



The impact of COVID-19 on company performance per industry sector: Evidence from South Africa



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Orientation: Governments across the world have adopted a variety of preventative measures to curb the spread of the coronavirus disease 2019 (COVID-19). The full socioeconomic costs present a significant threat to economic growth, with developing economies such as South Africa predicted to be the worst affected.

Research purpose: This study assessed the impact of COVID-19 on company performance based on the various industry sectors of the Johannesburg Securities Exchange (JSE) of South Africa.

Motivation for the study: The study builds on the growing body of knowledge on the impact of COVID-19 on company performance in a South African context.

Research approach and method: All JSE-listed companies were analysed for the period 2014–2020. Descriptive statistics and regression analyses were applied to assess the impact of COVID-19 on company performance per industry sector and to identify the mechanisms through which company performance was affected during the pandemic year.

Main findings: Company performance per JSE industry sector suffered a significant negative impact during the 2020 pandemic year. Sectors were affected differently owing to the idiosyncratic nature of each industry. Cash-flow-related variables significantly affected company performance during the pandemic year.

Practical implications: A healthy cash flow is paramount in times of crisis. Investors and other stakeholders should be cognisant of how industry sector idiosyncrasies affect company performance during crises.

Contribution: Results may provide insights into the effect of COVID-19 on company performance per industry sector in South Africa, to support the mitigation of the negative consequences of COVID-19 and future crises or pandemics.

Keywords: company performance; COVID-19; industry sectors; JSE-listed companies; South Africa.

Introduction

Coronavirus disease 2019 (COVID-19) emanated from China's Wuhan province in December 2019 and subsequently spread around the world, threatening public health and safety (Takyi & Bentum-Ennin 2020). The economic catastrophe in the wake of the COVID-19 pandemic is more severe than any financial crisis since the great depression of the 1930s in terms of its cause, scope and severity (Balla-Elliott et al. 2020; Ramelli & Wagner 2020). Unlike earlier financial crises that were caused by factors within the financial system, the financial crisis associated with the COVID-19 pandemic mostly resulted from the mandatory lockdown policies that were applied globally to contain the spread of the disease (Shen et al. 2020). The global response to COVID-19 meant that whole economies were shut down, except for essential services, and many sectors were therefore bound to record low levels of production and revenue in 2020 and beyond (Mittal & Sharma 2021). Industries that rely on mass gatherings (like entertainment, sports, aviation, restaurants and hospitality) were the worst affected (Mittal & Sharma 2021). The consequences of the preventative measures are uncertain, but the full socioeconomic costs and the devastating effects thereof present a significant threat to the economic growth and advancement of many economies, with developing economies predicted to be the worst affected (Takyi & Bentum-Ennin 2020).

Understanding and assessing the impact of COVID-19 has become an important issue (He et al. 2020). At company level, the COVID-19 pandemic affected the stock market and company

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performance (Shen et al. 2020). Most studies have focused on the volatility in the stock market subsequent to the outbreak of COVID-19, while global evidence on the effect of COVID-19 on company performance is limited (Qin et al. 2020). An understanding of the impact of COVID-19 on company performance of listed companies is especially relevant, because listed companies are the foundation of a national economy (Shen et al. 2020). Unlike the global financial crisis of 2007 and 2008, COVID-19 is an exogenous shock that has affected industry sector performance globally and, by extension, companies' performance in diverse ways owing to the idiosyncratic characteristics of the various sectors (Thorbecke 2020).

South Africa, as a developing country, was applauded for its relatively quick response to COVID-19 and imposed extreme lockdown measures despite its poor economic and social circumstances prior to the pandemic (De Villiers, Cerbone & Van Zijl 2020). South Africa presents a unique research setting, with its dual economy representing characteristics of both developed and developing economies (Grant, Harber & Minter 2018). The Johannesburg Securities Exchange (JSE) of South Africa is regarded as a world-class stock exchange, with a sophisticated financial sector, that is comparable to that of the most advanced economies (Wesson et al. 2018). The JSE is also the largest stock exchange in Africa and was found not to have been as severely affected by the COVID-19 pandemic when compared to other African countries (Takyi & Bentum-Ennin 2020).

To the best of the authors' knowledge, there are no existing empirical studies on the impact of COVID-19 on listed companies' performance by industry sector in South Africa. The aim of this study is to assess the impact of COVID-19 on company performance per industry sector for JSE-listed companies. This study therefore contributes to the growing body of literature on COVID-19 and its reverberations in different spheres of the economic and financial systems (He et al. 2020). Understanding the impact of COVID-19 on company performance per industry classification for JSE-listed companies provides valuable insights into the factors that drive various industry sectors of the South African economy and how these sectors were affected differently by the COVID-19 pandemic. Companies, civil society and the South African government could learn from this body of knowledge to respond more effectively to similar threats in the future by incorporating such idiosyncratic risks into risk mitigation, business and investment processes, response strategies, and strategic planning for future crises or pandemics.

Literature review

The impact of an infectious disease is not limited to humans, but also affects the economic and financial health of countries and organisations (Mayer 2000; Zhang et al. 2009). As COVID-19 infects families, it has an impact on households, the business sector, labour markets, the public sector, the balance of payments, foreign investment, prices and money

supply (Ajam 2020). Furthermore, the financial performance of companies operating in industries which are characterised by personnel intensity, social interaction and cross-border trade has experienced a sharp drop in demand owing to the policies implemented in response to the COVID-19 pandemic (Shen et al. 2020).

Financial markets comprising listed companies are complex systems. To assist in the understanding of the core business activities, the constituent companies in a stock market are assigned to one of several possible sectors. Among the many industry classification systems, the Financial Times Stock Exchange (FTSE) Global Classification System is universally accepted (Doherty, Adams & Davey 2005; Phillips & Ormsby 2016). The FTSE Global Classification System is based on the division of the market into a four-tier structure: economic groups, industrial sectors, industrial sub-sectors and companies. The system has been used to classify over 30 000 companies, across 59 countries (Doherty et al. 2005). In South Africa, the JSE uses the Industry Classification Benchmark (ICB) Classification System (FTSE Russell 2021), which is similar to the FTSE Classification System in that it uses a four-tier structure with 11 industries, 20 super-sectors, 45 sectors and 173 subsectors (JSE 2021).

Company performance

Companies' financial performance is fundamental to investors in making investment decisions, to managers in making financial decisions, and to creditors in substantiating their funding decisions. Financial performance can be affected by many factors that are broadly classified into endogenous variables (such as management decisions) and exogenous factors (such as global crises) (Bărbuț, Madaleno & Ilie 2019). Microeconomic factors (such as demand and industry production) are generally controllable and these effects can be anticipated, but the macroeconomic variables (such as unemployment rates, real gross domestic product [GDP], corporation tax rates, and monetary factors) are beyond the control of any organisation (Issah & Antwi 2017).

Furthermore, there is an expectation for companies classified as falling within an industry sector to perform similarly owing to the idiosyncratic risk that each sector tends to have by the very nature of activities performed (Doherty et al. 2005; Ooi, Wang & Webb 2009). Companies in the same industry adhere to the same regulatory and policy frameworks and are exposed to similar macroeconomic conditions (He et al. 2020; Issah & Antwi 2017) – which explains the highly correlated operating conditions of companies within the same industry when faced with changes in the economic environment (Issah & Antwi 2017; Moskowitz & Grinblatt 1999). Meric, Ratner and Meric (2008) reported that certain sectors can be clustered as they tend to perform similarly when exposed to macroeconomic factors and, in fact, can also be affected similarly across different countries. Bhuiyan and Chowdhury (2020), however, hold an opposing view, suggesting that country-specific idiosyncratic factors, such as those occurring in the United States of

America and neighbouring Canada, could affect sectors differently in different countries.

Company performance measures

The measures that define the financial performance of a company are much debated and can be analysed in numerous ways, including profitability, dividend growth, sales turnover, asset base and capital employed (Liargovas & Skandalis 2010). Traditionally, the success of a company's performance has been evaluated using financial measures such as return on assets (ROA), return on sales (ROS) and return on equity (ROE) (Johnson, Mans-Kemp & Erasmus 2019; Liargovas & Skandalis 2010).

During periods of sudden financial crisis, as with the COVID-19 pandemic, metrics such as cash flow, revenue, debt-to-equity ratios, and operating profits have been found to be critical (Nguyen, Ngo & Tran 2021; Qin et al. 2020; Shen et al. 2020). Qin et al. (2020) emphasised the importance of cash flow in a COVID-19 environment. A company's cash flow could shrink to the point where it cannot maintain its operational activities. The restriction of economic activity, the disruption in supply chains and the additional expenses of COVID-19 pandemic prevention may therefore ultimately lead to the closing down of the business (Qin et al. 2020). The real options theory (Zeng et al. 2016) supports the retention of cash when uncertainties arise. Managers, therefore, tend to decrease investments in times of uncertainty, and consumers prioritise their expenditure on health and safety – resulting in a shrinking demand and a reduction in an organisation's momentum towards sustainable development (Shen et al. 2020).

The impact of COVID-19 on listed companies and industry performance

As with the 2007 and 2008 global financial crisis, a major concern of economists, managers and investors is the impact that the COVID-19 pandemic would have on financial and stock markets and listed companies (Takyi & Bentum-Ennin 2020). The pandemic has led to worldwide declines in stock prices, increases in stock-price volatility, decreases in nominal interest rates, and contractions of real economic activity, as reflected in real GDP (Kotishwar 2020).

Uddin et al. (2021), when considering data from 34 developed and emerging markets, argued that stock market volatility can be mitigated by the economic strength of a country, which is measured by economic characteristics and factors such as economic resilience, intensity in capitalism, level of corporate governance, financial development, monetary policy and the quality of their health systems. Developed markets are more successful in managing market volatility than emerging markets owing to fragility in emerging market structure, lack of trust from investors, and governance quality factors. Takyi and Bentum-Ennin (2020) confirmed that stock market performances in Africa (an emerging market) have significantly reduced because of the pandemic. However, Topcu and Gulal (2020) reported that Africa as a

region was not the worst affected and that the impact of the outbreak had been the highest in Asian emerging markets, whereas emerging markets in Europe had experienced the lowest impact.

From an industry perspective, the stock market performance of industries varied between industries and countries after the outbreak of the pandemic (Rababah et al. 2020). In a Chinese study, He et al. (2020) found that the transportation, agriculture, mining, electricity and heating, environment, and healthcare sectors had been adversely impacted by COVID-19, while the manufacturing, information technology, sports and entertainment, and business service sectors had been positively impacted by the pandemic. Traditional industry sectors of China were therefore adversely affected by COVID-19, but this had created opportunities for the development of high-tech industries (He et al. 2020). Xiong et al. (2020) confirmed that the market reaction of Chinese companies to COVID-19 was more severe in companies in the industries that were vulnerable to the consequences of the pandemic, and those with high institutional investors. Furthermore, companies with larger scales, better profitability and growth opportunities, higher combined leverage and fewer fixed assets experienced a less adverse impact of the COVID-19 pandemic than other companies (Xiong et al. 2020). In an Indonesian study by Machmuddah et al. (2020), the manufacturing sector (specifically food and beverages) was found to be resilient, while – in contrast with the findings of He et al. (2020) – the healthcare sector (specifically pharmaceutical companies) was positively affected by COVID-19. Similarly, in India, where the healthcare sector represents the largest sector in India in terms of revenue and employment, the healthcare and pharmaceutical sectors are expected to outperform many other sectors in the medium to long term as a consequence of COVID-19, since companies in these sectors are investing heavily in research and development to fight the COVID-19 pandemic and to prepare for possible future pandemics (Mittal & Sharma 2021). Thorbecke (2020) reported similar outperformance by the healthcare sector in the United States of America, with sectors that profited from the epidemic including electronic entertainment, diversified retailers such as Amazon, nondurable household goods such as cleaning chemicals, biotechnology, and computer hardware and software; whereas the airlines, aerospace, real estate, tourism, oil, brewers, retail apparel and funeral sectors were negatively affected.

With limited global evidence of the impact of COVID-19 on company performance (Qin et al. 2020), China – as the first country to respond to COVID-19 (He et al. 2020) – provides some evidence of the effect of COVID-19 on company performance in an industry context.

A comprehensive study on the impact of COVID-19 on the company performance of listed Chinese companies was conducted by Shen et al. (2020). These authors investigated the impact of COVID-19 on corporate performance (measured by net ROA) at the company level in different regions and industries in China. Shen et al. (2020) used financial data from 2013 to 2019 to predict the performance of companies in

the first quarter of 2020. The forecasted results were compared with actual results at the company level in different industries and regions. All industries underperformed, with the worst performance achieved by the accommodation and catering sector, followed by the education sector. The authors then divided the listed companies into the highest and lowest affected groups by region and industry dimension to explore the mechanisms through which COVID-19 affects corporate performance. Highly affected industries comprised eight industries (namely tourism, film and television entertainment, catering retail, transportation, realty business, construction, accommodation and export manufacturing industries) characterised by personnel intensity, social interaction and cross-border trade. They found that the negative impact of COVID-19 on a company's performance was more pronounced in significantly affected geographic areas and industries, and when a company's investment scale (measured by the growth rate of fixed assets [CNCA]) or sales revenue (measured by the logarithm of revenues) was smaller. Investment scale and revenues were therefore found to be moderating variables to lessen the negative impact of COVID-19 on company performance. They concluded that the pandemic curtailed production, operational activities and sales, which eventually reflected in a negative net rate of ROA (Shen et al. 2020).

Rababah et al. (2020) concurred with the findings of Shen et al. (2020), reporting that small and medium-sized Chinese companies were most affected by the pandemic and that significantly affected geographic areas and industries had experienced a sharper decline in financial performance (measured by ROA) when compared to other industries. In assessing the effect of COVID-19 on company strategy, Qin et al. (2020) found that COVID-19 had a positive effect on the cash holdings (measured by the ratio of cash to current operating income) of Chinese companies in industries that were most affected by the pandemic. These companies chose to hold higher levels of cash subsequent to the pandemic when compared to companies less affected by the pandemic.

The impact of COVID-19 on South African-listed companies and industry performance

One year before the COVID-19 pandemic, South Africa's economy had already entered a technical recession. By 2019, South Africa's GDP per capita of US\$6000 ranked it 115th of all countries in the world (De Villiers et al. 2020). Although South Africa was not well prepared from a socioeconomic standpoint, it responded to the call from the World Health Organization to implement measures aimed at reducing the COVID-19 infection rate through restrictions imposed on citizens' movements.

The initial lockdown was followed by a continued rise in infections, leading to further lockdowns and restrictions, resulting in many companies reporting losses for the second quarter of 2020 – with the long-term effect on the economy yet to unfold (De Villiers et al. 2020). The pandemic is viewed as a severe economic and social stress test for South

Africa and its government as the lockdown has cost the economy approximately R13 billion per day (Ajam 2020; De Villiers et al. 2020). Preliminary projections by the South African Reserve Bank and economists suggested that hundreds of thousands of jobs would be lost, and the economy would contract, leading to a fiscal deficit of 12% of GDP and a debt-to-GDP ratio of 81% in 2021 (De Villiers et al. 2020).

Takyi and Bentum-Ennin (2020) evaluated and quantified the short-term impact of COVID-19 on stock market performance in 13 African countries, using daily time series stock market data from 01 October 2019 to 30 June 2020. They argued that although stock market performance on the JSE was negatively affected by COVID-19 and, by extension, so was the performance of listed companies, the stock market performances in South Africa were not affected as significantly as other African countries in the same study period.

Rogerson and Baum (2020), however, suggested that over the long run specific industry sectors, such as South Africa's tourism sector, were most affected by the pandemic and had the potential to transform the size and complexion of the sector going forward. Akrofi and Antwi (2020) concurred that the pandemic had adversely affected liquidity in Africa which had negative effects on investments and could halt the growth of specific sectors in countries such as South Africa. The JSE is historically dominated by companies in the resources sector, which are driven by a different set of macroeconomic factors compared to other sectors (Small 2017). Sectors such as mining and agriculture in South Africa have been severely affected by COVID-19 owing to a reduction in export demand (Ajam 2020).

Based on the literature reviewed, this study formulated the following hypotheses:

H_1 : *Ceteris paribus*, the COVID-19 pandemic has a negative impact on company performance in most JSE-industries.

$H_{2,1}$: *Ceteris paribus*, when a JSE-listed company's investment scale is smaller, the negative impact of COVID-19 on company performance is more pronounced.

$H_{2,2}$: *Ceteris paribus*, when a JSE-listed company's sales revenue is lower, the negative impact of COVID-19 on company performance is more pronounced.

$H_{2,3}$: *Ceteris paribus*, when a JSE-listed company's cash and liquidity levels are lower, the negative impact of COVID-19 on company performance is more pronounced.

Data and methodology

This study was based on the positivistic paradigm and was approached from an objectivist's view as a rigorous scientific research process, detached from the values and beliefs of the researcher (Saunders, Lewis & Thornhill 2019). A quantitative research design was followed by applying statistical analyses on secondary data (obtained from the IRESS Expert database), similar to the methodology applied in the Chinese study by Shen et al. (2020).

The target period of the study was the 2020 financial year (pandemic year) and the prior 6 years (2014–2019). All JSE-listed companies were included, except companies that had been delisted from the JSE prior to their 2020 financial year and companies that had missing data in the period of analysis. A total of 300 JSE-listed companies met the data requirements of the study.

The 300 JSE-listed companies were categorised into the JSE industry classifications (Table 1). The technology and telecommunications sectors, as well as consumer discretionary and consumer staples sectors, were combined (Table 1) to provide sufficient data for the analysis. The utilities sector was not represented, as there were no listed companies in this sector during the target period of this study.

To address the research problem of the study, namely to assess the impact of COVID-19 on company performance per industry sector for JSE-listed companies, the following four secondary objectives were formulated:

- Forecast company performance of JSE-listed companies by industry sector during COVID-19 and compare these to actual performance results.
- Analyse the trend of company performance of JSE-listed companies by industry sector during COVID-19 and compare these trends to company performance over the previous 6 years.

TABLE 1: Number of Johannesburg Securities Exchange-listed companies per industry sector.

Sector code	Industry sector	Number of companies
10	Technology and telecommunications	27
20	Healthcare	9
30	Financials	56
35	Real estate	47
40	Consumer discretionary and staples	64
50	Industrials	49
55	Basic materials	41
60	Energy	7
	Total	300

TABLE 2: Variables and measures applied.

Variable	Description	Measurement	Source
NROA	Net profit margin on total assets	Profit after interest and tax/total assets	IRESS Expert
CNCA	Growth rate of fixed assets	(Ending value of fixed assets for the current period – initial value of fixed assets for the current period)/(initial value of fixed assets for the current period)	IRESS Expert
REV	Revenue	The logarithm of revenue for the current period	IRESS Expert
Size	Size	The logarithm of total assets	IRESS Expert
LEV	Asset-liability ratio	Total liabilities/total assets	IRESS Expert
GROWTH	Growth rate of operating income	(Current EBITDA – previous EBITDA)/previous EBITDA	IRESS Expert
FCF1	Free cash flow	(Cash available – Capital expense)/100 000	IRESS Expert
FCF2	Free cash flow	(Cash available – Capital expense ± Net interest paid/Received)/100 000	IRESS Expert
TR	Trade receivable turnover	(Total revenue/Average trade receivable balance)/1000	IRESS Expert
LIQ	Liquidity ratio	((Current assets – ending inventory)/Current liabilities)/100 000	IRESS Expert
YEAR	Financial period		IRESS Expert
Industry sector	Classification of company into a sector		JSE

Source: Adapted from Shen, H., Fu, M., Pan, H., Yu, Z. & Chen, Y., 2020, 'The impact of the COVID-19 pandemic on firm performance', *Emerging Markets Finance and Trade* 56(10), 2213–2230. <https://doi.org/10.1080/1540496X.2020.1785863>

JSE, Johannesburg Securities Exchange; EBITDA, earnings before interest, tax, depreciation and amortisation.

- Measure the magnitude of the performance differential during COVID-19 versus the previous 6 years per industry sector.
- Determine the mechanism through which company performance was most significantly affected during the COVID-19 period.

The variables applied in this study (Table 2) are based on the methodology of Shen et al. (2020), except for the Herfindahl index (representing the share held by the top 10 shareholders) that was not included as a control variable, owing to data limitations. To accommodate the fact that this study included the financials sector (as opposed to the study of Shen et al. [2020] that excluded this sector), an additional free cash flow variable (FCF2) which includes net interest paid/received was added. The dependent variable in all regression analyses is the net return on assets (NROA) and represents the company's performance status. Similar to other studies on factors that affect corporate performance (Fu & Shen 2020; Shen et al. 2020), control variables for company size (SIZE), asset-liability ratio (LEV), earnings growth rate (GROWTH), free cash flow (FCF), trade receivable turnover (TR) and liquidity (LIQ) were included. The FCF1, FCF2 and LIQ variables were scaled down to bring their numeric values into closer alignment with the other financial variables.

To address the secondary research objectives of the study, the data analysis was divided into two parts. Firstly, financial data of JSE-listed companies per industry from 2014 to 2019 were used to predict company performance in 2020, to allow for a comparison with the actual results for 2020 (Secondary research objective 1). The actual financial data of JSE-listed companies per industry for the period 2014–2020 were also analysed in order to describe the trend of company performance by industry sector over time (Secondary research objective 2).

In line with the methodology applied by Shen et al. (2020), the following model was adopted to address Secondary research objectives 1 and 2:

$$NROA_{it+1} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 GROWTH_{it} + \beta_4 LIQ_{it} + \beta_5 INDUSTRY + \beta_6 YEAR + \epsilon_{it} \quad [\text{Eqn 1}]$$

where:

- $it+1$ is the period 2020.
- it is the period 2014–2019.
- NROA is the net profit return rate.
- SIZE is the logarithm of its total assets.
- LEV is the asset-liability ratio.
- GROWTH is the growth rate of earnings before interest, tax, depreciation and amortisation (EBITDA).
- LIQ is the liquidity ratio.

Equation 1 was used in a two-way linear fixed effect panel regression model to develop equations for each industry sector that was used to forecast company performance (NROA) for the 2020 COVID-19 year (Secondary research objective 1). A mixed model analysis of variance (ANOVA) regression was then used to analyse the trend in company performance per industry sector, from 2014 to 2020, using Equation 1 (Secondary research objective 2).

Secondly, a mixed model ANOVA regression was used to test the impact of COVID-19 on company performance and the mechanisms through which company performance was affected, to address Secondary research objectives 3 and 4. Financial data of JSE-listed companies from 2014 to 2019 were compared to the 2020 results to quantify the magnitude of the impact of COVID-19 on company performance by industry sector (Secondary research objective 3). Additionally, independent variables which were most influential concerning company performance in the 2020 COVID-19 period were identified (Secondary research objective 4).

The following model, adopted from Shen et al. (2020), was applied to address Secondary research objective 3 and represents two equations, where growth in fixed assets (CNCA) and revenue (REV) are respectively applied as explanatory variables (Eqn 2 and Eqn 3):

$$\text{NROA}_{it} = \beta_0 + \beta_1 \text{Period}_{it} + \beta_2 \text{CNCA}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{LEV}_{it} + \beta_5 \text{GROWTH}_{it} + \beta_6 \text{FCF}_{it} + \beta_7 \text{TR}_{it} + \beta_8 \text{INDUSTRY} + \beta_9 \text{YEAR} + \epsilon_{it} \quad [\text{Eqn 2}]$$

$$\text{NROA}_{it} = \beta_0 + \beta_1 \text{Period}_{it} + \beta_2 \text{REV}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{LEV}_{it} + \beta_5 \text{GROWTH}_{it} + \beta_6 \text{FCF}_{it} + \beta_7 \text{TR}_{it} + \beta_8 \text{INDUSTRY} + \beta_9 \text{YEAR} + \epsilon_{it} \quad [\text{Eqn 3}]$$

where:

- it is the period 2014–2020.
- *Period* is the dummy variable: the 'COVID-19 outbreak time'.
- NROA is the net profit return rate.
- CNCA is the growth rate of fixed assets.
- REV is the logarithm of revenues.
- SIZE is measured by the logarithm of total assets.
- LEV is the asset-liability ratio.
- GROWTH is the growth rate of EBITDA.

- FCF is free cash flow = FCF1 or FCF2.
- TR is the trade receivable turnover.

Secondary research objective 4 was addressed by allowing all exploratory variables from Equations 1 to 3 (namely CNCA, REV, SIZE, LEV, GROWTH, FCF, TR and LIQ) to interact with the *Period* variable in a mixed model ANOVA regression, to assess the variables which exerted the most influence on company performance in the 2020 COVID-19 period.

The methodology applied to address Secondary research objectives 1–3 tested Hypothesis 1 (H_1), whereas the methodology applied to address Secondary research objective 4 tested Hypothesis 2 ($H_{2,1}$, $H_{2,2}$ and $H_{2,3}$).

The Grubbs test was used to test for outliers. All variables were found to have outliers; hence, the data were winsorised to reduce the impact of outliers. The data were also tested for multicollinearity and adjusted for heteroskedasticity. A significance level of 5% was applied in the statistical analyses.

Ethical considerations

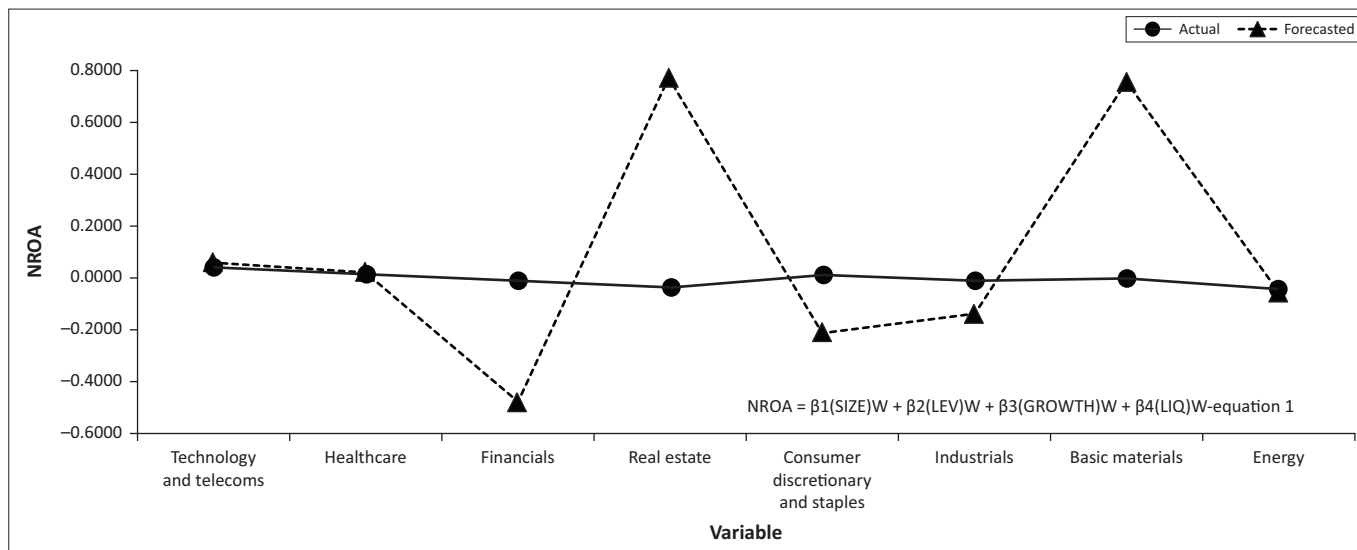
Ethical clearance to conduct this study was obtained from the University of Stellenbosch Business School Department of Ethics Screening Committee (USB DESC) (No. USB-2021-23233).

Results

Comparison of forecasted and actual company performance for the 2020 COVID-19 period

The comparison between forecasted and actual performance of JSE-listed companies during the 2020 COVID-19 period is a convenient and intuitive way to understand the impact of the pandemic on company performance per industry sector (Shen et al. 2020). The results obtained by forecasting the company performance (NROA) for the 2020 COVID-19 period per industry sector, using panel regression on Equation 1, were compared to actual results (Figure 1).

The results show that, from a company performance perspective (based on NROA), the various industry sectors were affected differently by the COVID-19 pandemic. The worst affected industries, based on a comparison with forecasted performance, were the real estate and basic materials sectors. Industries that performed better than expected were the financials, consumer discretionary and staples, and the industrials sectors. The financials sector showed the highest outperformance compared to the expected company performance for 2020. The technology and telecommunications, healthcare and energy sectors performed in line with expectations. The mean actual company performance (NROA) for the year 2020 was -0.003 , with the highest actual NROA reported by the technology and telecommunications sector, being 0.040 , and the energy



NROA, net return on assets.

FIGURE 1: Company performance forecast versus actual results during the 2020 COVID-19 period.

sector, reporting the lowest actual NROA namely -0.042 . Only the technology and telecommunications, healthcare and consumer discretionary and staples sectors showed positive NROAs during the 2020 COVID-19 year.

The results confirm global evidence of the devastating effect of COVID-19 on the real estate sector (Shen et al. 2020; Thorbecke 2020), while also supporting the fact that the basic materials sector in South Africa suffered in 2020 owing to the reduction in export demand (Ajam 2020). Although the consumer discretionary and staples sector outperformed, similar to global evidence (Machmuddah et al. 2020; Thorbecke 2020), the reported results were affected by the fact that the travel and leisure super-sector – which was brought to a halt by travel restrictions (Rogerson & Baum 2020; Shen et al. 2020) – was included in the consumer discretionary and staples classification of this study. The outperformance of the South African financials sector provided evidence of the strength of this sector, which was also observed in the resilience of South African banks during the global financial crisis of 2008 (Erasmus & Makina 2014). In line with global evidence, the performance of high-tech industries like industrials and technology and telecommunications was not negatively affected during COVID-19 (He et al. 2020; Shen et al. 2020). The company performance of the healthcare sector was also not negatively affected during COVID-19, which is in contrast to countries like China (He et al. 2020; Xiong et al. 2020) where the healthcare sector was negatively impacted and countries like India, Indonesia and the United States of America where the healthcare sector outperformed during COVID-19 (Machmuddah et al. 2020; Mittal & Sharma 2021; Thorbecke 2020). In South Africa, the impact from the remedial measures taken to stem the spread of the virus has removed most of the revenue for the healthcare sector outside of COVID-19 treatment (Lötter 2020). The energy sector on the JSE was also not negatively affected during COVID-19, in contrast to evidence of poor

performance in countries like China (He et al. 2020; Xiong et al. 2020). The sustained performance of the energy sector could possibly be driven by the strong motive for infrastructure development and the promotion of alternative energy and renewable energy sources in this sector (International Trade Administration [ITA] 2021). The results, therefore, support the findings of Rababah et al. (2020) and Bhuiyan and Chowdhury (2020) in confirming that country-specific idiosyncratic factors could impact sectors differently in different countries.

Company performance trends per industry sector (2014–2020)

A mixed model ANOVA regression analysis (which compares the means between groups), using Equation 1, was developed to understand the trends in company performance (NROA) for the entire period 2014–2020 for each industry sector (Figure 2). The healthcare and energy sectors were not represented in this analysis since there were insufficient data points for these sectors to successfully produce a mixed ANOVA regression model.

This study confirms the downward trajectory (Figure 2) of the South African economy and company performance prior to 2020 (De Villiers et al. 2020). All sectors had negative trends to varying degrees over the full period from 2014 to 2020, except for the financials sector that improved during the COVID-19 period compared to the previous year (2019). The financials, consumer discretionary and staples, and technology and telecommunications sectors had positive mean NROA values during the 2020 COVID-19 period, whereas the consumer discretionary and staples and the technology and telecommunications sectors were the only two sectors with positive mean company performance for the entire period from 2014 to 2020.

The results illustrate the difference in company performance by sector and that macroeconomic status such as GDP,

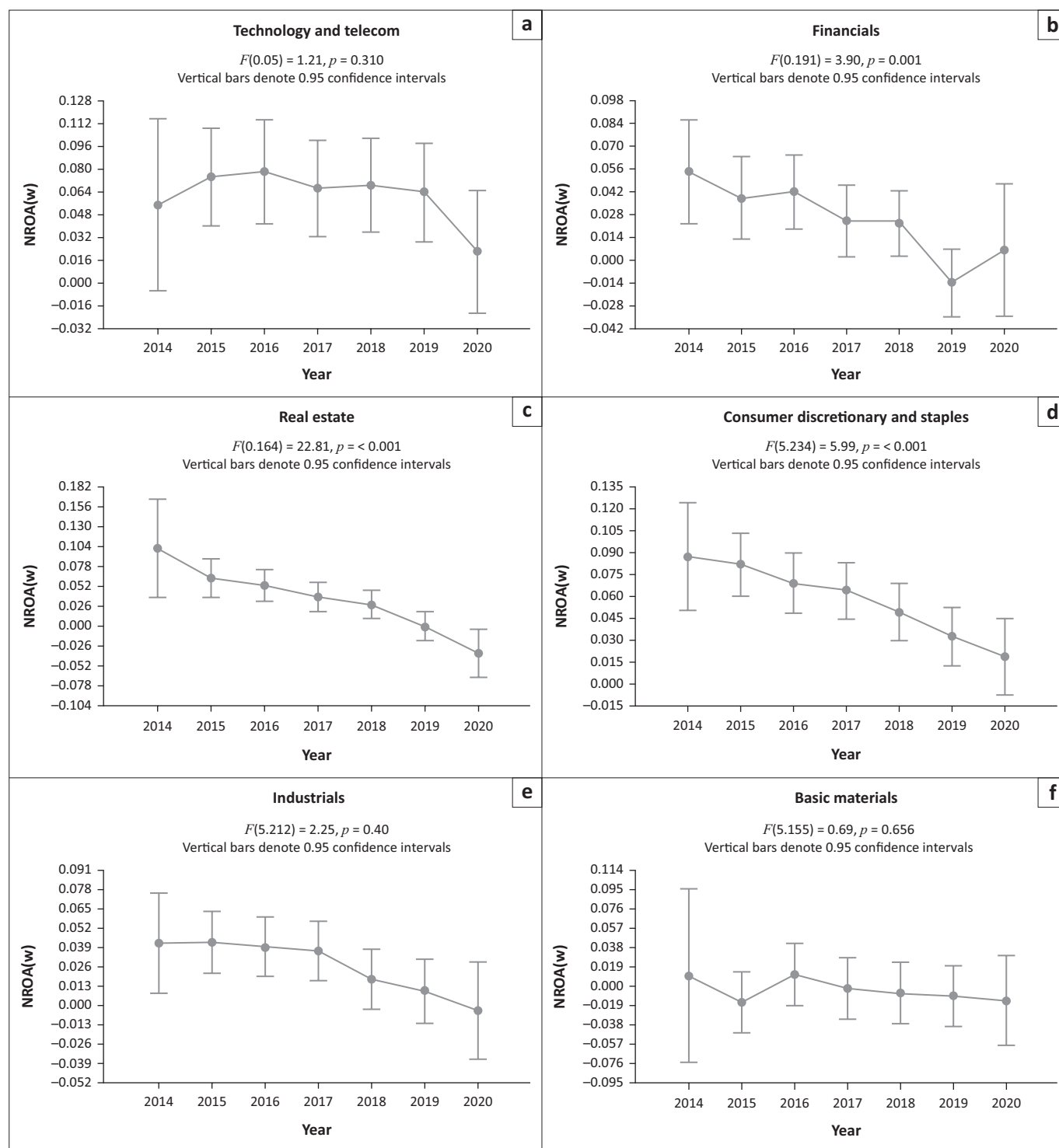


FIGURE 2: Company performance trends per industry sector (2014–2020) (a-f).

monetary factors and unemployment rates affected industry sectors in different ways and hence sectors performed differently (Issah & Antwi 2017). The suggestion by Meric et al. (2008) that certain sectors can be clustered as they tend to perform similarly when exposed to macroeconomic factors, such as the COVID-19 pandemic, is therefore not supported. The exogenous COVID-19 shock affected industry sector performance on the JSE in different ways owing to the idiosyncratic characteristics of the various sectors.

Magnitude of company performance differential during the 2020 COVID-19 period

The magnitude of the effect of COVID-19 on company performance was first analysed in total (Figure 3) and then per industry sector classification (Figure 4 and Table 3) by applying Equation 2 in a mixed model ANOVA regression analysis, using the free cash flow 1 (FCF1) variable, to compare company performance of JSE-listed companies for the pre-COVID period (2014–2019) to the 2020 COVID-19

period. The results from Equation 3, and when FCF2 was applied instead of FCF1, did not differ materially from the results (Figure 3 and Figure 4) and are therefore not reported separately.

The total company performance of JSE-listed companies shows a statistically significant decline in the average performance of about 103% (from a mean of 0.0215 to -0.0005) during the COVID-19 period (Figure 3).

The ANOVA results display the comparison between company performance per industry classification for JSE-listed companies for the pre-COVID to the 2020 COVID-19 period (Figure 4, Table 3). Superscript letters (Figure 4) indicate significant pair-wise differences, based on the

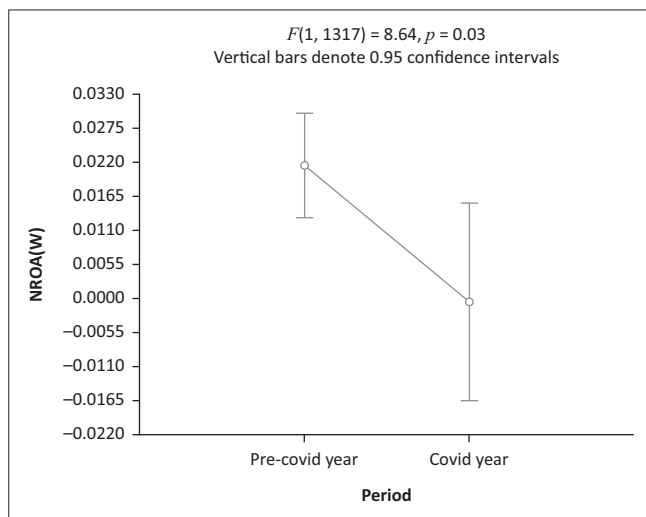


FIGURE 3: Performance of Johannesburg Securities Exchange-listed companies (pre-COVID vs. 2020 COVID-19 year).

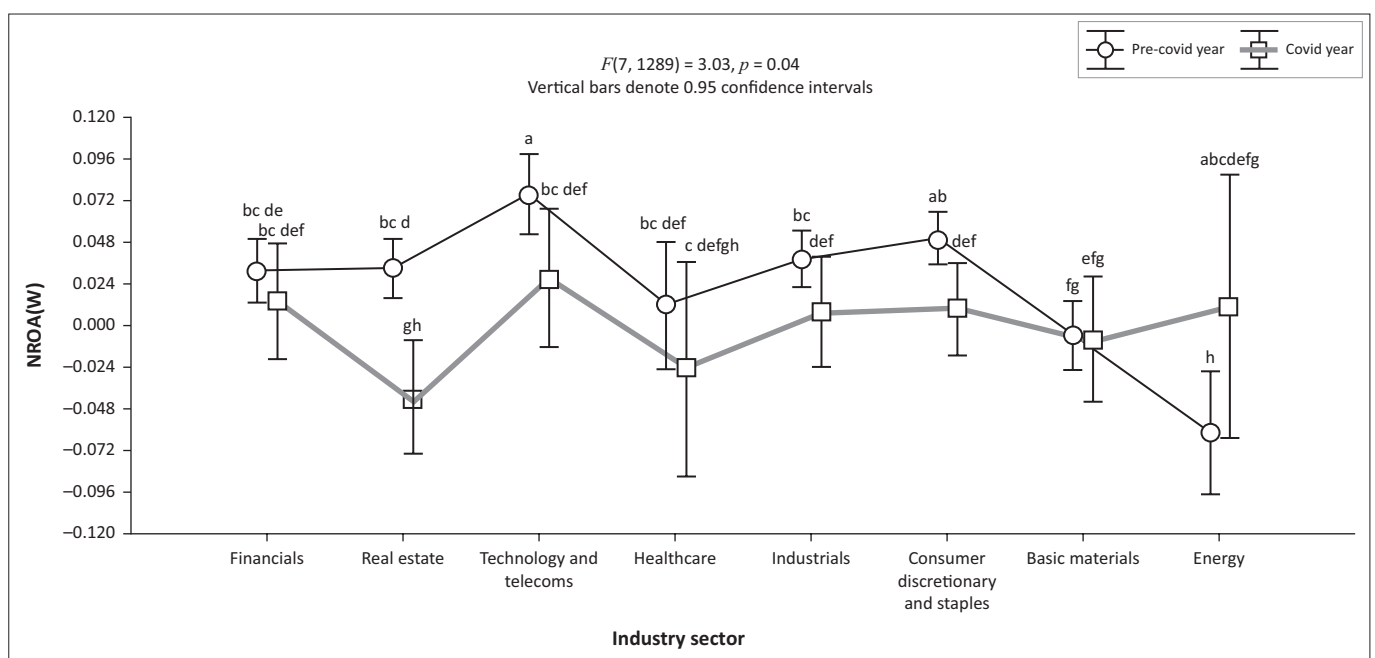
Fischer least significant difference (LSD) test, at the 5% significance level. If at least one letter overlaps when comparing two selected groups (e.g. a & ab), this indicates no significant difference between the location parameters. If there is no common letter (e.g. a & bc), this is indicative of a significant difference between the two groups at the 5% level of significance.

The negative impact of COVID-19 (Figure 4 and Table 3) in respect of real estate, technology and telecommunications, industrials and the consumer discretionary and staples sectors is statistically significant. The improved performance of the energy sector during COVID-19 is also statistically significant. As mentioned earlier, the government support and foreign direct investment in this sector could be the driving force behind its turn to an increase in NROA in 2020 (ITA 2021). The results, therefore, confirm the expectation from Hypothesis 1 (H_1), namely that the COVID-19 pandemic had a negative impact on company performance in most JSE industries.

Mechanism through which company performance is affected

The interaction of the explanatory variables in Equations 1–3 with the *Period* variable (2020) was used in a mixed model ANOVA regression analysis to determine the mechanisms through which total company performance (NROA) was most significantly affected (Table 4).

The FCF1, FCF2, TR and LIQ variables show p -values lower than 0.05, implying that these financial variables had a significant effect on company performance during the pandemic. The estimates of these variables are positive; therefore, they have a moderating effect on the negative



NROA, net return on assets.

FIGURE 4: Performance of industry sectors (pre-COVID vs. 2020 COVID-19 year).

TABLE 3: Differential in company performance between pre-COVID and 2020 COVID-19 year.

Industry sector	NROA: pre-COVID (2014–2019)	NROA: 2020 COVID-19 year	Difference (%)
Financials	0.03138	0.01385	-56
Real estate	0.03278	-0.04112	-225
Technology and telecommunications	0.07538	0.02740	-64
Healthcare	0.01164	-0.02470	-312
Industrials	0.03784	0.00797	-79
Consumer discretionary and staples	0.05004	0.00906	-82
Basic materials	-0.00586	-0.00802	-37
Energy	-0.06155	0.01095	118

NROA, net return on assets.

company performance during the pandemic – higher levels of free cash flow (FCF 1 and FCF 2), trade receivables turnover (TR) and liquidity (LIQ) will lessen the negative impact of the pandemic on corporate performance. All other financial variables had a non-significant moderating effect on company performance during the pandemic.

The results, therefore, confirm the expectation from Hypothesis 2–3 ($H_{2,3}$), namely that the negative impact of COVID-19 on company performance is more pronounced for JSE-listed companies with lower levels of cash and liquidity. The results do, however, not support the expectations from Hypothesis 2–1 ($H_{2,1}$) and 2-2 ($H_{2,2}$). Contrary to the findings of Shen et al. (2020), where investments in fixed assets (CNCA) were found to have a moderating effect on the negative company performance during the pandemic, the CNCA variable showed a negative and non-significant association with company performance during the pandemic. An increase in investments by JSE-listed companies, therefore, did not lessen the negative impact of the pandemic. Although the results show that an increase in revenues (REV) during the pandemic had a positive (moderating) association with company performance during the pandemic, this effect – contrary to the findings of Shen et al. (2020) – is not significant for JSE-listed companies. The strict COVID-19 measurements imposed by the South African government (De Villiers et al. 2020) may therefore have resulted in JSE-listed companies not being able to apply investment or revenue strategies to curb the negative effect of COVID-19 on company performance. Companies with available cash resources and those which better managed trade receivables and liquidity were, however, able to reduce the negative impact of COVID-19 on company performance.

Conclusion

The objective of this study was to assess the impact of COVID-19 on the performance of listed companies by industry sector in South Africa. The findings reveal that JSE-listed companies have experienced a significant negative impact in respect of company performance as a result of the COVID-19 pandemic. The study further confirmed that the performance of listed companies in South Africa was already on a downward trajectory owing to slow economic growth and the many challenges facing the country. The COVID-19

TABLE 4: Financial variables most significant to company performance in the 2020 COVID-19 year.

Variable	Estimate	<i>p</i>
CNCA*period	-0.0062	0.575
REV*period	0.0048	0.228
SIZE*period	-0.0018	0.658
LEV*period	-0.006	0.871
GROWTH*period	0.003	0.462
FCF1*period	0.0009	≤ 0.001
FCF2*period	0.0004	0.031
TR*period	3.9956	0.003
LIQ*period	0.0001	≤ 0.001

pandemic thus exacerbated the performance of these companies. The performance of industry sectors was affected differently as a consequence of the idiosyncratic nature of each industry and some industry sectors were affected more than others. The sectors that were the worst affected, based on actual versus forecasted performance, were the real estate and basic materials sectors. When comparing pre-COVID company performance from 2014 to 2019 with the 2020 COVID-19 year, the real estate, technology and telecommunications, industrials and the consumer discretionary and staples sectors showed statistically significant declines, and the energy sector a statistically significant improvement. Results from this study also show that the mechanism through which company performance was affected during this time of crisis hinged on cash flow.

South Africa has a difficult road ahead regarding inclusive economic growth. New ways of thinking about relationships between the public sector, private sector and civil society are required. Achieving this goal would require evidence-based analysis from a range of economic subdisciplines, such as fiscal policy, public economics, monetary policy, institutional analysis, industrial policy, financial economics and network industries regulation (Ajam 2020). This study is therefore relevant and beneficial in contributing to the analysis-based evidence required to forge these new social compacts in South Africa.

Limitations of this research study

This study focused on the impact of COVID-19 on JSE-listed company performance per industry sector. This limited the study to 300 companies, while there are thousands of large businesses and more than 2 million small and medium enterprises (SMEs) in South Africa (Small Enterprise Development Agency 2021). The impact of COVID-19 on these smaller businesses may be more severe (Rababah et al. 2020) when compared to JSE-listed companies.

This study replicated the methodology applied by the Shen et al. (2020) study on Chinese listed companies. Non-financial variables that may explain company performance were therefore not included in the analysis. There are other factors that can influence company performance in a crisis (e.g. company culture, age of the company, management practices, company structure, company learning, human capital, etc.) (Al-Tit 2017). Future research on these factors

could provide additional insights into the key mechanisms of company resilience. Furthermore, the comparison of the results of this study with those of Shen et al. (2020) was affected by the fact that annual results, as opposed to the quarterly results applied by Shen et al. (2020), were applied in this study owing to a lack of available data.

Practical implications and recommendations

This study could assist the South African government to understand the impact of COVID-19 on the performance of JSE-listed companies and, by extension, GDP growth and to develop processes and systems to support financial and business development in preparation for the next crisis. The learning from this research for business leaders is that, in times of crisis, a company's cash flow will determine whether it will survive. Companies must ensure that they are able to release cash quickly to cover their operational costs and reduce their debt burden. This study is also beneficial to investors, since it describes the impact, magnitude, resilience and idiosyncrasies of company performance per industry sector, which is useful to investors when deciding on the sector and company in which to invest. The benefit of this study to civil society is to highlight the impact of such a pandemic on civil society from an economic perspective. Like the business sector, households must have an economic plan in place when crises occur.

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Competing interests

The authors have declared that no competing interest exists.

Authors' contributions

K.M. was responsible for the data gathering and data analysis, while N.W. was responsible for the research design and supervision. Both authors were responsible for report writing.

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Data availability

Data sharing does not apply to this article as no new data were created or analysed in this study.

Disclaimer

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