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THE EFFECT OF RECENT CRISIS SITUATIONS ON THE SUSTAINABILITY OF INDEBTEDNESS OF THE MANUFACTURING SECTOR OF SERBIA

Abstract: This study investigates the impact of recent crisis situations on debt sustainability in the manufacturing sector of Serbia. Focusing on the economic and financial challenges facing the sector after the crisis, covering the period from 2015 to 2023, the research uses a comprehensive analysis of key indicators such as levels of total, short-term, and long-term debt as well as liquidity and profitability. Examining the dynamics of indebtedness during crisis periods, the study aims to show the resilience and adaptability of the sector to adverse economic conditions. The findings will contribute to a better understanding of the manufacturing sector's ability to sustain indebtedness in times of crisis and inform policymakers, industry stakeholders, and financial institutions about potential strategies to enhance financial stability and sustainability within the sector.

Keywords: Debt, Manufacturing sector, Indebtness

1. INTRODUCTION

Capital structure, often known as a company's debt-to-equity to debt-to-asset ratio, provides information about a company's creditworthiness and ability to pay its debts. One of the company's main issues is likely to be maintaining the right ratio of debt to equity financing. Gaspareniene (2022) argues that many companies like to use debt as seed money to start or continue their specific business operations. Data on the source of financing is important for a company because it indicates the proportion of its operations that are financed by external and internal resources (Horobet et al., 2021). A firm's capital structure affects several things, including its capital expenditures, risk exposure, liquidity, investor returns, and business valuation. For financial managers, the choice of financing source is always the most important and challenging decision because it affects the cost and availability of cash for the business. By definition, a company's capital structure is the ratio of debt to equity that it uses to finance its operations. Depending on the frequency and maturity of the income (long or short), debt financing takes different forms. Three forms of equity financing are available: common stock, preferred stock, and retained earnings. A company's debt-to-equity ratio, or capital structure, tells us a lot about how risky and financially stable the company is. Maintaining the right debt-to-equity financing ratio is certainly one of the company's main problems. The manufacturing sector in Serbia is a vital component of the country's economy, contributing significantly to job creation, growth, and innovation. Serbia has a long and rich industrial history that dates back centuries. With the help of its advantageous location, highly qualified labor force, and strong infrastructure, Serbia has developed into a thriving manufacturing hub. A wide range of industries, from textiles and electronics to machinery and automobiles, flourish inside its boundaries and provide substantial contributions to the GDP and export earnings of the country. In addition to overcoming economic hardships, Serbia's industrial sector's tenacity has helped the nation advance toward sustainable development and international competitiveness. To maintain the stability of the sector, which is of great importance for economic growth and development, it is necessary to draw attention to the debt levels of companies in the sector.

The paper is composed of five sections. The first section included the introductory considerations as well as stating the subject and goal of the research. The next section includes a review of the relevant literature, which mentions the studies carried out so far in the field of capital structure and reviews several main postulates of theories of capital structures, such as the theory of relevance, irrelevance, "Trade-off", "Pecking order theory". The third section includes the methodological framework of the work, where relevant diagnostic tests and econometric models that were applied in the research are listed. The fourth section includes a presentation of the research results as well as a discussion of their meaning. The last section includes a concluding discussion where the obtained results are summarized as well as suggestions for further research along with the limitations of this study.

2. LITERATURE REVIEW

Modigliani and Miller's (1963) theories of relevance and irrelevance served as the basis for the theory of capital structure. The theory itself suggests that in a perfect market, the capital structure of a firm is irrelevant to its market value, while the relevance theory considers factors like taxes and bankruptcy costs. Economists have continued to develop several other theories of capital structure over time, including the Pecking order theory (Myers, 1984) which suggests that firms prioritize internal financing over external financing, preferring debt over equity issuance to maintain financial flexibility. Trade-off theory (Kraus & Litzenberger, 1973) states that firms balance the benefits of debt, such as tax shields and increased leverage, against the costs, such as financial distress and agency conflicts, to determine their optimal capital structure. Stakeholder theory (Titman, 1984) posits that businesses should consider the interests of all stakeholders, including employees, customers, suppliers, and the community, in addition to shareholders, when making decisions, and many more theories of capital structure.

The influence of the debt ratio on profitability ratios, such as total liabilities to total assets and total equity to total assets, was investigated in the studies of Habini, Dsouza, Rabbani, Navaz & Demiraj, 2022; Huong, 2023; Ilie & Vasiu, 2022 The leverage ratio was shown to have a significant impact on the return on assets ratio, but it had a smaller impact on the return on equity. Companies prefer to use their funds for financing, according to the findings of Moscu, Prodan, and Grigorescu (2014). If they decide to finance with debt, it is best to do it first through the issue of shares, then through short-term and finally long-term debt. According to Kumar & Gupta (2022), a firm's decision to use financial leverage is influenced by a number of factors, including trade risk, firm age, tangibility, liquidity, profitability, business size, tax rate, and tax rate. Studies by Gajdosikova, Lazaroiu & Valaskova (2023); Gajdosikova, Valaskova, Kliestik & Kovačova (2023); and Iiadom, Mavutor, Amankva & Iallei (2020) found statistically significant differences in the leverage coefficient values based on company size and legal form organization. These findings supported previous research on identifying key internal factors that affect a company's debt. Researchers like Ersoi (2022), Ranjan (2021), Mazanec (2023), Ilie & Vasiu (2022), Tien (2023), Boshnak (2023), Roman, Rusu & Ghita-Mitrescu (2017) and Milovanović, Bašić & Bubaš (2022) confirmed the conclusions that debt maturity is largely influenced by factors such as business size, liquidity and maturity of funds. Also, studies by Gajdosikova, Lazaroiu & Valaskova (2023); Gajdosikova, Valaskova, Kliestik & Kovačova (2023); and Iiadom, Mavutor, Amankva & Iallei (2020) found statistically significant differences in the leverage coefficient values based on company size and legal form organization. These findings supported previous research on identifying key internal factors that affect a company's debt.

3. METHODOLOGY AND DATA

The research includes an analysis of 8 companies from the manufacturing sector, listed on the Belgrade Stock Exchange. The period from 2007 to 2022 was covered, while the segmentation was carried out into crisis and post-crisis periods. The period from 2007 to 2009, as well as the period from 2019 to 2022, is classified as a crisis period, while the post-crisis period includes the years 2010 to 2018. The segmentation was performed to better understand the effects of microeconomic and macroeconomic variables. Table no. 1 below shows the dependent and independent variables used as well as the methods of their calculations.

Table 1: Dependant and independent variables

Variable	Measure	Symbol
Dependant variables		
Total debt (pre-crisis)	Total debt / Total assets	CrDEBT
Total debt (post-crisis)	Total debt / Total assets	PcrDEBT
Independent variables		

General liquidity	Current assets / Current liabilities	GL
Profitability	Neto profit / Total assets	ROA
Size	Logarithm on assets	LnAssets
Tangibility	Tangible assets / Total assets	TAN
Gross domestic product	% growth of GDP	GDP
Inflation	CPI index	INF
Corporate tax rate	Annual tax rate	TAX

Source: author's

Based on defined segmentation criteria as well as dependent and independent variables, the authors generated the following equations:

$$CrDEBT_{it} = \alpha + \beta_1 GL_{it} + \beta_2 ROA_{it} + \beta_3 LnAssets_{it} + \beta_4 TAN_{it} + \beta_5 GDP_t + \beta_6 INF_{it} + \beta_7 TAX_{it} + \varepsilon$$

$$PcrDEBT_{it} = \alpha + \beta_1 GL_{it} + \beta_2 ROA_{it} + \beta_3 LnAssets_{it} + \beta_4 TAN_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \beta_7 TAX_{it} + \varepsilon$$

Where are:

CrDebtit = Dug prema imovini u kriznom periodu racio za preduzeće I u vremenskom periodu t
PcrDebtit=Dug prema imovini u post kriznom periodu racio za preduzeće I u vremenskom periodu t
GLtit = Racio likvidnosti za preduzeće I u vremenskom periodu t
ROAtit = Racio profitabilnosti za preduzeće I u vremenskom periodu t
LnAssetstit = Veličina kompanija I u vremenskom periodu t
TANtit = Racio opipljivosti za preduzeće I u vremenskom periodu t
GDPt= Stopa rasta GDP u vremenskom periodu t
INFt= Stopa rasta Inflacije u vremenskom periodu t
TAXt= Stopa rasta stope poreza na dobit u vremenskom periodu t

Table no. 2 below shows the descriptive statistics of the variables used in both models. Model 1 statistics show that general liquidity, GDP growth, and inflation had the highest level of standard deviation which means that in the case of those variables, the trend during the crisis period was more prone to big swings. In model 2 the same variables also showed the highest levels of standard deviation but on a smaller level compared to the crisis period. The general liquidity variable showed the greatest levels of standard deviation. The disparity between the highest and lowest levels of general liquidity was shown to be in the crisis period compared to the post-crisis period where even though the standard deviation of liquidity was still high the disparity was smaller.

Table 2: Descriptive statistics

Variables	Mean	Max	Min	Std. Dev.	Obs.
Model 1					
DEBT	0,42510	0,94315	0,03700	0,23740	63
GL	2,95757	42,40800	0,30400	6,35228	63
ROA	0,02518	0,25687	-0,24250	0,07535	63
SIZE	6,16287	7,17814	5,04118	0,54593	63
TAN	0,69026	0,90778	0,36242	0,15488	63
GDP	3,57047	7,38900	-2,73200	3,40640	63
INF	6,97040	12,41100	1,57500	4,06499	63
TAX	0,12540	0,15000	0,10000	0,02520	63
Model 2					
DEBT	0,41876	1,01770	0,00700	0,29215	72

GL	2,93190	29,80800	0,19700	5,01478	72
ROA	0,04424	0,26847	-0,20990	0,07707	72
SIZE	6,18503	7,10054	5,34441	0,49632	72
TAN	0,68520	0,89133	0,27837	0,17490	72
GDP	1,67760	4,49500	-1,59000	1,82729	72
INF	4,66560	11,13700	1,12200	3,35598	72
TAX	0,13330	0,15000	0,10000	0,02374	72

Source: author's

4. RESULTS AND DISCUSSION

In this section of the study, the authors initially present the results of unit root tests to establish stationarity, then conduct a variance inflation factors test to establish the absence of multicollinearity, while in the rest they indicate the main findings of this research. In table no. 3 shows the results of conducted panel unit root tests such as Levin, Lin & Chu test, Im, Pesaran & Shin test, and Augmented Dickey-Fuller test. The presented coefficients and levels of statistical significance indicate the presence of stationarity of all used variables during the first differentiation.

Table 3: Unit root tests

Variables	Levin, Lin & Chu		Im, Pesaran & Shin		ADF	
	Level	1st diff	Level	1st diff	Level	1st diff
DEBT	0,35631 (0,6392)	-3,7066 (0,0001)	0,15142 (0,5602)	-5,3548 (0,0000)**	16,4087 (0,4248)	58,4055 (0,0000)**
GL	-0,51234 (0,3042)	-5,0101 (0,0000)**	-0,24845 (0,4019)	-4,2028 (0,0000)**	15,5223 (0,4868)	46,7632 (0,0001)**
ROA	-1,2451 (0,1065)	-4,7971 (0,0000)**	-2,1266 (0,0167)**	-5,7327 (0,0000)**	28,9911 (0,0240)**	63,7589 (0,0000)**
SIZE	-0,4946 (0,3104)	-3,0390 (0,0012)**	2,2054 (0,9863)	-4,4494 (0,0000)**	10,3786 (0,1461)	49,0456 (0,0000)**
TAN	-1,2343 (0,1085)	-3,1399 (0,0008)**	- 2,1321 (0,0165)**	-5,9288 (0,000)**	28,8648 (0,0249)**	63,8540 (0,0000)**
GDP	-5,3855 (0,0000)**	-9,2482 (0,0000)**	-3,6592 (0,0001)**	-8,6566 (0,0000)**	40,2506 (0,0007)**	91,4141 (0,0000)**
INF	1,6409 (0,9496)	-2,9464 (0,0016)**	0,6358 (0,7376)	-7,1170 (0,0000)**	8,0973 (0,9459)*	76,0638 (0,0000)**
TAX	-1,1726 (0,1205)	-11,8199 (0,0000)**	0,8843 (0,8117)	-3,38801 (0,0004)**	6,9014 (0,9751)	-8,58250 (0,0000)**

Source: author's

After establishing the stationarity of the data, a variance inflation factor test was conducted to check the presence of multicollinearity between the used independent variables. The average VIF indicator is 1.3895, which indicates the absence of multicollinearity because the average value is less than the threshold value of 10.

Table 4: Variance inflation factor

Variables	Centered Vif
GL	1,2809
ROA	1,0698
SIZE	1,0903
TAN	1,2518
GDP	1,0877
INF	1,9502
TAX	1,9957
AVERAGE VIF	1,3895

Source: author's

As mentioned earlier in the work methodology section, this work section will present the results obtained based on the application of static and dynamic models on the example of the crisis and post-crisis period. The results of the diagnostic heteroscedasticity test on the example of model 1 (crisis period) failed to reject the null hypothesis of homoscedasticity, so it was determined that the used panel data are homoscedastic, which further confirms the greater adequacy of the application of static models in this case. The next diagnostic test performed is the Hussmann test for the selection between fixed and random effects static models. The results indicated a greater adequacy of the random effects model. The results of the diagnostic tests are summarized in Table No. Under. Observing the results, a statistically significant and negative effect of the profitability and tangibility variables was determined. The growth of profitability and tangibility of assets by 1% causes a decrease in total debt by 0.808%, and 0.416% respectively. Analyzing the obtained results, it is noticeable that the effect of microeconomic factors is far more statistically significant than the included macroeconomic factors, similar to the findings of Ersoi (2022), Ranjan (2021), Mazanec (2023), Ilie & Vasiu (2022), which lead us to the conclusion that it is necessary to include more macroeconomic factors for an even better understanding of the effects. Regarding microeconomic factors, the results are as expected and support the postulates of one of the main theories of capital structure, namely the "Pecking order theory". The negative effect of profitability tells us that companies in the manufacturing sector of Serbia rather decide to reinvest the money they earn at the end of the business year into business, which leads to increased use of their funds compared to borrowed funds. The negative influence of tangible assets further supports that conclusion because it shows that companies in the manufacturing sector of Serbia look to finance as many fixed assets as possible using their funds.

Table 5: Static and dynamic models

Variables	Model 1 (REM)	Model 2 (GLS)
GL	-0,002660 (0,3870)	-0,002424 (0,0178)**
ROA	-0,808407 (0,0016)**	-0,255867 (0,0287)**
SIZE	-0,107974 (0,6414)	-0,672532 (0,0000)**
TAN	-0,416830 (0,0110)**	-0,097484 (0,2186)
GDP	0,002494 (0,4249)	-0,003092 (0,3283)
INF	-0,001550 (0,5054)	-0,000118 (0,9453)
TAX	-0,741091 (0,5798)	-0,62201 (0,0912)*
C	-0,003514 (0,8548)	-0,005411 (0,4582)
R squared	0,4088	0,707
Probability	0,0028	0,0000

Source: author's

Table 6: Diagnostic tests

Model 1	
Heteroscedasticity Panel LR test	3,635595 (0,8884)
Hausmann test	0,0000 (1,0000)
Model 2	
Heteroscedasticity Panel LR test	67,25039 (0,0000)

Source: author's

In the case of model 2 (post-crisis period), the performed diagnostic test of heteroscedasticity managed to reject the null hypothesis of homoscedasticity, so the dynamic model was chosen as a more adequate model when interpreting the results. The Hausmann test was not performed, because the use of static models was already rejected by an earlier

diagnostic test. The results indicated a statistically significant and negative effect on liquidity, profitability, and the corporate tax rate, while a positive effect was shown for the company size variable. The effect of income tax is statistically significant at 10% significance, while the others are at 5% significance. A 1% increase in liquidity, profitability, and corporate tax rate predicts a decrease in total debt of 0.002%, 0.256%, and 0.622%, respectively. A 1% increase in company size causes a 0.672% increase in total debt. The results and conclusions are similar in the case of model 1 and the findings of Roman, Rusu & Ghita-Mitrescu (2017) and Milovanović, Bašić & Bubaš (2022, which shows a greater commitment of the manufacturing sector in retaining and reinvesting own funds about debt. What is interesting is the statistically significant effect of the macroeconomic variable tax on company profits. The negative effect supports the conclusions of another theory of capital structure, namely the "Trade" theory, which tells us that companies use debt as long as it is the most profitable in terms of the obligation to pay taxes. The negative effect of the tax on short-term indebtedness tells us that when the profit tax increases, companies look to reduce the level of their short-term indebtedness in order to use their own funds more efficiently. Through the segmentation of the research period into crisis and post-crisis periods, certain differences in the findings were observed, while the postulates of the "Pecking order" and "Trade-off" theories were confirmed. Liquidity did not show a statistically significant effect in the crisis period, while the profitability and tangibility of assets had a more significant effect on the decline in the total indebtedness of companies in the crisis period compared to the post-crisis period. The sources tell us that during the crisis period, the reinvestment of profits in the company itself, be it in fixed assets or short-term assets, reduces the level of debt to a greater extent compared to the post-crisis period. Also, the impact of income tax was significant in the post-crisis period.

5. CONCLUSION

In conclusion, this study dealt with the intricate relationship between various microeconomic and macroeconomic factors and their impact on the overall debt level of manufacturing companies listed on the Serbian Stock Exchange. A statistically significant and negative impact of profitability and tangibility variables was found in the case of model 1. Total debt decreased by 0.808% and 0.416%, respectively, as a result of a 1% increase in profitability and asset tangibility. In Model 2, a 1% increase in the corporate tax rate, profitability, and liquidity was expected to result in a decrease in total debt of 0.622%, 0.256%, and 0.002%, respectively. Total debt increased by 0.672% for every 1% increase in company size. Certain deviations in the results were observed when the research period was divided into crisis and post-crisis periods and the principles of the "Pecking order" and "Trade-off" hypotheses were confirmed. While the profitability and tangibility of assets had a more significant and stronger impact on the decline in total corporate indebtedness in the crisis period compared to the post-crisis period, liquidity did not have a statistically significant effect in the crisis period. Sources inform us that, compared to the post-crisis period, the amount of debt is reduced more when profits are reinvested in the company, be it permanent or short-term assets. In addition, income taxes have had a major impact in the post-crisis years. These findings provide valuable insights to policymakers, investors, and corporate stakeholders seeking to navigate the complexities of financial decision-making in the manufacturing sector. Going forward, further research can delve deeper into specific industry segments or explore the implications of regulatory frameworks on debt dynamics, contributing to a more comprehensive understanding of financial dynamics within the Serbian manufacturing sector. Further limitations of the study include the use of only 8 companies in the sample and the survey of the manufacturing sector of one country. A proposal for future research is research into the manufacturing sector of several countries for comparative analysis, as well as the inclusion of a larger number of companies in the sample.

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