

OPTIMAL ASSESSMENT OF THE IMPACT OF INFLUENCING FACTORS ON THE FINANCIAL PERFORMANCE OF COMPANIES IN THE FERROUS METALLURGICAL INDUSTRY IN ROMANIA

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Abstract

For an economic entity, performance is what contributes to improving the value-cost relationship. The relationship between value and cost is fundamental to purchasing decisions in the economy, in business and among consumers. This study aims to conduct an econometric analysis of the performance of firms in the metals industry. The proposed objectives to achieve this goal are: O1: to carry out a literature review to identify research trends on the stated topic; O2: to generate an econometric model on the influence of financial indicators on financial performance in firms in the metal industry and O3: the effects of economic crises on companies in the ferrous metal industry. Listed ferrous metals companies face serious financial and operational challenges and have adopted a variety of strategies to cope with the effects of economic crises over the period under review.

Keywords: *performance; economic crisis; microeconomic model.*

JEL Classification: M41

I. INTRODUCTION

Development implies change leading to improvement or progress. Sustainability or sustainable economic development implies a new attitude towards the environment and involves meeting all of humanity's present needs without compromising resources for future generations. Sustainability cannot be limited to economic growth (Barbier, 2011) and ensuring the quality of the environment, but must also include the creation of a favorable framework for solving the social problems faced by individuals and communities. The economic and financial approach to sustainability is based on the concept of the maximum income stream (Jin et al., 2023) that can be generated by maintaining the capital that produced these benefits. Underpinning this concept is the principle of economic efficiency applied to resource use. Efficiency is the maximization of the results of an activity relative to the resources programmed (Wickens, 2020). An efficient activity maximizes the results achieved with the same amount of resources or minimizes the resources for a given result. Consequently, in making expenditures, consideration should be given to achieving maximum results of appropriate quality.

Sustainability means achieving performance without negative environmental or social impacts. In today's market environment, a company's overall performance requires the three pillars of economic, social and environmental development (Figure 1), as the competitive environment indirectly demands sustainable investments.

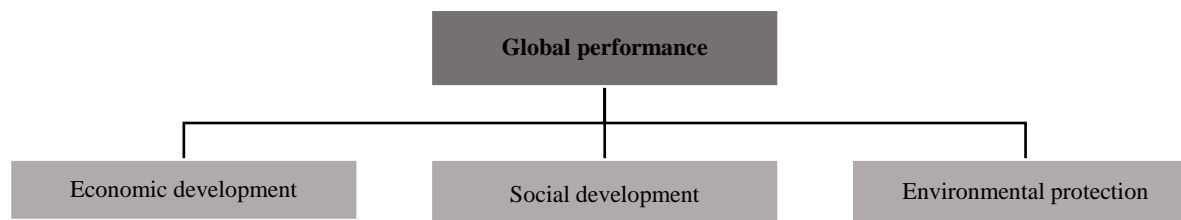


Figure 1. Overall performance within the entity

Source: Author's own elaboration

Performance is an outcome, a goal to be constantly pursued, and its existence is a continuous incentive for the success process. In a dynamic business environment, prosperity is the generation of profit through the beneficial effects of a company's operational and production structures. Performance, as a result of economic

processes, embodies value. Intrinsic value creation means that a company creates economic value added, i.e. a positive net value after remuneration of all factors of production, including the cost of capital. A company's performance depends on its ability to create value for customers, shareholders, employees and the natural environment. Value creation is a function not only of product attributes but also of the combination of intangible benefits associated with the product. Organisational performance is determined by how employees communicate and cooperate with each other. In a sustainable economy, a company's commitment to the environment should be seen as an obligation to future generations, not an opportunity, for commercial, moral and economic reasons. When companies perform well, shareholders are satisfied with their profitability, customers have confidence in the quality of products and services, employees are motivated and proud, and society as a whole benefits from the company's environmental policy. This enables the organisation to successfully achieve its economic, social and environmental objectives..

Financial performance is closely linked to profitability, which can be analysed using a rate system that represents the relationship between the result and the capital invested to achieve it. Operating profit, financial profit, recurring profit and net profit can be used to analyse profitability. In terms of invested capital, the following indicators can be used: equity, permanent capital, fixed assets and total assets. Financial profitability is one of the main indicators for analysing the performance of an enterprise and is determined by the fairness of the commercial policy, the efficiency of the invested capital and the financial policy and structure of the enterprise..

This study aims to conduct a dynamic econometric analysis of the performance of firms in the metals industry. The proposed objectives to achieve this goal are:

- O1: to conduct a literature review to identify research trends on the stated topic;
- O2: to generate an econometric model on the influence of financial indicators on the financial performance of ferrous metal industry firms;
- O3: effects of the economic crisis on companies in the ferrous metal industry.

In order to achieve the proposed goal and implicitly the three objectives set, literature and statistical data will be used, interpreted, and subjected to econometric analysis.

II. LITERATURE REVIEW

All companies operating in the European economic system are required to report their actions and results at the end of each financial year, thereby ensuring the transparency of the business they manage and allowing stakeholders to become familiar with the business that the reporting company is doing, i.e. allowing them to determine whether the company is profitable or not. Thus such reporting is achieved through financial statements that facilitate communication between the company and its stakeholders. With the increasing interest in sustainable business development and environmental protection, EU legislation, Directive 2014/95/EU, which has subsequently been transposed in the other Member States, requires the inclusion of non-financial items in financial statements to better assess the impact of business activity on society and the environment.

Weerathunga et al. (2020) argue that financial statements prepared in accordance with IFRS are designed to meet the information demands of stakeholders, in particular investors, current and potential creditors, and for this reason economic entities should place particular emphasis on presenting the best possible financial statements, reflected in performance at or above the level expected by users. The information presented in the annual financial statements should include, in addition to financial reporting and data on the non-financial activities carried out by the reporting undertakings, also a set of indicators that would make it easier for stakeholders to understand the message conveyed by the company. Huang (2021) states that company financial performance can be described either by accounting measures or market measures, with the same study showing that accounting-focused measures have a higher correlation with financial performance than market measures. Manikas et al. (2021) argue that firms will unintentionally improve their financial performance if they are concerned about corporate sustainability. In order to be considered sustainable, they must include sustainability strategies within their business model. This will require the adoption of new global strategies and governance performance, which will also involve stakeholders, "contributing to the continuous improvement of social standards, environmental conditions, and the economy on a regional and/or international scale" (Kantabutra & Ketprapakorn, 2020). Increased competition and growing stakeholder interest in quantifying the environmental impacts of economic activities raises the issue of the need for companies to invest in or focus on corporate social responsibility activities (Andreev, 2021; Tanasă (Brînzaru) & Cojocaru, 2022). In Reynaud's (2014) view global performance is the aggregation of economic, social and environmental performance. Thus, the performance of an economic entity is recorded as a result of financial results and as a result of measures taken to protect the environment and employees. The results of the study conducted reveal that there is clear empirical evidence for a positive correlation between social performance and corporate financial performance. A limitation of the theory is that it limits the social side by not including shareholders, customers, partners, etc. in the social dimension of performance. Studies (Socoliuc et al., 2020) show that more and more entities, despite difficulties in applying valid corporate social responsibility tools, are concerned about the role they play in society. Profitability and productivity are linked to a third important

dimension of performance, namely growth. Some authors (Bottazzi et al., 2008) find that, regardless of the specific sector of activity and financial conditions, there seems to be little market pressure and little behavioral inclination for more efficient and profitable firms to grow faster.

Financial analysis is "a method of understanding the company through its accounting statements, methods that aim to make an overall judgment of the company's level of performance and its financial situation" (Refis & Issaoun, 2021). For this reason, particular importance is attached to financial analysis which provides information on the real situation of the company and calculates its financial performance using the documents provided by accounting (balance sheet, profit and loss account). For this purpose, the performance management system uses a number of financial indicators, provided by the literature, based on which the company's financial performance will be studied. In the literature, financial performance is defined (Husted & Salazar, 2006) as the company's ability to make a profit in order to be profitable. According to Tien et al. (2020), the indicators most often used in financial studies, regarding the calculation of performance, can be structured into two main categories: (a) short-term indicators related to book value and profitability ratios and (b) long-term indicators related to market value factors, also known as asset growth factors.

The study published by Panda & Nanda (2018) uses a quadratic function to explore the nonlinear relationship between working capital financing and profitability. This study explores the relationship between working capital financing and profitability in terms of price-cost margin and financial flexibility of firms in different manufacturing sectors of the Indian economy. Gunarsih & Ismawati (2018) argue that if there is a high correlation between good management practice and Corporate Social Performance, then there will be a positive impact of Sustainability Reporting on company performance.

Deloof (2003) argued that the larger the gap between making expenditures on inventory purchases and earning revenue from inventory sales, the greater the investment in working capital and the higher the sales and profitability. The likelihood of declining profitability arises if the costs of investing in working capital increase faster than the benefits of holding more inventory or providing more trade credit to customers (Chamier-Gliszczyński & Bohdal, 2016).

Sustainability is widely accepted as one of the most important approaches to achieving long-term success. Metals companies use reporting to measure, analyze and evaluate their sustainability strategy. This reporting should be based on key performance indicators (Lenort et al., 2017). The concept of sustainability is increasingly used within corporations to derive specific sustainability performance indicators and to establish target correlations (Chamier-Gliszczyński & Bohdal, 2016). Bateh et al. (2014) differentiate between internal and external sustainability support. Internal sustainability is concerned with survival in a competitive market that involves global competition. External sustainability considers societal needs that address global quality of life issues.

III. MODELING METHODOLOGY

Ferrous metals companies play an important role in contemporary industry and the global economy. Ferrous metallurgy deals with the processing and production of iron-based metals such as steel and cast iron. Steel is used in most modern structures, from buildings to bridges, and is valued for its strength and durability. In cars, trains, ships and planes, steel and its alloys are essential components in their manufacture. Wind turbines, power plants and other energy infrastructure rely on steel for strength and efficiency. Many consumer goods, from household appliances to tools, are made from ferrous metals. Metal companies create thousands of jobs and contribute significantly to the GDP of many countries. They also create an entire industry dedicated to recycling. Research in the steel sector leads to the development of new alloys and processing techniques, enabling technological advances in many areas. Access to iron resources and steel production capacity has geopolitical consequences, affecting relations between states and national economic strategies. Recent developments in the metals industry focus on producing steel in a greener way and reducing carbon emissions and resource consumption.

The economic entities selected for the research are among the largest companies in the ferrous metallurgy industry in Romania. For the development of the econometric model, the financial profitability of five companies was analyzed through a relevant indicator, namely the financial performance indicator. The analysis aims to determine the dependence relationship of the financial performance dynamics on the dynamics of several influencing factors. The stated aim will be pursued by achieving the following objectives:

- to rewrite financial performance in the metallurgical sector in the form of multiple linear regression;
- to identify the determinants influencing economic profitability.

IBM SPSS Statistics 26 software was used to analyze the data of the ferrous metal industry firms for the period 2006-2022 and to validate the regression model. The model developed, analyses the linear dependence correlation between the IFP and the independent variables API, CRPI, IPI, DRPI according to the table:

Table 1. Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	DI, CRPI, IPI, API ^b	.	Enter

a. Dependent Variable: IFP

b. All requested variables entered.

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

$$IFP = \alpha + \beta_1 * API + \beta_2 * CRPI + \beta_3 * IPI + \beta_4 * DRPI + \varepsilon \tag{1}$$

where: IFP stands for financial performance index and is the dependent variable of the proposed model, the independent variables of the proposed model are API stands for asset performance index, CRPI stands for resource consumed performance index, IPI stands for revenue performance index and DRPI stands for debt repayment performance index, α , β_1 , β_2 , β_3 and β_4 are the regression model parameters and ε is the random error variable.

Metal companies are an integral part of the functioning and development of modern societies. Their impact goes beyond the simple production of metals and extends to technological innovation, economic development, the expansion of international relations and environmental sustainability.

IV. ECONOMETRIC MODEL ON THE INFLUENCE OF FINANCIAL INDICATORS ON FINANCIAL PERFORMANCE IN THE FERROUS METAL INDUSTRY

In this phase of the research we aim to show that the model determined describes the economic problem under analysis and has a high degree of confidence. Specifically, we want to determine the extent to which the dependent variable is sensitive to changes in the other elements.

Table 2 shows how to determine the value of the correlation ratio for the Summary.

Table 2. Model Summary

	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.996 ^a	.992	.991	.09498020	1.645

a. Predictors: (Constant), DRPI, CRPI, IPI, API

b. Dependent Variable: IFP

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

The value of the correlation ratio according to the Summary model obtained for the ferrous metallurgical industry is 0.996. It is observed that there is a strong relationship between the variables of the IFP, API, CRPI, IPI and DRPI model for ferrous metallurgical firms, as there is a significant relationship between the earnings estimate per unit of invested capital and the economic indicators profit, revenue, expenses and debt. Thus, financial performance is an overall assessment of how well a company is using its resources, generating profits, increasing shareholder value and securing future business. According to the determination ratio of 0.992, it can be seen that 99.20% of the variation in the PFI indicator is explained by the variation in the API, CRPI, IPI and DRPI indicators. The Anova test tests the econometric validation of multiple linear models.

Table 3. Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.612	4	11.653	1291.732	.000 ^b
	Residual	.388	43	.009		
	Total	47.000	47			

a. Dependent Variable: IFP

b. Predictors: (Constant), DRPI, CRPI, IPI, API

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

Table 3 shows that the values of the components of variation are: estimated explained variation 46.612, estimated residual variation 0.388 and estimated total variation 47. With a Fisher coefficient $F = 1291.732$ and a Sig. value of the F-test less than 0.05, the determined model explains the significant dependence between the IFP indicator and the API, CRPI, IPI and DRPI indicators by a multiple linear correlation. Statistically, the sig. value is less than 0.05, so the multiple linear model is valid with 95% probability. Therefore, the financial performance of Romanian ferrous metal companies is influenced by the performance of assets, the performance of consumed resources, the performance of revenues and the performance of debt repayment on the multiple linear model determined.

Since financial performance is the overall assessment of how well a company uses its resources, generates profits, increases shareholder value and secures future business (Bacidore et al., 1997), indicators of asset performance, resource utilization performance, revenue performance and debt repayment performance are considered to be the main factors affecting financial performance, as confirmed by Table 4.

Table 4. Coefficients

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8.833E-17	.014		.000	1.000
	API	-.023	.062	-.023	-.370	.713
	CRPI	1.363	.054	1.363	25.224	.000
	IPI	-.463	.034	-.463	-13.683	.000
	DRPI	.054	.016	.054	3.307	.002

a. Dependent Variable: IFP

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

Determining the regression parameters of the model leads to the definition of the estimated equation, i.e. the regression of financial performance on the factors under analysis. The model equation obtained for the ferrous metallurgical industry has the following non-standard form:

$$IFP = -8.833E - 17 - 0.023 * API + 1.363 * CRPI - 0.463 * IPI + 0.054 * DRPI \quad (2)$$

The econometric interpretation of model (2) obtained for the ferrous metallurgical industry provides the following information on how changes in PFI indicators are affected by the financial factors considered:

- If the API increases by 1%, and the other variables remain constant, then the IFP will decrease on average by 0.023%. The total assets of the companies analysed include a high proportion of tangible assets that generate value in the medium and long term. As a production company in the ferrous metallurgical sector, heavy technical equipment such as furnaces, rolling mills require significant investments, but according to the financial statements of the companies analysed they cannot afford these investments. If in the ferrous metallurgical sector, the use and turnover of assets would be efficient, then the companies will achieve financial performance. Therefore, stock turnover indicates that the companies analysed are not managing their stocks efficiently.
- If the CRPI increases by 1% and the other variables remain constant, then the FPI will increase by 1.363% on average. An unnatural correlation for any one firm, but in the ferrous metallurgical sector it can be seen from the financial statements that the firms in question record a lot of non-core expenses, which are recorded for tax reasons, and which bring economic benefits in future years. In today's business environment, sustainable resource consumption offers a competitive advantage in terms of cost reduction, improved brand image, and potential access to new markets and customers.
- If the IPI increases by 1% and the other variables remain constant, then the FPI will fall by 0.463% on average. The increase in earnings performance indicates that the 5 listed ferrous metals companies analyzed are gaining market share, due to increased demand in domains where ferrous products are not widely available and production restarting in post-crisis periods. Again an unnatural correlation is observed, with many companies increasing their expenses to compensate for the revenue gained, with an impact on corporate taxes. Being also an environmentally unfriendly sector, metallurgical companies, according to current legislation, invest in environmental protection policies..
- If the IPR increases by 1% and the other variables remain constant, then the FPI will increase on average by 0.054%. The entities analyzed avoid accumulating debt as, being an area where the commodity market is subject to large fluctuations, the preference is to use the shortest payment terms, i.e. payment in advance. During the COVID-19 pandemic, certain facilities for deferring payments were granted, namely, according to GEO 37/2020, they can be suspended on request: "the obligation to pay the installments due on loans, representing capital installments, interest, and commissions, granted to debtors by creditors up to 30 March 2020, shall be suspended at the request of the debtor for a period ranging from a minimum of one month to a maximum of 9 months". Although many companies have taken advantage of this facility, companies in the ferrous metals industry have maintained production volumes, even increased them due to low material prices by using the availability of advance payments to suppliers to lock in low prices.

According to Table 4 the model equation obtained for the ferrous metallurgical industry has the following standard form:

$$IFP = -0.023 * API + 1.363 * CRPI - 0.463 * IPI + 0.054 * DRPI \quad (3)$$

Analyzing model (3), it is observed that the IFP is influenced by the indicators analyzed in the following order, most by the CRPI, then by the IPI, DRPI, and least by the API. In the ferrous metal industry, according to the analysis the performance of consumed resources influences the financial performance the most, because companies in the industry that manage their resource consumption efficiently tend to have a lower cost of sales and can improve their profit margins. The companies analyzed need to manage their resources more efficiently to reduce potential disruptions and losses. Another factor influencing financial performance is revenue performance. Increased revenue performance leads to stability for companies in the ferrous metals industry.

Another influencing factor is the debt repayment performance index. A company's debt increases returns, but also increases risk (Neves et al., 2022). Optimal debt levels can improve financial performance, allowing the companies analyzed to make large investments and weather temporary financial downturns. A company's ability to repay debt in the shortest possible time is an important indicator of financial performance. The higher the interest coverage ratio, the more profit a company comfortably earns in addition to the interest it pays.

According to model (3) API has the least influence on PFI. In the ferrous metals industry, assets such as real estate and machinery that are maintained and highly valuable contribute to the maintenance of company value as well as financial performance. Therefore, in order to be economically profitable, listed ferrous metallurgical companies need to continuously invest in technological equipment by maintaining them at the highest performance, cost and environmental standards; short-term investments using cash on hand, have shown an increase in economic performance. In line with international guidelines, governments and industry organizations have stepped in with various support programmes to help metalworking companies. These programmes have included loan guarantees, tax incentives and direct financial support. Spending in the current year but with benefits in future years (sustainable spending) has been shown to positively influence financial profitability.

Table 5. Reziduals Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-.2951520	6.7344966	.0000000	.99586471	48
Residual	-.37925264	.16064233	.00000000	.09084863	48
Std. Predicted Value	-.296	6.762	.000	1.000	48
Std. Residual	-3.993	1.691	.000	.957	48

a. Dependent Variable: IFP

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

According to Table 5 the lowest value of the residue is -0.37925264 and the highest value is 0.16064233.

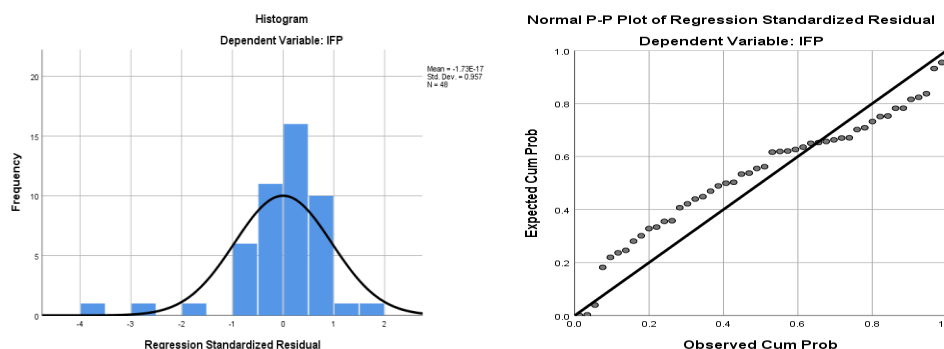


Figure 1. Histogram and Chart P-P Plot

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

It is observed, according to (Figure 1), that the Histogram does not follow a normal distribution and the P-P Plot has shifts with respect to the specific theoretical distribution representing Henry's line, because the assumption of normality of errors is not always met and autocorrelation of errors (Figure 2). Throughout the analysis carried out for the 5 companies in the ferrous metallurgical industry during the period under analysis, two economic crises occur. The financial crisis of 2008 and the pandemic crisis generated by Covid-19 hit the ferrous metal industry. As a result of these financial crises, the analysed companies faced reduced demand, falling prices and other challenges, but survived these crises. Declining demand led to falling prices in the metals industry, especially for steel.

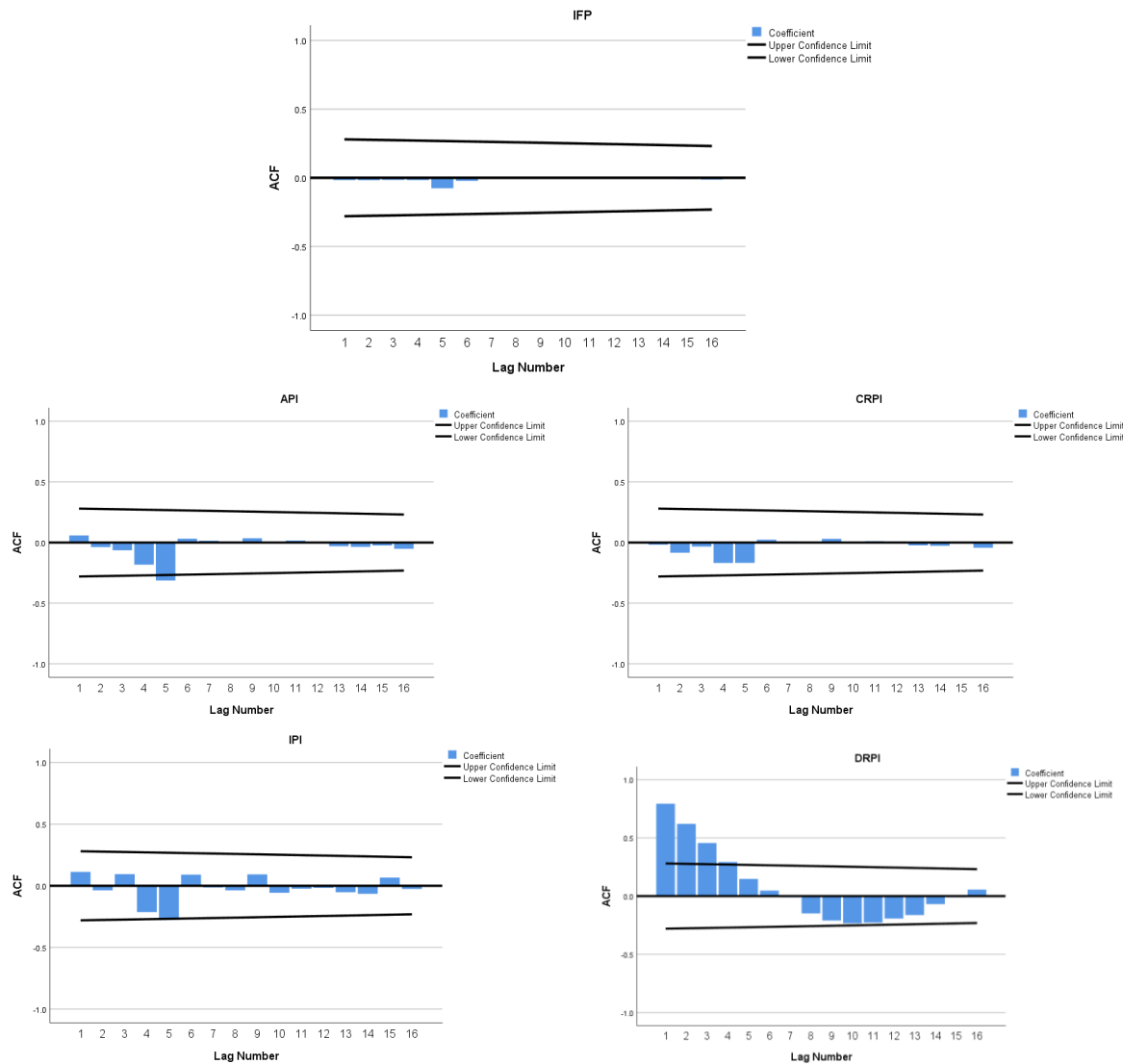


Figure 2. Autocorrelation of errors

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

According to the financial statements analysed, during the crises companies had to lay off employees and reduce production, which led to increased expenses and reduced profits; four out of the five companies made losses during the crises. Due to the lack of liquidity and new technologies the companies analysed were not able to adapt their production processes to cope with the crises.

Following the econometric analysis and the model obtained, the results show that at the level of the analyzed companies in the ferrous metallurgical industry, the increase in financial profitability is directly influenced proportionally by investments in technological equipment and keeping them at the level of the latest production technologies appearing on the market, along with this the level of industrial emissions is also maintained within legal limits, thus early investments will bring more value in the future of the companies. Another factor that has proved economically profitable is the purchase of raw materials at low prices, during the Covid-19 pandemic companies have produced maintained production volume by accumulating stocks of finished products, and sales in 2021, once the price of iron explodes, have brought them fantastic profits.

IV. CONCLUSION

The ferrous metals industry is a central pillar of industrial development and is of particular importance to the economy, society and technology. Steel is an essential raw material in construction, industrial machinery, automobiles and many other industries. High-quality steel production contributes to economic growth and national income. Over the years this industry has brought many technological innovations, such as blast furnaces and improved steelmaking technology, which have helped increase production capacity and efficiency. The ferrous metallurgical industry is of commercial and geopolitical importance. Many of the major steel-producing countries

are important players not only in their domestic markets but also internationally. Iron ore and steel trade routes are often the subject of political and economic negotiations. Romania plays an important role in global geopolitics. Romanian companies' exports have contributed to the country's economic development. After the fall of the communist regime, Romania's iron and steel industry faced a number of challenges. A number of plants were closed or reduced capacity due to lack of competitiveness, environmental problems and high costs. The transition period also saw privatisation to the private sector, with varying degrees of success. Modernisation and sustainability through better and greener technologies in this industry are very important. Romanian companies have found it difficult to cope with new technologies due to very high costs.

Financial performance ensures that economic entities have a sustainable presence in the market. In the study, financial performance is expressed using the financial performance index as the dependent variable. This index indicates the return on investment made by the shareholders of an economic entity through the resources contributed by them or the benefits accruing to them by right.

Following the econometric analysis and the model obtained, the results show that at the level of the five analysed Romanian listed companies in the ferrous metallurgical industry, the growth of financial performance is directly influenced by asset performance, resource consumption performance, revenue performance and debt payment performance. In essence, these four elements provide a comprehensive picture of how a company manages its resources, generates revenues, and manages its debts. Their interaction determines a company's overall financial performance and its potential for future growth and profitability. Romanian companies have faced major challenges in recent decades, but they continue to play an important role in Romania's economy and industry.

The ferrous metals industry contributes to global economic development, but faces environmental challenges such as carbon emissions and other pollutants. Addressing these challenges and making the industry more sustainable is now a key future research issue. Thus, the ferrous metals industry through its manufacturing companies is an essential part of modern society. As the industry continues to evolve, it will be essential to strike a balance between technological innovation, addressing environmental issues, and economic considerations.

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