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Chapter: Understanding Your Local Economy: to Identify and Analyse Regional Trends

EXAMINING FINANCIAL SUSTAINABILITY IN INVESTOR-BACKED VS. INDEPENDENT START-UPS: A ROMANIAN PERSPECTIVE

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Annotation. With the covid crisis the need for innovation in the health sector has increased substantially. At the same digitalization has started to play an important role in every industry. This current paper explores the financial performance of start-ups in Romania, with a particular focus on sustainability and the role of external investment. Through an empirical analysis of key financial metrics—including Return on Assets (ROA), Return on Equity (ROE), and Debt-to-Assets ratio—the research offers a comparative insight into the performance of companies with and without investors. Statistical tests, comprising t-tests and ANOVA, were employed to examine the differences in these metrics between the two groups of companies. The findings reveal no significant disparities in ROA, ROE, or the Debt-to-Assets ratio between investor-backed and non-investor-backed start-ups. This suggests that external investment does not inherently influence these financial indicators, with companies demonstrating comparable financial performance regardless of investor involvement. The research provides valuable implications for stakeholders, entrepreneurs, and policymakers interested in the sustainability and financial viability of start-ups in the Romanian entrepreneurial ecosystem.

Keywords: financial sustainability, return on equity, start-ups, entrepreneurship, MedTech.

JEL classification: F65, G31, G32.

Introduction

The development of start-ups in Romania has gained significant attention in recent years, as the country seeks to stimulate entrepreneurial activities and increase competitiveness. The Romanian government has prioritized support for entrepreneurship development, recognizing it as a crucial element for sustainable economic growth (Vodă, Florea, 2019). Of course, for start-ups to develop there needs to be an entire ecosystem that comprises of investors (business angels, venture capital funds, private equity) financiers (banks and other credit institutions) clusters that are promoting these initiatives and

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entrepreneurs that bring innovative ideas to life. Besides these factors, start-ups need the help of the government which should promote legislation to facilitate innovation. The present article aims to discuss the sustainability of med-tech start-ups in Romania, focusing on the financial performance in this entrepreneurial environment. One important aspect to consider is the impact of personality traits and entrepreneurship education on entrepreneurial intentions. Research has shown that certain psycho-behavioral traits, such as creativity, need for achievement, and risk-taking propensity, can influence an individual's inclination towards entrepreneurship (Popescu *et al*., 2016). By looking at the Romanian landscape we can notice that the most successful projects have started outside the capital city. One possible reason for this development is the fact that the employment rate and the average salary are much higher in Bucharest and thus are not leaving space for innovation. Talent has the option of getting a well-paid job at any point in time and thus the need for innovation and risk-taking are low. Additionally, entrepreneurial education plays a significant role in shaping entrepreneurial intentions, as it provides individuals with the necessary knowledge and skills to start and manage their own businesses (Popescu *et al*., 2016). Understanding the influence of these factors can help policymakers and educators design effective programs to foster entrepreneurship in Romania. As mentioned before the entrepreneurial environment is another crucial factor that influences the development of start-ups. (Păunescu, Molnar, 2020) conducted a study to identify the predictors of the country's entrepreneurial environment for starting a new venture. The research examined various factors, including business regulations, access to finance, market conditions, and cultural attitudes towards entrepreneurship. The findings of the study provide valuable insights into the strengths and weaknesses of Romania's entrepreneurial ecosystem, which can guide policymakers in creating a more supportive environment for start-ups. Furthermore, the development of start-ups in Romania is closely linked to the country's sustainable development goals. (Sirbu *et al*., 2015) conducted a study on Romania's sustainable development, highlighting the importance of innovation and technological advancements in achieving long-term economic, social, and environmental sustainability. Start-ups, particularly those focused on renewable energy projects, can contribute to sustainable development by introducing innovative solutions and promoting clean and efficient technologies (Cebotari, Benedek, 2017). Innovation capacity and business efficiency are also critical factors for the development of start-ups in Romania. (Onea, 2021) proposed a framework for assessing the innovation capacity and efficiency of Romanian small enterprises and start-ups. This framework can help identify the strengths and weaknesses of these businesses and guide them towards improving their innovation practices and overall efficiency. In conclusion, the development of start-ups in Romania is influenced by various factors, including personality traits, entrepreneurship education, the entrepreneurial environment, sustainable development goals, and innovation capacity. As we can see most of the articles that focus on the Romanian market look at the general overview but did not go into the issues that are affecting the entire ecosystem. What are the financial performances of start-ups? Is there a gap between the expectations of the investors and the results delivered by the entrepreneurs? Of course, that investing in a start-up brings a lot of risk and the literature mentions that 9 out of 10 start-ups fail to reach maturity, but we must see if this is true for the Romanian market. If angels and the different funds do not meet their investment target, they will try to focus their investment on other markets.

The MedTech industry has been rapidly growing in Romania, with an increasing number of start-ups emerging in this sector. This article aims to provide an overview of the MedTech start-up landscape in Romania, examining their financial performance and looking to see if the expectations set by investors have been fulfilled. One of the key challenges for MedTech start-ups in Romania is the limited implementation of the circular economy. According to (Albastroiu Nastase *et al*., 2021), the circular economy is still in its infancy phase in Romania, and there is a lack of scientific articles addressing the

country's specific situation. This presents a unique opportunity for MedTech start-ups to design and implement circular economy principles in their business models, contributing to sustainable development in the industry. Furthermore, the COVID-19 pandemic has highlighted the importance of health workforce protection and preparedness. (Kuhlmann *et al*., 2021) found that Romania, along with other European countries, has taken action to improve physical protection and digitalization in healthcare systems. However, there is a need for stronger occupational and organizational preparedness, which can be addressed by MedTech start-ups through innovative solutions and collaborations. In terms of personalized medicine, the implementation of pharmacogenetics (PGx) in patient care has been slow in Eastern European countries, including Romania. (Pop *et al*., 2022) conducted a survey among Romanian pharmacists and found that there is a lack of knowledge and limited implementation of PGx testing. MedTech start-ups can play a crucial role in promoting the adoption of PGx in Romania, improving the effectiveness and safety of medicines. Collaboration between industry and research is essential for the development of innovative solutions in the MedTech sector. (Forgo, Bakos, 2021) discussed the challenges of developing Digital Innovation Hubs (DIHs) based on Industry 4.0 principles in Romania. DIHs have been successful as knowledge transfer centers, particularly in information technologies, but there is a need for further development in manufacturing technologies. MedTech start-ups can contribute to the establishment of DIHs in Romania, fostering collaboration and innovation in the industry. Additionally, the diaspora start-up programs in Romania have supported the emergence of non-agricultural start-ups, including those in the creative industries. (Croitoru, 2021) conducted a comparative analysis of these programs and found regional differences within Romania. The MedTech start-up landscape in Romania presents both challenges and opportunities but as mentioned before is very much linked to the ecosystem. As such we notice that most of the MedTech start-ups are in the medical centers (Cluj-Napoca, Timisoara, Craiova, Iasi and Bucharest). In our analysis we chose to focus on 39 start-ups that were include in the yearly start-up report published by the Freshblood and Activize clusters which track the biggest players in the start-up environment.

Table 1. Distribution of MedTech start-ups included in the analysis

	No. of Start-ups	Percentage
Cluj	8	20%
Bucuresti	14	35%
Timisoara	4	10%
Iasi	1	3%
Constanta	2	5%
Suceava	1	3%
Alba	1	3%
Brasov	4	10%
Baia Mare	1	3%
Craiova	3	8%
Sibiu	1	3%

Source: own calculations.

Financial performance of start-ups in Europe is a topic of interest in academic research. Several studies have examined various factors that can influence the financial performance of start-ups in Europe. One study by (Munari et al., 2015)focuses on the role of university-oriented seed funds (USFs) in Europe in addressing funding gaps and facilitating the commercialization of academic technologies. The study analyzes the performance of start-ups backed by USFs compared to those backed by other venture capital (VC) funds. The findings suggest that USF-backed companies perform well in terms of exit rates,

staging, and syndication levels. Another study by (Van Rijnsoever et al., 2017) investigates the influence of incubation on start-up investments. The study examines the combined interaction effect between incubation and the use of different funding sources on start-up performance. The findings suggest that the monetary amount of investments raised by the start-up has a high signaling value for future performance. (Haddad, Hornuf, 2021) examine the impact of fintech start-ups on the performance and default risk of traditional financial institutions. The study finds a positive relationship between fintech start-up formations and the performance of incumbent institutions. The authors also analyze the link between fintech start-up formations and the default risk of traditional financial institutions. (Elitcha, Fonseca, 2018) focus on the impact of start-up costs on the self-employment-wealth relationship. The study uses longitudinal data from Europe and the United States to investigate the effects of the last global financial crisis. The results confirm a strong positive relationship between the entrepreneurial choice and wealth, as well as a negative effect resulting from the increase in start-up costs. (Choi et al., 2021) discuss the role of government support policies in enhancing the performance of start-ups in Korea. The study suggests that government support, particularly in improving the absorptive capacity of start-ups, can have a positive effect on performance. These studies provide valuable insights into the factors that can influence the financial performance of start-ups in Europe. Factors such as the type of funding source, incubation, fintech start-ups, start-up costs, and government support policies can all play a role in determining the success of start-ups. Understanding these factors can help policymakers, investors, and entrepreneurs make informed decisions to support the growth and success of start-ups. When looking at start-ups in the MedTech industry, we can mention that these face unique challenges and opportunities in terms of their financial performance. Several studies provide insights into different aspects of MedTech start-ups' financial performance. (Liu et al., 2022) focus on anticipating financial distress of high-tech start-ups in the European Union. They employ a machine learning approach to analyze imbalanced samples and predict financial distress. This study highlights the importance of assessing the financial status of start-ups to maintain stability and reduce dependence on external capital (Liu et al., 2022). (Brown et al., 2012) investigate how banks screen innovative firms, including high-tech start-ups. They find that high-tech start-ups face more difficulties in raising bank finance compared to low-tech start-ups. The study emphasizes the role of external credit scores in determining the availability of credit for start-ups (Brown et al., 2012). (Laitinen, 2019) explores the use of discounted cash flow (DCF) as a measure of start-up financial success. The study discusses the complexities and stochastic nature of cash flow development for start-ups. It suggests that DCF can be a useful tool for assessing the financial performance of start-ups (Laitinen, 2019). (Schachel et al., 2021) examine the importance of management control systems (MCS) for start-up funding. They find that financial MCSs play a crucial role in monitoring and managing cash flows, particularly for equity financiers. This study highlights the significance of financial accountability and the role it plays in attracting investment (Schachel et al., 2021). (Richmond et al., 2022) propose a novel maturity index for assessing medical device start-ups. They focus on the challenges faced by MedTech start-ups, such as regulatory and clinical readiness. The study emphasizes the importance of specialized accelerators and programs in supporting the development and maturity of MedTech start-ups (Richmond et al., 2022). These studies collectively provide insights into the financial performance of MedTech start-ups. They highlight the importance of assessing financial distress, understanding the challenges in raising finance, utilizing appropriate financial measures, implementing effective management control systems, and addressing the specific needs of the MedTech industry.

1. Materials and Methods

To study the financial performance of the start-ups we have selected a lot of 47 Med Tech start-ups which were included in the annual report of the most prestigious clusters that deal with start-ups – Activize (dealing with general start-ups) and Freshblood (cluster focused on health startups). In analyzing the performance, we have taken the financial information available on the Ministry of Finance for the last 3 years. In some cases, as the companies were founded in 2021, we could only use 2 years of financials.

After the selection of the start-ups, we wanted to see which ratios could offer the most valuable information for analyzing the financial performance. The Return on Assets (ROA), Return on Equity (ROE), and Debt-to-Assets ratio are widely recognized and extensively studied financial performance ratios in the literature (Lee *et al*., 2001) (Sayinzoga *et al*., 2016); (Deloof, Vanacker, 2018). These ratios play a crucial role in assessing the financial health and performance of organizations. ROA measures the efficiency with which a company utilizes its assets to generate profits, providing insights into its operational effectiveness and asset management (Lee *et al*., 2001) A higher ROA indicates better utilization of assets and higher profitability. On the other hand, ROE measures the return generated for shareholders' equity, reflecting the company's ability to generate profits from the capital invested by shareholders (Sayinzoga *et al*., 2016) A higher ROE signifies better profitability and indicates that the company is effectively utilizing shareholder funds. Additionally, the Debt-to-Assets ratio measures the proportion of a company's assets that are financed by debt, indicating its leverage and financial risk (Deloof, Vanacker, 2018). A lower Debt-to-Assets ratio suggests a lower risk of insolvency and financial distress. These ratios are essential tools for investors, creditors, and analysts to evaluate the financial performance and stability of organizations, aiding in decision-making processes such as investment, lending, and strategic planning (Hasani, O'Reilly, 2021).

Table 2. Inclusion of investor or angels in the company structure

Investors and Angels	24
Entrepreneurs	15
Total	39

Source: author's own calculation based on the information made public.

In Romania, the creation of a company is not difficult. The minimum required capital is equal to 200 lei which is equivalent to 40 euro. This minimum threshold allows entrepreneurs to easily start companies compared to Germany where the contribution as share capital to a GmbH upon formation 25000 euro.

When looking at the Return on Equity we can use the 3-point DuPont model

$$Return\ on\ Equity = \frac{Net\ Income}{Sales} \times \frac{Sales}{Assets} \times \frac{Assets}{Shareholder\ Equity} \quad (1)$$

Or the 5-point DuPont model

$$Return\ on\ Equity = \frac{EBT}{Sales} \times \frac{Sales}{Assets} \times \frac{Assets}{Shareholder\ Equity} \times (1 - Tax\ Rate) \quad (2)$$

Both are giving the same results only each is highlighting another important item in the income statement. The 3-step model highlights the Net Profit Margin which is one very important ratio that is defining the profitability of the company.

The Return on Assets shows as mentioned before, the efficiency to which the company is using its assets. The formula used for the ratio is equal to:

$$Return\ on\ Assets = \frac{Net\ Income}{Total\ Assets} \quad (3)$$

In order to see if the companies are using financial leverage we have opted for the debt – to – assets ratio and not for the classic debt – to – equity ratio because our main goal was to see if the assets are financed through debt or not. More so, as most of these companies are in the tech industry (be so MedTech) we will not see investment in *noncurrent Assets – Fixed Assets* or in *Inventory*. Given the information that was provided by the Ministry of Finance we used the following equation to calculate the debt – to – assets ratio:

$$Debt - to - Assets = \frac{Non\ Current\ Assets + Current\ Assets + Prepaid\ Expense}{Total\ Debt + Unearned\ Revenue} \quad (4)$$

2. Results and Discussion

The variability in ROE and ROA values highlights differences in profitability and efficiency among companies (*Appendix 1, Appendix 2*). Negative values warrant further investigation to understand the underlying reasons for the losses. The Debt-to-Assets ratio distribution provides insights into the financial leverage of companies. A higher ratio indicates higher financial risk, as a significant portion of the assets is financed by debt.

The next step in our analysis is to undergo a t-test (*Table 6*). The t-test is used to determine if there is a significant difference between the means of two groups (Kim, 2015). It calculates a t-value, which is then compared to a critical value to determine if the difference is statistically significant (Kim, 2015). The t-value is calculated by dividing the difference between the means of the two groups by the standard error of the difference (Kim, 2015). If the t-value exceeds the critical value, it indicates that there is a significant difference between the means.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (1)$$

Where $\bar{x}_1$ and $\bar{x}_2$ are the sample means and s^2 is the pooled variance and n_1 and n_2 are the sample size

Table 6. t-test results

	ROA	ROE	Debt-to-assets
t	-0,87	-1,08	0,96
p-value	0,39	0,28	0,34

Source: own calculations.

With a p-value of 0,39, there isn't enough evidence to reject the null hypothesis, suggesting that there is no significant difference in ROA between companies with and without investors. The same p-value higher than 0,05 for the case of ROE and Debt-to-Assets would indicate that there is no significant difference between companies that have investors within their shareholdings and those who don't.

After the t-test we wanted to conduct an Analysis of Variance. ANOVA is typically used to compare the means of three or more groups. It is an important method in exploratory and confirmatory data analysis (Gelman, 2005). ANOVA is used to determine if there is a significant difference between the means of the groups being compared. However, it can also be used for two groups. In this case, you have two groups: companies with investors and companies without investors. For ANOVA, you usually start with a null hypothesis that there is no difference among the groups, and the alternative hypothesis is that at least one group is different.

(1) Calculate the overall mean of the combined groups.
(2) Calculate the Sum of Squares Between (SSB), which represents the variance between the groups.
(3) Calculate the Sum of Squares Within (SSW), which represents the variance within each group.
(4) Calculate the F-static $F = \frac{SSB\ /\ (k-1)}{SSW\ /\ (N-k)}$, where *k* is the number of groups and *N* is the total number of observations.
(5) Compare the F-statistic to the F-distribution to find the p-value, which will inform you whether the observed data falls within a certain range of values (the acceptance region of the null hypothesis).

For the ANOVA test we have conducted separate analysis, and we can see the results in *Table 7*.

Table 7. ANOVA Test results

Metric	t-statistic	t-test p-value	F-statistic	ANOVA p-value
Return on Assets	-0,87	0,39	1,24	0,27
Return on Equity	-1,08	0,28	0,89	0,35
Debt-to-Assets	0,96	0,34	1,53	0,22

Source: own calculations.

With a p-value of 0,35 there isn't enough evidence to reject the null hypothesis, suggesting that there is no significant difference in ROE between companies with and without investors at the conventional 0,05 significance level. The same level above 0,05 is seen for the other metrics.

After we have seen that there are no differences, we wanted to see which the profitability of the companies (*Table 8*).

Table 8. Positive Net Income companies

	No.	Net Income 2022		Net Income 2021		Net Income 2020	
Investors and Angels	24	6	25%	8	33,33%	8	33,33%
Entrepreneurs	15	7	46,67%	9	60%	6	40%
Total	39	13	33,33%	17	43,58%	14	37,83%

Source: own calculations.

From the table above we notice that the percentage of companies that have a positive result at the end of the years are higher in the case of companies which have the money only from entrepreneurs, but this is not much higher than the companies which include in their equity investors like venture capital funds and business angels. However, we notice that there is a greater concern towards profitability and positive result as the only source of funding would be bootstrapping or using the operating cashflow. Our previous analysis show us that there is no statistical significance in this, the reasons could be various.

Conclusions

This research aimed to explore the financial performance of start-ups in Romania, focusing on the impact of sustainability and investment on key financial metrics such as Return on Assets (ROA), Return on Equity (ROE), and the Debt-to-Assets ratio. Through statistical analysis, our study provided valuable insights into the financial landscape of these entities, offering a comparative perspective between firms with and without investors.

The findings from the t-tests and ANOVA revealed no statistically significant differences in ROA, ROE, and Debt-to-Assets ratio between companies with investors and those without. Specifically, the p-values obtained from both analytical techniques were above the conventional 0.05 significance level, leading to the acceptance of the null hypotheses for each financial metric.

The absence of significant disparities in the examined metrics suggests that external investment does not inherently influence the financial performance of start-ups in terms of ROA, ROE, and indebtedness. This outcome is crucial for stakeholders, as it implies that start-ups can achieve comparable financial success and stability irrespective of their investor-backed status. However, it is imperative to approach these conclusions with caution due to the limitations inherent in the study. Future research should consider a more extensive dataset, incorporating various other factors influencing start-up performance, including market dynamics, managerial practices, and the economic climate. Moreover, it would be beneficial to explore the relationship between sustainability practices and financial performance in-depth, as the integration of sustainable business models is becoming increasingly pivotal in today's corporate environment. In light of the growing emphasis on sustainable development and financial viability, this study offers preliminary insights into the complex interplay between investment and financial performance among Romanian start-ups. The findings herein serve as a foundation for further scholarly inquiry and practical understanding, ultimately contributing to the robust body of knowledge essential for fostering sustainable and financially sound entrepreneurial initiatives in Romania and beyond.

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INVESTUOTOJŲ REMIAMŲ IR NEPRIKLAUSOMŲ PRADEDANČIŲJŲ ĮMONIŲ FINANSINIO TVARUMO TYRIMAS: RUMUNIJOS PERSPEKTYVA

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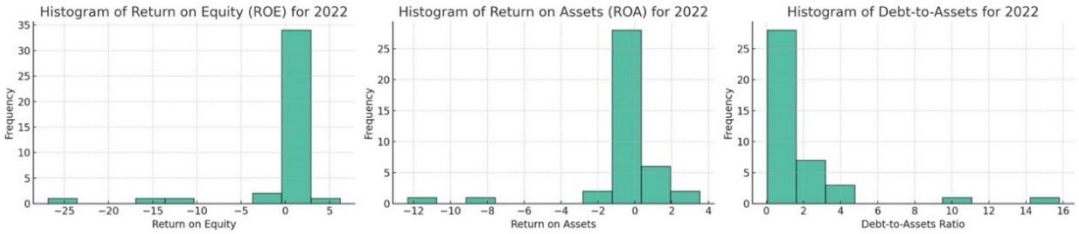
Santrauka. Naujovių poreikis sveikatos sektoriuje labai išaugo dėl koronaviruso krizės. Sykiu skaitmeninimas tapo itin svarbus kiekvienoje pramonės šakoje. Straipsnyje nagrinėjami naujų įmonių finansiniai rezultatai Rumunijoje, esminį dėmesį skiriant tvarumui ir išorės investicijoms. Atlikus empirinę pagrindinių finansinių rodiklių analizę, įtraukus turto grąžą (ROA), nuosavybės grąžą (ROE) ir skolos ir turto santykį, tyrime pateikta lyginamoji įžvalga apie įmonių, turinčių investuotojų ir jų neturinčių, veiklos rezultatus. Siekiant ištirti šių rodiklių skirtumus tarp dviejų įmonių grupių, buvo pasitelkti statistiniai testai, kuriuos sudaro t-testai ir ANOVA. Išvados neatskleidžia reikšmingų ROA, ROE ar skolos ir turto santykio skirtumų tarp investuotojų remiamų ir ne investuotojų remiamų pradedančiųjų įmonių. Tai reiškia, kad išorės investicijos iš esmės neveikia šių finansinių rodiklių, o įmonės demonstruoja palyginamus finansinius rezultatus nepaisant investuotojų dalyvavimo. Tyrimas suteikia vertingų įžvalgų suinteresuotosioms šalims, verslininkams ir politikos formuotojams, kurie domisi naujų įmonių tvarumu ir finansiniu gyvybingumu Rumunijos verslo ekosistemoje.

Reikšminiai žodžiai: finansinis tvarumas; nuosavo kapitalo grąža; startuoliai; verslumas; MedTech.

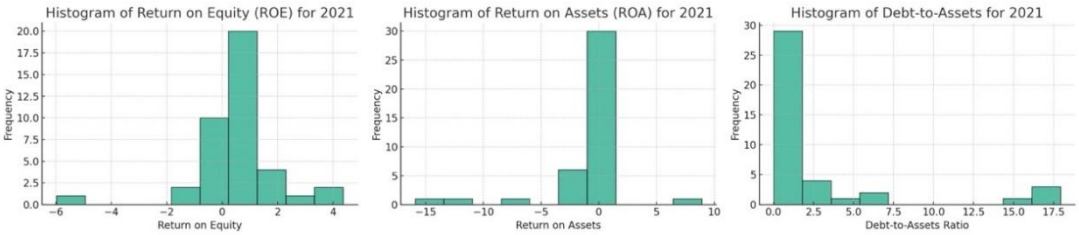
Appendixes

Appendix 1



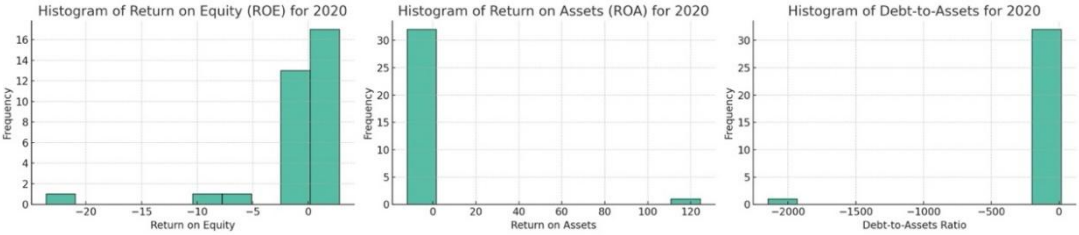
Source: created by the authors.

Figure 1A. **Histogram of ROE, ROA and Debt-to-Assets for 2022 for all companies in the sample**



Source: created by the authors.

Figure 2A. **Histogram of ROE, ROA and Debt-to-Assets for 2021 for all companies in the sample**



Source: created by the authors.

Figure 3A. **Histogram of ROE, ROA and Debt-to-Assets for 2021 for all companies in the sample**

Appendix 2

Table 3A. Mean, Median, Standard deviation and Range, 2020

	Mean	Median	Standard deviation	Range
Year	2020	2020	2020	2020
Net Income	-66185,03	0	355780,68	1707379
Fixed Assets to Current Assets	2,26	0,35	4,6	17,07
ROE	0,74	0,18	4,63	26,37
ROA	2,84	0,01	22,02	136,5
Debt-to-Assets	-63,15	0,9	374,43	2164,29
Equity-Assets	64,15	0,1	374,43	164,29

Source: own calculations.

Table 4A. Mean, Median, Standard deviation and Range, 2021

	Mean	Median	Standard deviation	Range
Year	2021	2021	2021	2021
Net Income	-58039,38	-1586,5	467099,43	2670055
Fixed Assets to Current Assets	8,19	0,3	20,2	73,77
ROE	0,53	0,49	1,5	10,34
ROA	0,81	0,0046	3,72	24,85
Debt-to-Assets	2,83	1,01	4,9	17,91
Equity-Assets	1,83	0,01	4,9	17,91

Source: own calculations.

Table 5A. Mean, Median, Standard deviation and Range for the year 2022

	Mean	Median	Standard deviation	Range
Year	2022	2022	2022	2022
Net Income	-119911,4	-3170	631302,16	4134537
Fixed Assets to Current Assets	5,72	0,32	15,83	87,58
ROE	-0,84	0,26	5,35	33,05
ROA	-0,52	-0,02	2,53	15,84
Debt-to-Assets	1,86	0,92	2,99	15,76
Equity-Assets	-0,86	0,08	2,98	15,76

Source: own calculations.