

PEDTR 2019**18th International Scientific Conference “Problems of Enterprise Development:
Theory and Practice”****THE DISCOUNT RATE AT THE EVALUATION OF FAIR VALUE
OF FINANCIAL INSTRUMENTS**

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Abstract

In the practice of financial analysis, there are several methods for determining the discount rate, for example, the CAPM model, the cumulative approach, etc. The problem of applying cumulative approach is that the existing methods for determining risk premium are more applicable to investment projects, and the methodology for determining the risk premium are suitable for financial instruments. The article describes methods to determine risk premium, their advantages and disadvantages. The research of the article offers the improvement in the methodology for determining risk level when calculating the discount rate. For this, risk factors are identified. Further, by giving them quantitative values and arterial ranges using the score, the integral risk value is determined. It is also proposed to take into account the significance level of each factor using a coefficient. For the analysis of each risk type, it is recommended to use special tables in which the most significant factors for each risk are presented, as well as the normative values of these indicators and score that is necessary to determine the significance of each risk. The article provides case-study of PJSC LUKOIL where this methodology is applied. According to the results of the study, it was received the risk premium considered in the calculation with the Methodological Recommendations does not take into account significant risk factors, such as the emitter's profitability, business reputation, and other risks, which does not allow companies to determine the fair value of financial instruments.

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1. Introduction

In financial accounting, in accordance with international accounting standards (IAS, IFRS, GAAP), financial instruments are measured at fair value. Typically, the fair value of a financial instrument at initial recognition refers to the transaction price, that is, the fair value of the consideration given or received (IFRS 13). However, if a company decides that the fair value at initial recognition differs from the transaction price, it can use the discount method, and then the fair value of financial instruments will be the present value of all future cash flows which are discounted using the prevailing market interest rate for a similar instrument which has a similar credit rating (Fontes, Panaretou, & Peasnell, 2018).

In the practice of financial analysis, there are several methods for determining the discount rate, for example, the CAPM model, cumulative approach, etc (Espinoza, 2014; Fiechter & Novotny-Farkas, 2017). The cumulative approach is the most popular, since it is quite simple and least labor-intensive. In its framework, the discount rate is determined, as a rule, by the formula:

$$d = r_{\min} + I + N,$$

where d - discount rate;
 r_{\min} – risk - free rate;
 I - inflationary component;
 N - risk premium.

The problem of applying the cumulative approach is that the existing methods for determining the risk premium are more applicable to investment projects, and there is no methodology for defining risk premium for financial instruments (Naumova, & Svetkina, 2019). Alt-Invest recommends that the calculation of risk premium should be based on the aim of the project (Table 01).

Table 01. Alt-Invest recommends that the calculation of risk premium for project

Project Type	Risk Level,%
Maintaining production	0
Production expansion	3
Entering new markets	6
Related Business Areas (New Product	9
New industries	12

Source: authors.

When centralized investment resources of the development budget of the Russian Federation on a competitive basis are placed the Regulation on evaluating the effectiveness of investment projects also provides the methodology for determining risk premium depending on project type. If investments are made during the production intensification on the basis of developed technology, the risk premium is 3-5%, with an increase in products' sales - 8-10%, at manufacturing and promotion of a new product -13-15%, at investing in research and innovation - 18–20% (Government decree of November 22 1997 N. 1470 On the assessment of the effectiveness of investment projects when placing centralized investment resources of the development budget of the Russian Federation on a competitive basis).

But above-listed methods can assess only risks that may arise during the expansion of the emitter's activity, and are insufficient to determine the risk premium in calculating the fair value of financial instruments because there is no assessment of emitter's trustworthiness, its financial condition, solvency and business reputation.

Japanese scientists Honko (1994) suggested the methodology for determining risk premium in which investments are classified according to the return (Table 02).

Table 02. The methodology for determining risk premium J. Honko

Type of investment	Return rate, %	Risk premium, %
unintended	–	0
to maintain market position	6	1
to update fixed assets	12	7
to save current costs	15	10
to increase revenues	20	15

Source: authors based on (Honko, 1994).

The methodology of Honko (1994) is focused on assessing the risk premium for investment projects and cannot be used to determine the fair value of financial instruments. In the Methodological Recommendations 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, Gosstroy of the Russian Federation on June 21, 1999 No. VK 477, it is recommended to take into account the country risk, unreliability risk of project participants and the risk of not receiving the income provided by the project when determining the risk premium. However, this methodology does not provide the possibility of taking into account the emitter's business reputation and other risks that can be essential for the company.

2. Problem Statement

The described techniques are used primarily in the implementation of real investments. Financial instruments are a type of financial investment and the assessment of their profitability requires a different approach. Therefore, to determine the risk premium (as part of the discount rate) when assessing the fair value of financial instruments, we propose to improve the existing approach, taking into account risk significance which are relevant in the current situation.

3. Research Questions

The following issues were researched:

- Assessment of changes of financial instruments' cost and their recording in the financial accounting;
 - Defining the main factors determining the level of risk changes of financial instruments' cost;
- Development of the score and assessment criteria to determine the level of risk.

4. Purpose of the Study

The main objective of the study is to develop and test the methodology for determining the level of risk, taking into account the significance of the risks which are the most relevant in the current situation. To determine the discount rate, the article assesses the possibility of applying the author's approach to determine the level of risk. The quantitative assessment of the impact of different approaches on the fair value of a financial instrument is also carried out.

5. Research Methods

During the study, the following methods were used: observation; comparison; theoretical analysis of scientific literature to obtain the theoretical justification of the problem; expert assessment method to identify the most crucial factors and their significance level; synthesis of the information obtained in the analysis process; stochastic and simulation methods to assess the level of occurrence of identified risks; scoring method for determining the level of risk, depending on the value of the studied factor; discount methods to determine the current value of bonds.

6. Findings

According to the survey of 12 experts in the field of financial management, accounting and investment analysis, the following most significant risk factors were identified related to the profitability of financial instruments (Table 03).

Table 03. Most significant risk factors were identified related to the profitability of financial instruments

Risk factor	Significance, %
Liquidity of emitter of a financial instrument	0,2
Emitter's financial stability	0,2
Emitter's profitability	0,2
Business reputation of an emitter of a financial instrument	0,2
Other risks (occurrence / non-occurrence of certain events)	0,2
Risk premium	1

Source: authors.

In this methodology, the maximum value of the risk premium is 1%, but if you assign integer values to each risk, then the minimum possible will be 5%. In our opinion, such overestimated rate will lower the fair value of the asset. Each risk factor is assigned a score in unit fractions with a maximum of 1, since the risk premium is calculated by scoring each risk factor taking into account its significance.

The “other risks” factor can be detailed depending on the emitter, the current market situation and other external factors (for example, the risk of changes in the macroeconomic and political situation in the emitter’s country, changes in the situation on the international financial market, the risk of an international crisis or change in the currency rate, etc.). As a result, the significance of this criterion can be increased to a value bigger than 1%. The significance of other risk parameters is evaluated in proportion to the effect on the company’s net cash flow. Other risks are assessed based on expert assessment.

For the analysis of each risk type, it is recommended to use special tables in which the most significant factors for each risk are presented, the normative values of these indicators, as well as the score necessary to determine the significance of each risk. When analyzing the emitter's liquidity, it is proposed to evaluate three indicators: absolute liquidity ratio, current liquidity ratio and quick liquidity ratio (Table 04).

Table 04. Assessment of the liquidity risk

Normative values	Score
Values of all coefficients are lower than normal	1
The value of one coefficient is normal, the rest is lower than normal	0,7
The value of two coefficients is normal, the value of one is lower than normal	0,5
Values of all coefficients are normal	0,1

Source: authors.

The emitter's financial position is recommended to be evaluated by categories: absolutely stable, stable, unstable and critical, using the methodology of Sheremet (2008) to assess the adequacy of sources of financial inventories and costs. The characteristics of financial situation, and their scores are presented in Table 05.

Table 05. Assessment of the emitter's financial stability

Financial position	Characteristics	Score
Absolutely stable (1, 1, 1)	The company is able to make payments on time, finance its activities at its own expense, is characterized by a high degree of solvency	0,1
Stable (0, 1, 1)	The company attracts long-term loans and borrowings, characterized by a normal level of solvency and high profitability.	0,3
Unstable (0, 0, 1)	The company does not have enough working capital to cover the value of inventories and costs, it is forced to attract insufficiently justified additional sources	0,7
Critical (0, 0, 0)	The company has loan arrears and borrowings, as well as overdue receivables and payables	1

Source: authors.

When analyzing the emitter's profitability, it is recommended to evaluate the return on equity, assets and sales.

Return rate, %:	Score:
0 <	1
0–0,8	0,7
> 0,8	0,2

The parameters for assessing the emitter's business reputation are the term of its activity, its rating, information on sanitation, the degree of transparency and disclosure of information, information on participation in legal proceedings, on emitter's reorganization, publicity and popularity of the company (Table 06).

Table 06. Assessment of emitter's business reputation

Parameter	Characteristics		
	More than 5	From 3 to 5	Up to 3
Rating	More than 5	From 3 to 5	Up to 3
Information on sanitation	Included into international rating	Included into national rating	Not included into rating
Degree of transparency and disclosure of information	Sanitation is not carried out	Sanitation was carried out once	Sanitation was carried out 2 times or more
Information on reorganization	low degree of transparency and disclosure of information	Inadequate degree of transparency and disclosure of information	High degree of transparency and disclosure of information
Publicity and popularity	Reorganization was carried out	Reorganization was carried out once	Reorganization was carried out more than once
Score	Public and popular	Not enough public and popular	Not public and not popular
Rating	0,1	0,5	1

Source: authors.

Each indicator presented in Table 03, the score is assigned. The most common value will be a measure of business reputation risk. The values assigned to each risk factor must be tabulated to calculate the risk significance and determine the risk premium rate (Table 07).

Table 07. Calculation of the premium for various risks to be included in the discount rate

Risk factor	Risk assessment [0; 1]	Significance, %	Significance of risk coefficient
Emitter's liquidity		0,2	
Emitter's financial stability		0,2	
Emitter's profitability		0,2	
Emitter's business reputation		0,2	
Other risks		0,2	
Risk premium		1,0	

Source: authors.

The use of proposed methodology will make the process of determining the fair value of financial instruments much easier and will help to avoid the difficulties associated with the cumulative approach for determining the discount rate (Tahat, Dunne, Fifield, & Power, 2016).

The proposed methodology on the materials of PJSC Lukoil is shown in Table 08. To calculate the risk premium, we transfer the score of risk factors from the table 8 to the summary Table 09.

Table 08. Calculation of the premium for various risks to be included in the discount rate

Risk factor	Indicators	Value	Score
Emitter's liquidity	Absolute liquidity ratio	2,57	–
	Current liquidity ratio	10,16	–
	Quick liquidity ratio	6,65	–
<i>Total</i>	–	–	0,1

Financial stability		1, 1, 1	–
<i>Total</i>	–	–	0,1
Emitter’s profitability	Return on sales	0,07	–
	Return on assets	0,08	–
	Return on equity	0,23	–
<i>Total</i>	–	–	0,7
Business reputation	Emitter's activity term	0,1	–
	Rating	0,1	–
	Sanitation	0,1	–
	The degree of transparency and disclosure	0,1	–
	Reorganization Information	0,1	–
	Publicity and popularity	0,1	–
<i>Total</i>	–	–	0,1
Other risks	–	–	1

Source: authors based on (Consolidated Financial Statements IFRS PJSC LUKOIL 31 December 2018).

Table 09. Risk premium calculation

Risk factor	Risk value [0; 1]	Significance, %	Value of risk coefficient
Emitter's Liquidity			
Emitter's financial stability			
Emitter's profitability	0,1	0,2	0,02
Emitter's business reputation			
Other risks			
Risk premium			
Emitter's financial stability	0,1	0,2	0,02
Emitter's profitability	0,7	0,2	1,4
Emitter's business reputation	0,1	0,2	0,02
Other risks	1	0,2	0,2
Risk premium	–	–	1,66

Source: authors.

According to the calculations, the risk premium for bonds issued by PJSC LUKOIL will amount to 1.66%. For comparison, we will analyze this issuer in accordance with the Methodological Recommendations for evaluating the effectiveness of investment projects.

Risk type:	Significance, %:
Country risk	3
Unreliability risk of project participants	0
Risk of not receiving project revenue	0
Risk premium	3

According to the analyzed data of PJSC Lukoil, it can be concluded that the emitter is reliable, therefore the risk significance of unreliability of project participants and non-receiving of the revenues provided by the project is 0. The risk premium for bonds issued by PJSC LUKOIL according to the Methodological Recommendations will be 3%.

7. Conclusion

Thus, the traditional risk premium value of 3% was obtained and the value determined by the method proposed by the authors was 1.66%. We calculate the discount rate based on the fact that the risk-free rate is taken at the level of the key rate of the Central Bank of the Russian Federation (from December 16, 2019 -6.25%), and the inflation rate - as the target according to the forecast of the Central Bank of the Russian Federation (4%).

$$D1 = 6.25\% + 4\% + 1.66\% = 11.91\%.$$

$$D2 = 6.25\% + 4\% + 3\% = 13.25\%.$$

We determine the fair value (SS) of PJSC Lukoil bonds using the rates calculated above. Bond's value is 1000 currency units, period of repayment is 10 years, the frequency of coupon payment is 6 months, coupon rate is 4.75% per annum.

The amount of the coupon income will be CU 23.75 per half year ($1000 * 0.0475 * 6/12$).

We calculate the fair value of the bond by determining the fair value of the annuity of CU23.75. for 20 periods and repayment of the nominal value after 20 half-year (10 years).

At a discount rate of 11.91% (semi-annual 5.955%), the fair value (CC1) will be CU 587.87.

At a discount rate of 13.25% (semi-annual 6.625%), the fair value (CC2) will be CU 536.33

Thus, in the second case, the fair value is underestimated by 51.54 CU, which is 9.6% of CC2 with a difference between discount rates of 1.34%. However, the risk premium considered in the calculation of CC2 and calculated in accordance with the Methodological Recommendations does not take into account significant risk factors, such as the emitter's profitability, business reputation, and other risks, which does not allow companies to determine the fair value of financial instruments.

References

- Consolidated financial statements IFRS PJSC LUKOIL 31 December 2018. Retrieved from: <http://www.lukoil.ru/FileSystem/9/328349.pdf> Accessed: 15.12.2019.
- Espinoza, R. D. (2014). Separating project risk from the time value of money: A step toward integration of risk management and valuation of infrastructure investments. *International Journal of Project Management*, 32(6), 1056-1072.
- Fiechter, P., & Novotny-Farkas, Z. (2017). The impact of the institutional environment on the value relevance of fair values. *Review of Accounting Studies*, 22(1), 392-429.
- Fontes, J. C., Panaretou, A., & Peasnell, K. V. (2018). The impact of fair value measurement for bank assets on information asymmetry and the moderating effect of own credit risk gains and losses. *Accounting Review*, 93(6), 127-147.
- Government decree of November 22 1997 N. 1470 On the assessment of the effectiveness of investment projects when placing centralized investment resources of the development budget of the Russian Federation on a competitive basis. Retrieved from http://www.consultant.ru/document/cons_doc_LAW_17537/ Accessed: 11.12.2019.
- Honko, J. (1994). *Competitive strategy of small industrialized countries*. Berlin: Rainer Bohn Verlag.
- Naumova, O., & Svetkina, I. (2019). Monitoring the financial security of the economic subject on the basis of financial risk assessment. In S. Ashmarina, M. Vochozka (Eds.), *Sustainable Growth and Development of Economic Systems: Contradictions in the Era of Digitalization and Globalization* (pp. 359-371). Cham: Springer.
- Recommendations 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, Gosstroy of

the Russian Federation on June 21, 1999 No. VK 477. Retrieved from <http://docs.cntd.ru/document/1200005634> Accessed: 11.12.2019.

Sheremet, A. D. (2008). Analysis and diagnostics of financial-economic operations of an enterprise. Moscow: Infra-M.

Tahat, Y., Dunne, T., Fifield, S., & Power, D. (2016). The value relevance of financial instruments disclosure: Evidence from Jordan. *Asian Review of Accounting*, 24(4), 445-473.