Application efficiency indicators of corporate risk management in the calculation of the discount rate

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Abstract

Implementation of risk management practices in the company's activities has a great impact on the reputation and performance of the company. As a result, the majority of stakeholders are interested in cooperation with the selected company. Predicting the results of cooperation implemented through investment projects efficiency assessment methods, where the main index, demonstrating the attitude to risk analysts, is a discounted rate of return of the project.

The purpose of this article is to adjust the discount rate on the business risk level, determined indirectly on the basis of stakeholder expectations.

Design/methodology/approach: *The main parameters of assessing the risk management efficiency from the perspective of the stakeholders are formulated on the basis of the assumptions made in the theory of market efficiency, investment attractiveness factors, and were obtained empirically.*

The first part was devoted to the formation of efficiency rating, the second - the study of the influence of the rating on the discount rate.

Findings: *Factor Analysis of indirect evidence of efficiency revealed that the majority of the most important factors are indicators of the structure and cost of capital, so in the calculation of the discount rate it is necessary to adjust on the degree of its efficiency.*

It is shown that decrease in the efficiency causes an increase in the rate of return to stakeholders

Research limitations/implications

A detailed description and calculation algorithm were given

Practical implications

The paper presents a practical calculation of the discount rate based on the efficiency of risk management

Originality/value: *None of the presented in prior research studies cannot be used in pure form for the Russian companies. Nevertheless, the question of how do stakeholders score the risk management efficiency and what the efficiency of have an impact on the discount rate remain unsolved. In this paper author disclose the algorithm of calculating the discount rate, depending on the degree of efficiency of risk management, evaluated in indirect method*

1. Introduction

Ensuring reliable protection of the investors and stakeholders interests within an acceptable for them risk appetite is one of the practical purposes of risk management implementation, and the growing interest of stakeholders to a company for long-term cooperation is becoming the most expected result of ERM.

Due to the fact that a large number of standards of risk management, any company has to choose their own model of corporate risk management, and the choice is influenced by a few reasons such as the availability of qualified specialists and consultants, a positive experience

with a particular standard, demand and a transferable model from stock exchanges, banks and investors (for example for American stock exchanges it is necessary to implement requirements of Sarbanes-Oxley Act, ERM COSO, for European stock exchanges it is enough to implement ISO, only in France and Italy internal control certification is required, In Russian practice companies cam implement any standard, but really COSO is only available). All of these aspects allow for a careful evaluation and thus help to answer the key question that a risk manager needs to consider: how does one measure the ERM value that is getting delivered to my organization? Therefore, the company, implementing and upgrading risk management, hopes to not only to reduce the risks and to improve their resilience in the face of uncertainty, but also to receive an additional bonus in the form of added value brought by the company due to new forms of activity.

In addition, investors and stakeholders are interested in cooperation with the selected company, need to provide any assurance that the uncertainty of the future periods will not negatively impact on the results of their activities. And if a few years ago a financial information about partner was a guarantor of future relations, but now, especially after the events of 2014 and 2015., it has it gradually replaced by information about the managerial abilities of the company in the face of uncertainty. Risk management, in this case, on a par with compliance have not the last role. These trends are reflected in the practical organization of risk management.

Latest standard in this area [ISO 31000: 2009] reflects the economic nature of the risk management, whereas earlier the mathematical sense was laid in the interpretation of the likelihood of risks and their proposed management practices. At the moment, corporate risk management is a fairly diverse in nature of activities as compared to those that are used in the early stages of ERM implementation in the company.

To measure the Value Added of risk management, in our opinion, is more appropriate from the point of assessing the effectiveness of ERM systems and its correlation with the investment attractiveness of the business.

An analysis of the existing scientific and applied literature in the field of risk management has identified several approaches to the evaluation of efficiency.

The most common approaches are the following: an approach to the assessment of economic efficiency from the perspective of NPV[Barton T., Shenkir W., Walker P., 2011], an approach to management efficiency from the perspective of KPI [Mamedova 2012, Minsky S 2012], an approach to value-efficiency from the perspective of EVA, fundamental value and ROA [Badalova A 2011, Jaspal S, 2014,], performance evaluation in terms of the rating agencies (for the most part in terms of compliance) and from the standpoint of company's shares performance on the market [Smithson C., Simkins B. 2005], assessment of compliance with the best world practices [Expert RA, S&P].

This approach indirectly reflect the reliability, profitability and business sustainability. In this study we will use the indicators, most specifically reflecting the expectations of investors and stakeholders with regard to the current system of risk management - the rating of market evaluation of the effectiveness of corporate risk management calculated by the indirect method.

2. Historical Reference.

Until 90ths risk management exist only at the level of individuals, taking a risk: portfolio managers, traders (micro risk management), or, at best, as an additional function of Strategic Planning and Treasury (see. Fig. 1). Some companies still have such a situation. In the early 90s, the organization of the risk management system uses a "bottom-up" approach, in which all types of risks are managed separately. The resulting estimates for the various types of risk were

diverse in nature and could not be compared with each other. With this approach, it was not possible to aggregate results obtained.

Enterprise risk management (ERM) as a term was introduced in 2004 by COSO represents a Top-down approach, unlike earlier risk management, which was presented with the individual elements of control or a bottom-up approach. A new model of integrated risk management examines risks of all departments and activities of the organization. Now it is possible to obtain comparable estimates for all types of risk due to the optimum approach between the methods and models of determination of specific types of risks. The existed ERM programs were designed to integrate management of risks from a wide variety of sources [Baxter R., Bedard J. C, Rani Hoitash R., Yezegel A., 2013].

Modern ERM is increasingly claimed to be a tool for improving the capability of companies in predicting and managing risks, enhancing planning and the achievement of their goals in general. ERM might be considered as the culmination of the risk management explosion (Power, 2007), which started during the 1990s. ERM is intended to be a holistic approach for assessing and evaluating the risks that any organization faces (COSO, 2004) and it is to create a culture of risk management as a whole at the level of the organization. Other functions of ERM are:

- development of a program of measures to eliminate the consequences of risky situations;
- development of mechanisms for survival of the business;
- conservation objectives of the enterprise;
- cost reduction;
- safeguarding the success of the enterprise;
- creation of a system of insurance;
- forecasting the development of the enterprise taking into account possible changes in market conditions.

Modern ERM includes a set of requirements, such as:

- Continuous improvement of risk management (risk-based KPI, annual report and revision).
- Risk management in any decisions (for example, the allocation of capital, the approval of projects, restructuring and changes in strategy.
- Continuous communication (frequent external and internal reports, two-way process).
- Full implementation of risk management in the governance structure (reflection of "uncertainty" as a term of risk management in the policy statements of the organization).

However, according to some researchers further development of ERM requires additional attention to such essential components of risk management as:

- time series analysis, analysis of the dynamics of global risk factors;
- portfolio diversification, immunization, securitization and hedging, including with respect to portfolios of business processes.
- taking into account external statistics;
- evaluation of the effectiveness of risk management based on risk management created value;
- ERM and harmonization of standards of sustainable development.

3. The Concept of "Efficiency" of Corporate Risk Management.

Definition of ERM efficiency in the works of different authors quite diverse and is differ from each other.

Prior research in the field of ERM [Bushman, Smith, 2001; Zimmerman, 2001; Larcker, Richardson, and Tuna, 2007; Davila and Foster 2005, 2007; Ittner and Larcker, 2003] investigates how corporate control mechanisms affect allocation and utilization of economic resources.

Cost and economic approach of efficiency is presented in the works Hilson D. Murray-Webster R.(2005) and Artamonov A. (2003), the efficiency of risk management in this case is treated as an "excess risk management results over costs in the process."

The organizational approach to efficiency is represented in the works of Mamedova A., (2002); Basova M., Michelsky A.,(2011); Jaspal S., (2011); Merna T, Al-Thani F., (2008), where the term "efficiency" is replaced by the term non-economic "successfulness"

Efficiency as value added is presented in the works of Badalova Panteleev, (2010); Ingley C., van der Wallt, (2008); Damodaran A. (2007); Smithson C., Simkins B., (2005); Hoyt R., Liebenberg A., (2005).

The qualitative assessment of the effectiveness of ERM is more common in the economic literature [Miller D..,1992; Otley D. 1999; Chapman C., Ward S., 2004; Stepanov V., 2010] and it implies a well organized process of interaction between risk managers, senior management and risk owners.

Our approach to definition of efficiency is based on the approaches following authors:MacDonald Ch. (2011), Skokov R. (2012), Smithson C., Simkins B. (2005), Segal S. (2011), Katzenbach J., Smith D. (2013), COSO (2004), Andersen T. (2008). It lies in the interpretation of efficiency as "the result of activity, during which created a risk-oriented culture of business management based on regular preventive risk management procedures."

From a theoretical point of view, this approach to the interpretation of efficiency allows to see risk management as a strategic business management tool, and demonstrates the potential of the company in the management of risks and uncertainties from a practical - the process exactly is organized in accordance with the recommendations and is focused on optimizing the return on risk companies.

Model of discount rate estimation based on degree of risk management efficiency, determined indirectly on the basis of stakeholder expectations.Основные допущения модели.

For the purposes of this study is necessary to specify the key parameters of the model. That is, as a factor of the model we take the degree of risk management efficiency, defined by the stakeholders of the company, and as a result - the discount rate used by investors and stakeholders as the base rate in the calculation of feasibility of potential cooperation.

The object of this study is the non-financial sector.

4. Rationale for the Key Indicators of Model

Investment attractiveness of companies is caused by the presence of a number of factors, the main ones are the following: macro-economic and market conditions; operational and financial characteristics of the company; value of the company; key indicators of business performance; quality and corporate governance principles, the presence of «free float», the issuer's country, the availability of risk management systems (the ERM), profitable (or at least break even) time, transparency of reports – that is, those factors that provide investment interest in a wide range of investors - ie investors that are not prone to increased risk. Thus, ERM determines its share of business investment attractiveness. The main goal of our work is to determine the size of this share (ERM impact on the investment attractiveness).

According to financial concept “Risk and Return” those objects of investments, which have a higher risk should give a higher return [Brown Consultancy Services]. However, it is rather difficult to assess the degree of risk exposure of companies that are not public and do not have a systematic assessment of the market risk coefficient (β). ERM in turn, is an integrated risk management tool for companies, modeled in accordance with the risk appetite and management strategy of the company, and the degree of its efficiency has a direct impact on the profitability of the business, offered to strategic investors and partners as a tool for enhancing the

attractiveness of the project. Especially in cases where a risk appetite does not correspond to the riskiness of the project. In other words, the effectiveness of corporate risk management system must be taken into account in the calculation of the discount rate to assess the effectiveness of investment projects:

$PV = \sum \frac{CF}{(1+r)^n}$, where r - the discount rate adjusted for the level of efficiency of risk management

5. Methods for Determination of Discount Rate

Usually, the discount rate depends on the fundamental characteristics of the investment project to be analyzed, such as:

- Sources of financing
- The planning horizon
- Payback period
- Duration of the project and its life cycle
- Project Risk Level

That is, the discount rate is a function of these characteristics and in general, the formula of the discount rate is as follows: $RR=f(x_1, x_2,x_3,x_4,\ldots)$, where

RR – adjusted discount rate; $x_1, x_2,x_3,x_4,\ldots$ - factors affecting the discount rate.

As a rule, average cost of capital is chosen as the base discount rate. WACC is adjusted for the possible risk factors associated with the implementation of a specific project, or investing in a certain company, and the expected rate of inflation.

In general, there are three basic ways to determine the discount rate of investment projects: capital asset pricing model (CAPM), the model of weighted average cost of capital (WACC) and the method of cumulative construction. In this case x1 - the discount rate, which is determined by one of the selected methods using; x_2, x_3, x_4 .... - a risk premium depending on the nature of the investment.

Risk premium are ranked according to the nature of the investment [Yakovleva IN, 2009] (Table 1).

Level Of Risk	Investment Type	Risk Premium
low	Replacement investments (replacement of facilities - equipment, machinery more sophisticated, requiring more highly skilled workers, new approaches to the production, the construction of new plants to replace old ones on the same or another location). New investments (new capacity for the production and promotion of old products)	3–5
medium	New investments (new capacity for the production and promotion of the production lines that are closely related to the existing). Investments in applied research and development, directed to specific goals	8–10
high	New investments (new capacity for the production and promotion of the production lines not related to the initial activity of the company)	13–15
excellent	Investments in fundamental research and development, the objectives of which are not yet precisely defined, and the expected result is not exactly known	

Table 1. Premiums for the risk of investment projects

In this case, the risk management efficiency determines the amount of the risk premium and is a complex indicator for the company as a whole.

CALCULATION OF THE DISCOUNT RATE BY CAPM

The basic formula for calculation is as follows:, $E(R_i) = R_f + \beta_i(E(R_m) - R_f)$, where: $E(R_i)$ - the expected return on assets; R_f - risk-free interest rate (usually interest on government bonds); β_i (*beta*) the sensitivity of the security of return (portfolio) with respect to the profitability of another portfolio, as is often performs the average market portfolio.

$\beta_i = \frac{Cov(R_i,R_m)}{Var(R_m)}$, where $E(R_m)$ –ожидаемая доходность рынка; $E(R_m) - R_f$ – market risk premium; $E(R_i) - R_f$ – the risk premium of an asset: $E(R_i) - R_f = \beta_i(E(R_m) - R_f)$

Assumptions of the model:

1) The expected market return, as a rule, is estimated by the arithmetic mean based on historical data S&P500 portfolio.

2) As the risk-free rate of return the arithmetic mean of the historical risk-free rates of return is used.

For non-public companies unleveraged beta is used: $\beta_u = {}^{\beta_i}/_{1} + (1-t)^{W_d}/_{W_e}$, where

β_i — levereged beta; (1- t) — tax shield; w_d — the share of debt in the capital; w_e the share of equity in the capital.

Unleveraged beta can not be used for companies with debts [Fernandez Pablo.,2003].

The other two ways of calculating the discount rate are: method of WACC and the cumulative method.

A wide variety of methods and sources of information for calculations gives a risk-free rate of return as determined in the range of 2% to 10%, which is totally unacceptable for accurate calculations of the discount rate.

Furthermore, none of the methods do not take into account the role of the ERM in the company management,

Taking into account the existing methods for calculating the discount rate, as well as the results of the study the relationship of stakeholders to the effectiveness of corporate risk management systems [Makarova VA 2015] we have proposed an algorithm for determining the discount rate projects, considering both the current practice of capital management, as well as the level of investment attractiveness to stakeholders, and evaluation of the corporate risk management efficiency as an integral indicator of business risk.

6. The Algorithm for Determining the Discount Rate, Depending On the Efficiency of the Company Risk Management.

The study of the views of potential investors, company management, the existing shareholders and other interested parties with regard to the factors of efficiency of the corporate risk management, based on the Kendall criterion of consistency, revealed the following most important features of effective risk management (Table 2).

Symbol	Indicators	Number of Responses	Mean	Std. Deviation	Min	Max
k_1	Diversified structure of suppliers and customers	17	4,71	1,799	2	7
k_2	Profitability and turnover of the company is better than the average for the industry or activity	17	4,00	1,528	2	6
k_3	WACC is lower than the industry average, or decreased during the study period	17	3,71	2,138	2	8
k_4	Availability of information in the media	17	4,14	1,676	1	6
k_5	Interest coverage ratio, ICR is greater than 1	17	4,29	1,380	3	7
k_6	Financial security ratio is less than 3	17	5,86	1,773	4	8
k_7	The current ratio is greater than 1	17	5,57	1,813	3	8
k_8	The risk management policy includes a special relationship to the key risks;	17	4,57	2,370	2	8
k_9	Risk management is in a strict compliance with the selected standard	17	3,14	1,574	1	5

Table 2. Descriptive analysis

N	17
Kendall's W[a]	0,716
Chi-Square	11,055
df	5
Asymp. Sig.	0,050

Table 3: Test Statistics

As a result, based on the distribution of respondents' answers the following equation was obtained. This equation describes the evaluation of efficiency rating of the corporate risk management:

$R = 0{,}12 * k_1 + 0{,}1 * k_2 + 0{,}11 * k_3 + 0{,}1 * k_4 + 0{,}11 * k_5 + 0{,}14 * k_6 + 0{,}12 * k_7 + 0{,}12 * k_8 + 0{,}08 * k_9$,

where: R – the efficiency rating of corporate risk management;

k_1 …k_9 - indirect indicators of efficiency of risk management, presented in table 2;

Performance calculation method is presented in Table 4.

№	Indicator	How to define	What demonstrates
k_1	HHI;	Herfindahl – Hirschman index; $HHI = \sum_{i=1}^{n} S_i^2$, where S_i - share of the customer	Diversification of suppliers structure
k_2	I_{ROS}	$ROS_{company}$ / $ROS_{industry}$ (ROS=Return On Sales) ROS =net income/sales	Increasing the company's profitability over the average margin on economic activity
k_3	I_{wacc}	$WACC_{industry}/WACC_{company}$	The excess of the industry average WACC over the cost of capital of the company
k_4	I_{INF}	Analysis of media	Presence of announcements, press releases or other information
k_5	ICR	$ICR = {EBIT}/{Annual\ interest\ expences}$	The company's ability to pay interest on its loans
k_6	FSR	Financial security ratio=Debt/EBITDA	The company's ability to repay existing liabilities
k_7	CR	$CR = \frac{CA}{CL}$	Current ratio
k_8	I_{KR}	Analysis of the media and corporate documentation	Policy of risk management involves special risks related to the core;
k_9	I_C	Analysis of the media and corporate documentation	Risk management is implemented strictly in accordance with the selected standard

Table 4. The methodology of calculating

In order to form a ranking calculation results were coded as follows: 1 - high level of efficiency of risk management, 2 - medium and 3 - low.

A special feature of this equation is that the respondents had a fairly broad view of corporate risk management systems and the estimation of corporate risk management efficiency was carried out from the perspective of an external expert. Since the methodology of risk management is not subject to disclosure, the expert opinion seized two interrelated areas of analysis: evaluation of efficiency ERM systems and the investment attractiveness of the company to a specific corporate risk management system, ie indirect signs of efficiency of risk management.

Based on the definition of efficiency of corporate risk management, we can conclude that the perception of efficiency implemented risk management systems by stakeholders at 30% is due to direct processes and procedures, risk management, and at 70% - the methods of risk management, causing increase of the investment attractiveness of the analyzed business[1].

In other words, 30% of the risk premium is determined by the imperfections of the existing risk management system, In other words, 70% due to the fact that the company is taking on additional risk and controls it in order to provide a better return on invested capital.

Therefore in accordance with the logic of the proposed formation of the risk premium, the discount rate will be determined as a function of the following variables: Historically rate of return with an acceptable level of risk for the owners, premium for the efficiency of risk management, premium for risk management in respect of investment attractiveness: RR=f(Rf;RPef, RPatt).

Thus, in our opinion as the discount rate is advisable to use weighted average cost of capital, adjusted for the rate of efficiency of the corporate risk management system, calculated in accordance with the expectations of stakeholders.

WACC can be adjusted in terms of possible risks associated with the implementation of a specific project or investment in certain company, if necessary, as well as by the expected inflation rate.

7. The Practical Implementation of the Proposed Model

The analysis of data of more than 100 companies revealed that 22 compamies have sufficient information to test the hypothesis and the formation efficiency rating in the range of statistical significance before and after measures to introduce or upgrade a corporate risk management system.

Analysis of data have been processed more than 100 companies The result of the calculation of the discount rate on the basis of the proposed algorithm is presented in Table 5.

[1] This observation is supported by studies in the field of ERM and the cost of capital, carried out by &P and LTD "Zeb / ROLFES.SHIRENBEK. ASSOCIATES" in Russia, which suggests that the "proportion of risk management in the middle value of the interest rates on new issues of corporate bonds depends solely on the industry. When it comes to the insurance company, it is 100% when about The asset management, up to 80% if a trader, custodian or registrar, then 10-15% if of the industry, while about a third assessment "[C . Ragulina, 2010]

№	Rank (R)		Place in the ranking		Changing the corporate risk management system	WACC		Discount rate (WACC*R)	
	Value before and after the measures of implementation or upgrading of corporate risk management system								
	before	after	before	after		before	after	before	after
1	2,00	1,52	16	1	improved	44%	48%	0,88	0,73
2	1,75	1,54	8	2	improved	14%	15%	0,25	0,24
3	1,61	1,57	3	3	remains unchanged	12,9%	16,3%	0,21	0,26
4	1,77	1,58	9	4	improved	12,8%	0,1130	0,23	0,18
5	2,00	1,64	15	5	improved	14,1%	0,2820	0,28	0,46
6	1,98	1,68	12	6	improved	11,70%	11,70%	0,23	0,20
7	1,59	1,72	2	7	worsened	27,5%	0,2360	0,44	0,41
8	1,65	1,72	4	8	worsened	0,1450	0,1450	0,24	0,25
9	1,93	1,73	10	9	improved	0,0426	0,0459	0,08	0,08
10	1,96	1,76	11	10	improved	12,70%	12,70%	0,25	0,22
11	1,99	1,93	14	11	improved	0,1397	0,0660	0,28	0,13
12	1,50	1,94	1	12	worsened	12,90%	16,30%	0,19	0,32
13	1,99	2,01	13	13	remains unchanged	0,1397	0,0660	0,28	0,13
14	2,37	2,03	19	14	improved	0,1400	0,1410	0,33	0,29
15	1,72	2,10	6	15	worsened	0,1450	0,1450	0,25	0,30
16	1,72	2,10	7	16	worsened	0,1450	0,1450	0,25	0,30
17	1,68	2,14	5	17	worsened	0,1630	0,1420	0,27	0,30
18	2,10	2,21	18	18	remains unchanged	0,0330	0,0450	0,07	0,10
19	2,08	2,34	17	19	worsened	0,0672	0,0934	0,14	0,22
20	2,42	2,34	20	20	remains unchanged	0,0780	0,0440	0,19	0,10
21	2,67	2,47	21	21	remains unchanged	0,1630	0,1420	0,44	0,35
22	2,00	1,52	16	1	improved	0,44	0,48	0,88	0,73

Table 5. The calculation of the efficiency rating of corporate risk management and discount rates

Based on these results we can say that 35% of companies carry out activities for the implementation or upgrade of risk management the efficiency of risk management has decreased. A small amount of the sample does not allow for detailed statistical analysis of the reasons for this, but it is worth noting that the period of two years after the events is small enough to obtain a result of the corporate governance reforms. Therefore, the deterioration of some indicators may not be a negative consequence of ERM.

Further, a number of companies in the sample can be traced fairly high cost of capital.

The vast majority of these companies belong to the state. For such companies, risk management has significant value - the rating of most companies rose up after the events.

In 22% of companies did not observe a change in the overall ranking of risk management, but most of them declined the WACC, indicating a shift in emphasis towards the governance of credit risks. Improving risk management rating observed in 43% of companies, indicating the efficiency of risk management policies and the adequacy of the biennium, to obtain a result of carried out measures.

8. Conclusion

The resulting methodology of calculation of discount rate allows to evaluate the effectiveness of participation in business by the stakeholders and in accordance with their level of risk appetite.

Participation of key indicators of business performance as an indirect measure of estimation of efficiency risk management allows to approximate the expectations of stakeholders in relation to the received level.

Factor analysis of the indicators included in the rating can be used as an element of management in order to increase the investment attractiveness of the business.

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