International Journal of Engineering & Technology, 7 (3.15) (2018) 336-339

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Current Issues in Assessment of Risks Related to Investment Projects

Alexander Sergeevich Voronov1, Mikhail Vladimirovich Karmanov2, Irina Anatolievna Kiseleva2, Vladimir Ivanovich Kuznetsov2, Lidia Sergeevna Leontieva1

1Moscow State University M.V. Lomonosov, 119991, Russian Federation, Moscow, Leninskie Gory, 1
2Plekhanov Russian University of Economics, 117997, Russian Federation, Moscow, Stremyanny lane, 36

Abstract

The definition of the essence of an object of management in economics is an indispensable component of professional risk management. Since the national risk management theory is just being formed, the need to find a clear and comprehensive definition for the notion "risks" is especially topical. Capital valuation is one of the most important issues, which needs to be solved by companies during ROI studies. This article makes an attempt to study the role of risk management in the implementation of investment projects. The main purpose of this article is to identify the main regularities which determine the peculiarities of risk assessment in business, being the key element facilitating the organization of investment projects. The objectives have been as follows: to review the basic concepts of risk management; to study its components in business; to reflect the system and risk management principles, and to carry out risk assessment; to consider the main kinds of risks in the business area.
The article describes various types of investment and project risks, risk analysis methods for investment projects, as well as efficiency indicators of investment projects, and provides an analysis of risk factors and uncertainties during the development of investment projects. The peculiarities of the practical use of project risks' analysis methods have been studied. Risk assessment methods for an investment project help evaluate its feasibility, the time within which it will start being profitable, as well as the probabilistic volume of its future profits. Investment project valuation models have been analyzed, in particular, the CAPM model for emerging capital markets. The DCF method has been studied, being the base for assessing the attractiveness of business in general and a company's investment project in particular.

Keywords: *risks, risk management, investment project, capital asset pricing models.*

1. Introduction

One of the main problems arising in the efficiency assessment of investment projects is associated with the assessment of company's risks, being a factor affecting the costs, the capital, and the discount rate. The risks mean the probability that the actual financial result of a transaction will differ from the expected one. In a developing market economy, a particular entrepreneur determines the methods which he will use to carry out his activities, and they all imply certain entrepreneurial risks.
According to the finance theory, if a company's new project has approximately the same risks as its current business has, then, in order to calculate the discount rate, one should take into account the capital expenditure value, i.e. the weighted average return on liabilities (bonds) and equity (shares). Consequently, capital expenditure is the starting point in determining the discount rate for cash flow in a new project, and then, at a later stage, adjustment is made towards an increase or decrease if the project implies more or less risks as compared to the company's current business. Between the dynamics of the risk level and dynamics of return, there is a direct correlation, namely: the higher the average return of a specific transaction is, the greater the risks are. The CAPM (capital asset pricing model) is the best at describing the relation between the return and the risks of a project based on a sensible suggestion that the higher the risks of a project are, the more return we are supposed to obtain. The CAPM was created in the 1960s by W. Sharpe and J. Lintner. Despite the model name, it does not suggest a specific value of an asset but just determines the discount rate necessary for finding the value of a financial tool. According to this model, the required rate of return for the securities of a company is calculated as follows (1):

$$R_E = R_f + \beta \cdot (R_m - R_f) \quad (1)$$

where R_f is the rate for risk-free securities, β is the risk degree of a project (security) expressing the sensitivity of change in the project return to change in the market return, R_m is the expected return, and $R_m - R_f$ is the equity risk premium. Thus, by building a stock market curve, we should regard all projects which lie above it, i.e. provide more revenue at every given risk level.

1.1 The Irrelevance of the CAPM Model in Emerging Capital Markets; Determining Risks in Such Markets

The problem is that the CAPM model does not always work in practice, and it is often very difficult to assess a company's capital expenditure and, as a consequence, the discount rate for the project cash flow. First of all, this is true for emerging capital markets which have extra risks due to the market's inefficiency, limited diversification options, as well as institutional peculiarities of developing countries, which is what Iu.A. Dranev and Ia.S.

Copyright © 2018 Authors. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Nurdinova write about in their article about capital expenditure assessment models for emerging capital markets [1]. The authors say that most researchers come to the conclusion that the global CAPM model has a number of drawbacks, especially when used in emerging markets. Godfrey and Espinosa showed that the inclusion of the risks related to a country led to unnecessary account of risks since part of these risks was included in the risk premium. In other words, the researchers insist that it is necessary to distinguish between the local risks (risks of a particular country) and the global risks (risks of the world economy) in calculating a company's capital expenditure [2]. The solution was to introduce more sophisticated models which took into account the peculiarities of emerging markets. Thus, Foong and Goh, after analyzing the capital market of Malaysia from 2002 to 2007, suggested the following (2):

$$r_{ei} = r_f + \beta_{Li} \cdot (r_m - r_f) + \beta_{Gi} \cdot (r_M - r_F) \quad (2)$$

where r_m was the local risk-free rate, r_f was the global risk-free rate, r_M and r_F were the return on local and global market portfolios, and β_{Li} and β_{Gi} were a company's sensitivity to local and global factors [3]. This model is an effective solution for risk assessment in calculating capital expenditure since it takes into account global and local risks for company's projects separately. But in fact, the risk assessment issue is very topical, and that is why the traditional methods based on discounting often provide false answers as they do not take risks into account.

1.2 Neglect of Risks as another Drawback of DCF Models; Solutions Involving Interval Prediction

Currently, there are two main criteria of risk assessment for investment projects – NPV and IRR.

NPV is net present value, which shows the expected value of money that the investor will receive, taking into account the discount factor; IRR means internal rate of return at which NPV=0, i.e. the amount of funds invested in the project corresponds to the results and implies neither profit nor loss for investors.

Both these criteria are based on cash flow discounting, and therefore they belong to the class of DCF (discounted cash flow) models. In fact, the DCF method is a fundamental method for business attractiveness assessment in general, or a company's individual investment project in particular. It is not surprising that this method has become so popular since it uses rather simple mathematical tools and it allows taking into account the expected return and alternative costs related to capital procurement in the discount rate. However, DCF models, besides being too simplistic, are often also extremely volatile, which is manifested during their testing. Quite often, a minor change in the finance model parameters can seriously affect the outcome, which makes it difficult to make reasonable and exact investment decisions.

But the main disadvantage of the DCF model is that it ignores risks and uncertainty as it does not take into account different scenarios for the project development with different probabilities. In general, all risks can be divided into discrete and continuous. Discrete risks include risks associated with strategic decisions, while continuous risks include market risks, or risks of fluctuations of market factors (e.g., price, interest rates, exchange rate). These risks have different meaning in certain phases of an investment project: in the preinvestment phase, discrete risks play an important role; in the investment and operation phases, continuous market risks are the most important ones. The DCF method becomes relevant only when continuous and discrete risks are equally low, because then the same discount rate for all cash flows can be applied. However, in reality, companies often face high risks, both discrete and continuous ones, and that is why the estimates obtained by means of the DCF model turn to be inaccurate due to this factor.

A possible solution to this problem is to use the interval simulation technology based on the fact that one should use not point prediction for expected values, but interval prediction in order to increase the reliability of assessment. This is so because the point prediction estimates obtained by means of the traditional DCF model are mathematical expectations of predicted values. Deviations of these predicted values from the actual values are never known until they happen. But, on the one hand, the approximate intervals which may include the actual values are known, but their accurate assessment is unknown, thus, we are in the so-called state of "underdefiniteness" - a state between complete certainty and complete uncertainty.

Obviously, when applying the interval risk assessment method to investment projects, it is necessary to use a zero interval in case of low uncertainty of the investment project indicators and an extensive interval in case of high uncertainty of the indicators. For instance, if, in a financial model, the predicted values are interrelated, e.g. mathematically (and, in practice, it is true), then by setting an interval for one predicted value, one can automatically obtain intervals for the others. The narrower interval we choose based on our calculations, the greater accuracy we expect, but, obviously, with less probability.

The interval method implies that, in the earliest phase of an investment project, an interval for the assessed value is chosen, and then, in each project phase, the data get more accurate and are compared with the expected values. If the actual values fell within the interval, then it could be said that the model was relevant and accurate. An example of such a model is shown in Fig.1 [4].

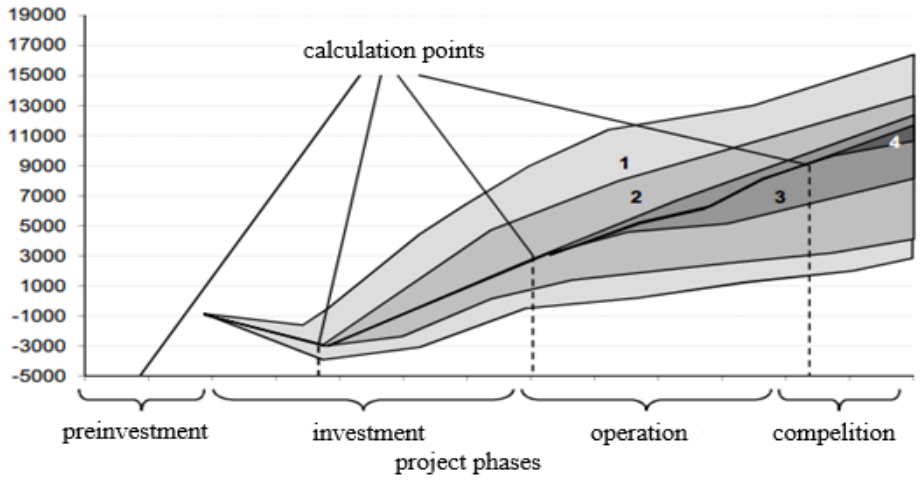

Fig.1:. Investment project phases.

This is an example of a perfect case when the actual results are within the interval obtained in the preinvestment phase. As one can see, applying the interval method allows to: 1. Find out the risks related to uncertainty without making numerous calculations; 2. Identify periods with the most extensive intervality, thus identifying the riskiest periods of the project.

1.3 Determining the Risk Levels of the Base Project and the Alternative Project to Adequately Assess Capital Expenditure

Capital valuation is undoubtedly one of the most important issues which need to be solved by companies during ROI studies. Many scientists, such as A. Damodaran, W. Sharpe, I. Blank and others [5, 6, 7, 8, 9, 10] put a lot of effort into solving this issue. However, some of its aspects, unfortunately, still remain underinvestigated. For example, equity valuation is rather problematic for the Russian companies, taking into account the financial risks of investment projects. The majority of financiers believe that the value of an equity invested in an investment project should be based on the alternative costs of capital procurement, i.e. the return which the owners can get in case they choose not to invest a certain equity in a certain (base) project, preferring to invest it in an alternative capital. [11, 12, 13, 14]. But capital valuation requires taking into account the financial risks inherent to projects. Needless to say, that if the base project and the alternative project have the same risk level, the equity value for the base project must be equal to the return of the alternative one. But if they have different risk levels, it is necessary to make an adjustment to the return based on the risk difference (3):

$$\begin{cases} FRL_b > (<) FRL_a \\ Ve_b = Re_a + (-) RA \end{cases} \quad (3)$$

where FRL_b is the financial risk level of the base project, FRL_a is the risk level of the alternative project, Ve_b is the equity value for the base project, Re_a is the return of the alternative project, RA is the extra charge or discount taking into account the difference in risk.

The problem is to assess this difference in risk. Unfortunately, professional literature does not pay due attention to this issue, and there are hardly any accurate numerical methods for such assessment. Potashnik Ia.S., the author of the article "Otsenka stoimosti sobstvennogo kapitala predpriiatiia s uchetom finansovogo riska investitsionnogo proekta" [Company's Equity Value Assessment Taking into Account Financial Risks of the Investment Project] (Potashnik 2014), to determine the difference in the risks related to two projects, suggests using the method based on the calculation of interest rates at which banks are willing to provide loans for funding these projects (base and alternative ones). In other words, two average values are to be calculated: the first value is the average of all R_{i1} – the rate at which the i-th bank is ready to provide a loan for the implementation of the 1st project (the base one), the second value is the average of all R_{i2} – the rate at which the i-th bank is ready to provide a loan for the implementation of the 2nd project (the alternative one). Thus, the difference between the two average interest rates, at which banks are willing to provide loans for the project, is the difference in the risk levels of the two projects.

Let us apply this model to the Starlight confectionery shop, which was considering to open a new confectionery warehouse for bakery products (base project) and was studying various options offered by several Moscow banks (see Table 1). In addition, the company had an alternative project – to open a confectionery warehouse which would be engaged in baking cakes. For this project, banks were willing to provide a loan, but at a different annual interest rate. Thus, to estimate capital expenditure for the base project, we need to know the difference in the risk levels of the two projects. As mentioned above, this difference is the difference between the average interest rates at which banks are willing to provide loans for the projects.

Table 1::. Loan options provided by commercial banks.

Bank	Interest rate, %		RA, %
	Base project	Alternative project	
VTB 24	25.50	18.00	7.50
Gazprombank	24.00	16.05	7.95
Russian Agricultural Bank	22.00	16.00	6.00
Alfa-Bank	24.50	17.50	7.00
Bank Of Moscow	23.00	16.50	6.50
Promsvyazbank	24.00	16.75	7.25
UniCredit Bank	23.50	17.00	6.50
Average	23.78	16.82	*6.96*

The difference in the risk levels of the two projects in this case equals to 6.96%. This difference is important to know when capital expenditure for the first (base) project is calculated, but, in practice, it is not so easy to accurately estimate this value.

4. Conclusion

Thus, it can be concluded that, in practice, the classical methods of the theory of investment can often give inaccurate results due to the extreme simplification of reality. In addition, these methods have several disadvantages and specific features, which, if neglected, may cause a financial manager to get incorrect results. It seems to be necessary to use more complex models more widely, instead of simplified methods, since the former take into account the specific features of an investment project, as well as its risk [16, 17, 18]. After all, the main feature of any investment project, which is of interest to any investor, is the risk which this project implies. Unfortunately, the classical DCF models do not allow adequate risk assessment of a project and valuation of capital necessary for the implementation of this project. In other words, risks and return are the two main characteristics of a project which are the most important to investors, and theoretical and practical methods of these indicators' calculation are being constantly improved, and it is becoming obvious that, in order to facilitate the assessment of these indicators, companies should apply more complex and reliable models which give relevant results [19, 20]. Between the dynamics of the risk level and dynamics of return, there is a direct correlation, namely: the higher the average return of a specific transaction is, the greater the risks are. The current market threats are greater than potential profit. It is impossible to increase income without increasing risks or reduce risks without reducing income. The smaller the probability distribution range of the expected return in relation to its average value is, the smaller the risks associated with this transaction are.

References

[1] Yu.A. Dranev, Ya.S. Nurdinova, Modeli otsenki zatrat na kapital na razvivaiushchikhsia rynkakh kapitala [Capital Expenditure Assessment Models for Emerging Capital Markets], HSE NRU 2(22) (2012) 107-117.

[2] S. Godfrey, R. Espinosa, A Practical Approach to Calculating Costs of Equity for Investments in Emerging Markets, Journal of Applied Corporate Finance (1996).

[3] S.-S. Foong, K.-L. Goh, Measuring the Cost of Equity of Emerging Market Firms: The Case of Malaysia, Asian Academy of Management Journal of Accounting and Finance 6(1) (2010) 25-46.

[4] M.A. Kolesnikov, Metod otsenki stoimosti investitsionnogo proekta v usloviiakh vysokogo urovnia riska [Investment Project Value Assessment under High-Risk Conditions], 2013.

[5] D. Aswath, Investitsionnaia otsenka. Instrumenty i tekhnika otsenki liubykh aktivov [Investment Valuation: Tools and Techniques for Determining the Value of Any Asset], 2004.

[6] N.J. Foss, Scientific Progress in Strategic Management: The Case of the Resource-Based View, International Journal of Learning and Intellectual Capital 4(1/2) (2007).

[7] J.L. Morrow, D.G. Sirmon, M.A. Hitt, T.R. Holcomb, Creating Value in the Face of Declining Performance: Firm Strategies and Organizational Recovery, Strategic Management Journal 8(3) (2007) 271-283.

[8] J.-J. Lambin, Strategicheskiy marketing. Evropeyskaya perspektiva [Marketing Strategy: A New European Approach], Nauka, Saint Petersburg, 1996.

[9] W. Sharpe, G. Alexander, J. Bailey, Investitsii [Investments], Infra-M, Moscow, 2010.

[10] I.A. Blank, Finansovyi menedzhment [Financial management], Nika-Center, Kyiv, 2004.

[11] O.A. Firsova, Upravlenie riskami organizatsii [Organizations' Risk Management], MOO Inter-regional Public Organization Safety and Survival Academy, 2014.

[12] D.A. Lapchenko, Metody otsenki riska investitsionnykh proektov [Risk Assessment Methods for Investment Projects], 2013.

[13] N.A. Rykhtikova, Analiz i upravlenie riskami organizatsii [Analyzing and Managing an Organization's Risks], Forum, Moscow, 2012.

[14] L.N. Mamaeva, Upravlenie riskami [Risk Management], 2013.

[15] Ya.S. Potashnik, Otsenka stoimosti sobstvennogo kapitala predpriiatiia s uchetom finansovogo riska investitsionnogo proekta [Company's Equity Valuation Taking into Account Financial Risks of an Investment Project], 2014.

[16] I.A. Kiseleva, A.M. Tramova, Modelirovanie investitsionnoi privlekatelnosti turisticheskoi otrasli regionalnoi ekonomiki (na primere Kabardino-Balkarskoi Respubliki) [Simulation of Investment Attractiveness of the Tourism Industry in a Region's Economy (based on the example of the Kabardino-Balkar Republic)], Audit and Financial Analysis 5 (2010) 241-246.

[17] D.A. Lapchenko, Otsenka i upravlenie ekonomicheskim riskom: teoriia i praktika [Economic Risk Assessment and Management: Theory and Practice], Amalfeia, Minsk, 2007.

[18] V.A. Moskvin, Upravlenie riskami pri realizatsii investitsionnykh proektov. Rekomendatsii dlia predpriiatii i kommercheskikh bankov [Risk Management in the Implementation of Investment Projects. Recommendations for Enterprises and Commercial Banks], Finance and Statistics, Moscow, 2004.

[19] C.K. Prahalad, V. Ramaswamy, Budushchee konkurentsii. Sozdanie unikal'noy tsennosti vmeste s potrebitelyami [The Future of Competition: Cocreating Unique Value with Customers], Olimp-Biznes, Moscow, 2006.

[20] D.J. Teece, G. Pisano, A. Shuen, Dinamicheskie sposobnosti firmy i strategicheskoe upravlenie [Dynamic Capabilities and Strategic Management], Vestnik SPbGU, Ser. 8: Menedzhment 4(32) (2003).