

Analyzing the Market Performance of Romanian Firms: Do the COVID-19 Crisis and Classification Type Matter?

Abstract

Purpose: Stock market performance is paramount to every country, as it signifies economic growth, business performance, wealth maximization, savings deployment, and consumer confidence. This study investigates differences in the market performance of listed firms in Romania. This study also examines whether the COVID-19 crisis affected market performance.

Methodology: Data were collected from 69 firms listed on the Bucharest Stock Exchange (BSE) from 2018 to 2022, belonging to 11 sectors. This study used several methods to achieve its objectives. Difference tests were considered to analyze the performance of Romanian companies before and during the COVID-19 crisis, as well as across sectors. Regression analysis was also conducted to estimate the effect of the COVID-19 crisis and classification type on Romanian companies' performance. Additional analyses were performed to verify the findings of the present study.

Findings: The study's findings indicate a discernible difference in market performance between the pre-crisis and crisis periods. COVID-19 negatively impacts market performance. In addition, there is a discernible difference in market performance between sectors. The communication services sector has specifically demonstrated accelerated growth.

Originality: This research analyzes the differences in the market performance of companies during pre-Covid-19 and the COVID-19 periods and across different sectors. It also provides evidence of the potential impact of COVID-19 on firms' market performance. This research contributes to a better understanding of how sectors perform during a crisis.

Keywords: Bucharest Stock Exchange (BSE), COVID-19; Firms Classification; Market Performance.

1. Introduction

The COVID-19 pandemic represents one of the most significant and influential phenomena affecting human lives (social, economic, institutional, etc.) in recent history. According to WHO (World Health Organization), 6844267 people have died from the first reported death of the novel coronavirus in China (January 11, 2020) up to now, and 756,581,850 confirmed cases. In Europe, were 272,634,146 confirmed cases, with 2189540 deaths. Critical and difficult-to-obey measures were implemented at national and international levels to limit the virus's spread and offer assistance to people, companies, and institutions hit by it (Bouri *et al.*, 2022). Accordingly, beyond the lack of popularity and social acceptance, their findings highlighted the positive impact of lockdown measures on stock returns in New Zealand, with several differences within sectors.

Ever since the acute period of the effects of the COVID-19 pandemic, researchers have tried to determine, in terms of the data generated by the pandemic in real-time (number of cases, number of deaths, the need for resources to find solutions to limit the loss of human life), the impact that the new coronavirus had on the capital markets (both from the perspective of the effects that the information about the pandemic caused changes on the stock exchanges, as well as from the perspective of the measures that the public decision-makers announced); the impact on the results of the companies listed at the stock market and connection between the capital markets was also investigated. The COVID-19 pandemic came into global life unexpectedly and significantly impacted the economic activity of individuals, businesses, markets, and supply chains (Habib and Kayani, 2022; Habib and Mourad, 2022; Mourad *et al.*, 2021, 2022). Starting with 2007, these phenomena are called in the literature black swans negative events (Talib *et al.*, 2007; Zhang *et al.*, 2022). These abnormal events impact the firm

performance (Habib and Mourad, 2023a; Ho *et al.*, 2021; Škare *et al.*, 2021). The uncertainty generated by COVID-19 at the national and international levels, as well as at the stock market level, was very high, so the capital market experienced a bearish trend, especially for some sectors; researchers using different approaches to evaluate the effects (Aslam *et al.*, 2022; Habib and Kayani, 2023; He *et al.*, 2022; He and Li, 2022; Jabeen *et al.*, 2022). After regulatory and financial government intervention, some sectors started to recover from the initial peaks, and the demand tailwinds were also endorsed by all those measures.

Several researchers such as (Insaiddoo *et al.*, 2023; Naeem *et al.*, 2022; Naeem, Farid, *et al.*, 2023; Naeem, Karim, *et al.*, 2023; Oanh, 2022) have analyzed the impact of the pandemic on the stock market. In this sense, Naeem *et al.* (2022) observed an increased transmitted spillover than admitted during COVID-19 for Bahrain, Malaysia, Oman, and Qatar. In addition, Naeem, Karim, *et al.* (2023) showed an intensified connectedness at the country level and cross-country between ethical investments during COVID-19. Though, few studies have considered the effects of the pandemic on the sectors that the listed companies represent (Ahmad *et al.*, 2021; Bouri *et al.*, 2022; Dong *et al.*, 2022; Liu *et al.*, 2023; Zhang *et al.*, 2022). Precisely, a few of them have considered the capital market in Romania (Gherghina *et al.*, 2021; Hatmanu and Cautisanu, 2021). Romania's market was hit drastically by health crises at the beginning of 2020, GDP decreased by 3.7% in the first pandemic year (OECD, 2022), and the unemployment rate reached 5.5%, while the current deficit reached -7.0 percent of GDP in 2021. BVB is a stock exchange officially established 140 years ago, with a suspension period of 70 years, currently having the emerging market status offered by FTSE Russel, obtained in September 2020. The BET index has grown superior to the S&P indices 500 or FTSE 100 in the last two years. In 2020, BVB lost approximately 15% of the capitalization of the main segment compared to 2019. Regarding the capital market in Romania, the evolution of the sectors under the pandemic's impact has not yet been investigated in the literature. In addition, what our work brings new and comes to cover the research gap is precisely the ability to capture the pandemic in a broader context, considering that this research covers the period January 2018 - May 2022; thus, highlighting the behavior of the Romania stock market during pre-COVID-19 and COVID-19 period.

The objective of the comparative analysis in this research is to shed light on the behavior of firms in the Romanian stock market during the pandemic and compare it with the pre-COVID-19 period. In addition, we analyze the differences in the market performance of firms across different sectors. We also provide evidence for the potential impact of COVID-19 on firms' market performance. The research adopts the Mann-Whitney U and Kruskal-Wallis H tests to observe differences in market performance, and multi-regression analyses are conducted.

This research contributes to the literature in many ways, with several initial attempts, as it contributes to a better understanding of Romanian firms' situations during crises and across sectors. Undoubtedly, this information is necessary for decision-makers to take practical actions for the continuous improvement strategy of performance, in addition to being an important indicator for investors, as investors seek to invest their funds in stable and well-performing firms to achieve satisfactory returns on their investments. We intend to reveal how an emerging stock market evolves in different frameworks, especially in the presence of a black swan. In this sense, our analysis takes into consideration the reaction and effects on different sectors.

The remainder of this paper is organized as follows: Section 2 presents the literature review and hypothesis development. Section 3 presents the methodology. Section 4 presents the results and discussions. Finally, section 5 presents the conclusions.

2. Literature Review

Many studies explored the impact of the COVID-19 pandemic on the economy, considering the efforts that authorities from various spheres (health, government, financial regulation, different levels of administration, local, national, and global) had to make to reduce the multiple effects of the pandemic. While some areas were affected more significantly (tourism, energy, clothing, education), some sectors, like the technology industries, had the chance to use the pandemic as a boost (Dong *et al.*, 2022; Tetteh *et al.*, 2022). The pandemic generated an acute need to change the behavior of individuals, investors, and decision-makers, which also transferred to the capital markets due to uncertainty. In this respect, the COVID-19 pandemic affected European, United States, and Asian stock market indices to a different extent (Ashraf, 2020; Sharif *et al.*, 2020), where traditional stocks were hit harder than technology industries (Statista, 2022), including on cryptocurrencies market (Neslihanoglu, 2021), where Iqbal *et al.* (2021) found an asymmetric impact.

In their research regarding the COVID-19 pandemic implications on systemic financial risks in China using the event analysis method, Huang *et al.* (2022) highlighted that securities, together with the real estate sector, had an important contribution to the systemic risk; also, they pointed out that the pandemic influenced market liquidity. Empirical research analyzing the COVID-19 pandemic across Vietnam market sectors (Ho *et al.*, 2021), pointed out that the lockdowns negatively affected the Vietnamese market sectors, and the market risks across sectors were modified significantly under the pandemic pressure. Moreover, Ahmad *et al.* (2021) studied the COVID outbreak at the sector level using endogenous structural break models and factor-augmented event study; their results showed the presence of the black swan for a period affecting the investment opportunities in the US, UK, and Europe.

In addition, using Cox proportional hazards and Poisson regressions, a research Feyen *et al.* (2021) evaluated financial sector policy response to COVID-19 and found a direct relationship between the level of private debt and the immediate response.

Ashraf (2020) investigated the research on 64 countries using panel data analysis and highlighted a decline in the stock market returns related to the increase in confirmed cases. Market reaction to new deaths was not significant in the period analyzed. In parallel, in a comparative study Tetteh *et al.* (2022), regarding Ghana and Botswana's stock market response to the COVID-19 pandemic, the authors have determined a negative effect, higher in Ghana than in Botswana.

Ding *et al.* (2021) suggested in their study of 6700 firms from 61 countries that firms with stronger performance in the pre-COVID-19 pandemic period suffered less during the health crises. Also, in the same line, firms with corporate social responsibility (CSR) related activities were exposed to a smaller extent to pandemic pressures. In addition, households became pessimistic during the pandemic, as Sha *et al.* (2022) stated in their study on China, and were more cautious and highly risk-averse. Conversely, in Xu *et al.* (2022) analyzed the impact of the new coronavirus on China's capital market, the authors found no significant impact on the market stock return; instead, they observed increased volatility of the market related to the pandemic. In addition, the study highlighted a differentiated sensitivity of sectors, with a slow reaction of Telecom to the pandemic. Similarly, Baig *et al.* (2021) observed an increase in market volatility and deterioration of US market liquidity due to the pandemic impact. The withdrawal of global liquidity providers during the pandemic was also highlighted by (Foley *et al.*, 2022) in their analysis of the global stock market. Also, being evaluated the impact of the COVID-19 pandemic on the Indonesian stock market performance of 272 firms, Utomo and Hanggraeni (2021) found a mixed impact of the pandemic and lockdown policies. While the confirmed cases and deaths of COVID-19 significantly affected the daily stock returns with differences between sectors, the lockdown

policies positively impacted the market, also confirmed by (Bouri *et al.*, 2022). Moreover, using an extreme bounds analysis to identify the determinants of US stock price fluctuations during the COVID pandemic Ahmed (2022) founded that the daily confirmed cases and deaths are irrelevant to the stock price formation

A study regarding companies' stock market performance during COVID-19, including from the perspective of environmental concerns (Wielechowski and Czech, 2021), found significant differences between sectors; conventional energy and financial sectors suffered in the analyzed period less than the alternative energy sector in terms of average weekly rates of return. Similarly, Kumar and Kumara (2021) concluded that the telecommunications, healthcare, and banking sectors were immune to the COVID-19 pandemic in a study analyzing market capitalization under the impact of the pandemic in India. These results are also confirmed by Alam *et al.* (2021) in their study regarding the Australian stock market based on an event study method. They also observed a negative impact on the transportation industry.

Some interesting reason could also sustain this: the period when the pandemic hit the economic and social life was characterized by much uncertainty, much searching for information, and fake news; everyone had the desire to learn more, to know different aspects regarding the evolution of the disease, its spread, the level of alertness and continuous decisions kept the interest for new information at a critical and acute level. Based on this search for information, the field of telecommunications found a development context generated by a geometrically increasing distorted demand. This involved new jobs and new solutions to cover information presentation and transmission as quickly and efficiently as possible, while restrictions and lockdown measures marked other sectors. Also, healthcare was subjected, on the one hand, to an additional demand for medicines, due to the lack of information about how to treat the coronavirus, including at the official level, and panic, which generated searches for solutions under the herd effect involved by the lack of information or truncated information. On the other hand, it was about the absorption valve for investments that would support the production of a vaccine or other protective materials, tools, and medicines necessary to treat patients. These statements are also confirmed by Espinosa-Méndez and Arias (2021), who found an increase in herding behavior in European capital markets under the impact of the COVID-19 pandemic in a study on stock exchanges from France, Germany, Italy, the United Kingdom, and Spain. As the authors suggested additionally, uncertainty conducts less informed agents to follow the agents that capitalize on more information. In a research González and Gallizo (2021) on the Chilean industrial sector, the authors concluded that the stock market responded inefficiently to the pandemic arrival and was observed an overreaction to market losses.

Dong *et al.* (2022) focused on using the Quantile-on-Quantile Regression (QQR) methodology, indicating that most global stock sectors are strongly affected by COVID-19, except for those responsible for the provision of strictly necessary goods and services. Additionally, their study spotlights a significant connectedness among global stock sectors for two months from the pandemic's beginning.

Gherghina *et al.* (2021) investigated the Romania stock market volatility, using the Bucharest Exchange Trading index together with some listed companies on the market in the COVID-19 pandemic framework in the GARCH approach, found an increase in the market volatility between January 2020 and April 2021 similar to the one reached during 2007-2009 financial crisis. Another research conducted by Hatmanu and Cautisanu (2021) complements the evidence. Thereby, analyzing the COVID-19 impact on the Romanian stock market using Autoregressive Distributed Lag methodology from March 11, 2020, to April 30, 2021, discovered a significant long-term negative impact on

Bucharest Exchange Trading (BET) index generated by the pandemic represented by new confirmed daily cases and new deaths on Romanian territory. Based on the prior studies, this study investigates the following hypotheses:

H1: Compared to the COVID-19 pandemic period, there were statistically significant differences in firms' market performance during the pre-pandemic period.

H2: Compared to sector type, there were statistically significant differences in firms' market performance during the study period.

H3: The COVID-19 pandemic significantly influenced firms' market performance during the study period.

3. Data and Methodology

The data include all firms listed on the Bucharest Stock Exchange (BVB) in Romania from 2018 to 2022. The data sample consists of 82 firms and 62,125 daily observations retrieved from the BVB database. Daily data were used because they provide a more accurate and detailed measure of the price fluctuations of companies' stocks. Volatility measures the degree of companies' market performance over time, and the more data points used, the more accurate the results will be. Additionally, financial companies were excluded because they have special characteristics and follow a different set of regulations for assessing performance, risk management, and monitoring (Dalwai *et al.*, 2023; Habib, 2023a; Habib and Mourad, 2022). Accordingly, the final sample comprises 69 firms and 48,020 daily observations. The sample sizes and characteristics are presented in Table I.

[Insert Table I here]

Table I lists the study sample by sector. The firms comprise 11 sectors according to the Global Industry Classification Standard (GICS). These sectors include communication services, consumer cyclical, consumer discretionary, consumer staples, energy, healthcare, industrials, information technology, materials, real estate, and utilities.

This study used several methods to achieve its objectives. Difference tests were considered to analyze the performance of Romanian companies before and during the COVID-19 crisis, as well as across sectors. Regression analysis was also conducted to estimate the effect of the COVID-19 crisis on Romanian companies' performance. Additional analyses were performed to verify the findings of the present study.

This study used several methods to achieve its objectives. First, difference tests were considered to analyze the performance of Romanian companies before and during the COVID-19 crisis, as well as across sectors. This study used a set of statistical techniques, including the Mann-Whitney U and Kruskal-Wallis H tests, to analyze the differences among the groups of firms. The Mann-Whitney U test is a statistical test that falls under the category of nonparametric tests. It is commonly employed to compare the means of two groups derived from a shared population (Habib and Dalwai, 2023; Habib and Kayani, 2023; Habib and Mourad, 2023a). This study uses the Mann-Whitney U test to check the null hypothesis that Romanian firms' performance distribution is the same before and during the COVID-19 crisis. Furthermore, the Kruskal-Wallis H test is also a nonparametric test commonly employed to compare the means of more groups derived from a shared population. This study uses the Kruskal-Wallis test to check the null hypothesis that Romanian firms' performance distribution is the same across sectors. Second, a regression analysis was conducted to estimate the effect of the COVID-19 crisis on Romanian companies' performance. The following equation represents the regression analysis:

$$PER_{i,t} = \beta_0 + \beta_1 COV_{i,t} + \beta_2 TUR_{i,t} + \beta_3 TRA_{i,t} + \beta_4 \sum \gamma_t + \beta_5 \sum \tau_i + \varepsilon_{i,t} \quad (1)$$

where $PER_{i,t}$ represents the performance of a firm (i) at a day (t). $COV_{i,t}$ represents the COVID-19 crisis defined by a dummy variable take zero for the period pre-COVID-19 and one for the period during the crisis. $TUR_{i,t}$ represents the share turnover of a firm (i) per day (t) defined by a trading volume divided by the average shares outstanding. $TRA_{i,t}$ represents the trading volume of a firm (i) per day (t). γ_t represents the year fixed-effects. τ_i represents the sector fixed-effects. β_0 is the regression intercept, and β_i ($i=1, \dots, 5$) represents the regression slope. Residuals are ε_{it} with $\varepsilon_{it} \sim N(0, \sigma_i^2)$ and $E(\varepsilon_{it}\varepsilon_{kt}) = 0$ for $i \neq k$ and $E(\varepsilon_{it}\varepsilon_{it+j}) = 0$ for $j > 0$. Note that these analyses were computed using the Stata/MP 17.0 software.

4. Empirical Results

4.1 Descriptive Statistics

Table II provides descriptive statistics of the daily data for the entire sample. The MP minimum and maximum values are 13.05 and 25.01, respectively, and the mean value was 19.28. This indicates that the market performance of Romanian firms is moderate. The minimum COV is 0, and the maximum is 1, with a mean of 0.548, while the mean of TUR is approximately 9.69, with minimum and maximum values of -4.77 and 20.71, respectively. This indicates that the turnover of Romanian firms is relatively high. The minimum TRA was 0, and the maximum was 7.88, with a 2.51 mean. This finding suggests that the trade volume of Romanian firms is relatively low.

[Insert Table II here]

4.2 Differences Analysis

Table III shows the results of the Mann-Whitney test to determine whether Romanian firms' market performance differed during the COVID-19 pandemic compared to the period before the pandemic. Panel A shows the ranks and test statistics showing that the mean ranks of the market performance of Romanian firms during the pre-COVID-19 and COVID-19 are 23628.29 and 24326.02, respectively. In addition, the results of the Mann-Whitney test suggest that the market performance of Romanian firms differs in the pre-COVID-19 pandemic period compared with the post-COVID-19 pandemic period at a significance level of 0.01 ($z = -5.49$, $p < 0.01$). Panel B shows the Mann-Whitney test summary suggesting that Romanian firms' market performance distribution is not the same across categories of the COVID-19 pandemic. Accordingly, H1 is supported. These results are compatible with Habib and Mourad (2023) findings, which reveal significant differences in U.S. firms' performance before and during the COVID-19 pandemic. In contrast, the results are incompatible with (Habib and Kayani, 2023; Habib and Mourad, 2022), as Habib and Kayani (2023) revealed no significant difference in UAE firms' performance before and during COVID-19, and Habib and Mourad (2022) revealed no significant difference in Gulf firms' performance before and during COVID-19.

[Insert Table III here]

[Insert Table IV here]

Table IV shows the results of the Kruskal-Wallis test used to determine whether Romanian firms' market performance differs among sectors. Panel A shows the ranks and test statistics, which indicate that Romanian firms' mean ranks of market performance are not the same across sectors. It is important to note that firms in the communication services sector were efficient due to their best performance, whereas firms in the consumer discretionary sector were inefficient due to their worst performance. In addition, the Kruskal-Wallis test results suggest that Romanian firms' market performance differs among sectors at a significance level of 0.01 ($z = 24464.68$, $p < 0.01$). Panel B shows the Kruskal-

Wallis test summary, which suggests that the market performance distribution of Romanian firms is not the same across sectors. Accordingly, H2 is supported. These results are compatible with Wielechowski and Czech (2021) findings, which reveal significant differences in firms' performance in 11 main sectors belonging to the MSCI index. In addition, these findings align with the official statistical data, as large companies dominate the telecommunications market. According to official statistical data, in the first semester of 2022, this sector had a 6.9% weight in the formation of GDP, given that the volume of activity in the field increased by 23.9% compared with the same semester of the previous year. Large companies dominate the telecommunication market. According to the National Authority for Administration and Regulation in Communications, the first three large companies operating in the field of telecommunications cover 87% of the market if we consider the revenues obtained from electronic communications in the first half of 2022, according to the National Authority for Administration and Regulation in Communications (ANCOM). Overall, these findings highlight the importance of continuous improvement and the need for firm decision-makers to focus on developing sound strategies to enhance a firm's market performance, even if the improvement is slight, as the process of continuous improvement is always initiated with a step. In order for a business to attain operational excellence, it must commit to a culture of continuous improvement (Habib, 2022, 2023b; Mourad *et al.*, 2021, 2022). Continuous improvement is also super important for those pursuing innovation and for those looking to improve efficiency, productivity, product quality, and customer loyalty (Habib and Mourad, 2023b; Habib and Shahwan, 2020; Shahwan and Habib, 2020, 2023).

4.3 Regression and Additional Analyses

Multicollinearity tests are useful for identifying issues between explanatory variables. The results showed no multicollinearity problems regarding the variance inflation factor (VIF), as the COV, TUR, and TRA values were 1.03, 4.99, and 5.04, respectively. Similarly, the tolerance values of the variables range from 0.198 to 0.975. Consequently, there was no multicollinearity between the study variables. Table V shows the regression analysis results used to determine the potential effect of the COVID-19 pandemic on Romanian firms' market performance during the study period. The results indicate that the COVID-19 pandemic negatively influences firms' market performance at a 0.10 significance level or less ($t = -1.87$, $p < 0.10$). Accordingly, H3 is partially supported. These results are compatible with (Habib and Kayani, 2023; Habib and Mourad, 2022, 2023a; Utomo and Hanggraeni, 2021). Turnover positively influences firms' market performance at a 0.01 significance level or less ($t = 55.55$, $p < 0.01$). The number of trades positively influences firms' market performance at a 0.01 significance level or less ($t = 13.36$, $p < 0.01$).

[Insert Table V here]

From a theoretical perspective, the results confirm that the COVID-19 pandemic has influenced Romanian firms' market performance. These results are consistent with the findings of previous literature in this regard (Anh and Gan, 2021; Hatmanu and Cautisanu, 2021; Hong *et al.*, 2021; Makni, 2023; Rakshit and Neog, 2022; Ullah, 2022). Additionally, the results confirm that Romanian firms' market performance distribution differs in the pre-COVID-19 pandemic period compared with the crisis period, revealing the relatively significant influence of the crisis on firms' market performance. Our findings are consistent with those of Jan *et al.* (2022), who investigated the market performance of a sample of Chinese firms in the consumer goods and services sector and found that the market performance differed before and after the pandemic. Machmuddah *et al.* (2020) investigated market reactions to COVID-19 using a sample of Indonesian firms in the consumer goods sector. Their results indicate that market performance during pre-COVID-19 and COVID-19 periods differed. In addition, the study by Sansa (2020) investigated the impact of the COVID-19 crisis on financial markets'

performance in China and the United States, whose results indicated a significant positive connection between the COVID-19 crisis and financial markets' performance.

[Insert Table VI here]

Table VI presents the additional analyses of the regression model estimations. These tests examined whether different estimations resulted in significant differences in the essential model. Regression estimations with robust standard errors, bootstrapping with 5000 replications, and regression analysis with industry-fixed effects (FE) were adopted as robustness checks. The results suggest that even when robustness test estimates are used, the estimates of the key variables coefficients have the same statistical significance and direction, which is expected. These findings were consistent with the results, as illustrated by Table V.

5. Conclusion

This research empirically investigates differences in the market performance of listed firms in Romania and the impact of the COVID-19 pandemic on market performance. The market performance of Romanian companies demonstrates fluctuations between the timeframe before the outbreak of the COVID-19 pandemic and the timeframe subsequent to the COVID-19 pandemic. This is consistent with the study of Habib and Mourad (2023), which reported similar findings for a developed country such as the US. However, no significant differences were found between the periods for an emerging market such as the UAE Habib and Kayani (2023). Thus, the findings indicate each financial market had a unique response before and during the pandemic. The market performance of Romanian enterprises fluctuates across different sectors. These outcomes are consistent with the findings of Wielechowski and Czech (2021), who highlight notable disparities in the performance of enterprises within the 11 primary sectors that fall under the MSCI index. These findings suggest that firms' market performance is adversely affected by the COVID-19 pandemic. The results support those of previous studies conducted by Makni (2023) and Ullah (2022), which also demonstrate the negative influence of the COVID-19 pandemic on firms' market performance. The results were confirmed through robustness tests.

This analysis clarifies the important implications for emerging markets. The pandemic has been associated with economic slowdown. As suggested by the findings of this study, the pandemic negatively impacts stock market performance, thus affecting the revenue and profits of the company. Businesses focus on cash flow management to sustain themselves during such events. Managers must reevaluate and adjust their business strategies to address the challenges posed by macroeconomic conditions. There should also be an emphasis on the pre-COVID-19 period to build corporate immunity against the likelihood of adverse events. The Romanian government and regulators must ensure the availability of support programs during a crisis to curtail its negative impact. For example, the hospitality and retail sectors needed more support during the downturn caused by COVID-19. This supports the maintenance of investor confidence in emerging markets. Investors are keener on moving their investments out of an emerging market during a pandemic, as they risk the returns being affected. Romanian businesses that performed well during the crisis should invest in building their capacity and resilience, thus incentivizing digital infrastructure.

Business management must be aware of the possible occurrence of these negative events wrapped in uncertainty that impacts market performance at the industrial level differently and find solutions to control the effects by adopting strategic options. Investment options must also be re-evaluated and assessed according to industries' specific evolutions and responses to black swan events. Some shock-stable firms and industries could be remarked, representing a minimized risk solution for investment portfolios. Romanian regulators should oversee emergency preparedness to quickly adapt to

government measures and changing market conditions. Furthermore, Romania should build an adaptive ecosystem in which government and industry are responsive to market dynamics.

The research was analyzed in the Romanian context. Furthermore, future research could extend to other emerging markets in Europe, thus providing a more comprehensive comparative analysis and increasing the generalizability of the findings. Future research could extend the impact of regulatory factors and government support measures. There is also scope for conducting an Event Study analysis about the announcement of restriction measures and firm performance.

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References

- Ahmad, W., Kutan, A.M. and Gupta, S. (2021), “Black swan events and COVID-19 outbreak: Sector level evidence from the US, UK, and European stock markets”, *International Review of Economics & Finance*, Vol. 75, pp. 546–557, doi: 10.1016/j.iref.2021.04.007.
- Ahmed, W.M.A. (2022), “What drives US stock markets during the COVID-19 pandemic? A global sensitivity analysis”, *Borsa Istanbul Review*, Vol. 22 No. 5, pp. 939–960, doi: 10.1016/j.bir.2022.07.001.
- Alam, M.M., Wei, H. and Wahid, A.N.M. (2021), “COVID -19 outbreak and sectoral performance of the Australian stock market: An event study analysis”, *Australian Economic Papers*, Vol. 60 No. 3, pp. 482–495, doi: 10.1111/1467-8454.12215.
- Anh, D.L.T. and Gan, C. (2021), “The impact of the COVID-19 lockdown on stock market performance: evidence from Vietnam”, *Journal of Economic Studies*, Emerald Publishing Limited, Vol. 48 No. 4, pp. 836–851, doi: 10.1108/JES-06-2020-0312.
- Ashraf, B.N. (2020), “Stock markets’ reaction to COVID-19: Cases or fatalities?”, *Research in International Business and Finance*, Vol. 54, p. 101249, doi: 10.1016/j.ribaf.2020.101249.
- Aslam, F., Ferreira, P. and Ali, H. (2022), “Analysis of the Impact of COVID-19 Pandemic on the Intraday Efficiency of Agricultural Futures Markets”, *Journal of Risk and Financial Management*, Vol. 15 No. 12, p. 607, doi: 10.3390/jrfm15120607.
- Baig, A.S., Butt, H.A., Haroon, O. and Rizvi, S.A.R. (2021), “Deaths, panic, lockdowns and US equity markets: The case of COVID-19 pandemic”, *Finance Research Letters*, Vol. 38, p. 101701, doi: 10.1016/j.frl.2020.101701.
- Bouri, E., Naeem, M.A., Nor, S.M., Mbarki, I. and Saeed, T. (2022), “Government responses to COVID-19 and industry stock returns”, *Economic Research-Ekonomska Istraživanja*, Informa UK Limited, Vol. 35 No. 1, pp. 1967–1990, doi: 10.1080/1331677x.2021.1929374.
- Dalwai, T., Habib, A.M., Mohammadi, S.S. and Hussainey, K. (2023), “Does Managerial Ability and Auditor Report Readability Affect Corporate Liquidity and Cost of Debt?”, *Asian Review of Accounting*, Vol. 31 No. 3, pp. 437–459, doi: 10.1108/ARA-06-2022-0151.
- Ding, W., Levine, R., Lin, C. and Xie, W. (2021), “Corporate immunity to the COVID-19 pandemic”, *Journal of Financial Economics*, Vol. 141 No. 2, pp. 802–830, doi: 10.1016/j.jfineco.2021.03.005.

- Dong, Z., Li, Y., Zhuang, X. and Wang, J. (2022), “Impacts of COVID-19 on global stock sectors: Evidence from time-varying connectedness and asymmetric nexus analysis”, *The North American Journal of Economics and Finance*, Vol. 62, p. 101753, doi: 10.1016/j.najef.2022.101753.
- Espinosa-Méndez, C. and Arias, J. (2021), “COVID-19 effect on herding behaviour in European capital markets”, *Finance Research Letters*, Vol. 38, p. 101787, doi: 10.1016/j.frl.2020.101787.
- Feyen, E., Alonso Gispert, T., Kliatskova, T. and Mare, D.S. (2021), “Financial Sector Policy Response to COVID-19 in Emerging Markets and Developing Economies”, *Journal of Banking & Finance*, Vol. 133, p. 106184, doi: 10.1016/j.jbankfin.2021.106184.
- Foley, S., Kwan, A., Philip, R. and Ødegaard, B.A. (2022), “Contagious margin calls: How COVID-19 threatened global stock market liquidity”, *Journal of Financial Markets*, Vol. 59, p. 100689, doi: 10.1016/j.finmar.2021.100689.
- Gherghina, Ștefan C., Armeanu, D. Ștefan and Joldeș, C.C. (2021), “COVID-19 Pandemic and Romanian Stock Market Volatility: A GARCH Approach”, *Journal of Risk and Financial Management*, MDPI AG, Vol. 14 No. 8, p. 341, doi: 10.3390/jrfm14080341.
- González, P.A. and Gallizo, J.L. (2021), “Impact of COVID-19 on the Stock Market by Industrial Sector in Chile: An Adverse Overreaction”, *Journal of Risk and Financial Management*, MDPI AG, Vol. 14 No. 11, p. 548, doi: 10.3390/jrfm14110548.
- Habib, A.M. (2022), “Does the efficiency of working capital management and environmental, social, and governance performance affect a firm’s value? Evidence from the United States”, *Financial Markets, Institutions and Risks*, Vol. 6 No. 3, pp. 18–25, doi: 10.21272/fmir.6(3).18-25.2022.
- Habib, A.M. (2023a), “Does real earnings management affect a firm’s environmental, social, and governance (ESG), financial performance, and total value? A moderated mediation analysis”, *Environment, Development and Sustainability*, doi: 10.1007/s10668-023-03809-6.
- Habib, A.M. (2023b), “Do business strategies and environmental, social, and governance (ESG) performance mitigate the likelihood of financial distress? A multiple mediation model”, *Heliyon*, Elsevier BV, Vol. 9 No. 7, p. e17847, doi: 10.1016/j.heliyon.2023.e17847.
- Habib, A.M. and Dalwai, T. (2023), “Does the efficiency of a firm’s intellectual capital and working capital management affect its performance?”, *J Knowl Econ*, Vol. ahead-of-print No. ahead-of-print, pp. 1–28, doi: 10.1007/s13132-023-01138-7.
- Habib, A.M. and Kayani, U.N. (2022), “Does the efficiency of working capital management affect a firm’s financial distress? Evidence from UAE”, *Corporate Governance: The International Journal of Business in Society*, Emerald, Vol. 22 No. 7, pp. 1567–1586, doi: 10.1108/cg-12-2021-0440.
- Habib, A.M. and Kayani, U.N. (2023), “Evaluating the Super-Efficiency of Working Capital Management Using Data Envelopment Analysis: Does COVID-19 Matter?”, *Oper. Res. Forum*, Vol. 4 No. 2, p. 40, doi: 10.1007/s43069-023-00217-4.
- Habib, A.M. and Mourad, N. (2022), “Analyzing the Efficiency of Working Capital Management: a New Approach Based on DEA-Malmquist Technology”, *Oper. Res. Forum*, Vol. 3 No. 3, p. 32, doi: 10.1007/s43069-022-00155-7.
- Habib, A.M. and Mourad, N. (2023a), “The influence of environmental, social, and governance (ESG) practices on US firms’ performance: Evidence from the coronavirus crisis”, *J Knowl Econ*, Vol. ahead-of-print No. ahead-of-print, pp. 1–20, doi: 10.1007/s13132-023-01278-w.
- Habib, A.M. and Mourad, N. (2023b), “Analyzing the efficiency of intellectual capital: a New Approach Based on DEA-MPI Technology”, *Benchmarking: An International Journal*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/BIJ-06-2022-0384.
- Habib, A.M. and Shahwan, T.M. (2020), “Measuring the operational and financial efficiency using a Malmquist data envelopment analysis: a case of Egyptian hospitals”, *Benchmarking: An International Journal*, Emerald Publishing Limited, Vol. 27 No. 9, pp. 2521–2536, doi: 10.1108/bij-01-2020-0041.

- Hatmanu, M. and Cautisanu, C. (2021), “The Impact of COVID-19 Pandemic on Stock Market: Evidence from Romania”, *International Journal of Environmental Research and Public Health*, MDPI AG, Vol. 18 No. 17, p. 9315, doi: 10.3390/ijerph18179315.
- He, Z. and Li, Y. (2022), “A new type of engagement between China and Europe amidst the COVID pandemic”, *Journal of Chinese Economic and Business Studies*, Routledge, Vol. 20 No. 3, pp. 295–301, doi: 10.1080/14765284.2022.2056387.
- He, Z., Nagel, S. and Song, Z. (2022), “Treasury inconvenience yields during the COVID-19 crisis”, *Journal of Financial Economics*, Vol. 143 No. 1, pp. 57–79, doi: 10.1016/j.jfineco.2021.05.044.
- Ho, C.M., Pham, T.T., Nguyen, H.L.-P. and Vo, D.H. (2021), “Does the COVID-19 pandemic matter for market risks across sectors in Vietnam?”, *Heliyon*, Elsevier BV, Vol. 7 No. 12, p. e08453, doi: 10.1016/j.heliyon.2021.e08453.
- Hong, H., Bian, Z. and Lee, C.-C. (2021), “COVID-19 and instability of stock market performance: evidence from the U.S”, *Financial Innovation*, Vol. 7 No. 1, p. 12, doi: 10.1186/s40854-021-00229-1.
- Huang, W., Lan, C., Xu, Y., Zhang, Z. and Zeng, H. (2022), “Does COVID-19 matter for systemic financial risks? Evidence from China’s financial and real estate sectors”, *Pacific-Basin Finance Journal*, Vol. 74, p. 101819, doi: 10.1016/j.pacfin.2022.101819.
- Insaidoo, M., Ullah, A., Dziwornu, R.K., Amoako, S. and Abdul-Mumuni, A. (2023), “COVID-19 pandemic and stock market performance: A comparative study of emerging economies”, *Heliyon*, Vol. 9 No. 5, p. E16054, doi: 10.1016/j.heliyon.2023.e16054.
- Iqbal, N., Fareed, Z., Wan, G. and Shahzad, F. (2021), “Asymmetric nexus between COVID-19 outbreak in the world and cryptocurrency market”, *International Review of Financial Analysis*, Vol. 73, p. 101613, doi: 10.1016/j.irfa.2020.101613.
- Jabeen, S., Farhan, M., Zaka, M.A., Fiaz, M. and Farasat, M. (2022), “COVID and World Stock Markets: A Comprehensive Discussion”, *Frontiers in Psychology*, Vol. 12, p. 763346, doi: 10.3389/fpsyg.2021.763346.
- Jan, N., Li, Z., Xiyu, L., Farhan Basheer, M. and Tongkachok, K. (2022), “Pre- and post-COVID-19: The impact of the pandemic and stock market psychology on the growth and sustainability of consumer goods industries”, *Frontiers in Psychology*, Vol. 13, p. 796287, doi: 10.3389/fpsyg.2022.796287.
- Kumar, M.P. and Kumara, N.V.M. (2021), “Market capitalization: Pre and post COVID-19 analysis”, *Materials Today: Proceedings*, Vol. 37, pp. 2553–2557, doi: 10.1016/j.matpr.2020.08.493.
- Liu, W.J., Liu, P., Lei, W., Jia, Z., He, X., Shi, W., Tan, Y., *et al.* (2023), “Surveillance of SARS-CoV-2 at the Huanan Seafood Market”, *Nature*, doi: 10.1038/s41586-023-06043-2.
- Machmuddah, Z., Utomo, S.D., Suhartono, E., Ali, S. and Ali Ghulam, W. (2020), “Stock Market Reaction to COVID-19: Evidence in Customer Goods Sector with the Implication for Open Innovation”, *Journal of Open Innovation: Technology, Market, and Complexity*, Elsevier BV, Vol. 6 No. 4, p. 99, doi: 10.3390/joitmc6040099.
- Makni, M.S. (2023), “Analyzing the impact of COVID-19 on the performance of listed firms in Saudi market”, *Technological Forecasting and Social Change*, Vol. 187, p. 122171, doi: 10.1016/j.techfore.2022.122171.
- Mourad, N., Habib, A.M. and Tharwat, A. (2021), “Appraising healthcare systems’ efficiency in facing COVID-19 through data envelopment analysis”, *Decision Science Letters*, Vol. 10 No. 3, pp. 301–310, doi: 10.5267/j.dsl.2021.2.007.
- Mourad, N., Tharwat, A., Habib, A.M., Wafik, D. and Hamed, M.A. (2022), “Appraising the economic efficiency of european football teams: Evidence from Covid-19 crisis using data envelopment analysis”, *Journal of Positive School Psychology*, Vol. 6 No. 8, pp. 4383–4403.

- Naeem, M.A., Billah, M., Marei, M. and Balli, F. (2022), “Quantile connectedness between Sukuk bonds and the impact of COVID-19”, *Applied Economics Letters*, Routledge, Vol. 29 No. 15, pp. 1378–1387, doi: 10.1080/13504851.2021.1934384.
- Naeem, M.A., Farid, S., Yousaf, I. and Kang, S.H. (2023), “Asymmetric efficiency in petroleum markets before and during COVID-19”, *Resources Policy*, Vol. 86, p. 104194, doi: 10.1016/j.resourpol.2023.104194.
- Naeem, M.A., Karim, S., Yarovaya, L. and Lucey, B.M. (2023), “COVID-induced sentiment and the intraday volatility spillovers between energy and other ETFs”, *Energy Economics*, Vol. 122, p. 106677, doi: 10.1016/j.eneco.2023.106677.
- Neslihanoglu, S. (2021), “Linearity extensions of the market model: a case of the top 10 cryptocurrency prices during the pre-COVID-19 and COVID-19 periods”, *Financial Innovation*, Vol. 7 No. 1, p. 38, doi: 10.1186/s40854-021-00247-z.
- Oanh, T.T.K. (2022), “The impact of COVID-19 vaccination on stock market: is there any difference between developed and developing countries?”, *Heliyon*, Vol. 8 No. 9, p. e10718, doi: 10.1016/j.heliyon.2022.e10718.
- OECD. (2022), “OECD Economic Surveys: Romania 2022”, *Organisation for Economic Cooperation and Development (OECD)*, pp. 1–65, doi: 10.1787/e2174606-en.
- Rakshit, B. and Neog, Y. (2022), “Effects of the COVID-19 pandemic on stock market returns and volatilities: evidence from selected emerging economies”, *Studies in Economics and Finance*, Emerald Publishing Limited, Vol. 39 No. 4, pp. 549–571, doi: 10.1108/SEF-09-2020-0389.
- Sansa, N.A. (2020), “The Impact of the COVID-19 on the Financial Markets: Evidence from China and USA”, *Electronic Research Journal of Social Sciences and Humanities*, Vol. 2 No. 2, pp. 29–39, doi: 10.2139/ssrn.3567901.
- Sha, Y., Zhang, Y. and Lu, X. (2022), “Household investment diversification amid Covid-19 pandemic: Evidence from Chinese investors”, *Finance Research Letters*, Vol. 47, p. 102820, doi: 10.1016/j.frl.2022.102820.
- Shahwan, T.M. and Habib, A.M. (2020), “Does the efficiency of corporate governance and intellectual capital affect a firm’s financial distress? Evidence from Egypt”, *Journal of Intellectual Capital*, Emerald Publishing Limited, Vol. 21 No. 3, pp. 403–430, doi: 10.1108/JIC-06-2019-0143.
- Shahwan, T.M. and Habib, A.M. (2023), “Do corporate social responsibility practices affect the relative efficiency of Egyptian conventional and Islamic banks?”, *International Journal of Emerging Markets*, Emerald Publishing Limited, Vol. 18 No. 2, pp. 439–462, doi: 10.1108/IJOEM-05-2020-0518.
- Sharif, A., Aloui, C. and Yarovaya, L. (2020), “COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach”, *International Review of Financial Analysis*, Vol. 70, p. 101496, doi: 10.1016/j.irfa.2020.101496.
- Škare, M., Soriano, D.R. and Porada-Rochoń, M. (2021), “Impact of COVID-19 on the travel and tourism industry”, *Technological Forecasting and Social Change*, Vol. 163, p. 120469, doi: 10.1016/j.techfore.2020.120469.
- Statista. (2022), *Comparison of the Effect of the Coronavirus (COVID-19) Pandemic on Major Stock Indices Worldwide from January 2020 to November 2021(in Standardized Index Points)*, Statista Research Department.
- Talib, B.A., Jani, M.F.M., Mamat, M.N. and Zakaria, R. (2007), “Impact assessment of liberalizing trade on Malaysian crude palm oil”, *Oil Palm Industry Economic Journal*, Vol. 7 No. 1, pp. 9–17.
- Tetteh, J.E., Amoah, A., Ofori-Boateng, K. and Hughes, G. (2022), “Stock market response to COVID-19 pandemic: A comparative evidence from two emerging markets”, *Scientific African*, Vol. 17, p. e01300, doi: 10.1016/j.sciaf.2022.e01300.

- Ullah, S. (2022), “Impact of COVID-19 Pandemic on Financial Markets: a Global Perspective”, *J Knowl Econ*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1007/s13132-022-00970-7.
- Utomo, C.D. and Hanggraeni, D. (2021), “The Impact of COVID-19 Pandemic on Stock Market Performance in Indonesia”, *The Journal of Asian Finance, Economics and Business*, Vol. 8 No. 5, pp. 777–784, doi: 10.13106/JAFEB.2021.VOL8.NO5.0777.
- Wielechowski, M. and Czech, K. (2021), “Companies’ Stock Market Performance in the Time of COVID-19: Alternative Energy vs. Main Stock Market Sectors”, *Energies*, MDPI AG, Vol. 15 No. 1, p. 106, doi: 10.3390/en15010106.
- Xu, W., Li, A. and Wei, L. (2022), “The Impact of COVID-19 on China’s Capital Market and Major Industry Sectors”, *Procedia Computer Science*, Vol. 199, pp. 87–94, doi: 10.1016/j.procs.2022.01.011.
- Zhang, N., Wang, A., Haq, N.-U. and Nosheen, S. (2022), “The impact of COVID-19 shocks on the volatility of stock markets in technologically advanced countries”, *Economic Research-Ekonomska Istraživanja*, Routledge, Vol. 35 No. 1, pp. 2191–2216, doi: 10.1080/1331677X.2021.1936112.

Table I
Tabulation of the sample sectors of the study

Sector	Freq.	Percent	Cum.
Communication Services	1,102	2.29	2.29
Consumer Cyclicals	1,058	2.20	4.50
Consumer Discretionary	5,819	12.12	16.62
Consumer Staples	2,939	6.12	22.74
Energy	8,213	17.10	39.84
Health Care	4,096	8.53	48.37
Industrials	8,927	18.59	66.96
Information Technology	2,026	4.22	71.18
Materials	8,940	18.62	89.80
Real Estate	1,591	3.31	93.11
Utilities	3,309	6.89	100.00
Total	48,020	100.00	-

Table II
Descriptive statistics summary of the data set

Variables	Obs	Mean	Std. dev.	Minimum	Maximum
PER	48,020	19.28	2.007	13.05	25.01
COV	48,020	0.548	0.498	0.000	1.000
TUR	48,020	9.691	2.980	4.711	20.71
TRA	48,020	2.505	1.577	0.000	7.878

Table III
Mann-Whitney test results

Panel A: Ranks and test statistics					
Variable	COV	N	Mean Rank	Sum of Ranks	Test Statistics
PER	Pre	21715	23628.29	513088304.5	Z-value -5.49* Asymp. Sig. <0.01
	During	26305	24326.02	639895905.5	
	Total	48020	-	-	
Panel B: Hypothesis test summary					
Null hypothesis		Test		Sig.	Decision
The distribution of PER is the same before and during the COVID-19 crisis		Independent-Samples Mann-Whitney U test		<0.01	Reject the null hypothesis
Note: * denote statistical significance at the 0.01 level.					

Table IV
Kruskal-Wallis test results

Panel A: Ranks and test statistics				
Variable	Sector	N	Mean Rank	Test Statistics
PER	Communication Services	1102	52372.50	Z-value 24464.68* Asymp. Sig. <0.01
	Consumer Cyclical	1058	25244.84	
	Consumer Discretionary	5819	16693.20	
	Consumer Staples	2939	23108.50	
	Energy	8213	39174.88	
	Financials	14105	40612.68	
	Healthcare	4096	38881.12	
	Industrials	8927	17777.81	
	Information Technology	2026	19392.46	
	Materials	8940	22870.96	
	Real Estate	1591	33285.54	
	Utilities	3309	51693.60	
	Total	62125	-	
Panel B: Hypothesis test summary				
Null hypothesis	Test	Sig.	Decision	
The distribution of PER is the same across sectors.	Independent-Samples Kruskal-Wallis H test	<0.01	Reject the null hypothesis	
Note: * denote statistical significance at the 0.01 level.				

Table V
Regression analysis results

Independent variables	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
COV	-0.06542	0.03503	-1.87*	0.062	-0.13407	0.00323
TUR	0.25445	0.00458	55.55**	<0.01	0.24547	0.26343
TRA	0.11774	0.00881	13.36**	<0.01	0.10047	0.13501
γ	Yes	Yes	Yes	Yes	Yes	Yes
τ	Yes	Yes	Yes	Yes	Yes	Yes
_cons	18.3802	0.05239	350.8**	0.000	18.2775	18.4829
Num. of obs	48,020		Pr(skewness)		<0.001	
F(17, 48002)	3896.11		Pr(kurtosis)		<0.001	
Prob > F	<0.001		Adj chi2(2)		156.71	
R ² (Adj R ²)	0.5798 (0.5797)		Prob>chi2		<0.001	
<p>Note: This table reports estimations from the OLS regression analysis. The dependent variable is a firm's market performance (MP). The independent variables include the COVID-19 pandemic (COV). The control variables include turnover (TUR), trade (TRA), year fixed effects (γ), and the sector fixed effects (τ); ** and * denote statistical significance at the 0.01 and 0.1 levels, respectively.</p>						

Table VI
Additional analyses

Independent Variables	Robust standard errors estimator	Bootstrapping estimator	Heteroskedastic regression	Quantile regression
COV	-0.065* (0.036)	-0.065* (0.036)	-0.065* (0.035)	-0.073* (0.044)
TUR	0.254** (0.005)	0.254** (0.005)	0.254** (0.005)	0.217** (0.006)
TRA	0.118** (0.009)	0.118** (0.009)	0.118** (0.009)	0.106** (0.011)
γ	Yes	Yes	Yes	Yes
τ	Yes	Yes	Yes	Yes
_cons	18.38** (0.043)	18.38** (0.052)	18.38** (0.052)	18.93** (0.066)
F (Prob > F)	7731.89 (< 0.01)	-	-	-
Wald chi ² (Prob > chi ²)	-	130117.47 (< 0.01)	66258.78 (< 0.01)	-
R ²	0.5798	0.5798	-	-
Adj R ²	-	0.5797	-	-
Pseudo R ²				0.4097

Note: This table reports robustness tests estimates for the study regression model. These tests examined whether different estimations resulted in significant differences in the essential model. Regression estimations with robust standard errors, bootstrapping with 5000 replications, heteroskedastic regression estimator, and quantile regression estimator were adopted as robustness checks. The dependent variable is a firm's market performance (PER). The independent variables include the COVID-19 pandemic (COV). The control variables include turnover (TUR), trade (TRA), year fixed effects (γ), and the sector fixed effects (τ); ** and * denote statistical significance at the 0.01 and 0.1 levels, respectively.