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MANAGEMENT OF FINANCIAL RESOURCES AND PROFITABILITY OF COMPANIES IN THE CONTEXT OF THE CORONAVIRUS PANDEMIC

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Abstract:

Natural disasters and risks in the business environment create substantial uncertainties in companies, and resilience becomes a dynamic and adaptive capability that develops over time and is necessary for these companies to respond to difficult conditions and to achieve resilience and multiple resources. The aim of this study is to verify whether the management of financial resources obtained before the coronavirus pandemic crisis stimulates the increase in profitability of companies traded on the Bucharest Stock Exchange (BVB) both on the Regulated and AeRO markets, in the Premium and Standard sections, during and after the crisis. Using the regression analysis we demonstrate that robust growth during the coronavirus pandemic was only registered by companies that had high levels of profitability. It was also found that both leverage and research and development (R&D) investments made by companies before the coronavirus pandemic were important in boosting profitability during the crisis.

Key words: *crisis, coronavirus pandemic, profitability, business environment, organizational resilience*

1. Introduction

Natural disasters and environmental shocks create substantial uncertainties for companies by altering conditions across industries. The global coronavirus pandemic has caused major economic and social disruptions worldwide (McKibbin & Fernando, 2023), resulting in an unprecedented economic decline. The year 2020 was a distinctive period of

development for both the local capital market and international markets in the context of the coronavirus pandemic (Hatmanu & Cautisanu, 2021). The impact of economic crises on companies has been widely discussed (Liu & Yu, 2017), but analysing the effect of financial resource management during the coronavirus pandemic still requires further attention.

We believe that the capacity to thrive during economic downturns distinguishes entrepreneurial and resilient companies from others (Davidsson *et al.*, 2002). Organizational resilience indicates to the ability of an organization to adapt to difficult conditions, such as economic risks, and by overcoming these risks, the organization becomes stronger and has more resources (Rudolph & Repenning, 2002).

A resilient company possesses the ability to generate added value that exceeds the demand for existing products and services, such that this ability leads to a profitable response in crisis situations. The management of financial resources is important for the development of companies and increasing resilience (Marcineková *et al.*, 2024), identifying a growing interest in assessing the impact of resilience on companies (Abeysekara *et al.*, 2019). Although there are many studies and theories on resilience in different domains, we do not identify a universally accepted definition or a common approach to the concept of resilience, therefore the general understanding of resilience remains fragmented (Iftikhar *et al.*, 2021). In economy, however, resilience is underpinned by appropriate financial planning behavior (Yeo *et al.*, 2023). Resilience tracks and assesses the potential impact of major shocks on economic development and explores how industries and regions react according to their vulnerability and strength to shocks (Martin & Sunley, 2015).

Building on the cross-sectional research by Tognazzo *et al.* (2016), our study provides pragmatic evidence on how the management of financial resources obtained before the coronavirus pandemic crisis contributes to the increased profitability of firms listed on the Bucharest Stock Exchange (BVB) during and after the crisis. Researchers Tognazzo *et al.* (2016) argue that organizational resources, although limited, can boost the development and profitability of companies, acting as a buffer during times of crisis.

Our study examines at the financial data of BVB listed companies regarding leverage and R&D investments for the periods comprised between 2017 and 2019 (pre-pandemic) and 2020 and 2023 (during and after the pandemic), respectively, aiming to analyse their impact on the companies' ability to make profit both during and after the pandemic. The results indicate that strong financial performance, high financial leverage and strategic R&D investments made before the crisis played a significant role in companies' ability to make profits during and after the pandemic.

The next section contains a brief review of the literature, based on which the three research hypotheses to be tested are formulated. After outlining the literature review and justifying the research hypotheses, we present the methodology and findings. In the last part of the article, we summarise the conclusions and future research directions of the study.

2. Literature review

Using the resource-based theory to argue the factors that determine the business success of companies during recessions, we consider that financial performance becomes a powerful competitive advantage. This advantage becomes sustainable insofar as a company's resources are valuable, available, scarce, inimitable, and organized (Barney, 1997). Companies have limited market power, and achieving above-average profitability is due to resources invested and exploited (Davidsson *et al.*, 2009).

2.1. Company profitability before and after the pandemic

Given that the business environment is not static, every company is required to continuously improve its resources and capabilities to take advantage of changing opportunities (Pettus, 2001). The economic objective of increasing profit involves achieving a balance between the efficient exploitation of existing resources and the development of new resources (Hansen & Wernerfelt, 1989). When companies face risky situation, they utilize existing resources first, and then develop dynamic capabilities required for growth in dynamic environments (McKelvie & Wiklund, 2010). Based on this theory, we argue that organizations that have produced more resources become more adept at successfully responding to changes in their environment. These companies possess the ability to strategically exploit these resources in turbulent times, increasing profitability and achieving growth. The subject of company profitability has piqued the interest of researchers, academics and practitioners interested in identifying the key determinants of business success.

In order to assess the likely evolution of companies' performance in the future, the paper by authors Cevik and Miryugin (2021) investigated the impact of past pandemics (caused by infectious diseases such as Ebola, malaria, SARS, yellow fever) using financial data for more than 537,000 non-financial companies in 14 developing countries from 1998 through 2018. Their study showed that a higher number of infectious disease cases increases the likelihood of failure among non-financial firms, especially for small firms and start-ups.

Some researchers (Labadze & Sraieb, 2023) claim that a company's financial performance is partly supported and substantiated by its past performance. Their study set out to assess the impact of the coronavirus pandemic on the profitability of firms in Europe. Their methodology used a dynamic panel data approach and a generalized method of moments (System-GMM) model to estimate and evaluate the impact of the pandemic on profitability across sectors and the severity of anti-pandemic policies. They concluded that the coronavirus pandemic reduced firms' profitability by 25%, with the consumer and industrial sectors being the most impacted, and in countries with strict measures, firms lost an additional 19% compared to other European countries.

Tekin (2022) proposed to analyse which internal financial indicators significantly influence the profitability of energy sector companies in Turkey, using the return on assets (ROA) and return on equity (ROE) indicators. Specifically, the goal is to identify those financial factors that enhance competitiveness and support long-term financial success

and sustainability for companies in the oil, gas and electricity production and distribution sector. The research analysed a sample of 16 energy companies in Turkey, listed on the Istanbul Stock Exchange using a panel data linear regression model to identify the main factors influencing ROA and ROE. In the same vein, Pervan and Mlikota (2013) investigated the factors influencing the profitability of food and beverage companies in Croatia between 1999 and 2009. The dynamic panel data analysis results revealed a significant negative influence of financial leverage on profitability and a significant positive influence of company size, degree of capital concentration and past performance on current profitability.

The study by authors Demiraj *et al.* (2022) aimed to analyse the impact of working capital management on the profitability of firms in the European automotive industry before and during the coronavirus pandemic. Their objective was to evaluate the effects of debt collection and debt repayment on return on assets (ROA). The research method, namely a quantitative analysis of financial data, revealed a significant negative impact of these factors on profitability, emphasizing the need for prudent management of the working capital in times of crisis. Thus, companies that managed to build profitability on solid foundations and to invest strategically before the pandemic appear to have been better suited to withstand its negative effects and even to thrive afterwards.

Other researchers, namely Migliaccio and Pavone (2022), analysed how the international economic crisis influenced the long-term profitability of the Italian agricultural sector. Their approach relied on the analysis of the earnings dynamics of a sample of companies in the Italian agricultural sector by observing the 10-year evolution of three main profitability indicators: return on equity (ROE), return on assets (ROA) and return on sales (ROS). The study used statistical methods, including the analysis of variance (ANOVA), to assess the impact of the international economic crisis on these companies and the evolution of their profitability by geographical location. The results suggest that the crisis period was characterized by higher revenues than the post-crisis period and indicated a general downward trend in all the regions of Italy, despite the significant socioeconomic differences between them.

The study conducted by Darmawan *et al.* (2021) aimed to compare the profitability of companies in the agricultural sector during the pandemic and during the pre-pandemic period (2018-2020). A sample of 9 companies listed on the Indonesia Stock Exchange that had complete financial reports was selected for this study. The analysis technique used in this research was horizontal comparative analysis and profitability ratio analysis, including core earning power, return on equity (ROE), return on assets (ROA) and profit margin. The results indicate that the coronavirus pandemic did not have a significant impact on the profitability of most companies, with the exception of just one company, which had a decrease in performance in 2020 compared to previous years. On the other hand, the study conducted by Surya and Suhendah (2023) examined the influence of the coronavirus pandemic on the financial performance of 105 companies listed on the Indonesia Stock Exchange. In their research, the authors used paired samples t-test and Wilcoxon test for hypotheses. The results show significant differences in profitability of companies in the food sector, in solvency for the telecommunications sector, in profitability, solvency and activity for the transportation sector, and in all indicators for the tourism,

restaurants and hospitality sector. The study highlights substantial differences in the financial performance achieved by companies (function of their business sector) before and during the coronavirus pandemic.

The indicators return on equity (ROE) and return on assets (ROA) provide important values in creating a solid basis for substantiating the strategic decisions of company managers. In this context, the study by Kayakus *et al.* (2023) focused on estimating return on assets and return on equity using advanced prediction methods: artificial neural networks (ANN), multiple linear regression (MLR), and support vector regression (SVR). The purpose of the research was to identify the most effective methods to predict companies' financial performance and to evaluate the accuracy of these techniques in estimating financial indicators. The main objective was to provide reliable information to support managers and investors in making informed decisions, thus contributing to strategic management based on accurate financial data.

The literature review reveals that company profitability is significantly influenced by both internal financial factors and external economic conditions such as economic crises. Studies emphasize the importance of factors such as financial leverage, working capital management, liquidity and firm size in determining long-term profitability and resilience. Furthermore, the use of advanced forecasting and comparative analysis methods provides managers and investors with a solid basis for strategic decision-making in times of economic uncertainty, emphasizing the crucial role of rigorous financial management in sustaining the competitiveness and stability of companies. Based on the review of the literature on company profitability before and after the coronavirus pandemic, we thus formulate the first research hypothesis:

H1: Companies listed on the Bucharest Stock Exchange (BVB) with high profitability growth in the lead-up to the coronavirus pandemic increase their financial performance during and after the risk event.

2.2. Leverage and profitability during economic crises

Several studies highlight the effects of leveraged finance on the performance and profitability of companies in the context of economic crises. However, the concept of financial leverage does not have a clear and universally accepted definition, which means that it can be interpreted and measured in different ways depending on the context (Berent, 2011).

An important aspect emphasized by Ayaz *et al.* (2021) is that the positive relationship between leverage and firm performance becomes negative when the leverage level exceeds the optimal point. This suggests that there is a limit against which firms may face difficulties in managing financial resources in such a way that profitability is not affected.

For instance, Vithessonthi and Tongurai (2015)’s study examined the relationship between financial leverage and firm performance of non-financial firms in Thailand during the 2007-2009 financial crisis. They illustrated the effects of leverage on firm performance over time, analysing a sample of 159,375 firms and using Ordinary Least Squares (OLS) panel regression. The results show that the effect of financial leverage on firm performance

differs significantly depending on firm orientation, being negative for domestically oriented firms and positive for international firms, suggesting that access to global resources and opportunities allows international firms to capitalize more efficiently on borrowed capital compared to firms operating only domestically. In the same vein, Vătavu (2015) investigates the relationship between capital structure and financial performance in 196 Romanian manufacturing firms listed on the Bucharest Stock Exchange, over the 2003-2010 period. The results indicate that performance and profitability are higher in firms that prefer equity over debt, suggesting that higher financial leverage, i.e. debt-oriented financing, could reduce profitability.

Also, Bui *et al.* (2021) analysed the relationship between capital structure and firm performance, as measured by ROA and ROE, on a sample of SMEs in Vietnam in the period after the global financial crisis (2008-2016). The results indicate a non-linear, inverted U-shaped relationship between leverage and profitability as follows: profitability increases up to a certain level of leverage, but decreases when debt becomes too high. Which is precisely why the authors of the study believed that managers should be careful in managing the financial leverage of the firm, keeping it at an appropriate level so as to balance the advantages and disadvantages associated with leverage in order to maximize the profitability of the firm.

The study by Shukla *et al.* (2024) analysed the speed of adjustment of financial leverage of corporate firms during the coronavirus crisis, examining how they adjusted their leverage towards the desired level under economic uncertainties. They formulated three research hypotheses for the pre-COVID, COVID-19 and post-COVID periods. Their results showed as follows: the speed of adjustment was faster during coronavirus than before, with increased values of financial leverage adjustment during the crisis and sustained high levels afterward; financially flexible firms had a faster speed of adjustment than the firms that were constrained during coronavirus, due to their higher adaptive capacity; each COVID wave had a significant positive effect on the speed of adjustment, indicating a steady adjustment of financial leverage during the crisis.

Also in the context of the coronavirus pandemic induced economic crisis, Shaharuddin *et al.* (2021) geared their study towards examining the impact of leverage, liquidity and cash flows on firm performance during the coronavirus pandemic. They focus on data from publicly listed companies on the Stock Exchange of Malaysia for two financial quarters in the year 2020. The results showed that liquidity and cash flows from operations had a significant impact on the performance of companies during the coronavirus pandemic.

The study by Xue *et al.* (2023) aimed to examine the relationships between leverage and corporate investment, and between leverage and firm value, respectively, during the coronavirus pandemic, using data from listed companies in China, to understand how the pandemic influenced these relationships. Following their analysis, the authors found that during the coronavirus pandemic, high leverage reduced investments and the value of firms, but allowed companies to retain more cash, reducing the pressure to use cash to pay down debt.

The literature review highlights that leverage plays a key role in improving the performance, profitability and investment decisions of companies during times of economic

crisis, particularly in the context of the coronavirus pandemic. Studies show that optimal leverage can support the adaptability and financial stability of companies, while excessive leverage can diminish performance and increase financial risk, noting the importance of balanced management of financial resources to maximize profitability under conditions of economic uncertainty.

Building on the results of the studies identified in the literature on the relationship between the leverage and profitability of firms during times of crisis, we propose to test the following research hypothesis:

H2: Companies listed on the BVB with high leverage in the lead-up to the coronavirus pandemic increase their financial performance during and after the risk event.

2.3. Investments in research and development

Research and development (R&D) is often considered the key driver for creating sustainable innovations and achieving climate transitions (Rehman *et al.*, 2020). Given the role of R&D spending in economic growth, analysing the factors that influence economic performance is becoming a central concern for researchers (Becker, 2014). R&D spending generates innovation and contributes significantly to economic growth (Rehman *et al.*, 2020).

The study by Park *et al.* (2018) examined the effects of R&D dynamics on firms' growth during and after the 2008-2009 global financial crisis. The results of the study emphasized that persistence in a firm's R&D investment can be a driving force for financial growth both during and after economic crises, regardless of size. Thus, Roper and Turner (2020) emphasized in their study that if firms can maintain R&D investments during crisis periods, they would have higher chances of survival, stronger growth and higher profitability.

However, Giotopoulos *et al.* (2023) investigated how a long-lasting economic shock, such as the crisis in Greece, affects the innovation strategies of firms in economies with moderate innovation activities. Their study examined the relationship between R&D, innovation, and productivity among firms. The researchers investigated the impact of the crisis on firms' engagement in R&D activities, the effect of R&D activities on the likelihood of producing innovation, and the link between innovation output and labor productivity, to highlight differences in the responses to the crisis between small and large companies. The results underline the idea that the economic crisis has amplified differences in adaptability between small and large companies, suggesting that larger firms have been able to capitalize on R&D and innovation investments to increase their productivity even under difficult economic conditions.

The research conducted by Pham *et al.* (2023) highlighted the crucial role of R&D investment during the coronavirus crisis. The researchers assessed whether R&D investment can protect companies against the negative effects of economic crises such as coronavirus and explore the ability of these firms to manage financial challenges without excessive reliance on external financing. The results show that for R&D-intensive companies, the negative impact of coronavirus on profitability was smaller compared to other companies. This means that although the pandemic affected many businesses, the

companies that consistently invest in innovation and development were better suited to adapt and maintain stable profitability.

The study conducted by Arianpoor and Khargh (2023) suggests that maintaining the budgets allocated for R&D investment is vital to ensuring stability and has a positive influence on future profitability, noting that innovation investments can support firms in managing economic uncertainties.

Behbahaninia and Golbidi (2022) investigated whether R&D activities reduce the negative impact on performance in critical situations, such as the coronavirus pandemic. The results demonstrate that R&D investments play a crucial role in the ability of companies to cope with crises, contributing to their resilience in critical times.

In relation to the results of previous research on the impact of R&D investments on firms' performance during crisis periods, we formulate the third research hypothesis:

H3: Companies listed on the Bucharest Stock Exchange (BVB) that invest in R&D in the lead-up to the coronavirus pandemic increase their financial performance during and after the risk event.

3. Methodology

The first hypothesis proposes that BVB-listed firms that experienced a significant increase in profitability before the coronavirus pandemic maintain and even improve their profitability during and after the risk event generated by the pandemic. The second hypothesis explores whether BVB-listed firms that were highly leveraged before the pandemic experience an increase in profitability during the pandemic and afterwards. The third hypothesis explores whether BVB-listed firms that invested in R&D before the pandemic increase their profitability during and after the risk event caused by the coronavirus pandemic.

In the sample of the study, we included companies traded on the Bucharest Stock Exchange (BVB) on both the Regulated and AeRO markets, at the Premium and Standard sections. To test the profitability of companies in Romania during and after the crisis triggered by the coronavirus pandemic, the study is carried out over seven 7 years (2017-2023). The coronavirus pandemic affected every aspect of both human life and the global economy (Rupani *et al.*, 2020), leading to decreases in economic activities and markets (Nilashi *et al.*, 2020).

3.1. Data and Variables

The sample included in the study is comprised of companies listed on the BVB, traded on both the Regulated and AeRO markets, in the Premium and Standard sections. Of the total of 86 companies traded on the BVB, 70 companies were included in the study, after excluding the companies in the financial sector. In order to test the relationship between the management of financial resources obtained before the coronavirus pandemic crisis and the profitability of the companies included in the study, we collected financial data from the annual activity reports published on the BVB website (BVB, 2024) and on the website of the Ministry of Finance ((Ministerul Finanțelor, 2024).

Table no. 1 presents the main characteristics of the sample of companies included in the study. Companies missing relevant data (one company) and financial companies (15 companies) were excluded from the sample. Thus, the sample included in the study is comprised of 70 companies.

Table no. 1. Characteristics of the companies included in the study

	Number of company	Percentage of total
Company age		
> 50 years	1	1.43
26–50 years	53	75.71
11–25 years	15	21.43
10 years or less	1	1.43
Total	70	100.00
Sector		
Consumer goods industry (IBLC)	14	20.00
Oil and energy industry (IPE)	18	25.71
Basic materials, constructions and utilities (IMBCU)	28	40.00
Services (IS)	6	8.57
Technology and Telecommunications (ITT)	4	5.71
Total	70	100,00

Source: Own processing

In order to test the relationship between the management of financial resources obtained before the coronavirus pandemic crisis and the profitability of the companies included in the study, during and after the crisis, we propose the variables used in the study conducted by Tognazzo *et al.* (2016). Table no. 2 summarizes the variables of the econometric model proposed in the study.

Table no. 2. Variables used in the study

Variable	Period	Indicator
Dependent variables		
Return on assets	2020-2023	ROA
Return on equity	2020-2023	ROE
Independent variables		
Return on assets	2017-2019	PreROA
Return on equity	2017-2019	PreROE
Leverage	2017-2019	PreLEV
Investments in research and development	2017-2019	PreI
Control variables		
Geographic location of companies in Romania		MR
Industry		IND
Company age		AGE
Company size		SIZE

Source: Tognazzo *et al.* (2016)

The financial performance represented by the Return on Assets (ROA) and Return on Equity (ROE) profitability indicators is the dependent variable. Return on assets and return on equity are deemed reliable and representative indicators of company performance (Johnson & Greening, 1999). Through the ROA indicator we reflect the profit created by available assets, and through the ROE indicator we indicate the profit generated by the company using investments (Epps & Cereola, 2008). Thus, in the study, we evaluated the average performance of ROA and ROE indicators from 2020 through 2023, considering the period during and after the coronavirus pandemic.

Building on the study by Tognazzo *et al.* (2016), the independent variables used in the study are the profitability of companies before the coronavirus pandemic crisis calculated by the pre-crisis return on assets (PreROA) and pre-crisis return on equity (PreROE) indicators over the 2017 – 2019 period, financial leverage (PreLEV) calculated by the ratio of total debt to total assets over the 2017 – 2019 period, and research and development investments (PreI) made before the coronavirus pandemic crisis, which are assigned the value 1 if they are reported in the balance sheet over the 2017 – 2019 period, and the value 0 otherwise. The R&D investments made by the companies included in the study show these companies' concern with allocating the necessary resources to activities that enhance foreign market efficiency (Tognazzo *et al.*, 2016).

The study also includes several control variables, including geographic location of the companies, their related industry, company size and age. The financial performance of companies is influenced by local characteristics (North & Smallbone, 1996) and their related industry (Steffens *et al.*, 2009) alike, as well as by company size (Bradley *et al.*, 2011). Given that financial resource management varies and influences differently over time (George, 2004), we also introduced company age as a control variable, calculated by the total number of years since its establishment.

The geographical location of the company is represented by four dummy variables regarding the geographical areas in Romania: North West and Central (MR1), North-East and South-East (MR2), South-Muntenia and Bucharest-Ilfov (MR3) and Southwest and West (MR4). Based on the classification carried out by researchers Sierra *et al.* (2013), the sampled companies were divided into five business sectors, such as: consumer goods industry (IBLC), oil and energy industry (IPE), basic materials, constructions and utilities (IMBCU), services (IS) and technology and telecommunications (ITT). The company size was calculated by logarithm of total assets obtained by the companies included in the study in 2017.

3.2. Descriptive Statistics and Correlations

Descriptive statistics are presented in Table no. 3. We found that the average value of the return on assets (ROA) indicator before the coronavirus pandemic crisis was 0.0413 (s.d. = 0.123, min = -0.531, max = 0.691), while after the crisis the average value of ROA was 0.0538 (s.d. = 0.0981, min = -0.207, max = 0.5651). The mean value of the return on equity (ROE) indicator before the coronavirus pandemic crisis was 0.1062 (s.d. = 0.7718, min = -5.341, max = 2.4761) and after the crisis was 0.0187 (s.d. = 0.4402, min = -3.4365, max = 0.4919). We observe that after the coronavirus pandemic crisis, the

profitability of companies evidenced by the ROE indicator decreased quite a lot, while a slight increase is observed by the ROA indicator.

From a regional point of view, we identify that the area of Muntenia and Bucharest has on average the highest number of companies included in the study (0.4143), followed by the North and Center area (0.3286). The predominant business sector of the companies included in the study is basic materials, construction and utilities (mean value of 0.4).

Table no. 3. Descriptive statistics

	Min.	St. Dev.	Mean	Max.
Post-pandemic ROA	-0.20702	0.09805896	0.05384	0.56508
Post-pandemic ROE	-3.43651	0.4402143	0.01869	0.49194
North West and Central (MR1)	0.0000	0.4730851	0.3286	1.0000
North-East and Southeast (MR2)	0.0000	0.3916837	0.1857	1.0000
South-Muntenia and Bucharest-Ilfov (MR3)	0.0000	0.496155	0.4143	1.0000
South-West and West (MR4)	0.0000	0.2593989	0.07413	1.0000
Consumer goods industry (IBLC)	0.0	0.4028881	0.2	1.0
Oil and energy industry (IPE)	0.0000	0.4402145	0.2571	1.0000
Basic materials, constructions and utilities (IMBCU)	0.0	0.4934352	0.4	1.0
Services (IS)	0.00000	0.281963	0.08571	1.00000
Technology and Telecommunications (ITT)	0.00000	0.2337913	0.05714	1.00000
Firm Age	7	6.130803	29.09	52.00
Firm Size	6.284	0.8160602	8.377	10.665
Pre-pandemic ROA	-0.530561	0.1231866	0.041289	0.690506
Pre-pandemic ROE	-5.34068	0.7718331	0.10622	2.47606
Pre-pandemic Overall leverage (PreLEV)	0.009195	0.4968691	0.414919	3.268040
Pre-pandemic R&D investment (PreI)	0.0000	0.2593989	0.9286	1.0000

Source: Processing in Rstudio

Figure 1 shows the correlation matrix between the variables used in our study. We observe that the dependent variable Return on Assets obtained during and after the coronavirus pandemic crisis is positively and significantly correlated with the variable Leverage (0.29) obtained before the crisis. And the variable Return on Equity obtained before and after the pandemic is positively and significantly correlated with Return on Assets (0.25) and R&D Investment (0.40) obtained before the crisis, and negatively and significantly correlated with Return on Equity (-0.37) obtained before the pandemic.

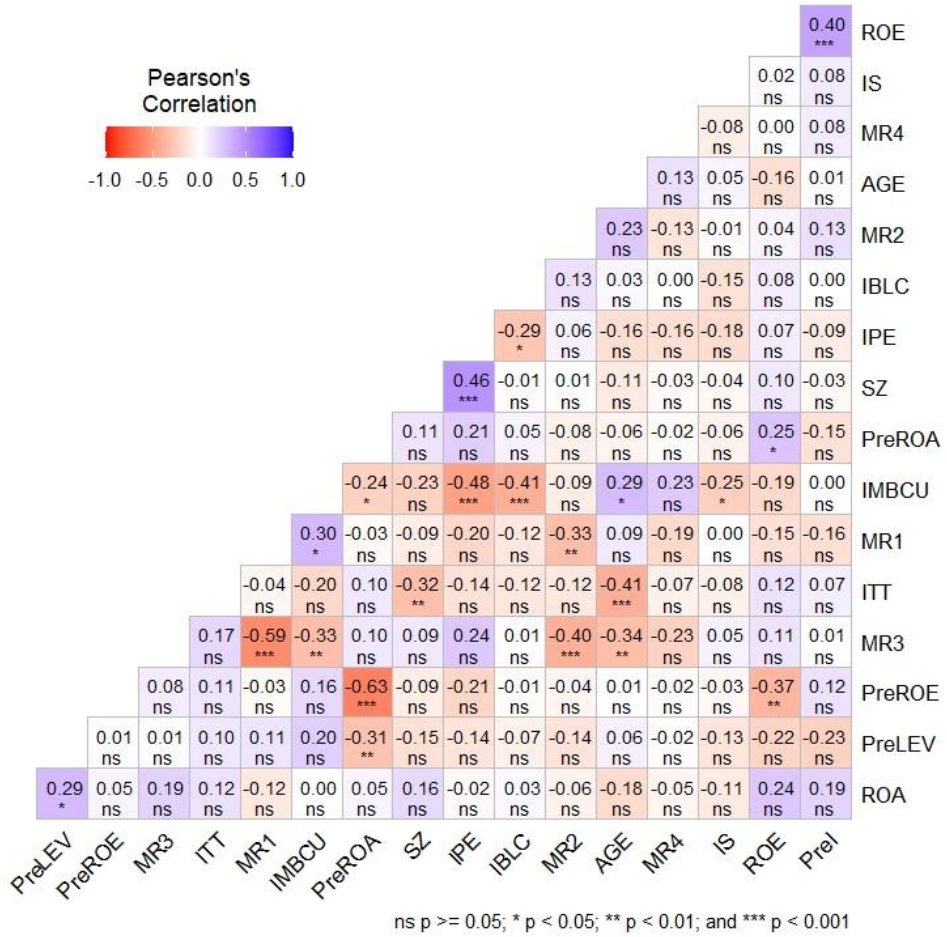

Figure no. 1. Correlation analysis. Processing in Rstudio

3.3. Method

We propose two regression analysis models based on the one proposed by Tognazzo *et al.* (2016), to analysis whether the efficiency of financial resources management before the coronavirus pandemic crisis influences the profitability of companies traded on the Bucharest Stock Exchange (BVB) both on the Regulated and AeRO markets, in the Premium and Standard sections, summarized by the following formulae:

$$ROA = \alpha + \beta_1 PreROA + \beta_2 PreROE + \beta_3 PreLEV + \beta_4 PreI + \beta_5 MR1 + \beta_6 MR2 + \beta_7 MR3 + \beta_8 MR4 + \beta_9 IBLC + \beta_{10} IPE + \beta_{11} IMBCU + \beta_{12} IS + \beta_{13} ITT + \beta_{14} AGE + \beta_{15} SIZE + \varepsilon_{it} \quad (1)$$

$$ROE = \alpha + \beta_1 PreROA + \beta_2 PreROE + \beta_3 PreLEV + \beta_4 PreI + \beta_5 MR1 + \beta_6 MR2 + \beta_7 MR3 + \beta_8 MR4 + \beta_9 IBLC + \beta_{10} IPE + \beta_{11} IMBCU + \beta_{12} IS + \beta_{13} ITT + \beta_{14} AGE + \beta_{15} SIZE + \varepsilon_{it} \quad (2)$$

4. Results and Discussion

In this section, we present the results of the regression analysis. Thus, in the first stage, we analysis the relationship between the management of financial resources obtained before the coronavirus pandemic crisis and the financial performance obtained during and after the pandemic by the companies included in the study, represented by the Return on Assets profitability indicator (Table no. 4). In the second stage we tested the relation between the management of financial resources obtained before the coronavirus pandemic crisis and the Return on Equity profitability indicator (Table no. 5).

We tested the research hypotheses by estimating five separate regression models for each dependent variable (Tables 4 and 5). These models provide regression analyses for the crisis and post-crisis financial performance obtained by companies traded on the Bucharest Stock Exchange (BVB) on both the Regulated and AeRO markets, in the Premium and Standard sections. The first model only considers the control variables, and the following models will incorporate one independent variable at a time, up to model 5 which incorporates all the variables introduced in the study.

Table no. 4 presents the regression analysis model for the return on assets indicator obtained during and after the coronavirus pandemic crisis by the companies included in the study. Analysing the model 5, we note that the regression analysis results indicate a significant positive relationship between the return on assets growth rate (0.324), leverage (0.104) and R&D investments (0.124) achieved before the crisis and the profitability of the companies obtained during and after the crisis ($p < 0.05$). On the other hand, there is no significant relationship between the return on equity variable obtained before the crisis and the profitability of companies during and after the crisis ($p > 0.05$). As for the control variables, only the company size variable shows significant positive values. We can say that most companies whose size increased before the crisis are able to cope with the initial impact of the crisis.

Table no. 4. Multiple regressions of post-CORONAVIRUS pandemic ROA

	Model 1	Model 2	Model 3	Model 4	Model 5
Pre-pandemic ROA		0.031	0.043	0.241*	0.324**
		(0.102)	(0.135)	(0.142)	(0.137)
Pre-pandemic ROE			0.003	0.026	0.031
			(0.021)	(0.021)	(0.020)
Pre-pandemic Overall leverage (PreLEV)				0.082***	0.104***
				(0.027)	(0.027)
Pre-pandemic R&D investment (PreI)					0.124***
					(0.045)
North West and Central (MR1)	0.008	0.008	0.008	-0.007	0.005
	(0.049)	(0.050)	(0.050)	(0.047)	(0.045)
Northeast and Southeast (MR2)	0.025	0.026	0.026	0.031	0.032
	(0.054)	(0.054)	(0.055)	(0.051)	(0.048)
South-Muntenia and Bucharest-Ilfov (MR3)	0.048	0.049	0.048	0.026	0.029
	(0.051)	(0.052)	(0.052)	(0.050)	(0.047)
Consumer goods industry (IBLC)	-0.052	-0.050	-0.048	-0.006	0.020
	(0.065)	(0.065)	(0.067)	(0.064)	(0.062)
Oil and energy industry	-0.092	-0.091	-0.089	-0.042	-0.011

(IPE)	(0.067)	(0.067)	(0.070)	(0.067)	(0.065)
Basic materials, constructions and utilities (IMBCU)	-0.036 (0.063)	-0.033 (0.064)	-0.031 (0.066)	0.004 (0.063)	0.027 (0.060)
Services (IS)	-0.089 (0.071)	-0.086 (0.073)	-0.083 (0.076)	-0.016 (0.074)	0.006 (0.070)
Firm Age	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.003 (0.002)
Firm Size	0.032* (0.018)	0.032* (0.018)	0.031* (0.018)	0.031* (0.017)	0.030* (0.016)
Constant	-0.142 (0.163)	-0.141 (0.164)	-0.140 (0.165)	-0.175 (0.155)	-0.307* (0.154)
Observations	70	70	70	70	70
R2	0.126	0.127	0.128	0.251	0.341
Adjusted R2	-0.005	-0.021	-0.038	0.093	0.188
F Statistic	0.962 (df=9;60)	0.861 (df=10;59)	0.772 (df=11;58)	1.588 (df=12;57)	2.227** (df=13;56)

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Processing in Rstudio

Table no. 5 presents the regression analysis results for the return on equity indicator obtained during and after the coronavirus pandemic crisis by the companies included in the study. Analysing model 5, we note that the regression analysis results indicate a significant negative relationship between the return on equity growth rate (-0.293) and the profitability of the companies obtained during and after the crisis ($p < 0.05$). We identify a significant positive relationship ($p < 0.05$) between the R&D investment variable (0.687) made before the crisis and the profitability of the companies obtained during and after the crisis. On the other hand, there is no significant relationship ($p > 0.05$) between the return on assets and leverage variables obtained before the crisis and the profitability of companies during and after the crisis. As for the control variables, we note that there are no significant relationships between them and the profitability of companies after the crisis.

Table no. 5. Multiple regressions of post - coronavirus pandemic ROE

	Model 1	Model 2	Model 3	Model 4	Model 5
Pre-pandemic ROA		0.810*	-0.194	-0.820	-0.360
		(0.460)	(0.572)	(0.623)	(0.580)
Pre-pandemic ROE			-0.247***	-0.320***	-0.293***
			(0.091)	(0.094)	(0.086)
Pre-pandemic Overall leverage (PreLEV)				-0.260**	-0.138
				(0.118)	(0.112)
Pre-pandemic R&D investment (PreI)					0.687***
					(0.189)
North West and Central (MR1)	-0.136	-0.132	-0.108	-0.060	0.010
	(0.227)	(0.223)	(0.212)	(0.207)	(0.189)
Northeast and Southeast (MR2)	-0.013	0.024	0.031	0.016	0.019
	(0.248)	(0.245)	(0.233)	(0.225)	(0.205)
South-Muntenia and Bucharest-Ilfov (MR3)	-0.055	-0.044	0.037	0.106	0.119
	(0.237)	(0.233)	(0.223)	(0.218)	(0.198)
Consumer goods industry (IBLC)	-0.158	-0.112	-0.270	-0.401	-0.254
	(0.299)	(0.295)	(0.286)	(0.283)	(0.260)

Oil and energy industry (IPE)	-0.222	-0.198	-0.412	-0.559*	-0.384
	(0.308)	(0.303)	(0.298)	(0.297)	(0.274)
Basic materials, constructions and utilities (IMBCU)	-0.279	-0.187	-0.342	-0.450	-0.323
	(0.291)	(0.291)	(0.282)	(0.278)	(0.254)
Services (IS)	-0.172	-0.092	-0.314	-0.526	-0.400
	(0.330)	(0.327)	(0.321)	(0.326)	(0.298)
Firm Age	-0.007	-0.008	-0.005	-0.001	-0.003
	(0.011)	(0.011)	(0.010)	(0.010)	(0.009)
Firm Size	0.058	0.050	0.075	0.075	0.065
	(0.081)	(0.080)	(0.076)	(0.074)	(0.067)
Constant	0.010	0.012	-0.095	0.015	-0.713
	(0.752)	(0.739)	(0.703)	(0.683)	(0.652)
Observations	70	70	70	70	70
R2	0.072	0.118	0.218	0.279	0.416
Adjusted R2	-0.067	-0.031	0.070	0.127	0.281
F Statistic	0.518	0.792	1.471	1.839*	3.073***
	(df=9;60)	(df=10; 59)	(df=11; 58)	(df=12; 57)	(df=13; 56)

Note:*p<0.1; **p<0.05; ***p<0.01

Source: Processing in Rstudio

In conclusion, we can say that only research hypothesis 3 has been validated, while research hypotheses 1 and 2 are partially validated. The study proves that increasing profitability before the crisis favors companies in coping with recession periods.

Consistent with the study conducted by Tognazzo *et al.* (2016), our first finding confirms the positive relationship between the increase in a company's return on assets in the years before a crisis and the return on assets in the years after a crisis. In contrast, we observe an inverse relationship for the return on equity indicator, suggesting that the performance of this indicator is not explained by past performance.

The analysis of the relationship between the amount of leverage in the period before the coronavirus pandemic and financial performance during and after the risk event suggests that the ability to generate additional external resources may help to sustain profits. But these resources are not enough to ensure the development of companies operating in mature markets. The regression analysis results indicate a positive relationship between leverage and return on assets, and a negative relationship between leverage and return on equity. We note that, consistent with the study conducted by Ayaz *et al.* (2021), the positive relationship between leverage and the performance of companies becomes negative when the level of leverage exceeds the optimal point.

Unlike the study proposed by Tognazzo *et al.* (2016), in Romanian companies we identify a positive relationship between R&D investments and financial performance. Our study demonstrates that in Romania, companies have taken advantage of the options generated by R&D investments, providing them with flexibility in situations of uncertainty. Obtaining resources strengthens the company's ability to respond to environmental changes, regardless of whether these changes are considered opportunities or threats (Gunther McGrath & Nerkar, 2004). If in a friendly environment, these real options are less important, in uncertain environments, they provide the flexibility necessary to respond to environmental opportunities and threats (Tognazzo *et al.*, 2016). Thus, R&D investments

become an important source in ensuring competitive advantages (Henderson & Cockburn, 1994). These investments improve existing products, reduce production costs, and increase product quality (Tognazzo *et al.*, 2016). In the same sense as researchers Lee *et al.* (2008), we argue that investments in research and development made before the manifestation of risks create competitive advantages for companies after the risks, advantages that they would not have obtained under normal conditions.

5. Conclusions

Using financial data from before and after the coronavirus pandemic crisis, we analysed a sample of 70 companies traded on the Bucharest Stock Exchange (BVB) on both the Regulated and AeRO markets, in the Premium and Standard sections, to determine whether effective financial resource management before the crisis leads to business success in the recession period. To measure post-crisis business success we used financial performance as the dependent variable, measured by return on assets (ROA) and return on equity (ROE).

Our first finding, consistent with the study by Tognazzo *et al.* (2016), confirms the positive relationship between pre-crisis company profitability and financial performance in the post-crisis years only for the Return on Assets performance indicator. In contrast, for the Return on Equity performance indicator, we note an inverse relationship with the financial performance achieved before the coronavirus pandemic crisis. We can say that improving the financial efficiency of companies that operated in stable markets led to more success during the crisis and post-crisis period compared to companies that were not concerned with increasing efficiency. Thus, the first research hypothesis that BVB-listed companies with high profitability growth in the lead-up to the coronavirus pandemic increase their financial performance during and after the risk event was validated only for the return on assets performance indicator.

The second finding relates to the role played by the financial structures of companies developed before the crisis and their financial performance during and after the coronavirus pandemic. We find that increasing the ability to generate additional external resources before the crisis may contribute to increasing profits, but is not sufficient to ensure companies' growth during and after the crisis. The regression analysis shows a significant positive relationship between pre-crisis leverage and the return on assets performance indicator during and after the crisis, and an insignificant relationship with return on equity. We argue that the ability of companies to generate additional external resources can contribute to increasing profits in the context of the reluctance of companies to rely on external sources of funds, as well as banks' strategy about credit tightening and increasing the collateral required for new loans.

The third research hypothesis that pre-crisis R&D investments boost financial performance during and after the crisis is supported. These investments can provide the flexibility to seize opportunities and are very important when risks arise. We can say that R&D investments made before the onset of risk create strong competitive advantages for companies to overcome these risks. We believe that R&D investment is becoming an important source in boosting financial performance during and after the crisis.

When market conditions are stable, managers and investors need to achieve profitability without relying too heavily on debt, thereby generating financial performance that can be utilized during crises. Our results also indicate that company size influences a company's ability to cope with turbulent environments. Although the R-squared for the regression models tested is low (0.341 and 0.416, respectively), we do not consider this to be a serious issue as low model power is not uncommon in business research (Tognazzo *et al.*, 2016). Irrespective of the R-squared value, the value of the variables included in the study explains the variances of the dependent variables.

In this current study we focus on the ability of companies to earn profits and to grow while undergoing adaptive change. Such strategies are not easy to implement, and identifying the resources needed to achieve resilience becomes a tedious process, as the post-risk event environmental uncertainty creates ambiguity about the resources needed to develop and maintain a competitive advantage. We view the coronavirus pandemic crisis as an environmental risk and support the idea that companies traded on the Bucharest Stock Exchange (BVB) have used their resources to boost their business success in the post-recession period, while also strengthening their resilience.

We find a positive relationship between leverage and company performance, so companies with low leverage ratios can perform better. Managers, in order to satisfy the needs of investors and shareholders, must make considerable efforts to achieve higher financial performance. In Romania, a low leverage can produce value for shareholders, while a high debt ratio diminishes the company's profitability.

Regarding the limitations of our study, firstly we would mention that the sample included in the study is only comprised of companies traded on the Bucharest Stock Exchange (BVB) on both the Regulated and AeRO markets, in the Premium and Standard sections, which limits the general applicability of our results. Secondly, the study does not address environmental variations, i.e. we do not include companies that did not go through a crisis to compare them with those that did. Including a control group would lead to a useful improvement in the research. In conclusion, the results of the study suggest different research directions. Thus, in addition to quantitative studies, we also propose qualitative research on companies with high and low financial performance alike in different industries, which also develops other relevant organizational variables designed to create broader analyses.

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