The Effect of COVID-19 on Firms' Financial Performance and Distress: Evidence from Southern Europe

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Abstract

This study uses ***regression analysis*** *to explore the impact of the COVID-19 pandemic on the financial performance and distress of firms in four Southern European countries—Portugal, Italy, Greece, Spain, and Cyprus—covering the period of 2019 to 2021. The results show that the financial performance of firms based on return on assets (ROA) and return on equity (ROE) deteriorated by -1.3% and -5.7% respectively in 2020 compared to the pre- and post-COVID-19 periods. Specifically, Cyprus and Spain experienced the largest decline in ROA, -3.2% and ROE -4.0% respectively, both of which are statistically significant. The Altman Z-Score for firms in the region deteriorated by 19% during the COVID-19 period, with Italy experiencing the highest negative impact of 34%.* ***In the pandemic period overall, the retail trade sector (particularly the retail-eating places segment) experienced the steepest decline in ROA, marking it as the worst-performing sector—a result influenced by limited progress in digital transformation and heavy reliance on tourism. Meanwhile, the manufacturing sector faced the highest bankruptcy risk, evidenced by a statistically significant drop in the Altman Z-Score when compared to the pre- and post-pandemic periods.*** *Decomposing the* ***Altman Z-Score****, we identify weak market sentiment and sharp revenue declines as the primary drivers of firms' deteriorating financial health during the pandemic.*

Keywords: financial performance; firm distress; COVID-19 impact; Southern Europe; Altman Z-Score

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1. Introduction

The COVID-19 pandemic was a crisis that not only impacted public health but also harmed the economy. The outbreak reached Europe in January 2020, with Italy and Spain reporting the first cases. By 17th March 2020, EU Member States (MS) took preventive measures such as restricting travel within and outside the EU. They also cancelled public events, closed schools, and shut down restaurants and hotels. In addition, many MS halted non-essential production and imposed lockdowns that hampered economic activity across Europe.

Lockdown measures, the collapse of tourism, and supply chain disruptions affected multiple sectors across Europe, particularly in countries reliant on tourism and services. This resulted in a severe hit on the GDP of many MS in 2020. Among them was Italy, which experienced an 8.9% decline in GDP in 2020—the largest drop since 1995.[5] Across Europe, restrictions on mobility, loss of foreign visitors, and the high share of temporary workers contributed to severe economic contractions. Among the hardest hit, Spain recorded the worst performance in the euro area, with GDP falling by 11.0% in 2020.[6] Greece and Cyprus both experienced significant declines in their tourism sectors due to travel bans and reduced demand. Greece, where tourism accounts for 20% of GDP, faced the second-largest recession in the EU, with GDP contracting by 9%.[7] Cyprus, whose tourism sector contributes 13% to the GDP, saw a smaller decline of 3.2%, compared to its 5.9% growth in 2019. Similarly, Portugal's economy, where tourism represents about 15% of GDP, suffered its worst decline since 1936, with GDP shrinking by 7.6% due to sharp falls in revenue and employment.[8] Despite the challenges posed by the pandemic, Cyprus maintained a moderate economic and epidemiological profile, resulting in minimal adverse economic

[5] Philip Muggenthaler, Joachim Schroth & Yiqiao Sun, *The heterogeneous economic impact of the pandemic across euro area countries* (2021), available at ,https://ec.europa.eu/eurostat/documents/2995521/10545471/2-08092020-AP-EN.pdf/43764613-3547-2e40-7a24-d20c30a20f64 (last accessed 15 April 2024)

[6] Antonio Maqueda, *Spain's economy shrank 11% in 2020, in biggest drop since Civil War* (2021), available at Economic fallout of coronavirus crisis: Spain's economy shrank 11% in 2020, in biggest drop since Civil War | Economy and Business | EL PAÍS English (elpais.com) (last accessed 16 April 2024)

[7] European Commission (2023), *Country Report Greece, Institutional Paper* (June 2023), available at https://economy-finance.ec.europa.eu/system/files/2023-06/ip232_en.pdf (last accessed 16 April 2024)

[8] Economic Times, *Tourism-dependent Portugal posts worst GDP slump since 1936* (2021), available at:https://travel.economictimes.indiatimes.com/news/destination/global/tourism-dependent-portugal-posts-worst-gdp-slump-since-1936/81240625 (last accessed 17 April 2024)

effects.[9] Studying the financial performance and distress of firms in Southern Europe during the pandemic period is important because these economies rely on sectors like tourism and services that are particularly vulnerable to systemic shocks. This provides a unique opportunity to understand how external crises exacerbate pre-existing economic weaknesses.

The pandemic widened economic disparities among MS, with some countries demonstrating greater resilience and preparedness in managing the crisis. Adaptability in financial habits also played a role in this resilience, particularly in the shift toward cashless transactions. While COVID-19 accelerated global digitisation, cash-to-GDP ratios increased in Greece and Cyprus from 2010 to 2020, suggesting cash remained a preferred method for low-value transactions, despite hygiene concerns surrounding physical currency.[10] Although this trend predates the pandemic, it remains relevant, as Greece and Cyprus maintained **higher cash dependency compared to more digitalised economies like Sweden**. Interestingly, these two countries also reported lower-than-expected COVID-19 case numbers and fatalities, but this reflects independent public health dynamics rather than financial behaviour. Looking ahead, payment technologies will shape global cash usage, with the pandemic reinforcing both the need to support traditional cash and the growing momentum for central bank digital currencies.

Beyond health risks, researchers argue that the COVID-19 crisis disrupted organisational structures and governance mechanisms, making decision-making more complex.[11] The pandemic introduced unprecedented challenges for policymakers and businesses, necessitating change in economic policy, social governance, environmental regulation, ethical considerations, and financial oversight. New research opportunities emerged to analyse how different sectors responded and adapted to these challenges. Researchers also emphasised the huge economic and social impact of COVID-19 as well as its influence on financial markets and institutions.[12] The overall earnings and debt levels of businesses outside the financial services sector in the

[9] Elias Mallis & Maria Matsi, *The Covid-19 economic, social and health impact on Cyprus and selected Euro Area economies* (2020), available at https://www.gov.cy/media/sites/11/2024/04/the_covid.pdf (last accessed 19 May 2025).

[10] P. Lois & S. Repousis, 'Preliminary Review of the Impact of COVID-19 on Cash in Greece and Cyprus' (2021) 33(1) *Cyprus Review*, 19–36.

[11] G. Rinaldi & M. Paradisi, 'An empirical estimate of the infection fatality rate of COVID-19 from the first Italian outbreak' (2020) *Medrxiv*, 2020-04.

[12] J.W. Goodell, 'COVID-19 and finance: Agendas for future research' (2020) 34, *Finance research letters*, 101512.

eurozone returned to pre-pandemic levels by the end of 2021, reflecting a broader economic recovery in the region.[13] However, smaller firms, highly leveraged companies, and those in the services industry faced more severe financial struggles, largely due to weaker revenue streams.

COVID-19 affected economies in diverse ways, with some studies highlighting variations between the US and the EU.[14] However, other research has focused on broader implications, such as sustainability accounting, risk contagion, and financial markets, without necessarily comparing the two regions. A number of studies explored the social and environmental effects of COVID-19 from a sustainability accounting perspective through reporting and performance management practices.[15] Meanwhile, others have examined the risk contagion and liquidity challenges brought by COVID-19, highlighting its widespread financial implications. Studies have explored how global stock markets transmitted risks, identifying the UK and Italy as core risk transmitters, with contagion primarily driven by low-frequency components affecting supply chains and long-term investor expectations.[16] Further analysis has assessed the liquidity crisis faced by listed firms across multiple countries, revealing that, under severe distress scenarios, companies with limited operating flexibility risked exhausting their cash holdings within two years, significantly increasing their reliance on debt financing to avoid insolvency.[17]Additionally, research has investigated the interplay between **capital structure and corporate social responsibility (CSR) activity**, finding that firms with **excessive debt exposure** suffered **higher financial risks** during the pandemic. Conversely, firms maintaining **debt levels at**

[13] J. Metzler & al. 'Identifying the corporates most vulnerable to price shocks following the pandemic' (2022), available at: https://www.ecb.europa.eu/press/financial-stability-publications/fsr/focus/2022/html/ecb.fsrbox202205_01~f5c0dcc413.en.html (last accessed 31 May 2025)

[14] S. Chen & al., 'Tracking the economic impact of COVID-19 and mitigation policies in Europe and the United States' (2020) *IMF Working Papers*, *2020*

[15] C. A. Adams & S. Abhayawansa, 'Connecting the COVID-19 pandemic, environmental, social and governance (ESG) investing and calls for 'harmonisation'of sustainability reporting" (2022) 82, *Critical perspectives on accounting*, 102309; S. Bose & al., 'COVID-19 impact, sustainability performance and firm value: international evidence' (2022) *62*(1) *Accounting & Finance*, 597-643; C. H. Cho, J. Senn, & M. Sobkowiak, 'Sustainability at stake during COVID-19: Exploring the role of accounting in addressing environmental crises' (2022) (82) *Critical Perspectives on Accounting*, 102327.; E. Demers, J. Hendrikse, P. Joos & B. Lev, 'ESG did not immunize stocks during the COVID-19 crisis, but investments in intangible assets did' (2021) 48 (3-4) *Journal of business finance & accounting*, 433-462.

[16] H. Yu & al., 'Risk contagion of global stock markets under COVID-19: A network connectedness method', (2021) 61(4) *Accounting & Finance*, 5745-5782.

[17] A. De Vito & J. P. Gómez, 'Estimating the COVID-19 cash crunch: Global evidence and policy', (2020) 39(2) *Journal of Accounting and Public policy*, 106741.

or below optimal thresholds exhibited **greater resilience**, regardless of their CSR policies.[18] Finally, discussions on risk management and corporate reporting emphasise that COVID-19 reshaped risk recognition practices, prompting firms to reconsider stakeholder engagement and transparency in financial disclosures to maintain legitimacy and adapt to evolving crisis conditions.[19] Additionally, research on the link between market sentiment and stock returns during the pandemic shows that COVID-19 negatively impacted stock performance, altered sensitivity to firm-specific information—with public attention slowing stock price reactions while infection rates intensified them—and disproportionately affected short-term cash flows, particularly low-duration equities, contributing to the underperformance of value stocks due to their lower durations.[20]

This study contributes to the literature by comprehensively examining the financial repercussions of the COVID-19 pandemic on firms in Southern European countries, including Greece, Italy, Spain, Portugal, and Cyprus. By focusing on these structurally vulnerable economies, the study provides a nuanced analysis of how systemic shocks affect financial distress and performance metrics. The study employs the Altman Z-Score, a well-established bankruptcy prediction model, alongside widely used financial performance indicators such as return on assets (ROA) and return on equity (ROE). This approach lays a robust foundation for systematically investigating sectoral and regional disparities in financial outcomes. Building on this framework, we develop hypotheses to explore the multifaceted impact of the pandemic, grounded in theoretical perspectives such as the black swan theory, signalling theory, and agency theory.

2. Developing Hypotheses: Black Swan, Signalling, and Agency Theories in Financial Performance

Exploring the profound economic repercussions of the COVID-19 pandemic across Southern Europe, this study aims to delve deeper into the financial implications for firms in this region. By examining the distinct economic challenges faced by Greece,

[18] H. Huang & Y. Ye, 'Rethinking capital structure decision and corporate social responsibility in response to COVID-19' (2021) 61(3) *Accounting & Finance*, 4757-4788.

[19] C. Crovini, S. Schaper & L. Simoni, 'Dynamic accountability and the role of risk reporting during a global pandemic', (2022), *Accounting, Auditing & Accountability Journal*, *35*(1), 169-185.

[20] L. Xu & al., 'COVID-19, public attention and the stock market' (2021) 61(3) *Accounting & Finance*, 4741-4756.; P. M. Dechow & al., 'Implied equity duration: A measure of pandemic shutdown risk' (2021) 59(1) *Journal of Accounting Research*, 243-281.

Italy, Spain, Portugal, and Cyprus, we seek to establish a framework for evaluating their financial performance and distress. This contextual foundation paves the way for developing hypotheses that systematically investigate the pandemic's impact on various financial metrics, including bankruptcy risk and performance indicators such as ROA and ROE.

2.1 Hypothesis 1: Black Swan Theory

The COVID-19 pandemic serves as a clear example of a black swan event—an unpredictable occurrence with severe systemic consequences, only fully understood in hindsight.[21] The pandemic's sudden emergence disrupted global economies particularly in sectors heavily reliant on predictability and routine operations. Southern European countries, such as Greece, Italy, Spain, Portugal, and Cyprus, were disproportionately affected due to their structural dependence on tourism and services—sectors inherently vulnerable to exogenous shocks.

The pandemic's effects were not uniform across sectors or regions. Tourism-dependent industries experienced sharp declines in financial performance due to lockdowns, travel restrictions, and reduced consumer demand. Conversely, sectors like healthcare and telecommunications displayed resilience due to their adaptability and essential nature during the crisis. This sectoral divergence underscores the importance of examining how black swan events impact industries to varying extents based on their structural characteristics.

The COVID-19 pandemic triggered black-swan-level disruptions across global stock markets, leading to significant negative abnormal returns.[22] The aviation and tourism sectors were among the industries most unprepared for the scale of the pandemic, leading to severe GDP contractions in Southern Europe, with Spain (-11%) and Italy (-8.9%) particularly affected due to structural dependencies.[23] The interconnected nature of global networks significantly amplified the unforeseen economic shockwaves of the pandemic, causing widespread disruptions across industries and markets.[24] Assessment of disaster management practices in India regarding black

[21] N. N. Taleb, 'The impact of the highly improbable' (2008) Penguin Books Limited.

[22] W. Ahmad, Kutan & S. Gupta, 'Black swan events and COVID-19 outbreak: Sector level evidence from the US, UK, and European stock markets' (2021) 75 *International Review of Economics & Finance*, 546-557.

[23] Liu, X., 'The Economic Environment and Black Swan Events: Taking COVID-19 as an example' (2023) 23 *Journal of Education, Humanities and Social Sciences*, 336-341.

[24] T. Antipova, 'Coronavirus pandemic as black swan event' (2020, May) In *International conference on*

swan events revealed the need for dynamic risk assessment, the importance of community action, and a shift toward managing uncertainty and building resilience.[25]

Overall, the literature consistently highlights how the pandemic exposed pre-existing weaknesses in global supply chains and economic structures, learnings which only fully emerged and were understood retrospectively. The pandemic's sudden onset disrupted industries reliant on stable demand and physical presence (e.g., retail-eating places). With no historical precedent for such a global shutdown, firms lacked contingency plans for mitigating financial distress during prolonged lockdowns. Resilient sectors like healthcare adapted quickly by leveraging digital tools and essential services demand. In contrast, retail firms reliant on in-person interactions suffered disproportionately due to limited digital transformation. Based on the above studies,[26] we expect firms in structurally vulnerable sectors within Southern Europe to exhibit significantly worse financial performance during 2020 compared to pre- and post-pandemic periods. For example, the sudden emergence and severity of the pandemic caught the aviation, tourism, and international trade sectors unprepared, leading to immediate and substantial disruptions through travel restrictions, reduced demand, and supply chain issues. In consideration of these factors, particularly the outsized impact on Southern European nations due to their reliance on tourism and the limited progress in digital transformation within their retail sectors, we form our first hypothesis:

> *Hypothesis 1 (H1): Companies in countries heavily reliant on tourism and other sectors with low digital maturity (e.g., retail-eating places) will have recorded significantly lower financial performance in 2020 compared to other regions/sectors.*

This hypothesis aligns with the black swan theory by emphasising the unpredictability of COVID-19's impact on structurally vulnerable industries and regions. By grounding our expectations in empirical findings from prior literature, we provide a coherent framework for examining how systemic risks disproportionately affect specific sectors during a pandemic.

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integrated science, 356-366. Cham: Springer International Publishing.

[25] P. K. Mishra, 'COVID-19, Black Swan events and the future of disaster risk management in India' (2020) 8 *Progress in Disaster Science*, 100137.

[26] X. Liu, 'The Economic Environment and Black Swan Events: Taking COVID-19 as an example' (2023) 23 *Journal of Education, Humanities and Social Sciences*, 336-341; W. Ahmad, A. M. Kutan & S. Gupta 'Black swan events and COVID-19 outbreak: Sector level evidence from the US, UK, and European stock markets' (2021) 75 *International Review of Economics & Finance*, 546-557.

2.2 Hypothesis 2: Signalling

While the COVID-19 pandemic's role as a black swan event profoundly impacted various sectors, as explored in Hypothesis 1, its effects were not uniformly distributed. The pandemic exposed vulnerabilities in firms with pre-existing financial weaknesses, thereby amplifying bankruptcy risks. This observation aligns with signalling theory, which posits that firms convey information about their financial health to stakeholders through various signals, including financial performance metrics. The COVID-19 outbreak heightened corporate financial distress, prompting firms—especially those already struggling—to engage in earnings management as a strategic response to mitigate negative stakeholder perceptions, with a preference for accrual-based techniques.[27]

Building upon this foundation, we posit that companies exhibiting weaker financial health prior to the pandemic were particularly susceptible to severe financial deterioration. This notion is grounded on the premise that pre-existing financial instability impairs a firm's ability to withstand external shocks. Examining a sample of listed Chinese companies, firms that signalled an early resumption of work during the pandemic enjoyed improved corporate performance, underscoring the importance of proactive messaging in times of crisis.[28] Conversely, asymmetric information between companies and investors increases the risk of adverse selection, highlighting signalling theory's role in mitigating these challenges.[29] To mitigate adverse selection risks, companies send signals about their financial health and prospects through channels such as transparent financial reporting and strategic disclosures. However, if these signals are manipulated, they may mislead investors rather than help them make informed decisions.

Signalling theory suggests that firms that cannot effectively signal their stability and prospects during a crisis are likely to face heightened perceptions of bankruptcy risk. As such, firms with lower pre-COVID Altman Z-Scores, indicative of financial instability, and weak liquidity positions were expected to experience a more pronounced deterioration in their financial health. The COVID-19 crisis influenced corporate cash dividend policies in Chinese firms, with signalling theory explaining

[27] A. A. Aljughaiman, T. H. Nguyen, V. Q. Trinh & A. Du, 'The Covid-19 outbreak, corporate financial distress and earnings management' (2023) 88 *International Review of Financial Analysis*, 102675.

[28] H. Shen & al. 'The impact of the COVID-19 pandemic on firm performance' (2021) In *Research on Pandemics,* 81-98 Routledge.

[29] H. Dang Ngoc, V. Vu Thi Thuy, & C. Le Van, 'Covid 19 pandemic and abnormal stock returns of listed companies in Vietnam' (2021) 8(1) *Cogent Business & Management*, 1941587.

how companies adjusted their dividend strategies during the pandemic, revealing a negative relationship between the crisis and cash dividend payments. Larger firms and state-owned enterprises were more likely to cut dividends to preserve cash and flexibility.[30] Based on these findings, this study extended the application of signalling theory to examine how firms' pre-existing financial health influenced their ability to cope with the COVID-19 crisis. By considering the relationship between financial stability, liquidity, and the pandemic's external shocks, we form our second hypothesis:

> *Hypothesis 2 (H2): Companies with lower pre-COVID Altman Z-Scores (indicative of financial instability) and weak liquidity will have experienced the largest decline in financial health.*

2.3 Hypothesis 3: Agency Theory

Agency theory addresses the relationship between principals (shareholders) and agents (managers) whose interests may not always align.[31] Under stable conditions, shareholders and managers often share similar goals: maximise the firm's value, ensure long-term sustainability, and pursue growth strategies. However, in times of crisis, diverging incentives can become amplified. Managers may opt to prioritise immediate liquidity preservation (e.g., cutting research and development or intangible investments) or avoid risks that could endanger short-term survival, potentially at the expense of the firm's long-term competitiveness. Agency problems can also arise when managers exploit informational advantages to mask poor performance or channel resources in ways not necessarily aligned with shareholder interests.[32]

The pandemic introduced unprecedented uncertainty—unclear duration of lockdowns, unpredictable consumer demand, shifting government regulations—exacerbating managerial decision-making challenges. Furthermore, certain governments extended sizable support packages, from wage subsidies to state-backed loans, thereby lowering the apparent cost of risk-taking or propping up unviable businesses.[33] Agency theory suggests that this environment may foster 'moral hazard', where man-

[30] X. Xu, C. Lin & Y. Yan, 'Covid-19 crisis and corporate cash dividend policies: Evidence from Chinese listed companies' (2023) 30(2) *Applied Economics Letters,* 178-184.

[31] W. H. Meckling, & M. C. Jensen, 'Theory of the Firm' (1976) 3(4) *Managerial behavior, agency costs and ownership structure*, 305-360.

[32] H. Dang Ngoc, V. Vu Thi Thuy & C. Le Van, C. 'Covid 19 pandemic and abnormal stock returns of listed companies in Vietnam' (2021) 8(1) *Cogent Business & Management*, 1941587.

[33] A. De Vito & J. P. Gómez, 'Estimating the COVID-19 cash crunch: Global evidence and policy' (2020) 39(2) *Journal of Accounting and Public policy*, 106741.

agers could be tempted to 'bet on resurrection' if they perceive that potential losses would be borne by creditors or the public sector.[34] Alternatively, managers might simply freeze capital expenditure and organisational development to ensure short-term solvency, a strategy that can hamper the firm's ability to rebound effectively once conditions improve. Agents (managers) in an environment of high uncertainty may make short-term decisions (e.g., reducing investment in digital transformation) to maintain liquidity at the expense of long-term sustainability. So, we form the following hypothesis:

> *Hypothesis 3 (H3): Sectors with high exposure to operational disruptions (e.g., manufacturing) and countries with weaker profitability metrics (e.g., Cyprus and Greece) exhibit greater financial distress.*

3. Methodology

This study employs a descriptive and quantitative approach to demonstrate how the data from firms' financial reports affects the variables under investigation. The Altman Z-Score model (1968), which can assess firms' financial wellbeing, also enhances the analysis. The model is as follows:

$$Z = 1.2\,X1 + 1.4\,X2 + 3.3\,X3 + 0.6\,X4 + 1\,X5$$

where

X1 = Working Capital / Total Assets
X2 = Retained Earnings / Total Assets
X3 = Earnings Before Interest and Taxes (EBIT) / Total Assets
X4 = Market Value of Equity / Total Liabilities
X5 = Sales / Total Assets

Financial distress is a condition where a firm's cash flow is insufficient to cover its debts. The COVID-19 pandemic caused financial distress for firms due in part to reduced demand for goods and services, especially in sectors like tourism, hospitality, entertainment, and retail. Additionally, disrupted supply chains led to higher costs and decreased productivity. Firms then faced reduced access to credit and liquidity, as lenders became more cautious and risk averse. The pandemic also caused uncertainty and volatility in the market, affecting consumer and investor confidence. These factors reduced revenue and profit for many firms, while increasing their expenses

[34] W. H. Meckling & M. C. Jensen, 'Theory of the Firm' (1976) 3(4) *Managerial behavior, agency costs and ownership structure*, 305-360.

and liabilities. As a result, some firms faced difficulties in meeting their financial obligations, such as paying wages, rent, taxes, interest, and principal in 2020.

Financial reports, which contain income statements and balance sheets, show a firm's financial situation to the stakeholders. The financial wellbeing (financial health) of a firm is essential for its operation. However, external shocks such as the COVID-19 pandemic can severely impact a firm's financial health, especially when persistent losses undermine its ability to remain solvent. A firm's financial health can deteriorate due to persistent losses, which reduce its ability to remain solvent.[35] Given these risks, financial distress occurs when a firm's cash flow becomes insufficient to cover short- or long-term obligations.[36] To investigate the relationship between the pandemic and bankruptcy risk, we utilise a panel data regression model that accounts for firm-level heterogeneity and the temporal dimension of the data. The model integrates cross-sectional and time-series data, enabling a robust examination of variations in financial distress across firms, industries, and countries. The regression model is as follows:

$$Z_{it} = b_0 + b_1\, Covid_{it} + b_2\, Liquidity_{it} + b_3\, AssetsTurnover_{it} + b_4\, Size_{it} + b_5\, BM_{it} + FE_{Country} + FE_{industry} + \varepsilon_{it}$$

This study also applies the panel data regression technique to identify the factors that influence the firm's financial performance. The following equation shows the regression model in this study:

$$ROA_{it} = b_0 + b_1\, Covid_{it} + b_2\, Leverage_{it} + b_3\, Liquidity_{it} + b_4\, AssetsTurnover_{it} + b_5\, Size_{it} + b_6\, BM_{it} + FE_{Country} + FE_{industry} + \varepsilon_{it}$$

$$ROE_{it} = b_0 + b_1\, Covid_{it} + b_2\, Leverage_{it} + b_3\, Liquidity_{it} + b_4\, AssetsTurnover_{it} + b_5\, Size_{it} + b_6\, BM_{it} + FE_{Country} + FE_{industry} + \varepsilon_{it}$$

where *i* represents the individual firm, and t represents the year. ROA and ROE are the dependent variables in this study. We consider COVID as the main variable of interest, while Leverage, Liquidity, Assets Turnover, Size, and Book-to-Market (BM) serve as control variables and is the error term. These control variables are commonly included to account for firm characteristics. In OLS regressions, we include country-and industry-fixed effects to control for unobservable differences based upon

[35] G. Andrade & S. N. Kaplan, 'How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed' (1998) 53(5) *The journal of finance*, 1443-1493.

[36] K. H. Wruck, 'Financial distress, reorganization, and organizational efficiency' (1990) 27(2) *Journal of financial economics*, 419-444.

observable characteristics in panel data. Definitions of the variables are detailed in the Appendix. In our regression analysis, we exclude leverage as a control variable in the first specification. This decision stems from the fact that leverage is inherently incorporated into the calculation of the Altman Z-Score, which serves as the dependent variable. The Results section explains how excluding leverage from the Altman Z-Score regression model ensures clarity and robustness.

4. Data and Descriptives

We collected data that covered the three-year period from 2019 to 2021 for the firms. The firms were listed in the stock exchanges in Athens, Greece (Exchange code: 107),[37] Nicosia, Cyprus (Exchange code: 221), Milan, Italy (Exchange code: 209), Lisbon, Portugal (Exchange code: 192), and Madrid, Spain (Exchange code: 201). We eliminated firms in the financial sector (Standard Industrial Classification, SIC code 6) and any firms that did not have observations for all three consecutive years. Our final sample consisted of 1,155 firm-year observations.

Table 1 shows the distribution of the firms across the three years. Almost half the firms in the sample are Italian (552 firms or 48% of the total firms), followed by 261 companies from Spain (23%). Greece has 231 companies, which is 20% of the sample. The last 10% of the sample contains firms in Portugal and Cyprus, totalling 33 (3%) and 78 (7%) respectively. Table 2 shows a considerable industry-level variation in our sample. The manufacturing and services industries have the largest number of observations (771 or two-thirds of the overall sample) while the industry of agriculture, forestry, and fishing has the least observations (6 in total, corresponding to 1%). Table 3 presents firm characteristics, including both dependent and independent variables. The mean value of the Altman Z-Score is 2.25, which suggests that, on average, companies are probably safe from bankruptcy (the main threshold for companies heading to bankruptcy is 1.81 within the next two years), but this is in the grey area and caution should be taken. In addition, our sample firms are profitable on average by 7% based on ROE and by 2% based on ROA. They have mean assets of 392 million euros (SIZE=5.97), and their median is slightly lower at 344 million euros. The dummy variable of COVID-19 indicates the one-third period, the year 2020, which is affected by COVID-19. A leverage ratio of 0.61 means that an average firm in our sample has 60% of debt and 40% of equity in its capital structure. This

[37] The stock exchange code (EXCHG) identifies the major exchange where a company's common stock is traded. For example, for Athens Stock Exchange (ASE) the code is 107.

indicates that our sample is moderately leveraged, meaning that an average firm relies more on debt than on equity to finance its assets and operations. The firms in our sample have a good liquidity position: they exhibit a ratio of 1.75, which means that, on average, they cover short-term obligations by 1.75 when liquating their current assets. Assets Turnover is on average 0.71, indicating that, on average, firms use their assets to generate 71 euro in sales out of 100 in their productive assets. The last independent variable is the Book-to-Market (BM) that proxies for the growth of the firm. Since on average the BM is below 1, at 0.75, this implies that the firms are on average undervalued because companies' equity is worth less than their market value. We winsorised all variables at the 1% and 99% level.

4. Results

Table 4 Panel A compares the mean and median values of all dependent variables between the COVID-19 and non-COVID-19 periods separately for each country. The table also shows the differences between the COVID-19 and non-COVID-19 periods separately for the sample of each country and tests for their statistical significance based on a t-test and Wilcoxon test on differences in means and medians respectively. Results suggest that the risk of bankruptcy measured by the Altman Z-Score increases in Italian firms with mean and median rising by 30.7% and 33.5% at 10% and 5% statistical significance, respectively while the other countries exhibit an increase in the associated risk, albeit a statistically insignificant one. With respect to profitability, Cyprus and Greece have the largest decline in profitability in ROA by -3.2% and -1.9% in means respectively at least at 5% significant level, followed by Italy's decline in ROA at mean difference 1.1% with statistical significance of 1%, and Spain's decline in ROA at median difference 2.0% with statistical significance at 5%. A similar pattern emerges using ROE. With respect to financial health, the Altman Z-Score for Cyprus and Portugal demonstrates mean and median differences that are comparable in magnitude with the other countries, though insignificant. This supports hypothesis H1: countries heavily reliant on tourism, such as Cyprus and Greece, experienced significant financial performance declines due to their exposure to systemic risks during the pandemic. The decline in profitability across these regions is consistent with their reduced economic activity stemming from restricted travel and tourism. Moreover, firms with lower pre-COVID financial stability, as indicated by weaker Altman Z-Scores, exhibited more pronounced deteriorations in financial health during the pandemic. This trend is particularly evident in countries like Portugal, where many

firms experienced Altman Z-Scores below the critical threshold of 1.81, emphasising pre-existing vulnerabilities that were exacerbated during the crisis.

This preliminary evidence is consistent with an overall decline in both financial health and performance of the firms. Table 4 Panel B compares the mean and median values of all dependent variables between the COVID-19 and non-COVID-19 periods separately for each industry. The manufacturing industry is affected the most from COVID-19. The industry's Altman Z-Score is negatively affected, as illustrated by median difference of 29.7% at a 10% statistically significant level, while there is a weak significance for the services industry showing median difference 26% and mean difference of 41.2% both at a 10% significance level. With respect to profitability based on ROA, a sharp decline is seen in retail trade, with 2.6% and 3.7%, followed by the manufacturing sector with 1.8% and 1.7% in medians and means respectively. The retail trade sector, particularly retail-eating places, experienced some of the steepest declines in profitability, further illustrating the vulnerability of sectors with low digital maturity in maintaining performance during systemic shocks. The sharp decline in the ROA for companies like AUTOGRILL SPA (from 0.0148 to -0.0984) and IBERSOL SGPS SA (from 0.0361 to -0.0757) underscores the unique vulnerabilities of retail businesses, especially those in the retail-eating places industry (SIC code 5812), in adapting to the unprecedented challenges of the pandemic. This aligns with our next hypothesis, H2: firms with low liquidity and weaker financial health, including companies in the manufacturing and retail sectors, faced more severe financial distress during the pandemic due to the accumulation of fiscal and operational weaknesses. Furthermore, the manufacturing industry demonstrated substantial declines in its Altman Z-Score, with a median reduction of 29.7% at a 10% statistical significance, highlighting the heightened financial distress of sectors with high exposure to operational disruptions. This aligns with the final hypothesis, H3: industries with complex supply chains, like manufacturing, were disproportionately impacted during the pandemic due to their vulnerability to systemic shocks.

The strict lockdown measures enacted to curb the spread of the virus resulted in prolonged closures of physical retail spaces. AUTOGRILL SPA, for example, operates extensively in travel hubs like airports and highways. With global travel restrictions leading to a near halt in tourism, the company faced a sharp contraction in its primary customer base. Similarly, IBERSOL SGPS SA, which manages restaurant chains across Portugal and Spain, suffered from reduced foot traffic and an overall contraction in consumer spending due to these restrictions. Moreover, there was a notable

shift in consumer behaviour during the pandemic. Fear of infection and economic uncertainty prompted consumers to prioritise spending on essential goods—such as groceries—over discretionary activities like dining out. This shift posed significant challenges to the retail-eating places businesses, which were often unprepared to pivot. Both AUTOGRILL SPA and IBERSOL SGPS SA faced limitations in adapting to takeaway and delivery models due to underdeveloped online delivery infrastructure. This lack of digital capabilities hindered operations during the crisis.

While the retail sector experienced the steepest decline in profitability, as evidenced by significant reductions in ROA, this decline did not consistently translate into an elevated bankruptcy risk as measured by the Altman Z-Score. Bankruptcy risk incorporates multiple dimensions beyond mere profitability, such as leverage, liquidity, asset efficiency, and solvency. Several factors explain this distinction, including capital intensity, cost structure, and sector-specific vulnerabilities. As a first example, the manufacturing sector is inherently more capital intensive, with significant fixed costs tied to machinery, equipment, and supply chain operations. During periods of economic downturn, the inflexibility of these fixed costs creates substantial financial pressure. This capital intensity, coupled with a reliance on long-term debt to finance operations, often leads to higher leverage ratios in manufacturing firms. Consequently, when revenue streams decline, as they did during the pandemic, manufacturing firms face amplified risks of financial distress and insolvency compared to their retail counterparts. In contrast, while they did suffer sharp declines in profitability, retail businesses tend to be structured with more variable cost models. For example, labour and inventory costs, which constitute a significant proportion of retail expenses, can be adjusted more flexibly in response to declining demand. This operational agility can mitigate the immediate impact on solvency, even in the face of poor financial performance. Additionally, manufacturing firms are more exposed to supply chain disruptions, which were pervasive during the COVID-19 pandemic. Delays in raw material deliveries, increased transportation costs, and factory shutdowns all compounded the financial risks for manufacturing businesses. Retail firms, on the other hand, while impacted by decline in consumer demand, were relatively less exposed to such upstream disruptions. Moreover, retail businesses often maintain stronger liquidity buffers, such as cash reserves, to manage short-term downturns in consumer demand. Manufacturing firms, by contrast, frequently reinvest cash into fixed assets or working capital, leaving them with lower liquidity during crises. This lack of immediate liquidity increases their vulnerability to bankruptcy. Lastly, sample size

considerations may have played a role in the observed trends. Retail companies constituted a smaller proportion of the sample compared to manufacturing firms, which may have reduced the statistical significance of bankruptcy risk metrics for the retail sector. This does not negate the observed trends in ROA decline but indicates that the Altman Z-Score's measurement of financial distress must account for such structural differences. Another contributing factor is the sectoral composition within retail. Many retail businesses cater to essential goods and services, such as grocery stores or pharmacies, which continued to generate revenue during the pandemic. By contrast, the manufacturing sector predominantly includes non-essential goods, where demand sharply declined during the crisis, further exacerbating financial risks.

Overall, while the retail sector experienced the steepest decline in ROA during the pandemic period, this decline did not uniformly translate into a higher bankruptcy risk. The manufacturing sector's elevated bankruptcy risk can be attributed to its capital-intensive structure, higher leverage, and reliance on long-term debt. Additionally, supply chain disruptions disproportionately impacted manufacturing firms, amplifying their financial distress. Conversely, retail firms often operate with more variable cost structures and maintain higher liquidity buffers, which provided some resilience despite poor performance. Finally, the inclusion of essential goods retailers within the sample moderated bankruptcy risk metrics for the retail sector.

The service industry was also hit by COVID-19, seeing its profitability plummet by 0.9% in medians and 2.2% in means. Across the countries we examined, service-related sectors were severely impacted by the pandemic-induced suspension of economic activity, travel restrictions, and reduced household spending opportunities. More specifically, firms operating in entertainment, hospitality, and sports experienced significant challenges during the pandemic. For instance, Notorious Pictures SpA in Italy saw a decline in profitability due to reduced cinema activity and disruptions in content distribution. Futebol Clube do Porto in Portugal faced a sharp drop in revenue (-39%) driven by restrictions on sporting events and reduced fan engagement. Neurosoft Software Productions in Greece (-27%) suffered from limited demand for its software solutions during the crisis. In Spain, FacePhi Biometria SA (-12% to -20%) saw weakened biometric services amid lower business activity, while Lordos Hotels Holdings Public in Cyprus (-5%) struggled with reduced tourism and hotel occupancy. These examples highlight how the pandemic's widespread impact on economic activities and consumer behaviour heavily affected the financial performance of service-based companies.

Table 5 presents correlations among all variables used in the study. Interestingly, the correlation between the Altman Z-Score and COVID-19 is negative and statistically significant at 5%, consistent with our expectation that, in the pandemic period, the Altman Z-Score becomes weaker than in the non-COVID-19 period presented with the years 2019 and 2021. The correlation between Altman Z-Score and the other independent variables is as expected. Thus, for more levered, overvalued, illiquid, and smaller firms, the Altman Z-Score is lower, indicated by the negative and statistically significant correlation; meanwhile, more efficient firms with respect to generating sales based on utilising assets are stronger in their financial status, evidenced by a positive and statistically significant correlation. ROA and ROE exhibit negative correlations of -0.116 and -0.096 with COVID-19, both at the strongest statistical significance and consistent with our expectations. Based on ROA, less levered, higher liquidity, and more efficient firms exhibit higher profitability, which is consistent with the general wisdom that these measures are positively associated with profitability.

Table 6 presents the results of the multivariate analysis based on the models shown in the methodology section. We include industry- and country-fixed effects in all multivariate regressions to control for industry- and country-level variations in our sample. Consistent with our expectations, the coefficient of dummy variable COVID-19 is negative in Panel A, suggesting that the Altman Z-Score is negatively affected by COVID-19 by -19.42%, statistically significant at 5%. In our regression analysis, we have excluded leverage as a control variable because it is directly embedded in the calculation of the Altman Z-Score, which serves as our dependent variable. Specifically, one of the components of the Altman Z-Score is X4 (Market Value of Equity / Total Liabilities), which is a measure of leverage. As such, including leverage as an independent variable in the regression would result in redundancy and a potential violation of the assumption of independence between the predictors and the dependent variable. Moreover, we observed a moderate negative correlation (-0.56) between leverage and X1 (Working Capital / Total Assets), another component of the Altman Z-Score. This highlights a level of overlap between these variables, which could lead to multicollinearity. Multicollinearity inflates the standard errors of the coefficients, making it difficult to isolate the effect of our variable of interest, the COVID-19 dummy.

Given this context, our primary focus is to examine the effect of COVID-19 on financial distress as measured by the Altman Z-Score. To get clear and reliable results, we sought to avoid redundancy and multicollinearity, which we achieved by exclud-

ing leverage as a separate predictor. This decision was in line with the methodological best practices when working with composite indices such as the Altman Z-Score, where variables like leverage are intrinsic components of the index.

The results in Panel B of Table 6 illustrate the impact of COVID-19 on financial performance as measured by ROA and ROE. Specifically, the coefficient for the COVID-19 dummy variable is -0.0134 in the ROA regression and -0.0572 in the ROE regression, both statistically significant at the 1% level. This indicates that, during the COVID-19 period, the average ROA decreased by 1.34% and the average ROE decreased by 5.72%, all else being equal. The negative coefficients suggest that the pandemic had a detrimental effect on financial performance. In practical terms, firms experienced reduced profitability, likely due to the economic disruptions caused by the pandemic. These results are statistically significant, as indicated by the p-values (0.0008 for ROA and 0.0030 for ROE). The practical implications of the multivariate analysis in Table 6 are significant for both policymakers and businesses. The negative impact of COVID-19 on the Altman Z-Score (-19.42%) and financial performance metrics such as ROA (-1.34%) and ROE (-5.72%) highlights the vulnerability of firms to systemic shocks. For businesses, these results underscore the importance of building financial resilience through improved liquidity management and proactive risk mitigation strategies.

Figure 1 shows the overall fall in profitability based on median ROA by country for all firms we examine. There is obviously a sharp decline in profitability during the year of the COVID-19 outbreak for all companies by country—Cyprus and Greece saw the largest decline. Figure 2 shows the median Altman Z-Score for each country by year. All companies in all countries, apart from Cyprus and Spain, show a sharp decline in their Altman Z-Score, especially firms in Portugal that are below the threshold of 1.81. In the following additional analysis section, we decompose the Altman Z-Score to see which of its components most affect the overall score.

5. Additional Analysis of the Altman Z-Score

We further investigate the components of the Altman Z-Score to see how they change with respect to the COVID-19 period. Figure 3 shows a weak market sentiment that significantly drops the market value equity of firms coupled with declining revenues during the COVID-19 period. These two major components appear to be the biggest driver of the deteriorating financial health of the companies, especially for Italy, Greece, and Portugal. The market value of equity reflects investor confidence, and

its decline indicates reduced trust in firms' stability, compounding financial distress. Additionally, declining revenues directly reduce firms' ability to cover expenses and sustain operations, making these components critical in driving the deteriorating financial health observed during the COVID-19 period. In Figure 4, we explain why the Altman Z-Score for firms in Cyprus rose in the COVID-19 period. We provide evidence that the main factor that has seen considerable climb is the ratio of market value of equity to total liabilities. For example, Blue Island Plc and Salamis Tours show a decrease in liabilities from 2019 to 2020, from 8 million euros to 6.5 million euros and from 7.8 to 5.9 million euros respectively. At the same time, these companies enjoyed a considerable increase in their market value of equity due to stock price increases during the COVID-19 period. Specifically, Blue Island Plc saw its price going up from 67 to 80 cents and Salamis Tours from 81 to 94 cents. This highlights the importance of country-specific factors, such as effective crisis management and economic structure, in mitigating financial distress. These results provide valuable insights into how tailored strategies can strengthen firm-level financial stability during systemic shocks.

6. Conclusion

The purpose of this study was to examine how the COVID-19 pandemic affected the financial outcomes and solvency of firms in Southern Europe, namely Portugal, Italy, Greece, Spain, and Cyprus, from 2019 to 2021, contributing to the literature by highlighting the significant impact of COVID-19 on firms' financial performance and solvency through metrics like ROA, ROE, and the Altman Z-Score.

The findings revealed that firms' financial performance, measured by ROA and ROE, worsened by -1.3% and -5.7% respectively in 2020 compared to the years before and after the pandemic. Cyprus and Spain experienced the most significant drops in ROA, -3.2% and ROE -4.0% respectively. Firms' financial distress, measured by the Altman Z-Score, decreased by 19% during the pandemic period and Italy suffered the most severe impact of 34%. The retail trade sector was the most negatively affected by COVID-19, while the manufacturing sector showed the highest likelihood of bankruptcy. Additionally, by breaking down the components of the Altman Z-Score, we discovered that the main causes of worsening financial condition for firms were the weak market sentiment, as indicated by the declining market values of equity and the steep drop in sales during the COVID-19 period. The insights into sector-specific vulnerabilities, such as in the retail trade sector and manufacturing sectors, enrich the

understanding of industry dynamics during systemic shocks. Additionally, the analysis emphasises the importance of market sentiment and revenue stability as critical drivers of financial health, offering new perspectives for future research on resilience strategies and the role of government intervention in mitigating financial distress.

While this study provides valuable insights into the financial impact of COVID-19 on firms in Southern Europe, it is important to acknowledge several limitations. The region-specific focus and reliance on financial performance metrics such as ROA and ROE may not capture broader implications; specifically, we have not considered operational efficiency or environmental, social, and governance (ESG) performance. Additionally, the analysis does not account for long-term recovery trends or differences in government intervention measures across countries. Future research could address these gaps by incorporating non-financial indicators, exploring recovery trajectories, and evaluating the effectiveness of policy measures, offering a more comprehensive understanding of firm resilience during systemic shocks.

Tables

Table 1. Sample Distribution by Country

Country	2019	2020	2021	Total	Percent
Cyprus (CYP)	11	11	11	33	3%
Spain (ESP)	87	87	87	261	23%
Greece (GRC)	77	77	77	231	20%
Italy (ITA)	184	184	184	552	48%
Portugal (PRT)	26	26	26	78	7%
Total	385	385	385	1,155	100%

Table 2. Sample by Country and Industry

Industry	CYP	ESP	GRC	ITA	PRT	Total	Percent
Agriculture, Forestry and Fishing	0	3	0	3	0	6	1%
Construction	0	24	21	21	6	72	6%
Manufacturing	12	111	102	273	27	525	45%
Mining	0	0	6	6	0	12	1%
Retail-Trade	0	6	12	15	12	45	4%
Services	15	54	36	123	18	246	21%
Transportation-Communications	3	60	33	93	15	204	18%
Wholesale-Trade	3	3	21	18	0	45	4%
Total	33	261	231	552	78	1,155	100%

Table 3. Descriptives

Variable	N	Mean	SD	P25	Median	P75
Altman Z-Score	1155	2.25	1.89	1.05	1.82	2.92
ROA	1155	0.02	0.07	0.00	0.03	0.05
ROE	1155	0.07	0.32	0.01	0.08	0.15
Covid	1155	0.33	0.47	0.00	0.00	1.00
Leverage	1155	0.61	0.20	0.49	0.62	0.75
Liquidity	1155	1.75	1.28	1.03	1.39	2.08
Assets Turnover	1155	0.71	0.62	0.38	0.62	0.88
Size	1155	5.97	2.17	4.27	5.84	7.47
BM	1155	0.75	0.70	0.33	0.56	1.00

Table 4. Univariate Analysis

Panel A. Median/Mean on Country Level

	Medians				Means			
Cyprus (CYP)	Covid				Covid			
	0 (N=22)	1 (N=11)	Dif	p-values	0 (N=22)	1 (N=11)	Dif	p-values
Altman_Z-Score	1.819	2.313	-0.494	0.530	2.247	2.195	0.052	0.937
ROA	0.043	0.011	0.032**	0.019	0.043	0.025	0.019	0.323
ROE	0.056	0.026	0.030**	0.047	0.036	0.047	-0.010	0.855
Spain (ESP)	Covid				Covid			
	0 (N=174)	1 (N=87)	Dif	p-values	0 (N=174)	1 (N=87)	Dif	p-values
Altman_Z-Score	1.811	1.809	0.003	0.666	2.493	2.444	0.049	0.865
ROA	0.027	0.018	0.009**	0.020	0.033	0.013	0.020**	0.028
ROE	0.105	0.064	0.040*	0.055	0.089	0.048	0.041	0.275
Greece (GRC)	Covid				Covid			
	0 (N=154)	1 (N=77)	Dif	p-values	0 (N=154)	1 (N=77)	Dif	p-values
Altman_Z-Score	2.054	1.736	0.318	0.259	2.384	2.135	0.249	0.334
ROA	0.030	0.010	0.019***	0.002	0.031	0.009	0.022***	0.007
ROE	0.075	0.037	0.038***	0.002	0.058	-0.028	0.086**	0.019
Italy (ITA)	Covid				Covid			
	0 (N=368)	1 (N=184)	Dif	p-values	0 (N=368)	1 (N=184)	Dif	p-values
Altman_Z-Score	1.920	1.585	0.335**	0.010	2.349	2.042	0.307*	0.060
ROA	0.030	0.019	0.011***	0.001	0.022	0.008	0.014*	0.056
ROE	0.094	0.062	0.032***	0.000	0.098	0.031	0.067**	0.041
Portugal (PRT)	Covid				Covid			
	0 (N=54)	1 (N=26)	Dif	p-values	0 (N=54)	1 (N=26)	Dif	p-values
Altman_Z-Score	1.203	1.045	0.158	0.304	1.408	1.130	0.278	0.357
ROA	0.030	0.020	0.011*	0.072	0.025	-0.001	0.026	0.134
ROE	0.101	0.071	0.030*	0.064	0.105	0.012	0.093	0.109

Panel B. Median/Mean on Industry Level

	Medians				Means			
Agriculture	Covid				Covid			
	0 (N=4)	1 (N=2)	Dif	p-values	0 (N=4)	1 (N=2)	Dif	p-values
Altman_Z-Score	0.966	1.683	-0.718	0.643	1.374	1.683	-0.310	0.775
ROA	-0.033	-0.076	0.043	1.000	-0.036	-0.076	0.040	0.518
ROE	-0.064	-0.196	0.132	1.000	-0.081	-0.196	0.116	0.460
Construction	Covid				Covid			
	0 (N=48)	1 (N=24)	Dif	p-values	0 (N=48)	1 (N=24)	Dif	p-values
Altman_Z-Score	0.990	0.805	0.184	0.410	1.148	0.976	0.173	0.453
ROA	0.006	0.004	0.002	0.933	0.007	0.010	-0.003	0.807
ROE	0.036	0.072	-0.036	0.466	-0.011	0.089	-0.100	0.325
Manufacturing	Covid				Covid			
	0 (N=350)	1 (N=175)	Dif	p-values	0 (N=350)	1 (N=175)	Dif	p-values
Altman_Z-Score	2.197	1.900	0.297*	0.065	2.691	2.479	0.211	0.271
ROA	0.035	0.018	0.018***	0.000	0.035	0.019	0.017***	0.009
ROE	0.093	0.056	0.037***	0.000	0.088	0.052	0.036	0.156

Mining	Covid				Covid			
	0 (N=8)	1 (N=4)	Dif	p-values	0 (N=8)	1 (N=4)	Dif	p-values
Altman_Z-Score	1.591	1.457	0.134	0.610	1.457	1.422	0.035	0.936
ROA	0.016	-0.041	0.056	0.734	-0.029	-0.037	0.009	0.875
ROE	0.037	-0.084	0.121	0.610	-0.233	-0.118	-0.115	0.739
Retail Trade	Covid				Covid			
	0 (N=30)	1(N=15)	Dif	p-values	0 (N=30)	1(N=15)	Dif	p-values
Altman_Z-Score	2.327	1.853	0.475	0.258	2.924	2.323	0.601	0.370
ROA	0.030	0.004	0.026**	0.012	0.043	0.006	0.037*	0.068
ROE	0.079	0.010	0.069**	0.016	0.133	-0.082	0.215**	0.018
Services	Covid				Covid			
	0 (N=164)	1 (N=82)	Dif	p-values	0 (N=164)	1 (N=82)	Dif	p-values
Altman_Z-Score	1.952	1.691	0.261	0.105	2.271	1.858	0.412*	0.092
ROA	0.026	0.018	0.009**	0.037	0.017	-0.005	0.022*	0.084
ROE	0.094	0.058	0.036**	0.027	0.092	-0.011	0.103**	0.043
Transportation-Communications	Covid				Covid			
	0 (N=136)	1 (N=68)	Dif	p-values	0 (N=138)	1 (N=69)	Dif	p-values
Altman_Z-Score	1.234	1.148	0.086	0.320	1.660	1.648	0.012	0.959
ROA	0.028	0.021	0.007*	0.052	0.026	0.006	0.020**	0.036
ROE	0.103	0.079	0.024**	0.019	0.123	-0.010	0.132***	0.006
Wholesale Trade	Covid				Covid			
	0 (N=30)	1(N=15)	Dif	p-values	0 (N=30)	1(N=15)	Dif	p-values
Altman_Z-Score	2.946	2.876	0.070	0.427	2.940	2.713	0.227	0.385
ROA	0.035	0.027	0.008**	0.041	0.035	0.021	0.014	0.107
ROE	0.103	0.062	0.041**	0.087	0.099	0.066	0.033	0.150

Table 5. Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Altman Z-Score	1.000								
(2) ROA	0.526***	1.000							
(3) ROE	0.177***	0.371***	1.000						
(4) Covid	-0.057*	-0.116***	-0.096***	1.000					
(5) Leverage	-0.572***	-0.332***	0.012	0.013	1.000				
(6) Liquidity	0.431***	0.160***	0.019	0.046	-0.530***	1.000			
(7) Assets_Turnover	0.240***	0.131***	0.088***	-0.057*	0.050*	-0.064**	1.000		
(8) Size	-0.175***	0.093***	-0.010	-0.006	0.248***	-0.245***	-0.114***	1.000	
(9) BM	-0.240***	-0.017	-0.121***	0.063**	-0.321***	0.057*	-0.029	-0.024	1.000

****p<0.01, **p<0.05, *p<0.1*

Table 6.

Panel A. Regression for Bankruptcy

	(1) *Altman Z-Score*
Covid	-0.1942** (0.0405)
Liquidity	0.6546*** (0.0000)
Assets_Turnover	0.6964*** (0.0000)
Size	-0.0244 (0.3157)
BM	-0.6774*** (0.0000)
Constant	1.0632 (0.1251)
Observations	1155
R-squared	0.3719
Country Fixed Effects	Yes
Industry Fixed Effects	Yes

p-values are in parentheses
**** p<.01, ** p<.05, * p<.1*

Panel B. Regression for Financial Performance

	(1) *ROA*	*(2)* *ROE*
Covid	-0.0134*** (0.0008)	-0.0572*** (0.0030)
Leverage	-0.1537*** (0.0000)	0.0327 (0.6082)
Liquidity	-0.0005 (0.7847)	0.0032 (0.7232)
Assets_Turnover	0.0257*** (0.0000)	0.0550*** (0.0039)
Size	0.0095*** (0.0000)	0.0031 (0.5775)
BM	-0.0143*** (0.0000)	-0.0379** (0.0168)
Constant	0.0315 (0.4325)	0.0569 (0.7679)
Observations	1155	1155
R-squared	0.2784	0.1149
Country Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes

p-values are in parentheses
**** p<.01, ** p<.05, * p<.1*

Figures

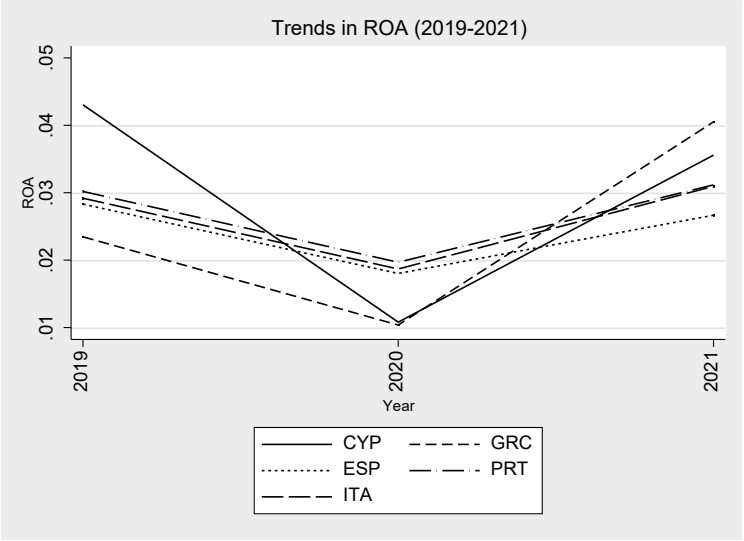

Fig. 1. Trends in Median Profitability ROA by Year for Selected Countries (2019–2021), showing variations across Cyprus (CYP), Greece (GRC), Italy (ITA), Spain (ESP), and Portugal (PRT)

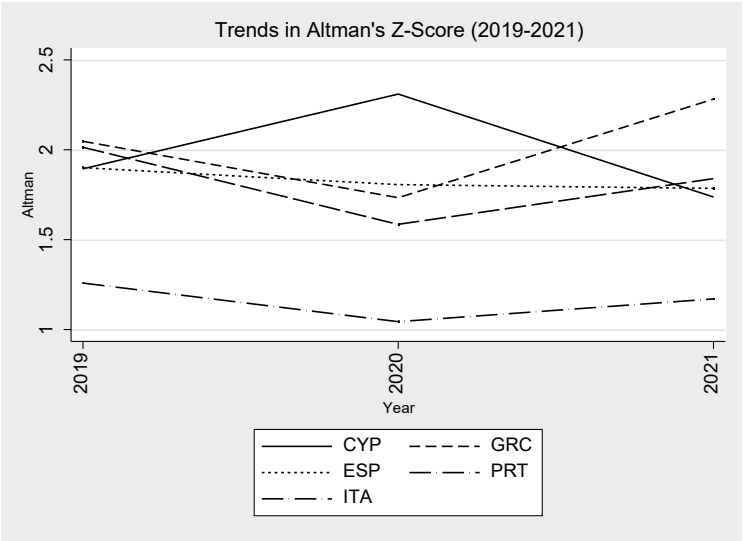

Fig. 2. Trends in Altman Z-Score by Year for Selected Countries (2019–2021), showing variations across Cyprus (CYP), Greece (GRC), Italy (ITA), Spain (ESP), and Portugal (PRT)

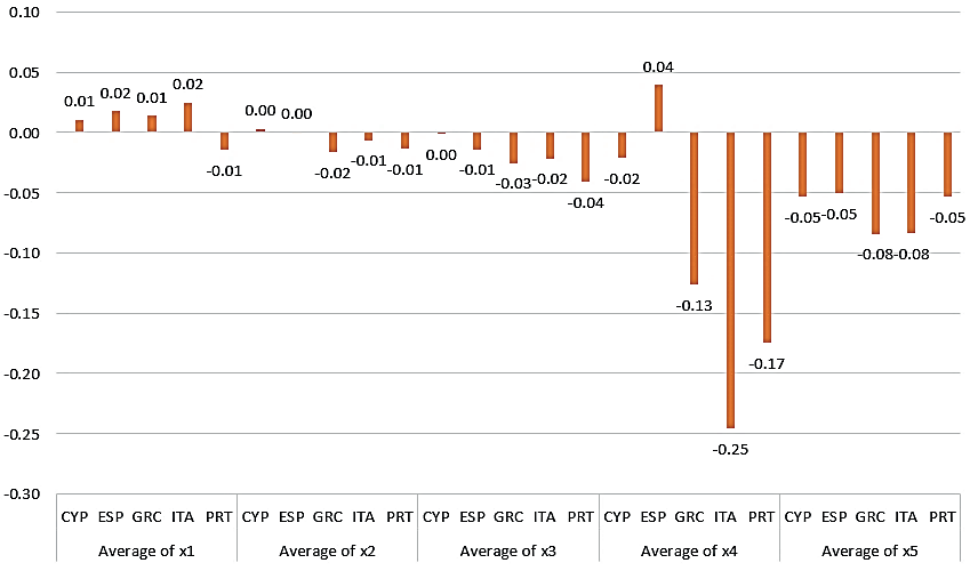

Fig. 3. Changes in each component of Altman Z-Score between the COVID and non-COVID periods

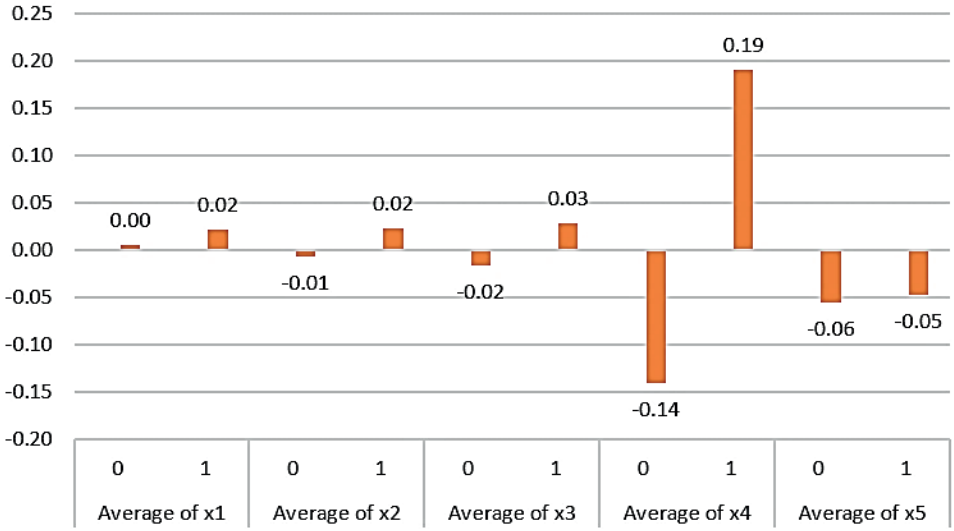

Fig. 4. Changes in each component of Altman Z-Score for Cyprus between companies that have seen an improvement in their Altman Z-Score during COVID-19 (1) and the rest (0)

Appendix

Variables	Definition
Altman Z-Score	A measure based on the following factors: X1= wcap/at X2=re/at X3=ebit/at X4= prccm*cshpria/lt X5=revt/at Source: Compustat-Capital-IQ, Compustat-Global Security Monthly
Assets Turnover	Sales divided by Total assets (revt/at) Source: Compustat-Capital-IQ
Covid	A dummy variable assigns the value of 1 to the year 2020; otherwise, it is assigned 0
BM	Book value of common stock (CEQ) divided by Market Capitalization (prccm*cshpria) Source: Compustat-Capital-IQ, Compustat-Global Security Monthly ceq: Book value of common stock, Compustat/Fundamentals/Balance Sheet Items prccm: Fiscal year end price cshpria: Common Shares Used to Calculate Earnings per Share (Basic)
Leverage	Total Liabilities divided by Total Assets (lt/at) Source: Compustat-Capital-IQ
Liquidity	Current Assets divided by Current liabilities Source: Compustat-Capital-IQ
ROA	Net Income divided by Total Assets Source: Compustat-Capital-IQ
ROE	Net Income divided by Total Equity Source: Compustat-Capital-IQ
Size	Natural logarithm of Total assets (at) Source: Compustat-Capital-IQ

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