one of the major joint-stock companies reporting sources, we see that in 2015 it passed the dividends, in 2016 they have been paid at the rate of more than 30% in ratio to equity capital. For this purpose, they used all the retained earnings of the reporting year and part of last year's retained earnings. The owner just decided to withdraw a part of his equity capital in order to invest in another project. In 2017 the dividends amounted up to 12.5% at a ratio to equity capital, in 2018 they were about 9%. The analyst should average this indicator, and it is not always clear how many years should
be involved in the calculation of the average indicator, as the periods selected for the calculation should be relevant, that is, comparable in terms of the business conditions.

In the conditions of developed markets, it’s recommended to take into account the profitability for several decades, or for the period of a reasonable work of one investor (for example, 40 years) [8]. All this leads to fairly stable averaged estimates.

In the context of emerging markets, it doesn’t seem possible to analyze the equity cost indicator within several decades. Therefore, there are different estimates of the capital cost for the particular investment project and they can differ significantly from each other, depending on quantity of years we take to average the cost of equity capital, e.g. five or four.

**Method based on Capital Asset Pricing Model (CAPM)**

CAPM method (*Capital Asset Pricing Model*) is an alternative to the method of justifying the equity capital cost based on actual historical data. The CAPM is a classic method for determining profitability of investment in equity capital. It shows “necessary, objective” return that an investor should demand and expect from investing in the equity capital of a given company. We can predict such return for all the firms quoting their shares in the stock exchange based on the following model [5, 6, 7, 8]:

\[
k_j = k_f + \beta_j(k_m - k_f)
\]

(2)

This function, represented graphically, is called the security market line (SML), where \(k_f\) is a risk-free return, \(k_m\) is an average market return and \(\beta_j\) is a coefficient that normalizes the return change of the particular safety stock due to the change in market return.

The analyst has observations about the historical data of all components of the CAPM model for a particular stock, there are experts' opinions about the market behavior for the forecast period, and therefore we can calculate the required yield for a particular security, which will be the return on equity capital to calculate WACC. But is this method applicable to a wide range of enterprises in Russia?

In the Russian Federation, less than 200 large corporations quote their securities on an organized exchange [9]. Therefore, they can only use this method to the full and without additional adjustments.

For the rest it is proposed to use additional tools for embedding into the CAPM model. The most well-known is the formula of R. Hamad [10], who suggested calculating the required equity capital return of companies on the basis of calculated indicators \(\beta_l\), which are the industry coefficients for non-leverage companies:

\[
\beta_L = \beta_U \left(1 + \frac{D}{E}(1-T)\right)
\]

(3)

Where: \(\beta_U\) is the coefficient for a given industry for enterprises without the loan capital; \(D\) is the sum of equity capital; \(E\) is the amount of loan capital; \(\beta_L\) is beta coefficient for the company, which is the recipient of the discount rate.

After having calculated \(\beta_L\) for the desired company on the basis of forecast or actual data on risk-free returns and risk premium in specific markets, we calculate the required return on equity capital.

In the countries with developed markets, data on \(\beta\) coefficients are widely published; it is possible to compare these data taken from different sources. For emerging markets, we managed to find only sectoral \(\beta\) coefficients on A. Damodaran site [11] without reference to a specific country. Such information is certainly useful, but it is very averaged and unreliable.

All of the above considerations make the calculation of the discount rate based on the WACC, at least, rather complex and not always reliable, based on unreliable indicators of country \(\beta\) industry coefficients and unstable dividend flow.

**Cumulative Discount Rate Method**
Another alternative to the method based on the weighted average cost of capital is the cumulative method (based on the risks summation), which is also recommended by the internal Russian regulations [1], although it may not be used in all cases.

In the theory of investment analysis, it is assumed that the discount rate should include the minimum guaranteed level of return (not dependent on the type of investment), the rate of inflation, and the coefficient, which takes into account the risk degree of a particular investment. That is, this indicator reflects the minimum allowable return on invested capital, at which the investor prefers participation in the project to alternative investment of the same funds in another project with a comparable risk degree.

In general case, the mutual influence of the three noted factors (minimum yield, inflation, and risk) is assumed, so it can be calculated that:

\[ (1 + r) = (1 + f)(1 + I)(1 + \beta). \]  

(4)

Where: \( r \) is the discount rate; \( f \) is minimally guaranteed real rate of return; \( I \) is the percentage of inflation; \( \beta \) is a risk adjustment.

Thus, we assume the multiplicative effect of the factors chosen by us for the discount rate calculating. However, for small values for \( f, I, \) and \( \beta \) coefficients, a variant of simple arithmetic addition can be used.

The risk-free rate can be set at deposit rates of banks with the first reliability category, exempted from the inflation component, or on the yield of low-risk government bonds, also adjusted for exemption from inflation. In the regulatory document of 1999 [1] it was recommended to use the LIBOR as such rate. This is the annual interest rate accepted on the London market by the first category banks to pay for their mutual loans; it includes inflation, which should be removed from it. In a stable situation, it is about 3-4%. However, in the crisis years of 2008-2009, the rate reached 10%.

In the magnitude of risk adjustments, in general, three types of risks are taken into account:

- Country risk;
- The risk of the project participants unreliability;
- The risk of fail to receive the project return.

*Country risk* is determined by experts and is published by expert agencies. You can also find it out by comparing the yield of similar financial instruments issued in Russia and abroad. For example, we compare the yield on Eurobonds of the Russian Federation and similar bonds in terms of US bonds. The difference in their returns will be the investments risk in our country.

*The risk of the project participants unreliability* is usually viewed as the possibility of an unforeseen project termination due to the financial instability of the participants, misuse of funds, legal incapacity, etc. The size of the risk premium for the unreliability of the project participants is determined by each participant singly, by expert means, usually this amendment does not exceed 5% [1].

As a rule examination for these purposes is not carried out, because this procedure is expensive and its results are not reliable. Most investors in Russia use the recommended figure of 5%.

*The risk of fail to receive the provided project return* is, first of all, the risk of unsuccessful technical, technological and organizational decisions, fluctuations in demand, etc. The question of calculating this risk is poorly investigated, it is recommended to use the expert method for the assessment, as well as to use the data, placed in the 1999 Guidelines [1]:

- Investments in the development of production on the basis of commercial technology 3-5%;
- The increase in sales of existing products 8-10%;
- Production and marketing of a new product 13-15%;
- Research and innovations 18-20%.

Calculated in such a way the discount rate meets all the requirements of science, however, accounting all factors is resulted by the high rate. Partly, this explains the "slipping" of the implementation of this methodology in practical calculations. Even when calculating economic...
efficiency in basic prices with the exception of the inflation component, the real rate usually exceeds 15-18%. Projects calculated at such discount rate are obviously detrimental.

The problem of the discount rate for specific projects justification
In addition to the given above methods for calculating the discount rate, the development of the theory and practice of evaluating the investment projects effectiveness has led to the emergence of various modifications of well-known methods. These modifications are necessary to justify the discount rate of specific projects (leasing, public-private partnerships, combinations of several investors interests). Let us dwell more detailly on the justification of the rate for projects with the participation of a private investor and state budget funds. This combination in Russia has received the name of public and private partnership (PPP).

Estimation of the discount rate when calculating the effectiveness of the projects implemented on the principles of PPP is based on the interests’ specificity of the state and businesses participated in the project. The intention of the public side (state) to understate the discount rate and the desire of the businesses to maximize it determine the question of the expediency for calculating two rates: for private and for the public partner, to make it possible to distribute the risks between each project participant.

For example, for the projects implemented on the public-private partnership principles, the discount rate for a public partner is calculated according to the official methodology by the formula [3]:

$$r_{ppp} = r_b * \frac{I_{b1}}{I_{b1}} + r_b * \frac{I_{b1}}{I_{b1}} + r_b * \frac{I_{b1}}{I_{b1}}.$$  \hspace{1cm} (5)

Where: $r_{ppp}$ is the discount rate for expenses and receipts of budgets of the Russian Federation budget system during the project implementation, on annualized basis:

- $r_b$ is yield to payment of federal saving bonds (FSB) with terms comparable to the project implementation period on an annualized basis, determined on the date of the comparative advantage calculation;
- $r_{b1}$ is the redemption yield of the bonds of the Russian Federation constituent entity where the project will be realized, with a maturity comparable to the term of the project (annualized), determined on the date of the comparative advantages calculation. If the subject of the Russian Federation where the project will be implemented does not have bonded debts, the yield of federal loan bonds redemption is used; $r_{b1}$ is the weighted average interest rate on borrowings from financial organizations (loans and bond loans), attracted (planned to be attracted) by a public partner to fulfill its obligations under the project, on an annualized basis, determined on the date of the comparative advantage calculation; $I_{b1}$ is the sum of the Russian Federation budget funds attracted for the project implementation; $I_{b1}$ is the sum of the budgets funds of the Russian Federation constituent entities and municipalities used for the project implementation; $I_{b1}$ is the amount of funds raised by the public partner to fulfill its obligations under the project, through borrowing from financial organizations and other external sources, including credit organizations; $I_{b1}$ is the expenses amount of budget funds of the Russian Federation budget system for the project.

In discount rate calculating the use of FSB yield equal to the maturity of the entire term of the project’s forecast period is a certain simplification, which means keeping the money in the project “to the end”. Besides that, there are no unconditional return guarantees of these investments for the investor, while bonded loans have a high degree reliability. It would be logical to assume that the components of the discount rate in formula (5) is to be multiply by the risk of investing in a PPP project.

It’s also difficult to calculate the weighted average loan rate. The difference between these rates is quite large, the annual volatility is up to 4% [9].
The calculation of this indicator is quite nominal for projects being implemented in the Russian Federation entities that did not issue government bonds at the time of the project. According to our enumeration in 2019, there are at least 12 such subject. Though their number will be even narrower if we take into account the condition that we must take the discount rate as the yield on bonds of the corresponding validity period coinciding with the project term [12].

Determination of efficiency for the private side is proposed to be carried out using two methods of discount rate calculating. In the first case, it’s calculated according to the official Methodology for evaluation of the project effectiveness [3]. According to the official Methodology, the discount rate for a private partner is assumed to be equal to or greater than the amount of yield to maturity on federal loan bonds with a term as close as possible to the project implementation dates, plus two and a half percentage points.

The second option of the discount rate is calculated by the cumulative method. However, the risks between public and private parties are usually not evenly distributed. We have already indicated above the problem of discount rate calculating by the cumulative method. Therefore, discrepancies between the first and second results of calculations can be significant.

Summary
Our analysis revealed some problems in justifying the discount rate in emerging markets. We often cannot justify the discount rate based on the weighted average cost of capital. For a number of companies not using the bank loans, this rate will be close or equal to zero, which makes the calculations of the current cash flow cost impossible.

The use of the cumulative method of the discount rate justification leads, on the contrary, to the rates overcharging. In addition, a number of components of the cumulative rate are proposed to be determined by an expert method, which makes the calculation of the rate very subjective.

Big problems are also related to the rates for specific projects justification, e.g., in partnership with the state. The use of the corresponding bonded loans rates to justify the cash flow discount rates leads to the discount rates underestimation.

References
[1] Guidelines for evaluating the effectiveness of investment projects (approved by the Ministry of Economy of the Russian Federation, the Ministry of Finance of the Russian Federation, the State Construction Committee of the Russian Federation 21.06.1999 N VK 477)
[2] Methodical recommendations on the calculation of leasing payments (approved by the Ministry of Economics of the Russian Federation 04.16.1996)
[3] Methodology for evaluating the effectiveness of a public-private partnership project, a municipal-private partnership project and determining their comparative advantage. Order of the Ministry of Economics of the Russian Federation of November 30, (2015), N 894
[4] The method of calculating the indicators and the application of criteria for the effectiveness of investment projects applying for state support at the expense of the Investment Fund of the Russian Federation. Order of the Ministry of Economic Development of the Russian Federation and the Ministry of Finance of the Russian Federation of May 23, (2006), N 139 / 82n
[5] Brigham Y, Gapensky L 1997 Economic School (SPb).
[6] Brealey R et al. 1988 Principles of Corporate Finance (11 edition, McGraw-Hill Education).
[7] Damodaran A 1996 Corporate finance.
[8] Sharpe W, Alexander G J, Bailey J W 1998 Investments.
[9] Information on https://www.moex.com/
[10] Hamada R S 1972 On the systematic risk of common stocks (The journal of finance) 2 (27) 435-452.
[11] Information on http://pages.stern.nyu.edu/~adamodar/
[12] Information on/ / http: //bonds.finam.ru