ANALYSIS OF RISKS AND THEIR IMPACT ON ENTERPRISE PERFORMANCE BY CREATING ENTERPRISE RISK MODEL

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Abstract: The aim of this article is the analysis of impact of selected systematic and unsystematic risks to performance of the enterprises. For the realization this aim, we used secondary data of financial statements the selected company, which is representative of the Slovak food industry. Systematic risks were represented as ß coefficient, which has been modified to levered ß coefficient. Addition to the above ß coefficient, we analyzed also impact of market risk and country risk. These systemic risks were compared between the selected countries in the EU. The second group of risks represented risks arising from the internal enterprise environment. We can conclude that the most significant impact on performance of the enterprise has just financial risk. The value of this risk was determined by low current liquidity of the analyzed company. According to our calculations, it was confirmed that the unsystematic risks have a higher impact on performance of the enterprise as systematic risks. For confirming this conclusion was constructed Enterprise Risk Model (ERM), which consisted of selected financial indicators, systematic and unsystematic risk and prediction models. This ERM can be used in managerial practice in order to minimize, diversify and predict risks on global market.

Key words: risk models, systematic and unsystematic risks, ß coefficients, enterprise performance, Enterprise Risk Model.

Introduction

No economic subject or an enterprise can predict the results of financial, investment or other decisions in business because every activity and decision is risky (Shim and Siegel, 2008) on global market. Risk is the category that affects business existence and performance (Sitek, 2013). Enterprises are constantly undergoing various risks, whether of financial, business, information or personal origin. As stated in Kralovic and Vlachynsky (2011), for each financial decision you need to consider not only its expected profitability, but also the risks. It may be expressed as: "probability in some interval or standard deviation which measures the degree of variability of observed phenomenon"(Majtan et al., 2007). The risk is defined as the state of imperfect knowledge, where the decision-making subject is aware of various possible consequences of its decision and is able to estimate the degree of probability that this or other result will occur¨ (Buganova et al., 2012). The amount of risk depends on the probability and negative consequences that stem from the occurrence of the phenomenon. For example, the risk is the chance to achieve above-average return from the investment (Klucka, 2006). Risk identification is not a one-off. Risk identification is an activity that is evaluated

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POLISH JOURNAL OF MANAGEMENT STUDIES
Kisel'áková D., Horváthová J., Šofranková B., Šoltés M.

2015
Vol.11 No2

periodically or continuously, according to the purpose (Buganova et al., 2012). In the classification of business risks, it is necessary to pay attention to the risks that come into models of calculating cost of equity and subsequently in the calculation models of business performance. For calculation of discount rate for the valuation of the enterprise and its performance is necessary to define the risks of business activity. The basic breakdown is as follows (Marik, 2011):

− business and financial risk,
− systematic and unsystematic risk on the market (were investigated in empirical studies by Olibe et al., 2008; Lopez-Espinosa et al., 2013; Vicente et al., 2015).

Business risk consists of:

− sector risk – dynamics of the sector, sector dependence on the business cycle, innovation potential of the sector, determining trends in the sector,
− risk of the market on which the business operates – market capacity, risk of achieving lower sales, the risk of market penetration,
− risk of competition – competition and competitiveness of the products, prices, quality, research and development, advertising and promotion, distribution and service,
− management risk – vision, strategy, key employees, organizational structure,
− risk of the production process – evaluation in terms of production risk, technological opportunities of production, labour force, suppliers,
− other business risk factors – level of fixed costs, position of the business towards customers and suppliers, entry barriers into the sector.

Financial risk can be evaluated through indicators: Debt/Equity, EBIT (Earnings before interests and taxes) / interest expense, loan repayments from Cash Flow, share of net working capital on current assets, current ratio and quick ratio, Average Collection Period, average period of inventories.

The methods of analyzing and quantifying of the risk are well known statistical tools and techniques to express numerical level of risk (Fotr and Soucek, 2011).

Methodology and methods

The aim of the study is to analyse business risks with focus on financial risks and to create risk models which solve the impact of risks on the enterprise financial performance and can minimize, diversify and predict risks. We investigate the difference how systematic and unsystematic risks affect business performance in the EU countries (in years 2003-2014). Part of the objective was to analyze selected systematic and unsystematic risks in the selected sector in Slovakia (food sector). Data processed in this article were provided by the sector itself.

For the creation of Enterprise Risk Model (ERM) were used secondary data from the financial statements of selected enterprise in the food industry for the years 2004 - 2013. Model ERM consists of selected:

− *financial indicators* (Current Ratio, Average Collection Period, Turn around Liabilities, Cash – to – cash, Debt Equity Ratio, Return of Assets, Return of

2015
Vol.11 No2

POLISH JOURNAL OF MANAGEMENT STUDIES
Kisel'áková D., Horváthová J., Šofranková B., Šoltés M.

Equity, Stability),

− *systematic and unsystematic risks* (Levered ß, Equity Risk Premium, Country Risk Premium, Total Risk Premium, *Risk premium for business risk, Financial risk premium, Risk premium for the capital structure, Risk premium for lower stocks liquidity),*

− *prediction models* (Altman Model, Index IN05, Index creditworthiness, Taffler Model, Springate Model, Fulmer Model, Balance sheet Analysis by Doucha I, Quick test).

The research hypothesis in this study is as follow:

H: We assume that unsystematic risks have a higher impact as systematic risks on the assessment of the enterprise performance. This hypothesis we will tested by quantification of systematic and unsystematic risks and the creation of enterprise risk model (ERM) in order to minimize and predict risks.

Before we mention processing methods and models used as CAPM model and model of Neumaierova - Neumaier which are applied to achieve the aim of this study, it is necessary to divide business risks into systematic and unsystematic. It should be noted that purely systematic risks and purely unsystematic risks do not exist. Table 1 shows the general distribution of risks into systematic and unsystematic.

Table 1. Classification of business risks

S/U	Risk	I/E	Risk specification
Unsystematic	Financial	Internal	Fundamental factor – Current Ratio
Unsystematic	Business	Internal	Fundamental factor – Return on Assets
Unsystematic	Lower stocks liquidity on the market	Internal	Fundamental factor – Equity
Unsystematic	Financial structure	Internal	Criterion - Interest coverage
Systematic	β	External	β , levered β, unlevered β, total β
Systematic	Equity Risk Premium	External	$ERP = R_m - r_f$
Systematic	Country Risk premium	External	CRP
$CRP = Default\ Spread * \dfrac{standard\ deviation\ in\ the\ equity\ market\ in\ the\ country}{standard\ deviation\ in\ the\ long\ term\ bond\ issued\ by\ the\ country}$			
Systematic	Inflation	External	Statistical Office of the Slovak Republic

For the calculation of unsystematic risks was applied the model by Neumaierova and Neumaier (2002) based on the valuation of equity. According to this model are defined following unsystematic risks (Table 2). Simultaneously those systematic risks affect business performance.

POLISH JOURNAL OF MANAGEMENT STUDIES
Kiseľáková D., Horváthová J., Šofranková B., Šoltés M.

2015
Vol.11 No2

Table 2. Calculation of unsystematic risk

Risk	Values	Criteria
Lower stocks liquidity premium (r_{LS})	$r_{LS} = 0\ \%$	E ≥3 mld. CZK E - equity
	$r_{LS} = 5\ \%$	E ≤ 100 mld. CZK
	$r_{LS} = (3\ \text{mld.} - E)^2 / 168{,}2 * 100\ (\%)$	100 mld. CZK < E < 3 mld. CZK
Business risk premium ($r_{business}$)	$r_{business} = 0\ \%$	EBIT/A ≥ Ie/PCZ*PK/A
	$r_{business} = 10\ \%$	EBIT/A≤ 0
	$r_{business} = ((X- EBIT/A)^2/ 10*X^2)*100\ (\%)$	0 < EBIT/A < Ie/DBCi*EDCi/A, X - average production power of the companies in the sector Ie - Interest expense DBCi – interest Debt and Borrowed Capital EDCi – interest Equity and interest Debt and borrowed Capital A – Assets EBIT – Earnings Before Interests and Taxes
Financial risk premium (r_{finan})	$r_{finan} = 0\ \%$	CR ≥1,2 CR - Current Ratio
	$r_{finan} = 10\ \%$	CR ≤ 1,0
	$r_{finan} = ((X- CR)^2/ (X- 1)^2*10)* 100\ (\%)$	1<CR< 1,2
Financial structure risk premium (r_{finstr})	$r_{finstr} = 0\ \%$	Interest coverage EBIT/Ie ≥3
	$r_{finstr} = 10\ \%$	Interest coverage EBIT/Ie ≤1
	$r_{finstr} = (3 – EBIT/Ie)^2/ 40 * 100\ (\%)$	1< EBIT/Ie < 3

Gradual Counting Risk Premium Model (GCRPM) with application of unsystematic risks and Capital Asset Pricing Model (CAPM) with acceptance of systematic risks were used to calculate the cost of equity valuation. The models are listed in the Table 3.

Table 3. Cost of equity valuation models

Model CAPM	$$r_e = r_f + \beta_L * ERP + CRP$$ $$\beta_L = \beta_u * \left(1 + (1-t) * (d/e)\right)$$ *r_e - equity value, ERP- Equity risk premium, CRP - Country risk premium* *β_L- levered Beta, β_u - unlevered Beta, d/e – debt/equity* Damodaran model (2014b) with the application of the country risk premium. This model accepts external - systematic risks - Equity risk premium ERP, Country risk premium CRP, systematic risk expressed by β coefficient. Analogy method with application of the recalculation of levered β was used to qualify β.

Model GCRPM	$$r_e = r_f + r_{business} + r_{finstr} + r_{finstab} + r_{LS}$$
	r_f - *Risk-free rate of return, $r_{business}$ - Risk premium for business risk, $r_{finstab}$ - Financial risk premium, r_{finstr} - Risk premium for the capital structure r_{LS} - Risk premium for lower stocks liquidity*
	Gradual Counting Risk Premium Model of Inka and Ivan Neumaier (2002) do not take into consideration external, macroeconomic risks. The model accepts internally unsystematic risks of the company, which are set using fundamental factors. Risks which are accepted: financial, business, capital structure and lower stocks liquidity on the market. Likewise accepts the risk-free rate of return of 10-year governments of Slovakia.

Empirical research results and discussion

One of the basic inputs for the calculation of the performance of enterprises with the application of systematic risks is the value of β coefficient and β pricing models (Hammami and Lindahl, 2013). According empirical statistical data, for an enterprise in the food industry the value of unlevered β is 0.66 and the value of levered β is 0.77. Figure 1 compares levered and unlevered β in selected European countries. Selection is formed by emerging market countries and developed countries. Unlevered β in the sector is the same for all selected countries. Only levered β varies, because data are supplemented by the influence of capital structure and indebtedness. Levered β reaches the highest figures in Greece and Turkey, the lowest unlevered β is in the market countries including Germany, Austria, France, Italy, United Kingdom and Poland (Filip et al., 2010).
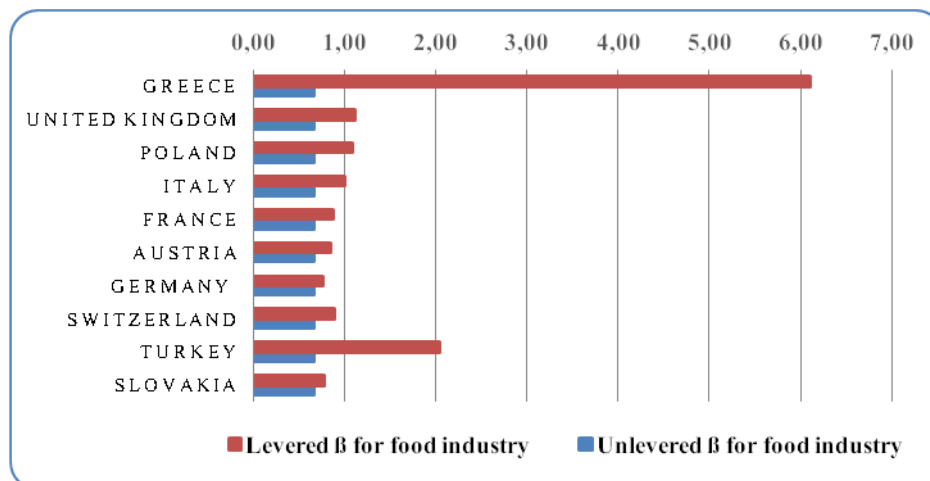

Figure 1. Comparison of levered ß and unlevered ß in selected countries of the EU for food industry in 2013

POLISH JOURNAL OF MANAGEMENT STUDIES
Kisel'áková D., Horváthová J., Šofranková B., Šoltés M.

2015
Vol.11 No2

Figure 2 shows the comparison of levered and unlevered β in Slovak food industry. The highest value of the levered β was reached from 2008 to 2010, 2012 and 2014. During these years the value of levered and unlevered β got near 0.9. That means that the risk of the market assets was higher than the average market risk. The increase in the β value led to an increase of cost of equity during that period and therefore caused the drop in performance of analyzed whole industry. We can assume that deterioration of β coefficient could be caused by influences of external economic environment and the economic crisis.
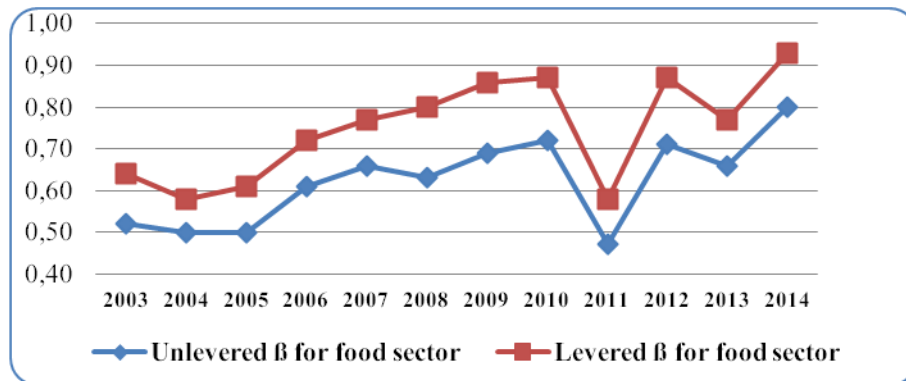

Figure 2. Comparison of levered ß and unlevered ß for Slovak food industry

From additional systematic risks for calculation of the cost of equity is necessary to mention the Country risk premium (CRP). Currently, Slovakia reaches 1.28 % well as in Poland. This risk premium is one the lowest within analysed countries. The country with the highest risk premium nowadays is Greece. Germany, Switzerland and Austria are countries that reach 0 risk premium. The comparison of risk premiums of selected countries is in the Figure 3.
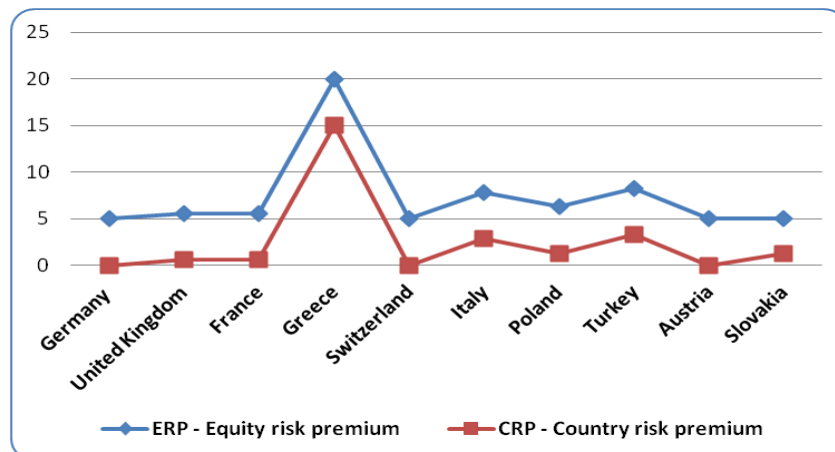

Figure 3. Risk premiums of selected European countries in 2013 in %

55

Equity and Country risk premiums were applied for the calculation of the cost of equity of the food sector in Slovakia. The evolution of the risk premiums is shown in the Figure 4. The largest value fluctuations of impact of ERP and sector TRP were for the years 2008 to 2012. This was because the debt of the enterprises in the food industry in Slovakia was growing. In 2011 and 2012 the Equity risk premium increased as well. The total risk premium for Slovakia reached its peak in 2012.
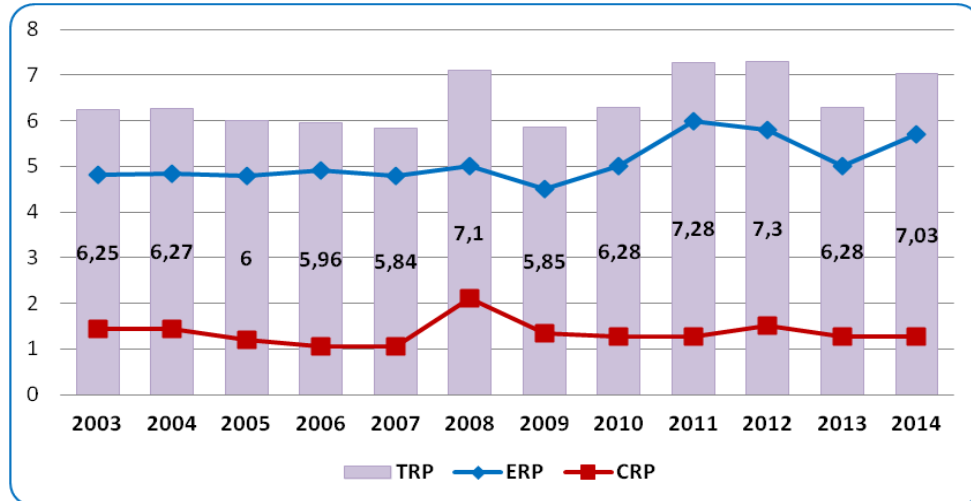

Figure 4. Risk premiums for Slovak food industry in %

The next Figure 5 presents the new created model – Enterprise Risk Model (ERM) for selected enterprise in the food industry in the Slovak Republic with impact of risks. This model expresses the influences between selected eight financial indicators, selected eight systematic and unsystematic risks and selected eight prediction models. All values of input indicators were calculated using the scoring method. Using this method were the best values of input variables assigned a maximum of 5 points; the worst values of the input variables have been assigned 0 points.

The best performance reached the Slovak company which was analyzed by us in 2013 (see Figure 5). On this positive status participated systematic and unsystematic risks. In the sphere of systematic risks there happened an improvement of unlevered β, whereas this improvement was influenced by levered β which high is 0.66. If we would like to compare levered β of the food industry with the same value in Germany, we can say that the Slovak Republic reached the value that is only 0.01 higher than Germany. The Slovak´s ERP is in comparing with other countries of Europe are at the comparable level as German and as was written before, the height of CRP is 1.28%. However the improvement of performance was influenced by falling of unsystematic risks and mainly the falling of financial risk due to the improvement in the current company´s liquidity. By this

56

POLISH JOURNAL OF MANAGEMENT STUDIES
Kiseľáková D., Horváthová J., Šofranková B., Šoltés M.

2015
Vol.11 No2

we can confirm the hypothesis which was established in the part Methodology and methods. Unsystematic risks have greater influence on the company´s performance than systematic risks. This detection we can confirm with this, that systematic risks are elicited from the financial indexes which are the key indicators of company performance. In the year 2013, the company analyzed by us reached the best position in the ERM – Enterprise Risk Model, from the viewpoint of financial performance and from the viewpoint of business success, too. In addition to normal liquidity contributed to improving the turnover cycle of money accelerated, the indebtedness of company decreased and the profitability of company increased. As a result of improvement these parameters increased stability of the company about 1 and it achieves value 3.5. If we monitored the results of this company more detailed, so in 2013 there was eliminated all unsystematic risks and the development of financial performance, risks and business success were stabilized at one point. Overall point score of company´s performance is 93 points what with the maximum 120 points assumes great success in reached performance. The best results achieved the company in future business success when from 40 points reached 35.4 points.
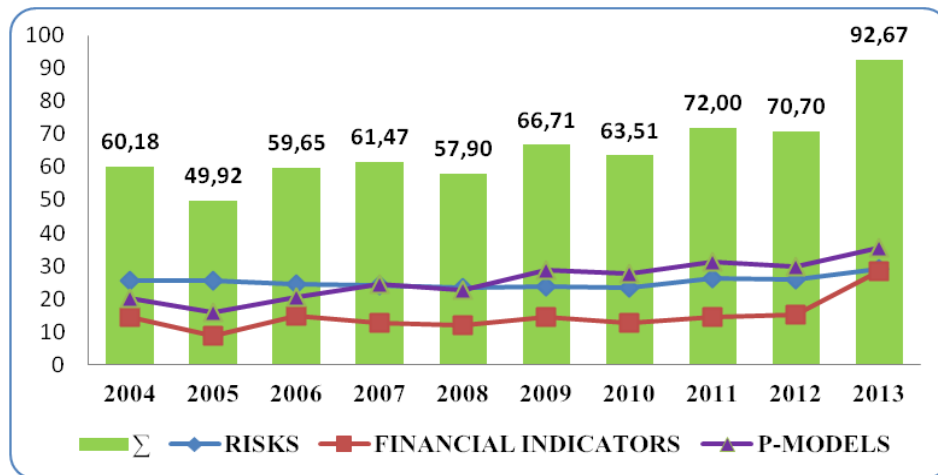

Figure 5. Analysis of point values for selected input variables for ERM

The other way around, the company reached the worst results in years 2005, 2006 and 2008. These years were qualified with lower financial performance and higher unsystematic risks. Particularly, the year 2005 is signed by the high indebtedness of the food sector.
In the following Figure 6 is constructed 3 - dimensional Enterprise Risk Model (ERM) for our selected company created by software STATISTICA V.12. This model particularly confirms risk changes in business performance in years 2004-2013 and during global crisis (can be associated with results by Chira and Marciniak, 2014).
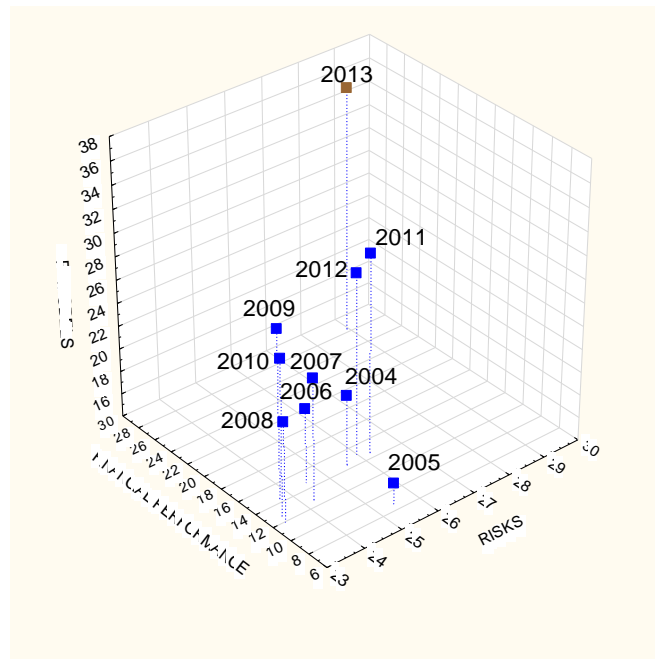
2015
Vol.11 No2

POLISH JOURNAL OF MANAGEMENT STUDIES
Kisel'áková D., Horváthová J., Šofranková B., Šoltés M.

Figure 6. Model ERM (3D model) using software STATISTICA V.12

Conclusions

Finally, it is necessary to evaluate the applied capital asset pricing models. Based on above mentioned conclusions, we can assume that the most appropriate model for quantification of cost of equity will be CAPM (Heckova et al., 2014). This model is necessary to modify by conditions of Slovak Republic. Issue considering is the encompassment of the financial risk, which is specific for food industry, since as according the calculations is evident that liquidity is the poor place of this sector.

Based on the above mentioned it is possible to set the following general conclusions, which we have reached also in our study (Sofrankova et al., 2014):

1. Despite numerous problems with the application of CAPM, this model represents the only theoretically based model of Cost of Equity valuation. It is also the model recognised throughout the world as a model of calculation discount rate of market valuation.
2. It is recommended to apply this model in such a way that market risk and β were applied based on the US data and these were supplemented by Risk premium of given country.
3. It is recommended to modify and supplement Cost of Equity by significant Equity Risk premiums of particular enterprise, with emphasis on replenishment of unsystematic risk.

58

POLISH JOURNAL OF MANAGEMENT STUDIES
Kisel'áková D., Horváthová J., Šofranková B., Šoltés M.

2015
Vol.11 No2

4. If the requirement of diversification is not met, it is recommended to use the calculation of Total β. However, this method of calculation leads to high values of equity valuation. In this case it is advisable to apply Gradual Counting Risk Premium Model of valuation of equity (GCRPM).

5. ERMs can be used in managerial practice for effective risk management in order to minimize, diversify and predict risks on global markets and to streamline enterprise performance (Olton and Glowacki, 2014).

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ANLIZA RYZYK I ICH WPŁYW NA WYDAJNOŚĆ PRZEDSIĘBIORSTWA POPRZEZ TWORZENIE MODELU RYZYKA PRZEDSIĘBIORSTWA

Streszczenie: Celem niniejszego artykułu jest analiza wpływu wybranych systematycznych i niesystematycznych zagrożeń na funkcjonowanie przedsiębiorstwa. Dla realizacji tego celu użyliśmy wtórnych danych sprawozdań finansowych wybranej firmy, która reprezentuje słowacki przemysł spożywczy. Ryzyko systematyczne było reprezentowane, jako współczynnik ß, który został zmodyfikowany do współczynnika ß levered ("dźwignia beta"). Poza powyższymi współczynnikiem ß, przeanalizowaliśmy również wpływ ryzyka rynkowego i ryzyka kraju. Te ryzyka systemowe porównane zostały pomiędzy wybranymi krajami UE. Druga grupa zagrożeń stanowiła zagrożenia wynikające z wewnętrznego otoczenia przedsiębiorstwa. Możemy stwierdzić, że największy wpływ na wyniki działalności przedsiębiorstwa ma właśnie ryzyko finansowe. Wartość tego ryzyka została określona przez niską płynność bieżącą analizowanej firmy. Według naszych obliczeń, zostało potwierdzone, że zagrożenia niesystematyczne mają większy wpływ na wyniki działalności przedsiębiorstwa, niż zagrożenia systematyczne. Na potwierdzenie tego wniosku zbudowany został model ryzyka przedsiębiorstwa (ERM), który składał się wybranych wskaźników finansowych, ryzyka systematycznego i niesystematycznego i modeli prognostycznych. Model ten może być stosowany w praktyce menedżerskiej w celu zminimalizowania, zróżnicowania i przewidywania ryzyk na rynku globalnym.

Słowa kluczowe: modele ryzyka, ryzyka systematyczne i niesystematyczne, współczynniki ß, wydajność przedsiębiorstwa, Model Ryzyka Przedsiębiorstwa.

風險分析及其影響企業績效通過創建企業風險模型

摘要：本文的目的是將企業業績選定系統性和非系統性風險的影響進行分析。為實現這一目標，我們用財務報表所選擇的公司，這是代表斯洛伐克食品行業的輔助數據。系統性風險被表示為ß係數，它已被修改為槓桿係數ß。除了上述ß係數，我們也分析了市場風險和國家風險的影響。這些系統性風險所選擇的歐盟國家之間進行比較。風險的第二組代表從企業內部環境產生的風險。我們可以得出結論，對企業的性能的最顯著影響剛剛財務風險。這種風險的價值是由公司分析的低電流的流動性決定的。根據我們的計算，它證實了非系統性風險對企業為系統性風險更高的性能的影響。為了證實這一結論，構建企業風險模型（ERM），其中包括了選擇的財務指標，系統性和非系統性風險和預測模型。這ERM可以用在管理實踐，以盡量減少，多樣化和預測全球市場上的風險

關鍵詞：風險模型，系統性和非系統性風險，ß係數，企業績效，企業風險模型