ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS

Volume LXI 44 Number 2, 2013
http://dx.doi.org/10.11118/actaun201361020385

EFFECT OF THE EQUITY MULTIPLIER INDICATOR IN COMPANIES ACCORDING TO SECTORS

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Received: January 31, 2013

Abstract

LÍZALOVÁ LENKA, KOZÁKOVÁ PETRA: *Effect of the equity multiplier indicator in companies according the sectors.* Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 2013, LXI, No. 2, pp. 385–392

Managers carry out the demand of the owners to maximise the rentability of invested capital with regards to the taken risk. The tool that evaluates the suitability to indebt in order to reach a higher rentability is the equity multiplier indicator. An analysis of the multiplier was carried out on 10 years of data from 456 Czech companies. Based on the data from these companies the influence of two components of the multiplier, which characterise the influence of indebtedness on the return on equity, was analysed. These components are "financial leverage" and "interest burden", these having an antagonistic effect. The low variability of the equity multiplier is apparent in the companies of the administrative and support service sector and it is also relatively low in the companies of the agriculture, forestry and fishing sector; on the contrary, in for example the professional, scientific and technical activities and the sector of water, sewage and waste there are companies with higher variability of the equity multiplier. The paper identifies companies (in view of their sector specialization) inclining to a larger utility of debts to increase the return on equity. The largest equity is reached in companies of the construction sector; the lowest effect of the multiplier is to be found in companies of the agriculture sector. The resulting value of the multiplier is to a large extent determined by the financial leverage indicator, to a lower extent and at the same time negatively by the interest burden indicator.

indebtedness, financial leverage, equity multiplier, ROE

The main interest of the owners is to reach the highest possible return on equity with regards to the taken risk. Should the managers utilise debts in an appropriate manner, the "financial leverage" will help to multiply the value of the return on equity. Rash utility of debts in business can increase the loss of the entire business as fast as it can increase its profit; in the negative sense it is known as the "financial club". Apart from an appropriate level of gained profit and a suitable speed of the turnover of capital, important factors for the return on equity are the structure of the individual sources of capital and the cost of these sources of finance. The optimizing structure is not possible to identify, but only to estimate because of the different approaches to the solution of the application problems of single theories; the optimal capital structure will vary because of the subjective approach to the process of optimizing (Hrdý, 2011). Among the tools helping to optimise the capital structure is the indicator of the equity multiplier, which was the subject of investigation of the analysis.

Aim

The aim of this paper is to analyse whether differences in the profit effect of the financial leverage throughout the companies groups with different business orientation (in CZ-NACE classification) exist. Should the hypothesis of different values of the equity multiplier throughout the companies of different sectors be confirmed, companies which incline to a larger utility of debts will be marked, as will companies where it is necessary to rationalise the utility of debts.

Theoretical base

The return on equity is influenced by a number of factors, for the explanation of their effect the authors (Pavelková, Knápková, 2009) use the formula:

$$ROE = \frac{EBIT}{S} \times \frac{S}{A} \times \frac{EBT}{EBIT} \times \frac{A}{E} \times \frac{NI}{EBT}, \quad (1)$$

where:
EBIT.....earnings before interest and taxes
S .....sales
EBIT / S.....operating rentability of sales
S / A.....turnover of overall assets
A .....assets
EBT .....earnings before taxes
EBT / EBIT ....interest burden
A / E .....financial leverage
E.....equity
NI .....net income
NI / EBT .....tax interest burden.

Two of the above stated factors characterise the influence of indebtedness on the return on equity. These factors are defined by the *interest burden* indicator and by the *financial leverage* indicator, these having an antagonistic effect. An increase in the share of debts, in other words of indebtedness, results in an increase in the financial leverage indicator and positively influences the return on equity. An increase in the share of debt investments has the opposite effect on the increase of interest, as these investments on the contrary decrease the owners' share on profit, which results in a decrease of the interest burden indicator and therefore also of the return on equity.

The resulting influence of the interest burden and of the financial leverage on the ROE is expressed via their multiplication, which is known as the influence of the financial leverage on profitability or the multiplier of the shareholders equity (the equity multiplier). It states how many times the capital is larger than one, therefore an increase in the share of debts in the company's financial structure has a positive influence on the return on the company owners' equity (Grunwald, Holečková, 2007).

The aim of the given study is to verify the potential of companies in the same sectors for the utilisation of financial leverage to increase the return on equity. The basis will be the decomposition of the equity multiplier indicator, which according to Deo, Mukherjee (2007) can be expressed via the formula:

$$\frac{EBT}{EBIT} \times \frac{A}{E} > 1, \quad (2)$$

where:
EBT .....earnings before taxes
EBIT.....earnings before interest and taxes
EBT / EBIT ....interest burden
A .....assets
E.....equity
A / E .....financial leverage.

Should the value of the multiplier be larger than one, then an increase in the share of debts in the financial structure of the company has a positive influence on the return on equity. [2]

As stated by ANGELL, R. J., BREWER, B. L: *When the relative reduction in equity is greater than the relative reduction in income, thereby increasing the ROE. As is generally known, this happens when EBIT/Assets (basic earning power) exceeds the interest rate on the debt.*

MATERIAL

The analysed data file of companies originally included 456 companies, of which 230 companies belong to the processing industry. Some sectors (mining and quarrying; generation and distribution of energy and gas; accommodation, food and entertainment industry; activity in real estate or administrative and support service activities) are represented only minimally, some of which will be excluded from the data file in the following analysis. For the purpose of the analyses of the average profit effect of financial leverage all the companies were excluded, which during the monitored period from 2000–2010 ran at a loss for six or more years. We consider five years of profit to be sufficient for the determination of the average values and to reveal potential extreme values or deviations.

In the remainder of the companies, should they have ended in loss in any of the years, these years were excluded from the average value of the indicator of interest burden, i.e. the relation of EBT/EBIT. The number of such companies in the individual sectors is stated in the Tab. I in the column titled 1st adjustment. The second adjustment in the data file is related to the tolerance level of the value of financial leverage (the relation of assets to equity) from 0 to 10. Should the company have reached in 6 or more years negative values or values larger than 10, it was excluded from the data file.

The adjusted number of analysed companies is stated in the Tab. I in column 3rd adjustment, where the sectors B, C and I were excluded due their minimal representation. Type indication of the sectors (by NACE) will be used in the whole paper.

In the Tab. I there are also stated data about representativeness of analysed file of companies. The correlation of first differentiation of equity multiplier represents the rate of dependence in the mutual development of data of analysed companies file and data stated by Ministry of Industry and Trade of the Czech Republic (MIT). The representativeness of analysed file is doubt in cases of low or negative correlation of data file with data of MIT. Excepting companies in the sector manufacturing we can say that low correlation is typical for sectors represented only minimally.

I: *Number of companies in the base data file*

NACE	Sector	Total	1st adjustment	2nd adjustment	3rd adjustment	Correlation of the 1st differentiation
A	Agriculture, forestry and fishing	34	32	31	31	.
B	Mining and quarrying	2	2	2	0	0.87
C	Manufacturing	230	207	197	197	–0.12
D	Electricity, gas, steam and air conditioning supply	1	1	1	0	–0.76
E	Water supply; sewerage, waste management and remediation activities	13	11	11	11	0.93
F	Construction	25	23	22	22	0.58
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	97	92	86	86	0.96
H	Transportation and storage	15	14	12	12	1.00
I	Accommodation and food service activities	4	2	2	0	–0.41
J	Information and communication	11	9	8	8	–1.00
L	Real estate activities	5	5	5	5	–0.06
M	Professional, scientific and technical activities	14	13	12	12	–1.00
N	Administrative and support service activities	5	5	5	5	–1.00
Total		456	416	394	389	

Source: Own evaluation

METHODOLOGY

Due to the fact that for the analysed synthetic indicator analytic indicators of multiplicative relations exist, the process of logarithm can be used to analyse their influence.

Logarithm is based on the logarithmic method which is thought to be the most precise for the explanation of the variability of the indicator, nevertheless should the analytical indicator reach negative values or a zero value, this method cannot be used. Due to the fact that in our case the analysed indicator technically cannot reach negative values, we can use logarithm in our analyses to our advantage.

Logarithmic method is based on decomposing of the increase in the synthetic indicator into the ratio of the logarithmic indexes of the partial individual indicators. Should we abstract from the method and use only its basic principle, it is possible to apply logarithm on the absolute value of analysed indicator of the equity multiplier and express the relation in which we divide the influence of the financial leverage and interest burden using the following formulas:

Influence of the financial leverage =

$$= \log\left(\frac{A}{E}\right) / \log MULTI\,, \qquad (3)$$

Influence of the interest burden =

$$= \log\left(\frac{EBT}{EBIT}\right) / \log MULTI\,, \qquad (4)$$

where

MULTI..... equity multiplier.

Synek (2003) explains: *The results of this method can be considered as most precise and we will give it priority whenever we can*. The above stated functions 3 and 4 can be simplified into the following equation:

$$\log MULTI = \log\left(\frac{A}{E}\right) + \log\left(\frac{EBT}{EBIT}\right). \qquad (5)$$

RESULTS AND DISCUSSION

Average values of the indicators of interest burden, financial leverage and equity multiplier were determined for each of the companies from the analysed data file. The companies were split according to the value of the equity multiplier into four quartiles 1–4. Upper quartile, marked as quartile 1 from now, included 25% of all the companies that reached a value of the multiplier larger than 2.82. On the contrary, lower quartile, marked by us as quartile 4, consisted of the companies with the lowest multiplier values, i.e. lower than 1.45. Quartiles above or below median,

II: *Statistical characteristics of the primary group*

	A/E	EBT/EBIT	Multiplier
No. of companies	389	389	389
Maximum	7.84	1.00	7.08
Upper quartile	3.65	0.96	2.82
Median	2.41	0.88	1.95
Lower quartile	1.74	0.74	1.45
Minimum	1.07	0.13	0.22
Average	2.80	0.83	2.25

Source: Own evaluation

further marked as quartile 2 and 3, were split according to the median, see the Tab. II.

The total number of companies and also representation of the individual sectors resembling the individual quartiles 1–4 are shown in the following Tab. III. Companies in the agriculture sector (A) undeniably include the largest number of companies with the lowest multiplier value. On the contrary, companies of the sectors construction, wholesale, retail, repair of motor vehicles, transportation and storage (labelled NACE F, G and H) are characterized by the largest values of the multiplier.

Should we need to determine the value in the group of measured values around which the data oscillate, we use a number of characteristics, which are known as the characteristics of position. The position though says nothing about the variability of the data, therefore it is appropriate to include for example number characteristics defining oscillation of the data around the average i.e. the rate of variability as are dispersion, deviation, coefficient of variation.

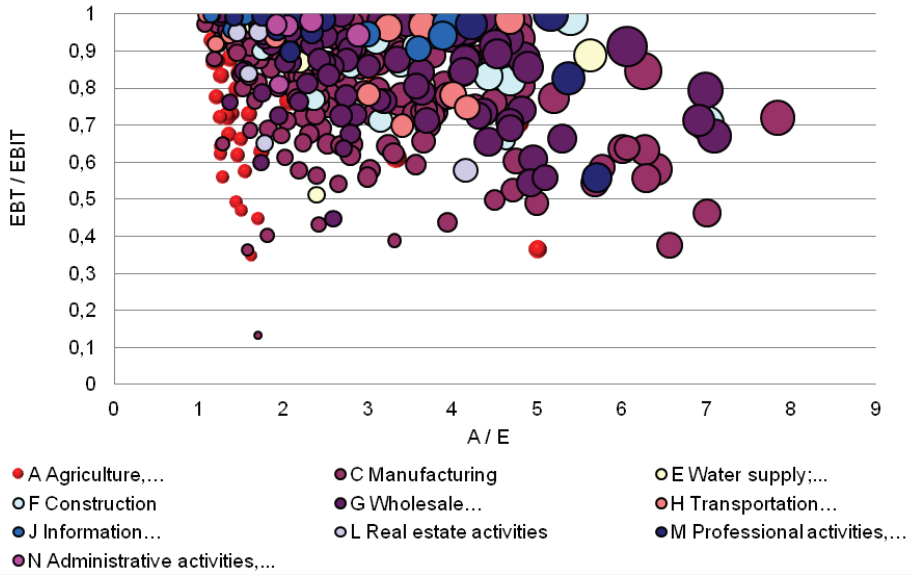
The variability of the multiplier value of the individual indicators of financial leverage and interest burden throughout companies, in view of their sector classification, are visualised in the Fig. 1. We see that a number of the symbols of the multiplier are to be found within all areas of the figure, therefore we expect a relatively higher variability of the results of the indicators for example in companies in the professional, research and technical sectors (NACE M), in the water, waste and reconstruction sectors (NACE E) or in the wholesale, retail and automobile repair sectors (NACE G). Due to the resulting values of the equity multiplier we can expect a larger variability especially of the financial leverage indicator.

Based on the analysis of dispersion and of the standard deviation it is possible to point out far more precisely the variability of the equity multiplier and of the individual indicators which influence it. Tab. IV provides the statistical characteristics of the monitored indicators of the entire data file. From the total of 389 companies it is possible to monitor the absolute difference in the financial leverage in the range of 6.77, the difference in the interest burden 0.87 and in the value of the equity multiplier itself with a value of 6.86. It is also evident that the average values of the indicators within the entire data file tend to near the lower values than the maximum ones. The standard deviation of the values of the indicators of each company from the overall average of the monitored sample totals the value 1.36 for the financial leverage; the standard deviation of the interest burden with a value of 0.15 being much lower and the deviation totalling 1.08 for the entire equity multiplier. The variation coefficient also provides similar results. When disregarding the variability of the true values of each company within the base data file, as we are unable to directly explain their values, and taking the average values of the companies and comparing these to the overall average of the monitored sample, we obtain substantially different results for the standard deviation 2 and for the coefficient of variation 2. It is evident though, that the variability between the average values of the individual industries will

III: *Number of companies from analysed file according to the individual sectors*

NACE	No. of companies in„1“	No. of companies in „2“	No. of companies in„3“	No. of companies in„4“	Total	Representation of companies in „1“	Representation of companies in „2“	Representation of companies in „3“	Representation of companies in „4“
A	1	2	2	26	31	3%	6%	6%	84%
C	40	53	61	43	197	20%	27%	31%	22%
E	4	0	4	3	11	36%	0%	36%	27%
F	11	5	4	2	22	50%	23%	18%	9%
G	32	24	16	14	86	37%	28%	19%	16%
H	4	3	2	3	12	33%	25%	17%	25%
J	2	2	2	2	8	25%	25%	25%	25%
L	0	1	1	3	5	0%	20%	20%	60%
M	4	4	3	1	12	33%	33%	25%	8%
N	0	3	2	0	5	0%	60%	40%	0%
Total	98	97	97	97	389				

Source: Own evaluation

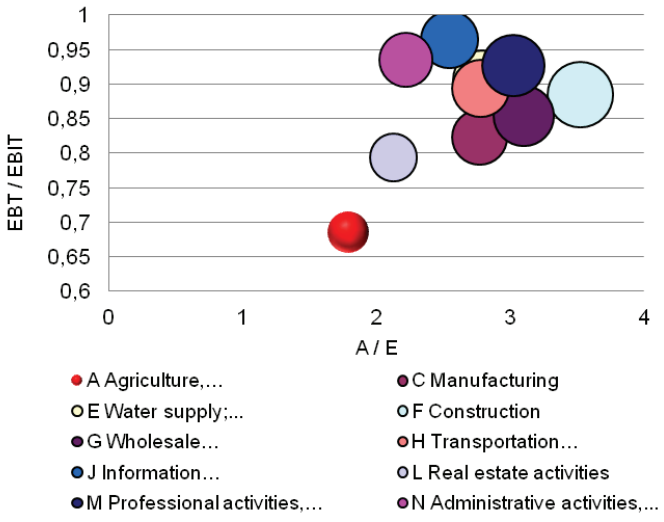


1: *Variability of the equity multiplier of all the companies according to the individual sectors*
Source: Own evaluation

IV: *Statistical characteristics of the monitored indicators of the base data file*

	A/E	EBT/EBIT	Multiplier
No. of companies	389	389	389
Maximum	7.84	1.00	7.08
Median	2.41	0.88	1.95
Minimum	1.07	0.13	0.22
Average	2.80	0.83	2.25
Standard deviation	**1.36**	**0.15**	**1.08**
Coefficient of variation	**49%**	**18%**	**48%**
Standard deviation 2	0.53	0.09	0.55
Coefficient of variation 2	19%	11%	25%

Source: Own evaluation



2: *Variability of the average equity multiplier according to sector*
Source: Own evaluation

not be as significant as is the variability of all the companies.

Similarly, the following Fig. 2 provides the same conclusion. In comparison with the figure 1 mentioned above, the lower variability of all the monitored indicators is evident at first sight.

Using the original Figs. 1 and 2 we could only simply estimate which companies concentrated in sectors demonstrate a larger variability of the resulting equity multiplier, financial leverage and interest burden. Should we compare the results of these indicators for the concrete companies with the averages of companies groups by sectors, the resulting standard deviation and coefficient of variation indicate the companies groups in which the highest and also the lowest variability of values is proven, see the Tab. V. The lowest variability is apparent in companies in the administrative and support service sector; especially here the result can be negatively influenced by the small number of monitored companies. The low variability is apparent also in companies of the agriculture, forestry and fishing sector. On the contrary, in for example the professional, scientific and technical activities and the sector of water, sewerage and waste the results of the individual companies show large differences from the average values of the indicators in the given group.

According to the values in the following Tab. VI it is possible to create a rough image of the profit effect of the financial leverage within the monitored companies and this according to the individual sectors. A certain inaccuracy in the comparison of the attained results is caused though by the different number of participating companies, often an inadequate amount. However, the used database does not offer data for a larger number of companies in the selected sectors. Based on the available results it is possible to notice, that the largest equity multiplier i.e. the profit effect of the financial leverage is reached in companies of the construction sector (F). Larger values can also be found for example in companies of the sector of professional, scientific and technical activities (M) and others. Concurrently, we can notice in these companies a slightly larger standard deviation. The lowest effect of the multiplier, as expected, is to be found in companies of the agriculture sector.

The resulting value of the multiplier is to a large extent determined by the financial leverage indicator, to a lower extent and at the same time negatively by the interest burden indicator. This

V: *Standard deviation and coefficient of variation of the average multiplier of companies according to sector*

Sector		Standard deviation			Coefficient of variation		
		A/E	EBT/EBIT	Multiplier	A/E	EBT/EBIT	Multiplier
A	Agriculture, forestry and fishing	0.97	0.15	0.55	54%	22%	47%
C	Manufacturing	1.32	0.16	0.92	48%	19%	43%
E	Water supply; sewerage, waste management and remediation activities	**1.58**	**0.15**	**1.43**	56%	16%	59%
F	Construction	1.35	0.10	1.22	38%	11%	40%
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	1.41	0.13	1.17	45%	15%	45%
H	Transportation and storage	1.27	0.11	0.98	46%	12%	42%
J	Information and communication	1.18	0.03	1.03	46%	3%	44%
L	Real estate activities	1.13	0.17	0.53	53%	22%	33%
M	Professional, scientific and technical activities	**1.60**	**0.13**	**1.31**	53%	14%	48%
N	Administrative and support service activities	0.15	0.03	0.14	7%	3%	7%

Source: Own evaluation

VI: *Statistical characteristics of the multiplier according to the individual sectors*

	A	C	E	F	G	H	J	L	M	N
No. of companies	31	197	11	22	86	12	8	5	12	5
Maximum	2.97	6.06	5.36	5.38	7.08	3.95	3.82	2.52	5.15	2.41
Median	1.01	1.86	1.76	2.84	2.37	2.29	2.31	1.41	2.1	1.97
Minimum	0.58	0.22	1.17	1.40	1.01	1.08	1.14	1.18	1.44	1.51
Average	**1.16**	**2.14**	**2.45**	**3.05**	**2.61**	**2.34**	**2.36**	**1.61**	**2.76**	**2.02**
Standard deviation	0.55	0.92	1.43	1.22	1.17	0.98	1.03	0.53	1.31	0.14
Coefficient of variation	47%	43%	59%	40%	45%	42%	44%	33%	48%	7%

Source: Own evaluation

VII: *The structure of the equity multiplier in companies by sector and the rate of influence of its components*

Sector	Multiplier	A/E	EBT/EBIT	Log Multiplier	Log A/E	Log EBT/EBIT
A	1.16	1.79	0.68	0.064	0.253	–0.167
C	2.14	2.77	0.82	0.330	0.442	–0.086
E	2.45	2.79	0.91	0.389	0.446	–0.041
F	3.05	3.53	0.88	0.484	0.548	–0.056
G	2.61	3.10	0.85	0.417	0.491	–0.071
H	2.34	2.78	0.89	0.369	0.444	–0.051
J	2.36	2.55	0.97	0.373	0.407	–0.013
L	1.61	2.13	0.79	0.207	0.328	–0.102
M	2.76	3.03	0.93	0.441	0.481	–0.033
N	2.02	2.22	0.94	0.305	0.346	–0.027

Source: Own evaluation

has been the subject of many of the authors' papers. Tab. VII shows the share in which the financial leverage and interest burden partake on the absolute values of the resulting level of the equity multiplier. It is evident here that the strength of the financial leverage is weakened by the interest burden. In companies of some sectors, as are for example E, J, M or N, the value of the interest burden almost reaches one. This implies that the companies monitored in this sector do not use debts subject to high interest and therefore the effect of financial leverage remains to a larger extent unreduced. Especially companies in the sector A, also L, are characterised by a larger value of the interest burden. We can expect that these companies on the other hand utilise to a larger extent debts subject to interest. The resulting values of the multiplier are in these cases the lowest of all the sectors.

With the use of logarithms (3), (4), (5) the intensity of the influence of the individual indicators on the synthetic indicator of the equity multiplier was positively proven. With the use of this method the authors found the answer to the question: "How many variants of the multiplier are explained by the value of the interest burden and how many by the value of the financial leverage?" The results of the application of formula 5 are stated in Tab. VII, which primarily points out the negative influence of the interest burden on the effect of the financial leverage.

Due to the fact that the given results of all three indicators are calculated as average values, the value of the multiplier does not correspond to the multiple of the financial leverage and interest burden. It is for the same reason that the sum of the logarithms of the financial leverage and interest burden does not correspond exactly to the logarithm of the equity multiplier. The results of used logarithm determine that for example in companies of the sector Construction, where the value of the multiplier is higher, this value is attained primarily due to financial leverage. Though the absolute value of the interest burden does not near the ideal value of 1, its negative influence on the multiplier is not as noticeable. As expected, the largest negative influence of the interest burden on the value of the multiplier is evident in companies in the sectors A (Agriculture, forestry and fishing) and L (Real estate activities). In these companies also the share of the influence of the financial leverage is the lowest. The combination of these two influences determines that the lowest profit effect of the financial leverage is reached here.

CONCLUSION

The above analysis proved unambiguously the differences in the values of the profit effect of the financial leverage throughout groups of companies according to the sectors. Concurrently, the companies that have a greater tendency to use debts were identified (companies of the sectors F, G, M), as were those that prefer the utility of equity for financing (A, L, N).

The results clearly state, that in all the groups all the values of the interest burden (EBT/EBIT) are to be found, therefore the deciding factor is the value of financial leverage (A/E).

The analysis proved that the resulting value of the multiplier is far more influenced by the results of the financial leverage than that of the interest burden. Companies with the largest values of the multiplier were concurrently the companies with the largest financial leverage. On the contrary, the companies with the lowest values of the multiplier were concurrently the companies with the lowest financial leverage. In these cases the companies should avoid the "rash" use of debts in business, which would increase the loss of the entire business just as fast as it would increase its profit in a thriving business.

SUMMARY

Managers carry out the demand of the owners to maximise the rentability of invested capital with regards to the taken risk. The tool that evaluates the suitability to indebt in order to reach a higher rentability is the equity multiplier indicator. An analysis of the multiplier was carried out on 10 years of data from 456 Czech companies, sorted by the sectors. Based on the data from these companies the influence of two components of the multiplier, which characterise the influence of indebtedness on the return on equity, was analysed. These components are "financial leverage" and "interest burden", these having an antagonistic effect. Average values of the indicators of interest burden, financial leverage and equity multiplier were determined for each of the companies from the analysed data file. The companies were split according to the value of the equity multiplier into four quartiles 1–4. The agriculture sector includes the largest number of companies belonging to the group of companies with the lowest multiplier value. On the contrary, the sectors construction, wholesale, retail, repair of motor vehicles, transportation and storage are mainly represented by companies with the largest values of the multiplier. The low variability of the equity multiplier is apparent in the companies of the administrative and support service sector and it is also relatively low in the agriculture, forestry and fishing sector; on the contrary, in companies for example in the professional, scientific and technical activities and the sector of water, sewage and waste there is higher variability. The paper identifies the companies groups according to sectors inclining to a larger utility of debts to increase the return on equity. The largest equity is reached in the companies of the construction sector; the lowest effect of the multiplier is to be found in companies of the agriculture sector. The resulting value of the multiplier is to a large extent determined by the financial leverage indicator, to a lower extent and at the same time negatively by the interest burden indicator. In companies in the sector construction, where the value of the multiplier is higher, this value is attained primarily due to financial leverage. Though the absolute value of the interest burden does not near the ideal value of 1, its negative influence on the multiplier is not as noticeable. This implies that the companies do not use debts subject to high interest. The largest negative influence of the interest burden on the value of the multiplier is evident in companies in the sectors agriculture, forestry and fishing and real estate activities. In these companies also the share of the influence of the financial leverage is the lowest. The combination of these two influences determines that in these companies the lowest profit effect of the financial leverage is reached.

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