

THE IMPACT OF MACROECONOMIC FACTORS ON THE PERFORMANCE OF COMPANIES IN THE MINING AND STONE EXTRACTION SECTOR

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Summary

The aim of this research is to examine the impact of macroeconomic factors on the business performance of companies in the mining and stone extraction sector in the Federation of Bosnia and Herzegovina. The research was conducted over a four-year period from 2020 to 2023. Business performance was observed through profitability, measured by return on total assets. The results of the research showed that macroeconomic variables, such as GDP growth rate and unemployment rate, are significantly related to return on total assets in companies that achieve a positive business result, primarily in companies from the subsector of metal ores extraction, other ores, and stone. On the other hand, no such connection was found in companies that operate at a loss, which mostly pertain to coal mines. The reason lies in the fact that the problems of coal mines in Bosnia and Herzegovina are primarily the result of internal and long-standing structural factors, rather than changes arising from the macroeconomic environment.

Keywords: *macroeconomic factors, business performance, profitability, return on total assets, companies in the mining and stone extraction.*

INTRODUCTION

The mining and stone extraction sector in Bosnia and Herzegovina (B&H) traditionally plays a significant role in the country's economy, with a special emphasis on providing energy resources, primarily coal for thermal power plants, thereby contributing to the stability of the overall energy system in B&H [9]. According to data from the Statistical Institute of Bosnia and Herzegovina for 2023, thermal coal power plants produced 56% of the total electricity in the country, while in 2022, this share was even higher at 65.34%. However, the sector faces numerous challenges that threaten its sustainability and competitiveness in both domestic and international markets.

The last four years have been marked by significant instabilities at local, state, regional, and global levels. In an economic context, these instabilities are reflected through volatility and pronounced fluctuations in macroeconomic indicators. A stable macroeconomic environment is essential for sustainable economic growth. Therefore, the goal of this paper is to explore whether and to what extent the fluctuations of macroeconomic variables have impacted the operations of enterprises in the mining and stone sector in the Federation of Bosnia and Herzegovina.

THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

One of the key criteria for assessing the success of company management is the analysis of its profitability [13]. In this context, profitability is often used as a primary indicator of business performance [12]. Previous research has shown that profitability is influenced by both internal specific factors and external factors [11].

This research focuses on the impact of macroeconomic variables as external factors on the return on total assets (abbreviation: ROA). ROA is a profitability indicator that reflects a company's ability to generate returns based on all available resources and is interpreted as the rate of return achieved on total assets [13].

Macroeconomic variables are economic indicators that measure total activity and the condition of the economy at the national or global level. They are used to analyze economic trends, cycles, and policies, and their impact covers a wide range of aspects, from production and employment to inflation and international trade. The most commonly analyzed variables include gross domestic product (GDP), inflation, unemployment, and interest rates.

GDP reflects the total market value of all goods and services produced within a country over a specific period. In the mining sector, strong economic growth is typically accompanied by an increase in demand for mining products, which can positively impact the profitability of mining companies. On the other hand, inflation can significantly affect profitability by increasing operational costs due to rising prices of raw materials and labor, which can have a negative effect on profit margins [12]. Interest rates, as an instrument of monetary policy, can also have an impact on the profitability of companies. An increase in interest rates results in higher borrowing costs, which reduces the ability to invest and increases overall business expenses [12]. Previous research conducted on a sample of companies from the mining sector has shown a connection between interest rates and economic growth with the return on total assets, while no significant impact was established for inflation [12]. Furthermore, research shows that an increase in corporate profitability is associated with a decrease in the unemployment rate, where profit growth leads to a reduction in unemployment [8].

METHODOLOGY AND RESULTS OF THE RESEARCH

General economic data about the sector

According to the Standard Classification of Activities in Bosnia and Herzegovina (2010), the mining and stone extraction sector consists of four subsectors:

- (a) coal and lignite extraction;
- (b) crude oil and natural gas extraction;
- (c) metal ores extraction; and (d) other ores and stone extraction.

Preliminary data from the Agency for Statistics of Bosnia and Herzegovina indicate that the value of sold products in this sector in 2023 amounted to 1.08 billion BAM. The structure by subsectors is presented in the table below.

Table 1. Value of industrial products sold according to NIP in 2023 – Mining and stone extraction sector [2]

T1. VALUE OF INDUSTRIAL PRODUCTS SOLD ACCORDING TO NIP, 2023	
Activity	Total production value of sale and fee paid value (0+1)

level		2023
	TOTAL	2.275.530
B	MINING AND STONE EXTRACTION	1.079.766
05	Coal and lignite	750.297
07	Metal ores	171.284
08	Other ores and stones	158.185

The largest share of the total value of sold products in the mining and stone sector is accounted for by the coal and lignite mining subsector, which makes up 69.5 %. This is followed by metal ores mining with a share of 15.9 %, while the extraction of other ores and stones contributes 14.65 %.

The coverage of imports by exports in the metal ores subsector significantly exceeds imports, while in the subsector of other products from ores and stones, it is also at high levels (table 2).

Table 2. Coverage of imports by exports – Mining and stone extraction sector [1]

Coverage of imports by exports - mining and stone in B&H					
	2020	2021	2022	2023	Average
Coal and lignite	5,64%	4,01%	12,57%	24,24%	11,62%
Metal ores	994,03%	440,39%	197,68%	294,43%	481,63%
Other ores and stones	97,32%	65,69%	62,20%	79,16%	76,09%

According to the data from the Financial Information Agency (FIA), in 2023, there were 152 companies operated in the mining and stone extraction sector in the Federation of B&H, accounting for 69.72 % of the total number of companies in this sector at the state level. These companies employed a total of 11,341 people and generated 748 million BAM in revenue, which constitutes 60.67 % of the total revenue in the sector at the state level (table 3).

Table 3. Structural statistics of the mining and stone extraction sector – Federation of B&H, 2023 [6]

	Number of business entities	Employees	Revenues (mil.BAM)	Export revenues (mil. BAM)	Number of profitable business entities	Total profit	Number of loss-making business entities	Total loss
Federation of B&H	152	11341	748	71	79	39	62	190
Share in total business sector of the Federation of B&H in which business entities operate	0,57%	3,08%	1,08%	0,71%	0,44%	0,73%	0,85%	14,84%

In the year 2023, in the territory of the Federation of B&H, 79 companies (52 %) recorded a profit, while 62 companies (40.1 %) operated at a loss. The total losses of these companies account for nearly 15 % (14.84 %) of the total loss recorded in the entire economic sector of the Federation of B&H, and are mostly related to companies in the coal extraction sub-sector. According to FIA data for 2023, seven coal mining companies generated a loss of 144 million BAM, which accounts for nearly 76 % of the losses for the entire sector at the level of the Federation of B&H.

Sample methodology

The research was conducted from the year 2020 to the year 2024 on a sample of companies that contributed the most to the results of the sector at the level of the Federation of B&H in terms of revenue, share in sector assets, and share in total profit/loss of the sector. The business data of the companies were taken from the official statistical bulletins on company operations from the website of the Financial Information Agency – FIA [6].

Table 4. Overview of the structure of companies included in the research sample – compiled by the author [6]

Description	2020	2021	2022	2023	Total
Number of observation units	35	35	35	35	140
Sample companies' revenue (mil BAM)	560	561	630	687	2,437
Total sector revenue (mil BAM)	635	571	654	748	2,608
Share of sample companies' revenue in the sector	88.20%	98.16%	96.26%	91.85%	93.45%
Asset value (mil BAM)	1,756	1,84	1,906	2,193	7,695
Total sector assets (mil BAM)	1,95	2,125	2,198	2,366	8,639
Share of sample companies' assets in the sector	90.03%	86.60%	86.73%	92.67%	89.07%
Sample companies' profit (mil BAM)	22	18	24	35	100
Total sector profit	23	23	30	39	115
Share of sample companies' profit in sector profit	96.03%	79.75%	80.66%	89.68%	86.61%
Sample companies' loss (mil BAM)	-82	-109	-131	-186	-508
Total sector loss	-85	-116	-136	-190	-527
Share of sample companies' loss in sector loss	96.03%	94.01%	96.00%	98.08%	96.32%

The presented data shows that this is a representative sample, considering that the companies in the sample accounted for almost 94 % of the total sector's revenue, had a share of 89.07 % in the sector's assets, and generated 86.61 % of the profit, but also 96.32 % of the sector's losses.

Definition of dependent and independent variables

The dependent variable in this research is the return on assets measured by the ratio of net profit achieved at the end of each observed period to the total assets of the observed companies [13]. The independent variables in this study are the GDP growth rate, inflation rate, interest rates on loans to businesses, and the unemployment rate. Data on the movement of the GDP growth rate, inflation, and interest rates on businesses were taken from the statistical bulletin of the Central Bank of B&H [5], while data on the unemployment rate were sourced from the statistical bulletin of the Agency for the Promotion of Foreign Investments in B&H [3].

Research Findings and Discussion

The research was conducted: (a) at the level of the entire sector (Model 1), (b) at the level of the sample of companies that operate positively and mostly (24/25) relate to companies from

the subsector of metal ores extraction and other ores and stones (Model 2); and (c) at the level of companies that operate negatively and mostly relate to coal mines (7/10). Coal mines operate in the subsector of coal and lignite extraction (Model 3).

The data were processed using the Excel Data Analysis Toolpak, employing both descriptive statistics and multiple regression analysis.

Descriptive statistics provide a summary of the dataset, making it easier to understand, interpret, and use for further analysis [11]. The results of the descriptive analysis for the dependent variable, return on assets (ROA), across each specific model are presented below:

Table 5. Descriptive Statistics Results for the Dependent Variable

	Model 1	Model 2	Model 3
Mean	0,02903	0,099618	-0,14699
Standard Error	0,015233	0,013382	0,024764
Median	0,020391	0,051817	-0,10032
Mode	0,03	0,03	-0,05841
Standard Deviation	0,180877	0,134486	0,158568
Kurtosis	4,954946	3,444089	7,927596
Skewness	-0,31563	2,036349	-2,68812
Minimum	-0,80455	0	-0,80455
Maximum	0,569853	0,569853	-0,01887
Count	140	100	40

From the observed data, a total of 140 units (Model 1) were analyzed. Out of these, 100 units (Model 2) achieved a positive return on assets (ROA), while 40 units (Model 3) reported a negative ROA. Return on assets (ROA) reflects how efficiently a company utilizes its assets to generate profit. At the sector level, the average ROA is slightly above zero (Mean Model 1 = 0.029). At the company level, results differ significantly between subsectors: Model 2 companies, which are predominantly engaged in metal and stone ores extraction, recorded an average ROA of 0.10 (0.099618). Model 3 companies, mostly coal mines, showed a negative average ROA of -0.15 (-0.14699). This indicates that companies in the metal ores, other ores, and stone extraction subsector are relatively efficient in asset utilization, generating approximately 0.10 BAM of profit for every 1 BAM of assets employed.

Table 6. Descriptive Statistics Results for the Independent Variable

	GDP	Inflation	Unemployment rate	Interest rates
Mean	0,026085	0,052305	0,15478	0,03522
Standard Error	0,003271	0,004764	0,001268	0,000314
Median	0,022	0,02	0,159	0,0379
Mode	-0,032	-0,01	0,159	0,038
Standard Deviation	0,038846	0,056574	0,01506	0,003731
Kurtosis	-1,11228	-1,13609	-1,00561	-0,76449
Skewness	-0,37899	0,549826	-0,34482	-1,02824
Minimum	-0,032	-0,01	0,132	0,0289

Maximum	0,074	0,14	0,174	0,038
Count	140	140	140	141

The average value of the GDP growth rate during the research period was 2.61 % (Mean = 0.026085), inflation was 5.23 % (Mean = 0.052305), unemployment was 15.48 % (Mean = 0.15478), and interest rates were 3.52 % (Mean = 0.03522).

Before conducting multiple regression, a correlation analysis between the independent variables was performed to avoid the problem of multicollinearity. The problem of multicollinearity is present if at least two regression variables are linearly dependent or approximately linearly dependent [4].

Table 7. Results of Correlation Analysis Between Independent Variables

	GDP	Inflation	Unemployment rate	Interest rates
GDP	1			
Inflation	0,39514557	1		
Unemployment rate	0,32599316	-0,3390821	1	
Interest rates	-0,806393	0,14625509	-0,764323	1

Interest rates on loans to companies have a significant negative high correlation with GDP (the correlation coefficient is greater than 0.8; = -0.806393) and a medium strong (the correlation coefficient is greater than 0.5) correlation with the unemployment rate (-0.764323), therefore they are excluded from further analysis to avoid distorting the regression results. A correlation coefficient from 0.5 to 0.8 implies a medium strong correlation and over 0.8 implies a strong correlation [10].

Table 8. Regression Analyses Results

Model 1 - Total sector					Model 2 - Companies -Metal ores exploitation and other ores and stones				Model 3 - Companies - Lignit and coal exploitation			
Multiple R	0,19				0,33				0,30			
R Square	0,04				0,11				0,09			
Significance F	0,16				0,01				0,32			
Observations	140,00				100,00				40,00			
	Coeff	StErr	t Stat	P-value	Coeff	StErr	t Stat	P-value	Coeff	StErr	t Stat	P-value
Intercept	0,41	0,19	2,20	0,030	0,68	0,18	3,88	0,000	-0,14	0,26	-0,56	0,580
GDP	0,05	0,47	0,10	0,921	0,74	0,43	1,73	0,087	-0,70	0,65	-1,08	0,286
Inlation	-0,30	0,32	-0,93	0,353	-0,38	0,30	-1,26	0,211	-0,34	0,43	-0,78	0,440
Unemployment rate	-2,32	1,18	-1,97	0,051	-3,72	1,11	-3,37	0,001	0,35	1,65	0,21	0,832

From the presented data, it can be concluded that in Model 2, the macroeconomic variables GDP and unemployment are statistically significant, with unemployment significant at the 5 % level and GDP at the 10 % level. The significance test (Significance F = 0.011) shows that this model is statistically significant, meaning that the macroeconomic variables are relevant for explaining the variation in returns on invested capital in companies that are operating positively and mostly relate to the subsector of metal ores extraction, other ores, and stone. The movement of GDP and unemployment rates significantly explains the variation in returns on assets for these companies. On the other hand, for Model 1 (total sector) and Model 3, macroeconomic

variables are not statistically significant. In Model 3, which primarily pertains to coal mines, it is possible that other factors such as long-standing structural issues in the sector (high fixed and operational costs, complex management, and lack of investment) have a more significant impact on the operations of these companies compared to the movement of macroeconomic variables. It is also evident that the results of this model were reflected in Model 1, which comprises the entire sector, which is not unexpected as the losses of coal mining companies exceed almost four times the total profit of the sector (144 million BAM in losses / 39 million BAM in profit) at the level of the Federation of Bosnia and Herzegovina. The factors that impact their operations at the total sector level are more significant than the macroeconomic variables that affect companies operating positively and are mostly related to the subsectors of metal ores extraction, other ores, and stone.

CONCLUSION

This research analyzed the impact of macroeconomic variables on the business operations of companies in the mining and stone extraction sector in the Federation of Bosnia and Herzegovina. The results showed a significant correlation between the unemployment rate and GDP with the return on assets for companies that achieve a positive business result. In contrast, for companies that operate at a loss, most of which are coal mines, such a connection was not established. Their operations depend more on internal specific factors than on the macroeconomic variables analyzed in this study. Also, at the overall sector level, no significant correlation was found between macroeconomic variables and return on total assets, indicating that specific factors related to coal mines have spilled over to the entire sector. Inflation, as a macroeconomic variable, was not significant in any sample, even though its rates were high during the research period (the average rate was 5.2 %).

The mining sector in B&H faces numerous challenges, particularly in the coal mining segment, but at the same time offers potential for development and transformation. Achieving greater competitiveness and sustainability requires investment in the modernization of production capacities, restructuring loss-making enterprises, applying green technologies, reducing emissions of harmful gases and substances, and optimizing operational costs. On the other hand, significant potential lies in the extraction of metal ores and other ores and stones, as confirmed by the export data of these raw materials (table 2).

The recommendation for further research is to expand the analysis to specific factors that affect the business of companies in this sector, as this study was limited solely to investigating the impact of macroeconomic variables on return on total assets.

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