TRADE AND MANUFACTURING COMPANIES RISK ANALYSIS

KULCSÁR Edina
Partium Christian University, Faculty of Economics and Social Science, Department of Economics, Oradea, Romania
kulcsar.edina@partium.ro

Abstract: *Risk assumption is a key element of profit generation and hereby of shareholder capital maximizing. Therefore the determination and measurement of risk have become an essential task for companies. The main purpose of this research is to analyse corporate risk of companies acting in two sectors of economy: trade and manufacturing. Financial literature shows many risk quantification methods as variance, standard deviation, etc., but according to present study aims, we use for corporate risk analysis two dynamic risk measures: Degree of Operating Leverage (DOL), Degree of financial Leverage (DFL). The investigation is based on Hungarian companies data for five years (2013-2017). The database used for risk analysis is ensured by data from financial statements of trading companies (1077 companies) and companies operating in the manufacturing sector (638 companies). The calculations were carried out using different packages of R statistics system. In the first part of study, it was calculated the basic statistical characteristics of above mentioned two leverage ratios for trading and manufacturing companies. Then we plot the results with boxplot diagram in order to show the dispersion of investigated data and to ensure a better comparison of results. According to Degree of Operating Leverage (DOL), the results shows, that excepting one period (2014), the manufacturing companies risk level is greater than trade companies. This means that investigated manufacturing enterprises have to reconsider their functioning and to optimize their costs, on aspect of fix costs. In term of Degree of Financial Leverage (DFL), the results obtained show that manufacturing companies' riskiness is higher than trading firms. This means that have to pay more attention to the level of indebtedness because this may be linked to financial risk. The coefficient of variance show extremely high values which drew attention on great spatial heterogeneity of trade and manufacturing companies in term of Degree of Operating Leverage (DOL) and Degree of Financial Leverage (DFL). We can conclude that solution for a proper risk analysis may be the grouping of companies' sample by different features.*

Keywords: *corporate risk; risk measurement; degree of operating leverage; degree of financial leverage; risk analysis; standard deviation; coefficient of variance; quartiles; heterogeneity.*

JEL Classification: *G3; G30; G32.*

1. Introduction

Risk is one of the most determinative, but at the same time, one of the most controversial questions of economics The rapid and often unpredictable changes in the economic environment, globalization and the strengthening of competition have place even more emphasis on the importance of risk-taking. Companies need to

take risk to ensure their subsistence, the necessary performance, the continuous adaptation to economy and customers' needs, the profit achievement, briefly the competitive functioning. The balance between the performance and the risks involved in it can be decisive for companies.
In order to determine the risk level, it is essential to map and quantify risk factors. Moreover, working out activities for managing them should be important, as well. Expressing corporate risk with right values is not an easy task. The aim of present paper consists in comparative analysis of corporate risk of firms acting in different sectors (trade and manufacture). In our analysis we quantify corporate risk by two leverage ratios Degree of Operating Leverage (DOL) and Degree of Financial Leverage (DFL) representing the main components of company's total risk.

2. Review of literature

Risk is an influential factor of economic environment. There are many theories about risk in literature, but I present only the most determinative ideas. Alastair (2009) defines risk as a chance, probability of loss, in his book gives more definitions of the risk and the most commonly mentioned: the probability of variant results, the deviation from the expected results, the symmetrical chance of gain and loss. Gallati (2003, p. 8) defines the risk as "a situation in which there is a possibility of deviation of expected result from the desirable result". Despite the fact that risk is mostly a symmetric concept, when we are talking about the deviation from the expected result, it is mostly used in a negative sense, as a "probability of negative event occurring". An important feature of the risk is that the time of occurrence of unfavourable events, the consequence and the gravity of its impact are uncertain and unpredictable. According to Bélyácz (2004, p. 1) "Risk and uncertainty are the most controversial phenomena in economics. It has never been the subject of controversy that both of them affect economic decisions..."It is essential to deal with specific risks of companies, basically with the economic and financial risks. According to Conklin (2002) the economic risk is reflected in the fluctuations of corporate's outputs, that cannot be predicted by company's management. Many researchers think that economic risk means negative change in revenue, cost and market share. Gabriel and Baker (1980) consider that economic risk is appears in the dynamics of net operating results and net cash flow. According to them, the relative standard deviation of operating profit is in close connection with the level of economic risk, so if the indicator shows a high value the economic risk is high. Besides the individual and company specific risks, there are some other independent risk factors against which companies have to defend. These include the effect of whole macroeconomic environment, the changes of economic competition's rules and the unpredictable and less favourable changes of laws, effects of globalization. In their book, Oxelheim and Wihlborg (2008) deal with definition of macroeconomic risks and they made a quite distinction from macroeconomic, company- specific and sector-specific risk. Santoro and Gaffeo (2009) think that the success and failure of company is significantly affected by the macroeconomic risk, but the intensity of the impact may vary depending on sector in which the corporate is acting in. According to Colquitt (2007), the classification of

corporate risks should take into account the different sector-specific risks. In the quantification of risk, it may be important to identify sector-specific risks, as they can be used to select appropriate risk measurement methods and corresponding indicators. In the comparative risk analysis we also take into account that results of two risk indicators may be interpreted carefully, because a relatively high value for companies operating in one sector does not necessarily mean quite high value for companies in the other sector. So, this is why we should take into consideration the main features of sector which we analysis. In the financial literature we can read about many risk indicators (standard deviation, variance, Value at Risk, Expected Shortfall). Besides these we can read about leverage ratios: Degree of Operating Leverage (DOL) and Degree of Financial Leverage (DFL). These leverage ratios are especially important because they are sensitivity ratios, so through their analysis we can find out step by step the cause which lead to the specific evolution of indicator. This is the reason why we used for present research these leverage ratios ratios.

Brealey and his co-authors (2014) in one of their studies deal with the average DOL values of companies operating in different sectors. The study embraced 20 years' time interval, between 1990 and 2010. The authors classified companies in two large groups. One group constituted the companies with lower DOL value and the second group the companies with larger DOL values. The analysis shows that lower DOL values were present at companies operating in electric utilities (0.39), food (0.97) and clothing industries, while companies that were operating in steel industry (2.31), in the paper industry (1.50) and in the machinery industry (1.49) had the larger average DOL value and higher operating risk.

Kumar (2017) analyses the companies operating in Indian steel industry. He tries to find out whether there is a relationship between degree of financial leverage (DFL) and earnings per share (EPS). He based his analysis on the financial statements of the companies operating in steel industry between the years 2006-2015. The result of the study shows there is a strong but negative relationship (-0.7779) between DFL and EPS in case of Indian steel companies. This means that if the degree of financial leverage increases, namely the cost of capital increases the earnings per share (EPS) decreases. This confirms that DFL has an effect on companies' profitability.

3. Research methodology

Financial literature shows distinct interpretation of corporate risk, including the concepts of financial and operational risk. We consider that it is indispensable to clarify the concepts and interpretations, on which we have built the overall risk of enterprises' functioning, including operational and financial risks.

One of the most important theorems of financial management is the "return- risk trade off", which means that higher risk must be assumed only if higher return belongs to it. According to this, the increase of return (profit) is in close connection with risk. According to Modigliani's and Miller's proposition II., the extent of return on capital depends on two factors, on the one hand on the return on assets, on the other hand on the capital structure of the company. The component a. (Return on Assets)

may be linked to the company's assets side and it is significantly influenced by the nature of company's operating activities, so it is called operating leverage, which can be considered as operational risk (business risk). The component b. is determined by the company's financing policy and on cost of debt. The component b. includes de Debt/Equity ratio, of which name in English literature is *leverage*. If the company does not use debt financing the Return on Equity is equal with Return on Assets. Therefore, the component b. appears and has great importance only if in the company's capital structure appears debt financing, which means greater risk exposure. Debt financing may increase the Return on Equity if the Return on Equity is greater than Cost of debt, but with this the financial leverage, and the financial risk (Ross et al., 2013, p. 532) also increase.

In the narrow sense, we can divide the firm's total risk into two parts: the first is the risk of the company's assets side, which depends on firms' operating activities (its name is operational business). The second one depends on companies' capital structure, namely on the debt ratio, so it is called corporate financial risk (Ross et al., 2010, p. 518). In almost all books dealing with corporate finance, I have found that firm's risk measure is the Degree of Combined leverage (DCL) which consists of two basic elements: the Degree of Operational Leverage (DOL) and the Degree of Financial Leverage (DFL). In the literature, the DOL and DFL indicators belong to the category of sensitivity indicators.

The DOL is an elasticity indicator, which reflects the ratio of the changes in Sales and changes in Earnings Before Interest and Taxes (EBIT).

DFL shows the percentage changes in net income, which results from changes in operating profit.

The formula of DFL highlights the close relationship between the degree of financial leverage and cost of debt. If there is no debt in a company's capital structure, the value of DFL is 1, which means that 1% changes in operating profit causes 1% changes in net income (EPS). If interest expenses appear in Income Statement, the DFL value is greater than 1, which also means a higher financial risk level. So, DFL is really relevant when the company uses debt financing such as credit, for which fix costs can be linked (Illés, 2007). There is a direct, positive relationship between DFL value and the cost of debt. The credit financing can provide many advantages. Firstly, it has a positive effect on the variability of profitability, but only up to a certain point. The degree of financial leverage can also be an essential tool in determination of borrowing limit and tolerable risk level because the exceeding of them may pose serious threats to the company's overall activity and its financing policy.

In favourable circumstances, the higher DFL value provides an opportunity to corporate's profit increase when the Return on Assets is greater than the cost of debt. However, this also leads to an increase of a company's financial risk. According to Damodaran (2015), under favourable circumstances, the cost of debt may increase the EPS. At the same time, in case of companies with debt financing, the volatility of EPS influences the EBIT in a greater way. This increases the risk of capital investment of company (Damodaran, 2015, p. 119, Berk - DeMarzo, 2014, p. 496).

The empirical research was based on Hungarian enterprise data for five years (2013-2017). The database used for risk analysis is based on data from financial

statements of Hungarian trading companies (1077 companies) and companies operating in the manufacturing sector (638 companies). The calculations were carried out using different packages of R statistics system. In the first part of empirical research, it was calculated the basic statistical indicators of two leverage ratios of trading and manufacturing companies. Then we plot the results with boxplot diagram in order to show the dispersion of investigated data and to ensure a better comparison of results.

4. Results of research

The empirical analysis in which we carried out a comparative risk analysis of the Hungarian trading and manufacturing companies contains more steps. First, we determine of Degree of Operating Leverage (DOL) and Degree of Financial Leverage (DFL) for trading and manufacturing companies. Then, we present the main statistical characteristics of investigated trade and manufacturing companies' two risk indicators. For a better comparison of obtained results we plot values for each risk indicator and each sector.
In the Table 1. it can bee seen the main statistical features of Degree of Operating Leverage (DOL) for investigated trade and manufacturing companies.

Table 1. The investigated trade and manufacturing companies DOL indicators (2014-2017)

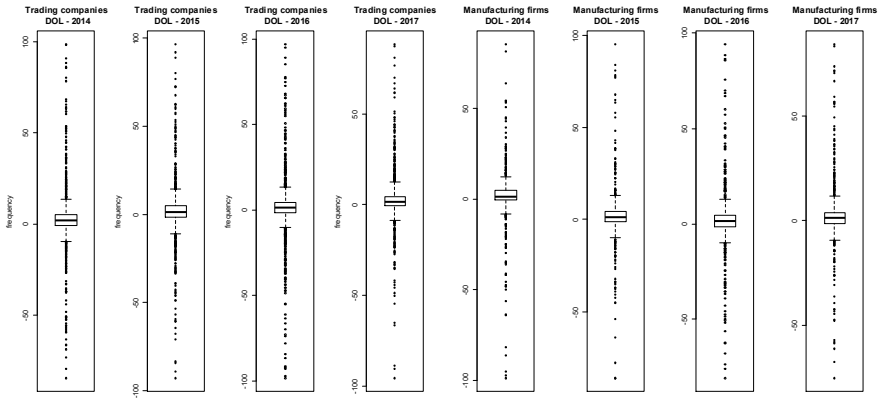
	2014		2015		2016		2017	
DOL	Trade companies	Manufacturing companies	Trade companies	Manufacturing companies	Trade companies	Manufacturing companies	Trade companies	Manufacturing companies
Minimum	-84.81	-98.76	-92.79	-86.19	-98.56	-80.95	-95.66	-75.13
1. Quartile	-0.93	-0.44	-1.57	-1.29	-1.72	-1.42	-0.83	-1.39
Median	1.68	1.60	1.41	1.37	1.06	1.24	1.42	1.18
3. Quartile	4.93	4.76	4.76	4.52	4.21	4.48	4.51	3.99
Maximum	98.57	85.53	96.39	95.16	96.54	94.01	88.10	83.97
Mean	2.43	1.49	1.82	2.12	0.94	1.95	2.57	2.57
Standard deviation	16.72	15.46	16.59	15.64	17.65	16.77	14.02	15.63
Coefficient of variance (%)	689.27%	1040.45%	910.23%	737.08%	1876.78%	858.81%	545.90%	608.39%
Skewness	0.52	-1.49	0.27	0.65	-0.32	0.46	0.23	0.73
Kurtosis	9.98	14.89	9.51	12.28	10.73	9.71	13.40	8.58

Source: own calculations using R statistical system

During the investigation of statistical characteristics of each year, we can observe that in 2015 and 2016, the manufacturing companies' average DOL values shows higher values than in case of trade firms, which means the profit/loss amplifier effect and also operating risk level is relatively high. In 2014 and 2017, the contradictory can be seen. Studying the evolution of mean DOL values, we can see that in case of trade companies the operating risk decrease until 2016 year, after that increase suddenly. In case of manufacturing companies' mean DOL values show fluctuation during investigated period with an overall increase of operating risk until 2017.
By analyzing the standard deviation of Degree of Operating Leverage (DOL), we can conclude that excepting the last investigated period, the values are greater in case of trade companies, which means that the trading enterprises sample it is more heterogeneous than the manufacturing sample. We can also see, that in both sectors

enterprise data, the coefficient of variance shows values greater than 100%, which also confirm the high heterogeneity of investigated companies, on aspect of DOL. In the first and the last year, in the case of manufacturing enterprises, the coefficient of variance of DOL shows higher values than in case of trade companies. In the 2015 and 2016 the coefficient of variance of DOL shows greater values at trading companies.
As we can see from Figure 1., for both sectors' companies, the distances between Minimum and 1. Quartile and 3. Quartile and Maximum are quite greater, which also confirm the high heterogeneity of enterprises data in term of operating risk. Based on these, it is clear, that the examined populations is strongly heterogeneous in term DOL.

Figure 1. Boxplots diagrams of trade and manufacturing companies' DOL indicators (2014-2017)



Source: own calculations using R statistical system

In term of skewness we can observe quite symmetrical distribution in case of trading companies, because values are very close to 0. Compared with trade companies' values, the manufacturing firms' skewness values for DOL shows slightly worse situation in term of symmetricity. In both case of trade and manufacturing companies, the kurtosis shows values greater than 0, what means high degree of peakedness of investigated data, so a leptokurtic distribution it is specific.
The Table 2. shows the main statistical characteristics of Degree of Financial Leverage (DFL) for trade and manufacturing companies.

Table 2. The investigated trade and manufacturing companies DFL indicators (2014-2017)

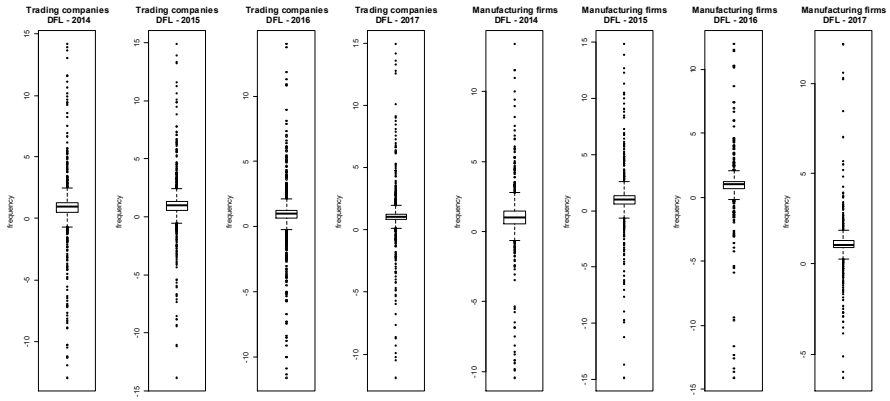
DFL	Trade companies	Manufacturing companies	Trade companies	Manufacturing companies	Trade companies	Manufacturing companies	Trade companies	Manufacturing companies
Minimum	-12.95	-10.44	-13.85	-14.87	-11.59	-14.10	-11.89	-6.31
1. Quartile	0.49	0.59	0.60	0.55	0.64	0.67	0.80	0.88
Median	0.92	1.01	0.98	0.98	0.97	1.02	1.03	1.05
3. Quartile	1.29	1.46	1.35	1.37	1.24	1.25	1.26	1.29
Maximum	14.15	13.39	14.88	14.81	13.97	11.96	14.91	12.17
Mean	0.83	1.06	1.02	1.04	0.89	0.93	1.08	1.09
Standard deviation	2.27	2.23	2.12	2.51	1.96	2.15	1.91	1.45
Coefficient of variance (%)	273.24%	210.29%	208.17%	241.85%	220.56%	230.90%	177.11%	132.20%
Skewness	-0.38	-0.50	0.15	-0.11	-0.56	-1.85	2.24	0.52
Kurtosis	13.57	10.74	14.27	11.52	15.48	21.48	21.92	19.44

Source: own calculations using R statistical system

During the investigation of statistical characteristics DFL, we can see that in case of manufacturing companies' mean values are higher than in case of trading companies. According to this, we can state, that manufacturing companies are more riskiness in term of financial risk. We can read in the financial literature books about the fact that greater indebtedness lead to greater financial leverage and also to a greater financial risk. This can be linked with our results and can be conclude that manufacturing companies are probably more indebted than trade companies due their specific functioning. This can be considered typically sector specific feature. By the examination of mean values of DFL of both sectors, we can also see that in some cases these not reach the value 1. This means that the financial leverage cannot be interpreted. Despite the fact that, first we susceptible to characterized as a favorable situation, but in fact this means the absence of amplifier effect. This is basically the consequence of fact that the operating leverage decrease is higher than the net income decrease. By analyzing of DFL evolution we can state in the last three (2015-2017) investigated years similar trend can be observed for manufacturing and trading companies. The DFL average follows the same fluctuation in the specified period: decreasing in 2016 and increasing in 2017. In 2014-2015 period contradictory evolution can be seen at manufacturing and trade companies financial risk.

In three of four investigated years, the standard deviation of DFL is lower in case of manufacturing companies. This shows less significant variability and also lower financial risk level in case of manufacturing companies. The coefficient of variance of DFL shows slightly contradictory results during investigated period, while in the first and the last years the trading companies shows greater values, in the middle years the manufacturing companies register greater values. It is clear, that both in case of trade and manufacturing companies, high values (greater than 100) of coefficient of variance reveals great heterogeneity of investigated data in term of DFL.

Figure 2. Boxplots diagrams of trade and manufacturing companies' DOL indicators (2014-2017)



Source: own calculations using R statistical system

As we can see from Figure 2., for both sectors' companies, the distances between Minimum and 1. Quartile and 3. Quartile and Maximum are quite greater, on which we can also underline the high heterogeneity of enterprises samples in term of financial risk expressed by DFL.
By examination of skewness values, we can observe that in the first three investigated period, the values relatively close to 0 shows quite symmetrical distribution for both trade and manufacturing enterprises. This can be the consequence of fact that analysed leverage ratios may register both positive and negative values, as we can see from Table 2. Both in case of trade and manufacturing companies the kurtosis shows greater than 0, what means high degree of peakedness of investigated data, so a leptokurtic distribution.
Finally, we can conclude that high values of dispersion measures (standard deviation, coefficient of variance) and the great statistical range drew attention on great spatial heterogeneity of trade and manufacturing companies in term of operating and financial leverage. This is why, the obtained leverage ratios' mean values need to be reconsidered. In this form, the leverage ratios are not proper measurements for sample characterizing. The right solution in order to get a homogeneous sample consists in grouping the sample by some specific features. In order to group the enterprise samples we can group by their size, for example using sales as grouping feature. We can also group by leverage ratios.

5. Conclusion

After studying books dealing with corporate finance and corporate risk quantification for analysts it still difficult to decide about the best risk measurement method that ensure the proper results in term of aims of concrete research. So, the corporate risk quantification is not easy task. The analysts have always take into consideration the

main purpose of his analysis and choose the risk quantification measure which suits best.

The main purpose of this research was to analyse corporate risk of companies acting in two sectors of economy: trade and manufacturing. Regarding to our research goal, we found that two leverage ratios express the corporate risk as well as possible: the Degree of Operating Leverage (DOL) and Degree of Financial Leverage (DFL).

The results shows that excepting the first investigated period (2014), the manufacturing companies operating risk level is greater than trade companies, according Degree of Operating Leverage (DOL) values. This means that investigated manufacturing enterprises have to reconsider their functioning on aspect of their costs. It is clear that they need to optimize their fix costs to total costs. The results of Degree of Financial Leverage (DFL) show that manufacturing firms' financial riskiness is higher than trading companies. Regarding to this, manufacturing companies have to reconsider their indebtedness level and/or cost of capital because this may be linked to financial risk.

The coefficient of variance shows extremely high values for both two leverage ratios which drew attention on great spatial heterogeneity of trade and manufacturing companies. We can conclude that solution for a proper risk analysis may be the grouping of companies' sample by different features.

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