

# A STUDY REGARDING THE RISK OF THE MICRO-ENTERPRISES IN THE DOLJ DISTRICT

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**Abstract:** The study of the risk has become very important in the last years, due to the increase of the competition on the Romanian market and also due to the consolidation of the market economy mechanisms that have determined the augmentation of the number of bankruptcies in Romania. The micro-enterprises are, obviously, the most exposed at the risk of bankruptcy, fact that justifies a study of the risk that these enterprises face. In this paper, we have analyzed the risk of the micro-enterprises during the period 2004-2005, on a database that included 1401 companies. For this aim, we have used two specific instruments: a score function, for the estimation of the bankruptcy risk, and the degrees of leverage, for the assessment of the operating and financial risk. After making this study, we noticed that the micro-enterprises from the Dolj District have dealt with a risk augmentation in 2005, fact emphasized both by the decrease of the average score and by the augmentation of the weight of the bankrupt companies in the total number of analyzed enterprises. Also, the other drawn conclusion was linked with the lack of correlation between the Z score and the degrees of operating and financial leverage, due to the different foundations of these instruments in appreciating the risk dimension.

## 1. Introduction

The risk is a basic element of the decision making process in a company. Including the risk in this process has become a must, if we take into consideration the consequences of materializing the risk that can considerably affect the company's results or can even put in danger its survival on the market. The identification of the risk factors, of the materialization modalities, the evaluation of its consequences have become an imperative for every firm, regardless the conducted activity. Practically, making any decision (of investment, of financing, of entering a new market, of launching a new product etc.) requires the identification and the evaluation of the risk, in a strong concordance with the results that are estimated to be achieved.

Out of the multitude of risks that a company deals with, the most important is the **bankruptcy risk** that can be considered as a consequence of the appearance of other types of risks. Actually, all the risks that a company takes are subordinated to the bankruptcy risk, because, when proper conditions are met, they can lead to the insolvency state. Beside the bankruptcy risk, **the operating and the financial risk** also need a special concern, considering the frequency of their appearance and the level of the generated consequences.

In this paper, we analyzed the specific features of the operating and financial risk for the micro-enterprises from the Dolj District, in the years 2004 and 2005. The data we needed was taken from the financial and accounting statements at 12/31/2005, posted by the 4918 micro-enterprises that were operating in 2005 in Dolj. Later, the restrictions that were imposed for the financial rates and for the degrees of leverage led to a significant reduction of the number of companies that finally remained to carry out the study.

## 2. Methodology

The following methodological instruments were used in order to analyze the risk of these enterprises:

- for the analyze of the failure risk, an own **score function** was used, determined relying on the discriminant analysis, as a linear combination between six financial ratios;
- for the analysis of the operating and financial risk, **the degrees of leverage** were used, determined relying on the sensitivity analysis.

The aim of the study is identifying the main features of the risk that the micro-enterprises from the Dolj District deal with and also pointing out the connections between the three analyzed categories of risks, relying on the instruments used to assess them. Taking into consideration that there is a relation of direct dependence between the operating and the financial risk, as influence factors, and the bankruptcy risk, the study also aims analyzing the correlation between the score function and the degrees of leverage, in order to test the compatibility between these risk evaluation instruments.

**The score functions** are an external diagnosis method and they are elaborated relying on the discriminant analysis, allowing to evaluate and to appreciate the bankruptcy risk of the company using a set of relevant financial ratios. The score is a grade assigned to an enterprise and reflects, globally and unitary, the degree of vulnerability or of financial wealth. Depending on its score, a firm can be classified as bankrupt or non-bankrupt. As the score functions are usually elaborated relying on the statistical methods, including a company into one of the two groups cannot be considered to be doubtless, but it is made with a specific probability.

The score function used for evaluating the bankruptcy risk has the following relation:

$$Z = 0,647 R_1 + 0,143 R_2 + 0,010 R_3 + 0,014 R_4 - 0,168 R_5 + 0,158 R_6 + 0,389 \quad (1),$$

- $R_1$ : The return on assets (Total Result/Total Assets)
- $R_2$ : The fixed assets financing (Permanent Capital/Fixed Assets)
- $R_3$ : The working capital rate (Working Capital/Total Assets)
- $R_4$ : The financial stability rate (Permanent Capital/Total Capital)
- $R_5$ : The patrimonial solvency (Own Capital/Total Capital)
- $R_6$ : The total assets rotation (Total Incomes/Total Assets).

The threshold values of the function are:

- $Z < 0.1454$  – the companies are bankrupt;
- $0.1454 < Z < 0.1852$  – the incertitude area;
- $Z > 0.1852$  – the companies are non-bankrupt.

In order to assess the operating and the financial risk, we have used **the degree of operating leverage** and **the degree of financial leverage**. Both of these coefficients rely on the fixed expenses, operating and financial, and are determined as follows:

$$DOL = \frac{\Delta OR \%}{\Delta S \%} \quad (2)$$

$$DFL = \frac{\Delta NR \%}{\Delta OR \%} \quad (3)$$

DOL – the degree of operating leverage;

DFL – the degree of financial leverage;

OR – the operating result;

S – sales;

NR – the net result.

The higher are these coefficients, the bigger is the risk.

### 3. Results

The analysis of the risk for the studied companies imposed setting some restrictions, respectively the elimination of the companies which for the financial ratios of the score function didn't take values and the companies which for the degrees of leverage either didn't take values or they were negative. After imposing these restrictions, 1401 micro-enterprises remained in the database to be further analyzed. For these companies, the Z score was calculated for the years 2004 and 2005 and also the degrees of leverage.

Table 1 points out the cumulated values for the main economical and financial indicators calculated for the firms kept in the study.

**Table 1**

<b>Indicators</b>	<b>2004</b>	<b>2005</b>	<b>Absolute variation</b>	<b>Percentage variation</b>
Total assets	147,775,198	182,644,155	34,868,957	23.60%
Own capitals	30,868,746	48,540,883	17,672,137	57.25%
Permanent capitals	46,035,912	70,475,913	24,440,001	53.09%
Working capital	-16,352,325	-8,046,305	8,306,020	-50.79%
Sales	150,039,388	161,368,424	11,329,036	7.55%
Total incomes	160,214,553	172,264,710	12,050,157	7.52%
Operating result	39,955,038	39,469,709	-485,329	-1.21%
Gross result	39,220,148	38,600,726	-619,422	-1.58%
Net result	36,875,216	33,830,853	-3,044,363	-8.26%

An increase of 23.60 % is counted for the total assets (+34.9 million RON), while the capitals have counted a bigger growth, over 50%, both for the own sources and for the permanent ones. Instead, the working capital is negative in both years, reflecting the existence of a financial disequilibrium, because the permanent resources are not sufficient to finance the fixed assets, even if the gap between them decreased in 2005. The sales have a small growth, of 7.55%, from 150 million to 161 millions. The total incomes have a level and a dynamics close to the sales, which is justified by the fact that the sales have a high weight in the incomes. Regarding the profit margin, the micro-enterprises post positive results in both the analyzed years, even if they are slowly decreasing in 2005, especially in the case of the net profit (-8.26%). What is really surprising is the big difference between the decrease paces of the gross and net profits, because in 2005 the income tax was cut from 25% to 16%.

After calculating the score function, the following specific values for the Z score and for the financial ratios of the function were counted:

**Table 2**

	Average value		Minimum value		Maximum value	
	2004	2005	2004	2005	2004	2005
Z	0.7924	0.7717	-1,462	-48,055	2,629	4,766
R1	24.48%	22.41%	-2370.02%	-7,426,700%	102.46%	100.00%
R2	73.79%	89.75%	-1,022,583%	-1,227,282%	1,837,580%	3,332,100%
R3	-11.07%	-4.41%	-3944.66%	-4485.36%	201.13%	140.14%
R4	31.15%	38.59%	-3943.97%	-4396.67%	293.75%	140.35%
R5	20.89%	26.58%	-3943.97%	-4396.67%	293.75%	140.35%
R6	1.08	0.94	0.01	0.000006	32.50	93.04

We realize that the average Z score is pretty high in both years, more than the threshold value of 0.1852 that separates the companies without financial difficulties from the strong ones. The extreme values are pretty high (-1462, respectively +2629 in 2004 and -48055, respectively +4766 in 2005), but these values are isolate cases, the majority of the companies (more than 96%) posting scores between -10 and +12. Even if the average Z score has a slow drop in the analyzed period, the decrease is not very big and it doesn't make these enterprises entering in financial distress.

Regarding the financial ratios, we can notice a pretty high average level for the return on assets (R1), even if it decreases with two percentage points in the analyzed period. The fixed assets financing (R2) is below one in both years, meaning the existence of a financial disequilibrium. The patrimonial solvency (R5) has a low level in 2004 (20.89%), below the minimum limit of 33%, and it grows till 26.58% in 2005. The total assets rotation oscillates around 1 in the studied period.

By analyzing the structure of the number of firms, after calculating the Z score, the following data was achieved:

**Table 3**

	2004		2005	
	no.	%	no.	%
Not bankrupt companies	1262	90.08%	1163	83.01%
Bankrupt companies	135	9.63%	229	16.35%
Companies with uncertain state	4	0.29%	9	0.64%
<b>Total</b>	<b>1401</b>	<b>100%</b>	<b>1401</b>	<b>100%</b>

It can be noticed that most of the companies have a strong economical and financial situation; thus, more than 90% of them are considered to be healthy in 2004. In the same year, 135 companies (9.63%) are supposed to be bankrupt and 4 of them (0.29%) are placed in the uncertainty area. In 2005, the situation gets worse, the number and the weight of the enterprises in financial distress are growing (229 companies, respective 16.35 %). The companies with uncertain state still have a small weight, even their number increased.

In order to evaluate the operating and the financial risk, **the degrees of operating and financial leverage** were calculated, using the relations (2) and (3). The distribution

of the number of companies after the intervals of value of these coefficients is presented in the following table:

**Table 4**

<b>DOL</b>	<b>No. of companies</b>	<b>DLF</b>	<b>No. of companies</b>
<1	315	<1	533
1-2	422	1-2	765
2-5	319	2-5	70
>5	345	>5	33
<b>Total</b>	<b>1401</b>	<b>Total</b>	<b>1401</b>

The distribution of the enterprises is more uniform if we consider the degree of operating leverage, while, using the degree of financial leverage, the firms are concentrated on a closer variation interval. By comparing the distributions resulted by taking into consideration these two coefficients, we can notice that most of the companies deal with a lower level of the financial risk against the operating risk. This observation is logical, because the financial risk is caused by the fixed expenses and not all the companies use banking loans in order to support the financial risk.

As previously mentioned, the bankruptcy risk is caused by a multitude of other categories of risk that appear in the activity of a company, including the operating and the financial risk. In this respect, in order **to analyze the correlation between the bankruptcy risk**, on one hand, **and the operating and the financial risk**, on the other hand, the correlation coefficients between the Z score of the micro-enterprises in 2005 and the degrees of operating and financial leverage were calculated. The values that were obtained are of 0.0032 in the first case and of 0.0014 in the second case. We notice that these values are very low and do not emphasize any correlation between these indicators.

Further on, the analysis was detailed on the three categories of companies, which for the Z score and the degrees of leverage were calculated.

By calculating the Z score for *the non-bankrupt companies*, the following values of the Z score and of the financial ratios were get:

**Table 5**

	<b>Average value</b>		<b>Minimum value</b>		<b>Maximum value</b>	
	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>
Z	0.8317	0.8268	0.1856	0.1895	2629	4766
R1	26.96%	26.05%	-134.19%	-1063.14%	102.46%	100.00%
R2	94.48%	113.88%	-2701.67%	-2933.64%	1,837,580%	3,332,100%
R3	-2.33%	5.95%	-1807.60%	-3015.51%	201.13%	140.14%
R4	39.85%	48.82%	-1742.98%	-2828.65%	293.75%	140.35%
R5	29.42%	36.10%	-1742.98%	-3074.73%	293.75%	140.35%
R6	1.12	1.01	0.0098	0.00002	32.50	93.04

The level and the dynamics of the average Z score are closed to the average calculated for all the companies that are included in the study; this is a normal situation, because the companies that are not in financial distress have the largest weight in the database. We can also notice, in this case, a slowly decrease of the Z score in 2005 against 2004. Regarding the financial ratios, the situation is similar, but the level is

obviously higher as compared with the previous case. We notice the positive level reached by the working capital rate (R3) in 2005 (5.95%), fact that signifies the existence of a financial equilibrium.

After calculating the degrees of operating and financial leverage, the following distribution of the number of companies was obtained for the year 2005:

**Table 6**

<b>DOL</b>	<b>No. of companies</b>	<b>DLF</b>	<b>No. of companies</b>
<1	245	<1	461
1-2	358	1-2	617
2-5	283	2-5	58
>5	277	>5	27
<b>Total</b>	<b>1163</b>	<b>Total</b>	<b>1163</b>

In this case too, most of the companies deal with a higher operating risk, while the level of financial risk is lower. The proportions on intervals of variation of the degrees of leverage are similar as for the entire database. The correlation coefficient of the Z score and DOL is 0.0101, while between Z and DLF is of 0.0096; these values point out that there is no correlation between these instruments used to evaluate the risk.

For *the bankrupt enterprises*, the values of the Z score and of the financial ratios are as follows:

**Table 7**

	<b>Average value</b>		<b>Minimum value</b>		<b>Maximum value</b>	
	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>
Z	0.0565	-0.0847	-1462	-48055	0.1404	0.1445
R1	-41.16%	-67.84%	-2370%	-2370%	34.12%	94.49%
R2	-203.87%	-119.41%	-1,022,583%	-1,227,283%	289.29%	5516.00%
R3	-130.07%	-95.43%	-3945%	-4485%	62.40%	61.80%
R4	-87.26%	-51.94%	-3944%	-4397%	97.15%	99.83%
R5	-95.26%	-57.61%	-3944%	-4397%	67.80%	99.83%
R6	0.57	0.35	0.01	-48,055.04	18.39	0.14

We notice a drop of the average Z score in 2005 against 2004, signifying a degradation of the financial position of the bankrupt companies, due to the significant growth of the number and the weight of these companies. Regarding the financial ratios, the first five are negative, reflecting the financial distress these companies are in. Regarding the dynamics, a growth of the fixed assets financing rate can be noticed (R2), of the working capital rate (R3), of the financial stability rate (R4) and of the patrimonial solvency rate (R5), even if they all still have negative values. The return on incomes (R1) presents a reduction and the total assets rotation (R6) slows down, from 0.57 rotations to 0.35. So, the rise of the average Z score is due to the favorable evolution of four financial rates, while two rates have a worse level.

The degrees of operating and financial leverage present the following distribution for the year 2005:

**Table 8**

<b>DOL</b>	<b>No. of companies</b>	<b>DLF</b>	<b>No. of companies</b>
<1	68	<1	68
1-2	62	1-2	143
2-5	35	2-5	12
>5	64	>5	6
<b>Total</b>	<b>229</b>	<b>Total</b>	<b>229</b>

The conclusions are similar as in the previous cases, a more balanced distribution can be noticed using the degree of operating leverage, while, regarding the financial risk, most of the companies have a low level. So, only 6 companies present a DFL level higher than 5, while 12 companies have a DOL between 2 and 5.

By making a comparison between the bankrupt companies and the non-bankrupt ones, we notice the discrepancy between the two categories of instruments used to assess the risks. So, taking into consideration that the division of the enterprises into bankrupt and non-bankrupt was made with the help of the Z score function, this instrument reflects pretty well the financial state of the micro-enterprises. In exchange, the number of firms with high levels of the degrees of leverage is quite closed for the two groups of companies, which signifies that these indicators don't point out accurately the financial position of the companies. A similar conclusion can also be drawn by establishing the weight of the companies' number on intervals of variation of the degrees of leverage:

**Table 9**

<b>DOL</b>	<b>% Bankrupt companies</b>	<b>% Non-bankrupt companies</b>	<b>DLF</b>	<b>% Bankrupt companies</b>	<b>% Non-bankrupt companies</b>
<1	29.69%	21.07%	<1	29.69%	39.64%
1-2	27.07%	30.78%	1-2	62.45%	53.05%
2-5	15.28%	24.33%	2-5	5.24%	4.99%
>5	27.95%	23.82%	>5	2.62%	2.32%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>Total</b>	<b>100%</b>	<b>100%</b>

We notice that 27.95 % of the bankrupt companies present a higher level of DOL, more than 5, while 23.82% of the "healthy" companies can be included in the same category. But, for the interval of variation comprised between 2 and 5, more "healthy" companies can be found (24.33% against 15.28%), fact that questions the capacity of this sensitivity coefficient to accurately assess the level of the operating risk. Regarding the DFL, the situation is not very different, the weight of the number of the non-bankrupt companies with levels bigger than 2 being a little bit more than the enterprises with financial difficulties. The same conclusions can be drawn by calculating the coefficients of correlation between the Z score, on one hand, and the degree of operating and financial leverage, on the other hand. The values of these coefficients (0.0101 in the first case and 0.0096 in the second case) confirm the weak correlation between these instruments of evaluating the risk.

*The companies with uncertain state* present the following specific values for the Z score and for the financial ratios:

**Table 10**

	Average value		Minimum value		Maximum value	
	2004	2005	2004	2005	2004	2005
Z	0.3197	0.1434	0.1582	0.1496	0.1822	0.1843
R1	-20.68%	-50.17%	-55.61%	-75.05%	40.01%	-25.91%
R2	-122.72%	-10.18%	-596.58%	-265.12%	-11.03%	193.37%
R3	-79.88%	-68.74%	-343.32%	-140.50%	-36.81%	32.25%
R4	-44.01%	-6.35%	-286.34%	-56.72%	-3.66%	66.78%
R5	-44.01%	-16.04%	-286.34%	-56.72%	-3.66%	66.78%
R6	1.14	0.47	0.54	0.16	1.57	2.30

The evolution of the average value of the Z score points out a considerable degradation of the financial state for the companies with an uncertain situation; although, the small number of these companies recorded in both years (4 companies in 2004 and 11 in 2005) doesn't confer relevance for the average values calculated both for the Z score and for the financial ratios from the model. Regarding the financial ratios, we notice that, excluding the total assets rotation (R6), all the others present negative values in both analyzed years; four financial ratios have an increase of the average level in 2005 against 2004, while two rates decreased.

#### 4. Discussions

After making this study, we have noticed that the micro-enterprises from Dolj District had a very favorable situation during the year 2004, but this situation deteriorated in the next year. This fact is pointed out both by the evolution of the average Z score, that had a slowly decrease in 2005, and by the evolution of the weight of the bankrupt enterprises' number, that had a significant increase (from 9.64% to 16.35%). However, the score function shows a quite strong financial state in both years (the average is much more than the threshold value of 0.1852). Regarding the weight of the number of companies with financial difficulties, the level cannot be considered as large, if we take into consideration that we talk about micro-enterprises, that are traditionally more exposed to risks and thus they have a higher probability of bankruptcy starting with the very first years of their life. We consider that two phenomena with antagonist effects have generated such an evolution:

the strong economic growth posted by Romania after 2000, that positively influenced the entire business environment and further the situation of most micro-enterprises;  
the consolidation of the Romanian economy and expected EU joining, that led to the implementation of efficient market economy mechanisms, capable of cleaning the economic environment, by eliminating the failed companies from the market.

Analyzing the structure of the studied companies, we realized that the „healthy” enterprises have also presented a slow degradation of the situation. The level and the evolution of the Z score and of the financial rates are very close to the entire database, a normal aspect, because the non-bankrupt firms have the biggest weight in the total number of the micro-enterprises. Regarding the failed companies, the score function has best emphasized the deterioration of the financial state, the medium level of the Z score recording a decrease, even if some of the rates had a significant increase of the average level. For the companies that were in an uncertain situation, the analysis could not establish a clear verdict, because they were not so numerous. This fact is a positive



aspect, meaning that the score function has divided pretty well the companies in the two categories, bankrupt and non-bankrupt.

By analyzing the operating and the financial risk, with the help of the degrees of leverage, we have noticed a big fluctuation of the degree of operating leverage, while the degree of financial leverage had a smaller fluctuation. These remarks are available for the entire database of companies, as well on categories of companies. The bigger number of firms with higher levels of DOL signifies a higher operating risk as compared with the financial risk, aspect justified by the fact that not all the companies use banking loans, in order to deal with the financial risk. Therefore, we have concluded that the main cause of the risk that these companies face is located in the operational activity rather than in the financial one.

In order to study the correlation between the bankrupt risk and the operating and the financial risk, we have calculated the correlation coefficients (Pearson coefficient) between the Z score, on one hand, and the degrees of leverage, on the other hand. We have surprisingly noticed that there is no obvious correlation between these indicators, aspect justified by the way itself these instruments evaluate the risk. Thus, *the score function emphasizes the present state of the companies* (normal or in distress), while *the degrees of leverage emphasize the possibility for these companies to deal in the future with the materialization of the operating and the financial risk*. This aspect is emphasized by the calculation formula of the leverage coefficients, that appreciate the risk through the volatility (the speed) of the operating or net result growth when the sales or the operating result are increasing with one percent. In such conditions, a company can face a high risk (when DOL or DFL is big), even if it has a strong financial state and high performances, due to a high rate of growth.

Hence, it means that the score function evaluates *the present risk* and the leverage coefficients *the future risk*. It cannot be said that one of these instruments evaluates in a wrong way the risk, but only that they are incompatible, referring to different aspects of the activity and to different moments in time.

## 5. Conclusions

The assessment of the risk that a company deals with can be made both by using the score functions (regarding this issue, the Romanian literature has enriched in the last years with several such instruments) and by using the degrees of operating and financial leverage. The bankruptcy risk, appreciated with the help of the score functions, is caused by factors located also in the operating and financial activity. Despite all these, a company may post a low score, sign of a bad financial state, but also a low level of the leverage coefficients, sign of a low operating and financial risk. It results that, in order to correctly appreciate the risk dimension that a company faces, the simultaneous use of these instruments must be made with precaution.

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