TRANSREGIONAL PERSPECTIVES ON FINANCIAL PERFORMANCE AND RISK: A STUDY OF THE INDUSTRIAL MACHINERY AND EQUIPMENT SECTOR IN ROMANIA AND EUROPE

Maxim Cojocaru*
University of Craiova, Craiova, Romania

Abstract
The paper focuses on the connection between financial results and corporate risk in the European Industrial Machinery & Equipment industry during the period 2020-2024. The analysis will be conducted using the Refinitiv Eikon database, taking into consideration a representative sample of industrial corporations from Eastern, Northern, Southern, and Western Europe, with special attention paid to the Romanian market. The study examined the relationship between the financial performance ratios (ROA, ROE, and EBITDA Margin) and the key financial risk ratios (liquidity ratios, Financial Leverage Ratio, and Z-score) to establish the association between profitability and financial risk. The empirical study utilized descriptive statistics and correlation coefficients.
The results highlight a significant difference in performance dynamics among regions, with better recovery patterns for Southern and Western Europe and more volatility for Northern Europe following the pandemic. A significant volatility level is shown for Romania, along with a trend of enhancement of financial stability beginning from 2021. The Z-score has a positive correlation with performance, and a weak negative correlation is shown for liquidity ratios with profitability, thereby confirming the liquidity-profitability trade-off hypothesis. Concluding, this analysis finds that financial performance in the industrial sector in Europe is more closely tied to financial stability than to either liquidity or leverage. These findings are important to understand in terms of financial risk and performance management in emerging markets in Europe.

Keywords
financial performance, risk management, industrial sector, Z-score, ROA, ROE, EBITDA margin, European regions, Refinitiv Eikon, Pearson correlation.

JEL Classification
G32, G33, P51

* Corresponding author, **Maxim Cojocaru** – maximcojocaru1234@gmail.com

Introduction

The financial performance of industrial firms is a key component of the European economic competitiveness, especially under the influence of recent systemic shocks such as the COVID-19 pandemic, the instability of the energy market, and the disruption of the supply chain. It is within this setting that the industrial machinery & equipment industry is under pressure to balance financial profit-making goals with financial risk management.

The literature highlights a close link between financial performance and risk, with bankruptcy risk and capital structure identified as key determinants of firm stability and profitability, influenced by regional characteristics in the European manufacturing sector.

In light of this literature, this paper seeks to contribute to existing work by adopting a transregional perspective for comparisons. The paper has two goals: first, it seeks to make comparisons with respect to financial performance and risk among different regions of Europe; and second, it seeks to test empirically how selected key performance ratios (ROA, ROE, and EBITDA Margin) relate to financial risk ratios (Liquidity ratios, Leverage ratio, and Z-score).

The novelty of this research effort appears in its comprehensive framework that combines a cross-regional analysis with a firm-level analysis to discern structural elements in the performance-risk relationship in the European industry. The research combines a cross-regional analysis with a firm-level analysis to provide a comprehensive framework with a theoretical as well as a practical dimension.

1. Review of the scientific literature

The relationship between financial performance and financial risk has been extensively analyzed in economic literature and is considered essential for assessing the stability and sustainability of firms. Performance indicators, such as profitability and resource efficiency, are closely correlated with various categories of financial risk, particularly liquidity risk, debt risk, and bankruptcy risk.

One of the most widely used models for assessing bankruptcy risk is the Z-score model developed by Edward I. Altman (1968), which uses a set of financial indicators to estimate the probability of a firm entering into financial difficulty. Subsequent studies have confirmed the relevance of this model in analyzing the financial stability of companies (Altman, 2018).

The literature also highlights the relationship between liquidity and profitability. The study by Eljelly (2004) shows that there is a trade-off between these two dimensions: a high level of liquidity can reduce profitability, while a low level can increase the financial vulnerability of the firm.

From a theoretical perspective, the relationship between risk and profitability is also explained by the portfolio theory developed by Harry Markowitz (1952), which emphasizes the importance of the balance between risk and return in the financial decision-making process.

From a theoretical perspective, the relationship between risk and return is also explained by the portfolio theory developed by Harry Markowitz (1952), which emphasizes the importance of balancing risk and return in financial decision-making.

Empirical studies also highlight the role of factors such as company size, operational efficiency, and financial structure in determining the profitability of European industrial companies (Goddard, Tavakoli, and Wilson, 2011; Voulgaris, Asteriou, and Agiomirgianakis, 2002). At the same time, research conducted on Romanian companies has shown significant correlations between profitability indicators and financial balance indicators (Siminică, Circiumaru, and Simion, 2012; Siminică and Cârstina, 2015).

In the current context, characterized by economic shocks such as the COVID-19 pandemic, energy market volatility, and supply chain disruptions, analyzing the relationship between financial performance and risk is becoming increasingly relevant for the European industrial sector. In this context, the present research proposes a transregional approach to the Industrial Machinery & Equipment sector, analyzing the relationship between performance indicators (ROA, ROE, and EBITDA Margin) and financial risk indicators such as liquidity, debt ratio, and Z-score. This approach allows the identification of structural patterns of the performance-risk relationship at the level of European industry.

2. Research methodology

2.1. Research design and data source

The empirical study relies on the financial information of companies collected from the Refinitiv Eikon database. This is because the database provides consistent information on companies from different countries. The study considers publicly listed companies from the Industrial Machinery & Equipment industry based on the Refinitiv Business Classification (TRBC) system. Financial information for the period 2020 to 2024 is available.

To address the issue of institutional and structural heterogeneity, the companies were grouped into four regions: Eastern, Western, Northern, and Southern Europe, according to a geo-economic classification widely used in comparative studies of corporate finance. This classification makes possible the identification of general differences in financial performance, access to capital, and crisis resilience between developed and emerging economies.

The paper uses descriptive statistics and Pearson correlation analysis in order to investigate the existence of certain patterns and linear dependencies between financial performance and risk variables. The above-mentioned approach is justified from the point of view of the exploratory nature of the paper, aiming at the establishment of certain structural linkages rather than causal relations. The above-mentioned approach does not consider the possibility of non-linear phenomena, nor does it address the issue of endogeneity, but it is the most reliable first-level analysis regarding the linkages between financial performance and risk.

2.2. Analysis indicators

The research evaluates the relationship between financial performance and associated risk based on a set of indicators widely used in economic and financial literature. Two categories of variables are distinguished:

Performance indicators

- *ROA (Return on Assets)* – expresses the efficiency of asset use in generating net profit. A higher ROA indicates optimal use of resources and high managerial capacity. The vast number of studies in which it was used confirms the relevance of this indicator for the comparative analysis of international performance.
- *ROE (Return on Equity)* – measures the return on equity, indicating how efficiently investors' capital is remunerated. It is a key indicator for financing strategies and dividend policy.
- *EBITDA Margin* – reflects operational performance by reporting profit before interest, taxes, depreciation, and amortization to turnover. This indicator eliminates tax and accounting influences, providing a more accurate picture of industrial efficiency.

Risk indicators

- *Current Ratio* – the ratio of current assets to current liabilities, indicating the company's ability to cover its short-term obligations.
- *Quick Ratio* – a more conservative version of liquidity, excluding inventories, to assess immediate payment availability.
- *Financial Leverage* – the ratio of total debt to equity, used to assess the degree of indebtedness and the risk associated with the capital structure
- *Z-score* – bankruptcy risk indicator formulated by Altman (1968), used as a proxy for financial stability. This score combines several accounting variables (profitability, liquidity, leverage, efficiency) into a single predictive index.

2.3. Analytical approach

The research has a quantitative, descriptive, and comparative design based on statistical analysis of panel data. For each region, the annual average values of each indicator were calculated, tracking temporal developments and the convergence (or divergence) of performance between regions.

The analysis was carried out in three stages:

- *Descriptive and exploratory analysis*: the main trends in performance and risk were identified, as well as the dispersion of values between companies and regions.
- *Pearson correlation analysis*: the linear relationship between performance and risk indicators was assessed. Pearson's correlation is frequently used in corporate finance studies due to its interpretability and robustness for aggregate data.
- *Cross-sectional analysis*: regions were compared with each other to highlight systemic differences, using arithmetic means and standard deviations.

2.4. Theoretical foundations and justification of the model

The relationship between performance and risk is explained by theories of capital structure and corporate behavior. The basic model of Modigliani and Miller (1958) states that the value of a firm is independent of its capital structure under perfect market conditions. Subsequently, Jensen & Meckling (1976) introduced agency theory, according to which financing decisions influence performance through their effects on managerial control and moral hazard risk.

In the European context, research by Voulgaris et al. (2002) has shown that capital structure differs significantly between developed and emerging regions, being determined by access to finance and institutional stability. Similarly, Goddard et al. (2011) showed that profitability is influenced not only by firm size and debt level, but also by geographical location and regional economic context.

Thus, the central hypothesis of this research is that there is a significant correlation between financial performance and the risk of industrial firms, and the intensity of this relationship differs depending on the European geographical region.

3. Results and discussion

The analysis of performance and financial risk for industrial companies in Europe reveals a complex picture of post-pandemic dynamics, marked by divergent developments across economic regions. The indicators analyzed provide an integrated perspective on how companies in the Industrial Machinery & Equipment sector responded to macroeconomic and structural pressures during the period 2020–2024.

3.1. Geographical analysis of financial performance in the European industrial sector

The cartographic representations created in Excel, based on financial performance indicators, highlight a clearly differentiated structure among European economies, outlining a heterogeneous financial landscape influenced by various macroeconomic, structural, and corporate governance factors.

The corresponding **Return on Equity (ROE)** map (Figure no.1) illustrates companies' ability to generate profits for shareholders and reveals a highly polarized geographical distribution. The coolest shades, associated with high values of the indicator, are found in Belgium (30.85%), Cyprus (30.06%), Austria (21.8%), and Serbia (19.87%). These countries demonstrate efficient use of equity capital, indicating well-balanced financing models and careful risk management.

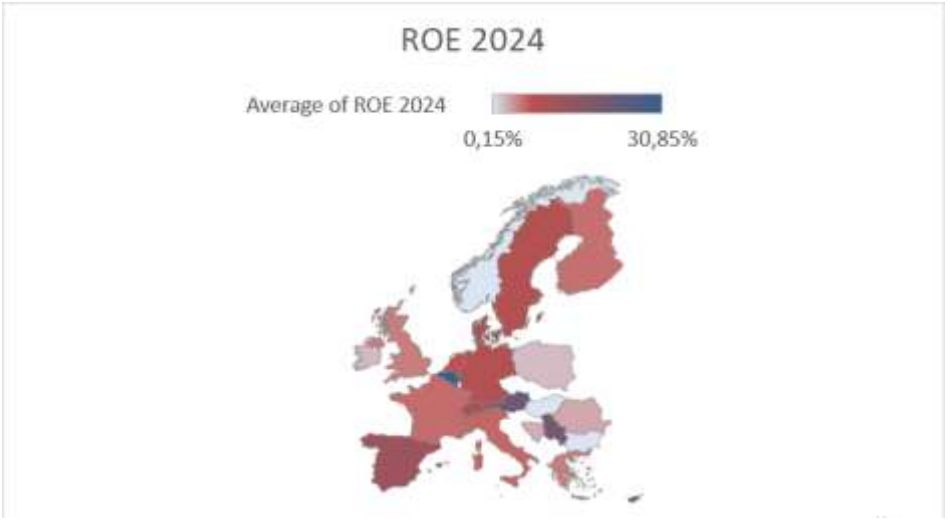

Figure no. 1. Return on Equity in the Industrial machinery & equipment sector 2024

Source: Author's computation through Excel

The distribution of ROE highlights the significant disparities in the performance of companies in different regions of Europe. Smaller, flexible economies are where companies perform better, which is a result of good governance and financial flexibility, while Eastern and Northern Europe are the regions with lower profitability due to structural issues. Romania is a country with modest but steady performance after the pandemic. Conclusion: Shareholder value is not driven by size but by financial resilience.

The corresponding **Return on Assets (ROA)** map (Figure no.2) provides an overview of the overall efficiency of asset utilization in the profit generation process. In this representation, cool colors — symbolizing high values — are concentrated in Cyprus (17.18%), Serbia (13.40%), Belgium (8.50%), and Spain (6.61%). These countries demonstrate a high capacity to convert assets into profit, often associated with judicious use of resources and high fixed capital productivity.

Figure no. 2. Return on Assets in the Industrial machinery & equipment sector 2024

Source: Author's computation through Excel

The distribution of ROA follows the ROE, but the distribution is more balanced, reflecting better cohesion in the European market. Western, Southern, and Mediterranean Europe have better asset management, but the East and the North have structural impediments in managing assets. Romania shows a mediocre performance, but growth prospects exist. The findings validate the West-East divide in the European market, where the Mediterranean economies have a relative efficiency advantage.

The map illustrating **EBITDA Margin** (Figure no.3) values for 2024 provides a clear picture of the structural differences between European regions. The areas colored in cool shades, representing high values of the indicator, are concentrated in Southern Europe (Cyprus, Italy, Spain) and partly in Western Europe (France, the Netherlands, Belgium). These regions are distinguished by EBITDA margins of over 14–25%, which indicates high operational efficiency, good cost control, and a value-added-oriented production structure.

Figure nr. 3. EBITDA Margin in the Industrial machinery & equipment sector 2024

Source: Author's computation through Excel

The analysis of the EBITDA margin shows a strong level of performance in Western Europe, especially in Cyprus, which is driven by flexible business models. Conversely, the margin is weak in Eastern Europe, as well as in some countries in Northern Europe, which is a result of structural rigidity. Meanwhile, the average level of performance is observed in the case of Romania, which shows a certain level of resilience but still a certain margin of weakness in terms of efficiency.

Visually, the EBITDA Margin map highlights an East-West contrast, with cool colors concentrated in the Mediterranean and Benelux regions and warm colors dominating the Balkans and part of Northern Europe, confirming the uneven distribution of value added in industry.

3.2. Financial performance evolution

Dynamic analysis of the profitability ratios sheds light on the post-crisis transformation process of European industrial enterprises, indicating convergence and structural differences. Analyzing changes in the ROE, ROA, and EBITDA Margin ratios over time (Table no. 1), (Table no. 2), (Table no. 3) will enable a more comprehensive assessment of how European enterprises have restructured their capital and operating structures in response to the latest economic shocks.

Table no. 1. Return on Equity in the Industrial machinery & equipment sector from 2020 to 2024

ROE	2020	2021	2022	2023	2024
Eastern Europe	7%	20%	14%	11%	7%
Northern Europe	11%	11%	6%	6%	4%
Southern Europe	10%	16%	15%	10%	8%
Western Europe	-1%	-33%	11%	13%	11%
Romania	9%	41%	1%	2%	3%
TOTAL	**7%**	**1%**	**11%**	**10%**	**7%**

Source: Author's computation through Excel

Table no. 2. Return on Assets in the Industrial machinery & equipment sector from 2020 to 2024

ROA	2020	2021	2022	2023	2024
Eastern Europe	4%	7%	4%	5%	3%
Northern Europe	4%	4%	2%	3%	2%
Southern Europe	5%	7%	7%	5%	5%
Western Europe	1%	6%	6%	6%	5%
Romania	0%	27%	0%	1%	3%
TOTAL	**4%**	**6%**	**4%**	**5%**	**4%**

Source: Author's computation through Excel

Table no. 3. EBITDA Margin in the Industrial machinery & equipment sector from 2020 to 2024

EBITDA Margin	2020	2021	2022	2023	2024
Eastern Europe	11%	12%	8%	25%	10%
Northern Europe	13%	10%	7%	12%	13%
Southern Europe	15%	18%	17%	16%	16%
Western Europe	8%	13%	14%	13%	12%
Romania	8%	13%	-28%	14%	10%
TOTAL	**11%**	**12%**	**11%**	**16%**	**12%**

Source: Author's computation through Excel

On the whole, the profitability ratios indicate a moderate trend of recovery and stability in most of the European regions, which have been using capital in a more efficient manner in Western and Northern Europe. Eastern Europe had a more volatile yet less sustainable trend of profitability, which was more vulnerable to cost challenges. Southern Europe is the most stable region in terms of efficiency of assets and operating profit. There is a high level of volatility in the case of Romania, which is mostly the result of periodic changes rather than improvements.

3.3. Financial risk and liquidity analysis

Examining financial risk indicators provides an additional viewpoint on the post-crisis adaptation of European industrial companies, highlighting variations in financial stability, liquidity management, and capitalization approaches across different regions.

Table no. 4. Z-score in the Industrial machinery & equipment sector from 2020 to 2024

Z-score	2020	2021	2022	2023	2024
Eastern Europe	2,25	2,89	2,69	3,43	4,09
Northern Europe	4,78	5,97	3,72	4,18	4,04
Southern Europe	1,84	2,26	2,50	2,64	2,47
Western Europe	7,56	9,07	3,97	4,28	3,89
Romania	1,63	5,34	5,39	7,04	13,71
TOTAL	**4,51**	**5,54**	**3,36**	**3,80**	**3,79**

Source: Author's computation through Excel

The Z-score analysis (Table no. 4) indicates improving financial stability in most regions, with Eastern and Northern Europe exceeding the safety threshold in 2024 (values above 4), while Western Europe shows a normalization of stability following exceptionally high post-pandemic levels (around 3.9). Southern Europe remains structurally more vulnerable, with Z-scores close to 2.5. Romania stands out with a sharp increase in financial stability, reaching 13.7 in 2024, reflecting a strong post-crisis consolidation.

Liquidity indicators (Table no. 5), (Table no. 6) show that, overall, Europe is in a good spot financially, with most regions falling within expected levels. However, Romania stands out with much higher figures—its current ratio is over 5, and its quick ratio is around 4.8. This suggests that Romanian businesses are very cautious with their finances, but it could also mean they might not be using their working capital as efficiently as they could.

Table no. 5. Current Ratio in the Industrial machinery & equipment sector from 2020 to 2024

Current Ratio	2020	2021	2022	2023	2024
Eastern Europe	2,48	2,84	2,61	2,64	3,13
Northern Europe	2,10	2,25	1,79	2,04	2,02
Southern Europe	2,42	2,19	2,16	2,15	2,44
Western Europe	2,37	2,37	2,17	2,15	2,23
Romania	1,95	4,04	5,03	3,09	5,51
TOTAL	**2,32**	**2,42**	**2,15**	**2,24**	**2,42**

Source: Author's computation through Excel

Table no. 6. Quick Ratio in the Industrial machinery & equipment sector from 2020 to 2024

Quick Ratio	2020	2021	2022	2023	2024
Eastern Europe	1,50	1,90	1,64	1,62	1,92
Northern Europe	1,46	1,59	1,10	1,29	1,24
Southern Europe	1,62	1,50	1,37	1,33	1,51
Western Europe	1,58	1,53	1,30	1,28	1,34
Romania	1,16	3,17	4,24	2,60	4,82
TOTAL	**1,53**	**1,64**	**1,33**	**1,37**	**1,47**

Source: Author's computation through Excel

Table no. 7. Financial Leverage in the Industrial machinery & equipment sector from 2020 to 2024

Financial Leverage	2020	2021	2022	2023	2024
Eastern Europe	1,10	0,86	1,87	1,43	1,48
Northern Europe	1,54	1,31	1,25	1,12	1,09
Southern Europe	1,63	1,55	1,41	1,31	1,20
Western Europe	1,49	5,33	1,97	1,49	1,32
Romania	-0,79	0,36	0,22	0,26	0,16
TOTAL	**1,43**	**2,36**	**1,63**	**1,33**	**1,27**

Source: Author's computation through Excel

In terms of financial leverage (Table no. 7), Europe has seen a steady decline, dropping to about 1.3 in 2024, which indicates a lower dependence on debt, particularly in

emerging regions. Romania's leverage is notably low, below 0.4, which keeps financial risks manageable but may also limit growth opportunities. Overall, these trends suggest that the financial behaviors of companies in Europe are gradually maturing and becoming more balanced between stability and performance since 2022.

3.4. Analysis of the correlation between performance and financial risk

To gain a deeper understanding of the relationship between financial performance and the stability of companies in the Industrial Machinery & Equipment sector, Pearson's correlation analysis was applied using aggregate data for the period 2020–2024. The correlations between the main performance indicators (ROE, ROA, and EBITDA Margin) and risk variables (Current Ratio, Quick Ratio, Z-score, and Financial Leverage) provide a nuanced picture of the structural interdependencies between profitability, liquidity, and systemic risk.

3.4.1 The relationship between EBITDA Margin and risk indicators

The results show that EBITDA Margin has a weak negative correlation with liquidity indicators (Current Ratio and Quick Ratio) in almost all the years analyzed (table no. 8), with values ranging from –0.20 to –0.09. This relationship suggests that high liquidity is not necessarily associated with better operational efficiency but, on the contrary, may reflect a capital conservation policy that sacrifices immediate profitability. Thus, firms that maintain high liquidity tend to have lower EBITDA margins, a phenomenon frequently observed in emerging economies in Eastern and Southern Europe, where cash accumulation is preferred over risky investments (Juhel, 2010).

Table no. 8. Correlation between EBITDA Margin and risk indicators in the Industrial machinery & equipment sector

EBITDA Margin and	2020	2021	2022	2023	2024
Current Ratio	-0,11	-0,18	-0,17	-0,09	-0,15
Quick Ratio	0,06	-0,11	0,00	-0,16	-0,20
Z-score	0,03	0,06	0,09	0,68	0,66
Financial Leverage	-0,00	0,02	0,05	-0,01	0,03

Source: Author's computation through Excel

On the other hand, the consistent positive correlation between EBITDA Margin and Z-score (between 0.66 and 0.68 in 2023–2024) confirms the direct link between operational performance and financial stability. In other words, firms with a high EBITDA margin tend to have a lower probability of insolvency, according to the Altman model (1968). This relationship has become more pronounced in recent years, suggesting a post-pandemic structural consolidation of high-performing companies. In contrast, the near-zero correlation between EBITDA Margin and Financial Leverage (values between –0.01 and 0.05) indicates independence between operational efficiency and debt levels. In other words, variations in EBITDA margin are not significantly

influenced by financing policy, which supports the hypothesis of prudent capital management in the industry.

3.4.2 The relationship between ROE and risk indicators

The analysis of the correlation between ROE and liquidity indicators shows an extremely weak link (table no. 9), with values ranging between –0.07 and +0.03 over the entire period analyzed. This lack of correlation suggests that return on equity does not depend directly on the level of liquidity, but rather on structural factors such as asset turnover, cost of capital, or investment efficiency. The results are consistent with studies showing that in emerging European economies, profitability is more sensitive to market risk and macroeconomic volatility than to liquidity indicators (Toth et al., 2011).

Table no. 9. Correlation between ROE and risk indicators in the Industrial machinery & equipment sector

ROE and	2020	2021	2022	2023	2024
Current Ratio	-0,07	0,01	-0,07	0,02	0,00
Quick Ratio	-0,07	0,01	-0,08	0,03	-0,01
Z-score	-0,01	0,03	0,18	0,26	0,30
Financial Leverage	-1,00	-0,98	0,08	0,07	-0,01

Source: Author's computation through Excel

The correlation between ROE and Z-score is moderately positive in 2024 (0.30) and 2023 (0.26), indicating a reasonable association between profitability and financial health. Companies that manage to maintain high profitability, therefore, tend to be more financially stable, which can be explained by the accumulation of equity capital and reduced debt pressure. However, in previous years (2020–2021), this correlation was almost zero, a sign of a period of structural imbalance immediately after the pandemic.

In terms of financial leverage, the correlation with ROE is atypical. While the values are slightly positive (0.07–0.08) in 2022–2023, strongly negative correlations (–0.98 and –1.00) are observed in 2021 and 2020. This phenomenon suggests a structural reversal of the relationship between leverage and profitability during the crisis, possibly driven by the decline in profitability of highly indebted companies. In practice, in years of economic instability, the massive use of borrowed capital has had adverse effects on performance, contradicting the classic model of the financial leverage effect (Modigliani & Miller, 1958).

4.4.3 Relationship between ROA and risk indicators

For ROA, correlations with Current Ratio and Quick Ratio (table no. 10) are also negative and weak (between –0.14 and –0.02), confirming the trend observed above: firms with high liquidity tend to have lower return on assets, possibly due to conservative resource management. This phenomenon is consistent with theories regarding the trade-off between liquidity and profitability (Eljelly, 2004).

Table no. 10. Correlation between ROA and risk indicators in the Industrial machinery & equipment sector

ROA and	2020	2021	2022	2023	2024
Current Ratio	0,06	-0,12	-0,11	-0,04	0,01
Quick Ratio	0,02	-0,14	-0,13	-0,10	-0,02
Z-score	0,19	0,13	0,28	0,71	0,50
Financial Leverage	0,07	-0,05	0,02	-0,08	0,02

Source: Author's computation through Excel

The strongest link is observed between ROA and Z-score, with values of 0.71 in 2023 and 0.50 in 2024. This strong positive correlation suggests that companies that achieve higher returns on assets are also the most financially stable. Logically, efficient use of assets leads to an increase in cash flows and, implicitly, to a reduction in the risk of insolvency. In contrast, the near-zero correlation between ROA and financial leverage (values between –0.08 and 0.07) indicates that debt does not significantly influence asset efficiency in the European industrial sector, which shows a balanced medium-term financing structure.

Looking at the correlations as a whole, a coherent pattern emerges: performance indicators are more closely correlated with Z-score than with any other risk indicator, confirming the central role of financial stability in determining the performance of industrial firms. On the other hand, the negative relationships between profitability and liquidity suggest a strategic trade-off between safety and return. Companies that prefer to maintain high liquidity seem to sacrifice profitability in favor of stability, while firms with high margins accept higher operational risk.

Conclusions

The transregional analysis of 160 industrial firms in Europe (2020–2024) reveals persistent structural differences between regions and a complex link between performance and financial risk. Western and Southern Europe show more stable and consistent profitability, while Eastern Europe, including Romania, exhibits greater volatility and higher risk exposure. Romania's profile is notable for a strong but temporary profitability spike in 2021, followed by stabilization and a marked improvement in financial stability, suggesting a transition toward more sustainable financing.

Pearson correlations confirm that financial stability (Z-score) is the strongest predictor of performance, indicating that firms with lower insolvency risk tend to achieve higher profitability. Liquidity ratios (current and quick) show negative associations with performance, supporting the liquidity–profitability trade-off, especially in regions where financial prudence limited investment and growth. Leverage presents weak or negative correlations with ROE, implying that in a volatile environment, high debt increases risk without enhancing returns. This pattern supports the idea that, in the post-crisis context, capital discipline and stability are more valuable than aggressive debt financing.

From a practical perspective, the results suggest clear managerial implications: firms should balance liquidity to avoid excess cash holdings, monitor the Z-score as a

strategic indicator of financial health, and adopt prudent capital structures that avoid over-indebtedness. These strategies are particularly relevant for companies in emerging regions, where access to credit remains volatile.

The study uses descriptive statistics and Pearson correlations, which are appropriate for exploratory analysis but do not establish causality or capture non-linear effects. Future research should extend the sample, include private firms, and apply advanced econometric methods to validate the identified relationships and test robustness.

References

[1] Altman, E.I., 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *Journal of Finance*, 23(4), pp.589–609.

[2] Altman, E.I., 2018. Applications of distress prediction models: What have we learned after 50 years from the Z-score models? *International Journal of Financial Studies*, 6(3), p.70.

[3] Eljelly, A.M.A., 2004. Liquidity–profitability trade-off: An empirical investigation in an emerging market. *International Journal of Commerce and Management*, 14(2), pp.48–61.

[4] Goddard, J., Tavakoli, M. and Wilson, J.O.S., 2011. Determinants of profitability in European manufacturing and services: Evidence from a dynamic panel model. *Applied Financial Economics*, 15(18), pp.1269–1282.

[5] Jensen, M.C. and Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), pp.305–360.

[6] Juhel, J.-C., 2010. L'effet de levier de trésorerie. *La Revue du Financier*, 173–174, pp.16–46.

[7] Markowitz, H., 1952. Portfolio selection. *The Journal of Finance*, 7(1), pp.77–91.

[8] Modigliani, F. and Miller, M.H., 1958. The cost of capital, corporation finance and the theory of investment. *American Economic Review*, 48(3), pp.261–297.

[9] Siminică, M. and Cârstina, A.S., 2015. Mathematical and economic modeling of the results of correlation between indicators of profitability and asset management. *Finance: Challenges of the Future*, pp.68–73.

[10] Siminică, M., Circiumaru, D. and Simion, D., 2012. The correlation between the return on assets and the measures of financial balance for Romanian companies. *International Journal of Mathematical Models and Methods in Applied Sciences*.

[11] Siminică, M., Sichigea, M., Cristea, M. and Noja, G.G., 2020. A comparative approach of the environmental performance between periods with positive and negative accounting returns of EEA companies. *Sustainability*, 12(18), p.7382.

[12] Tóth, B., Lempérière, Y., Deremble, C., de Lataillade, J., Kockelkoren, J. and Bouchaud, J.-P., 2011. Anomalous price impact and the critical nature of liquidity in financial markets. *Physical Review X*, 1, 021006.

[13] Voulgaris, F., Asteriou, D. and Agiomirgianakis, G., 2002. Capital structure, asset utilisation, profitability and growth in the Greek manufacturing sector. *Applied Economics*, 34(11), pp.1379–1388.