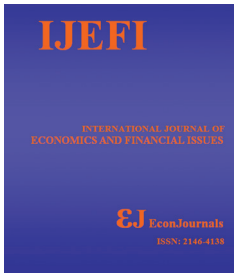

International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2023, 13(5), 32-42.

The Impact of Working Capital and Macroeconomic Variables on the Profitability of Listed Industrial Firms in South Africa

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Received: 20 April 2023 **Accepted:** 02 August 2023 **DOI:** https://doi.org/10.32479/ijefi.14497

ABSTRACT

This study examines the impact of working capital management policies and macroeconomic variables on the profitability of 83 industrial firms listed on the JSE over the period 2010-2020. The system Generalized Method of Moments approach was employed in regression analysis to deal with the existence of endogeneity. Results establish that working capital investment policy is significantly and negatively related to firm profitability. A significant and positive relationship was found between working capital financing policy and firm profitability. Contrary to our expectations, interest rates demonstrated significant and positive relations with return on assets. Exchange rates and inflation rates proved to impact firm profitability significantly and negatively, which resulted in the study recommending JSE-listed industrial firms to pay special attention to the external environment. Economic growth influenced firm profitability positively and significantly, which aligned with the idea that GDP growth increases the average consumers' income per capita, increasing the goods and services consumed, enhancing profitability.

Keywords: Working Capital Management Policies, Macroeconomic Variables, Firm Profitability
JEL Classifications: D24, G32, H32, O16, G17

1. INTRODUCTION

Finance literature identifies increasing shareholders' wealth as the primary goal of every JSE-listed industrial firm (Sucuahi and Cambarihan, 2016). Although shareholders' wealth can be increased in several paths, one straightforward path is through enhancing firm profitability (Odusanya et al., 2018). The major determinants of firm profitability in industrial firms can be classified into micro (firm-specific variables) and macro (external variables beyond the control of the firm) variables (Issah and Antwi, 2017). As part of the micro-variables, working capital management is an essential catalyst for enhancing profits; hence managing and formulating effective policies is crucial for every industrial firm, irrespective of its nature or size (Dinku, 2013). Accordingly, it is essential to note that industrial firms are exposed to the economic conditions prevalent in the environment in which they operate. As such, macroeconomic variables signalling the current economic trends may influence industrial firms' profitability (Pacini et al., 2017).

In developing economies such as South Africa, listed industrial firms are a much-needed panacea for improving economic growth (EG) and sustainable development across marginalized communities (JSE, 2020). Hence, one can argue that a thriving industrial sector is critical for bettering the South African economy. Despite being the most represented firms in South Africa, the past decade exhibits that JSE-listed industrial firms are not too big to fail, as evidenced by the number of JSE-listed industrial firms that have filed for business rescue, have been liquated and delisted. Between 2018 and 2020, well-known JSE-listed industrial firms such as Esor, Liviero Group, Basil Read Holdings, Group Five Holdings, and many others filed for business rescue (JSE, 2020). It can be noted that the number of JSE-listed firms in all sectors has reduced to 331 from 776 during the past 30 years, with an average of 14 firms delisting every year (Merwe and Bernard, 2021). The number of JSE-listed industrial firms that filed for business rescue or earned a delisting highlights some fundamental issues that need urgent attention. Although poor performance and firm failure is

attributed to various reasons in South Africa, working capital management policies (WCMP) and macroeconomic variables are frequently mentioned hence the need to examine the impact of WCMP and macroeconomic variables on firm profitability in South Africa to develop meaningful policies that improve profitability.

Many South African working capital studies predominantly focus on WCM efficiency, measured by the cash conversion cycle and its components. Some notable studies in this regard include studies by Erasmus (2010), Ngwenya (2010), Ncube (2011), Chirume (2013), Donkor (2014), Louw (2014), Kasozi (2017), and Mabandla (2018). It can also be seen that most existing working capital studies only used accounting-based profitability measures. These measures are relevant but fail to give a complete picture because they do not incorporate the cost of capital. Accordingly, Stewart (1994) reflects that the Economic Value Added (EVA), an economic-based measure of profits, is viewed as nearly 50% more accurate than accounting-based measures in explaining changes in shareholder's wealth. It is further notable that most existing studies, especially in South Africa, ignored the possible presence of endogeneity which may result in biased and inconsistent estimates when static panel data models such as the pooled OLS, fixed effects, and random effects models are used (Baltagi, 2008). While the input of existing studies cannot be disregarded, an investigation into the impact of WCMP on firm profitability represented by both an accounting and an economic-based measure is necessary to capture developments in this crucial area of South African industrial firms. There is also the need to conduct the analysis while considering the possible existence of endogeneity so that appropriate econometric models that produce more consistent and reliable estimates are used.

On top of the above, most South African studies on macroeconomic variables focused on share returns or stock prices, with very few concentrating on accounting and economic-based measures of firm profitability. Some of the notable studies focusing on share returns or stock prices include studies by Afordofe (2011), Coovadia (2014), Hackland (2015), Dlamini (2017), Banda (2017), and Ndlovu et al. (2018). Hence, this highlights a gap in the literature that this paper attempts to bridge.

2. LITERATURE REVIEW

2.1. Theoretical Review

Economists worldwide have provided several theories regarding the origins of firm profits. This paper is underpinned on the rent theory of profit, the innovation theory of profit, and the uncertainty-bearing theory of profit.

2.1.1. The rent theory of profit

The rent theory of profit by Walker (1887) described profitability as a rent of ability where profit is a rent of differential abilities that certain entrepreneurs possess. The rent theory of profit highlights that different entrepreneurs have different skills, and profits occur due to these differences in ability. Superior entrepreneurs (or, in this case, JSE-listed industrial firms) generate more profits, similar to how more productive and fertile land earns higher rent (Walker, 1887). The rent theory of profit reiterates that profitability is highly dependent on the superiority of some entrepreneurs over marginal or no-profit entrepreneurs. One of the strengths of the rent theory of profits is that it encourages firms to seek meaningful ways to be superior to other firms (Knowledgiate, 2017). Criticism of this theory note that profits can also emanate from other factors apart from entrepreneurial skill (Clark, 1908: Knight, 1921), with Nduati (2014) noting that rent and profits are not necessarily interchangeable terms (for example, rent cannot be negative, while profit (loss) can be expressed in the negative). Despite this criticism, this theory helps to explain the importance for JSE-listed industrial firms to maintain a competitive advantage (be superior entrepreneurs) and improve firm profitability. Accordingly, effective WCMP can be a vital tool to ensure industrial firms improve their superiority and competitive advantage (Hamlin and Heathfield, 1991).

2.1.2. The innovation theory of profit

The innovation theory of profit attempts to overcome the limitations of the rent theory of profit by recognising that profits also stem from successful innovations (Schumpeter, 1934). The innovation theory of profit by Schumpeter (1934) has the view that entrepreneurs (applied in this instance as JSE-listed firms) may generate profits by presenting rewarding innovations.

The innovation theory of profit views innovation from two angles. The first angle considers activities that minimize production costs, such as new techniques, advanced machinery, and improved management methods, which can be WCMP. It is also worth noting that enhanced techniques and policies of WCM can be employed as a valuable tool to minimize production costs in industrial firms (Sagner, 2011). The second angle considers activities that grow the demand for products. Improved WCMP allows industrial firms to invest in adventures that may enhance the quality of products and design to increase demand (Bank, 2019). The theory assumes that entrepreneurs (or JSE-listed industrial firms) only generate profit if they make innovations that are prosperous in minimising production costs or growing the demand for products (Schumpeter, 1934).

One of the strengths of the innovation theory of profit is that it encourages firms to innovate new techniques and policies that minimize production costs while increasing the demand for products, ultimately improving firm profitability. The theory has been criticized for focusing on innovations only as a source of profitability because other factors, such as strategic resources, bring profits (Knowledgiate, 2017). Regardless of the criticism, the theory is adopted in this study to substantiate the importance of improved and effective WCMP as an innovation that ultimately enhances the profitability of JSE-listed industrial firms.

2.1.3. Uncertainty-bearing theory of profit

The uncertainty-bearing theory of Profit by Knight (1921) presents that profits rely heavily on uncertainty bearing from non-insurable risks. This theory divides risk into unforeseeable and foreseeable risks (Knight, 1921). Foreseeable risk, which is insurable, entails risks that can be measured since their probability of manifesting can be estimated, while unforeseeable risks cannot be estimated, meaning they are non-insurable (Knight, 1921). Knight (1921) views foreseeable risks as not genuine risks capable of generating profits, meaning insurable risk fails to generate profits.

The theory assumes that profit arises because of unforeseeable and non-insurable risks, such as cyclical and risk of change in government policies (Knight, 1921). One of the strengths of the uncertainty-bearing theory of profit is that it is more detailed than other theories because it incorporates risk, the role of business ability, and economic changes (Shailesh, 2013). On the other hand, critics of this theory, among them Knowledgiate (2017), note that an entrepreneur's primary function is not limited to bearing uncertainty only but to complete different functions such as supervision and coordination of business operations.

Irrespective of the limitations of the uncertainty-bearing theory of profit, in this study, the theory explains the essence for JSE-listed industrial firms to bear and manage uncertainty (cyclical risk and risk of change in government policies) in the macroeconomic environment and seek meaningful ways to improve firm profitability.

2.2. Empirical Review

Numerous studies have examined the impact of WCMPs, macroeconomic variables, and firm profitability, and the findings have been somewhat mixed.

2.2.1. Evidence on WCMPs

Nazir and Afza (2009) used 204 non-financial firms in Pakistan to explore the association between WCMP and firm profitability measured by Return on Assets (ROA) and the Tobin's Q from 1998 to 2005. The pooled OLS model used in regression analysis discovered a significant and positive relationship between the current assets to total assets ratio (CATAR) and both profitability measures. Furthermore, the authors found a significant and negative relationship between the current liabilities to total assets ratio (CLTAR) and ROA.

In Kenya, Mulogoli (2015) used the annual data of 30 non-financial firms listed on the NSE between 2010 and 2014 to determine the impact of WCMP on profitability. By using the random effects model in regression analysis, the study's findings reveal a significant and positive relationship between ROA and both independent variables, CATAR and CLTAR.

Thakur and Muktadir-Al-Mukit (2017) used 80 listed manufacturing firms in Bangladesh from 2009 to 2014 to evaluate the impact of WCFP on profitability measured by ROA. By employing the fixed effects model, interestingly, the authors found an insignificant and negative association between ROA and CATAR, which is different from Javid and Zita (2014), who found that the relationship was negative and significant.

Rizki et al. (2019) evaluated the effect of WCMP on profitability using 19 property firms in Indonesia from 2011 to 2015 where ROA and ROE measured profitability. By using the fixed effects model, results showed a significant and negative association between CATAR and both measures of profitability.

In Ghana, Obeng et al. (2021) ascertained if effective WCM enhances firm profitability and the value of listed non-financial firms. Utilising annual data for 19 firms, the system GMM used in regression analysis found a significant and negative association between CLTAR and ROA, meaning increasing the use of short-term financing reduced the ROA. For firm value, a significant and positive relationship was found between CLTAR and the TQ.

The reviewed literature lacks empirical evidence in South Africa regarding the impact of WCMP on accounting and economic-based measures of firm profitability. Hence the interest of this paper is to uncover the extent to which WCMP impacts accounting and economic-based measures of profits while also considering the potential presence of endogeneity in the analysis.

2.2.2. Evidence on macroeconomic variables

Afordofe (2011) used the GDP, inflation rate (INR), interest rate (IR), and exchange rate (ER) to examine their relationships with the South African Resources sector's share returns from 2002 to 2011. The runs test and a test for autocorrelations showed a positive correlation between the GDP and the average market return (AMR). A negative correlation between IR and the AMR was found, while the relationship between ER and AMR was positive. Lastly, the result between the INR and AMR was inconclusive.

Mwangi (2013) used 21 aviation firms in Kenya to determine the impact of the ER, change in money supply (MS), IR, and INR on ROA from 2008 to 2012. The pooled OLS used discovered a negative relationship between ER and ROA. None of the relationships were found to be significant, which indicated that there existed other variables that impacted the profitability of aviation firms.

In Taiwan, Lee (2014) evaluated the impact of micro-variables alongside macro-economic variables on the profitability of 15 property-liability insurance firms using data between 1999 and 2009. By utilising the random effects models in regression analysis, the study found a significant and positive association between EG, INR, and operating ratio (OR). However, market share depicted negative and significant relations with OR. These findings reveal that the rise in EG and the INR increased the firms OR.

Pervan et al. (2019) examined the impact of EG and INRs on the determinants of the ROA of 9359 Croatian manufacturing firms from 2006 to 2015. The GMM model employed to analyse the data discovered a positive and significant relationship between EG and ROA. Significant and positive relations were also spotted between ROA and INR, indicating that the rise in prices improved the profitability of Croatian firms.

Odusanya et al. (2018), in their study that examined the determinants of firm profitability in Nigeria, tested the impact of the INRs and IRs on the profitability of 114 non-financial firms measured by ROA from 1998 to 2012. The system GMM employed discovered a significant and negative association between INR and firm profitability. Additionally, IR had negative and significant relations with profitability, contemplating that soaring borrowing costs from financial institutions harmed profitability.

Yeboah and Takacs (2019) used annual data for 48 JSE-listed firms in the mining and manufacturing sectors to determine the

effect of ER fluctuations on ROA. The study employed the South African rand against the US dollar ER. The random-effects model in regression analysis found a significant and negative relationship between ER fluctuation and profitability when both sectors were considered simultaneously, signifying that a depreciation in the ER decreases profitability.

Notably, the few macroeconomic variables studies in South Africa that looked at firm profitability mainly focused on accounting-based measures of profit only that fail to portray a complete picture due to not incorporating the cost of capital, which is a limitation. Thus an analysis of the impact of macroeconomic variables on accounting and economic-based firm profitability measures is crucial to understand this topic in the South African industrial sector space.

3. DATA AND METHODOLOGY

3.1. Data

The paper uses secondary and panel data in which the behaviour of firms was observed over several periods. Annual data from 2010 to 2020 on the 83 JSE-listed industrial firms was obtained from audited company financial statements from the INET BFA database, StatsSA online, South African Reserve Bank online, and World Bank Online. Annual data spanning from 2010 to 2020 was used for the simple reason that the latest data for investigation was available for this period.

3.2. Description of Variables

To determine the impact of WCMP and macroeconomic variables on firm profitability, the authors identified important variables representing WCMP and firm profitability. Other variables within industrial firms that impact firm profitability were included as control variables. The measurement of how the adopted variables were computed is illustrated in Table 1 below.

3.3. Data Analysis

The paper used descriptive statistics, correlation analysis, and regression analysis to determine the impact of WCMP and macroeconomic variables on firm profitability. Consequently, the selection procedure of the panel data model adopted in regression analysis is highlighted below.

3.3.1. Testing for endogeneity

The most frequent problem facing studies focusing on working capital variables and firm profitability is the endogeneity problem. Baños-Caballero et al. (2014) purport that in WCMP and profitability studies, endogeneity arises from simultaneity since it is highly plausible that there is a reverse relationship between WCMP and profitability. The existence of endogeneity makes the estimates of the pooled OLS, fixed effects, and random effects models biased and less efficient (Schultz et al., 2010). Consequently, the Durbin and Wu-Hausman test presented in Appendix 1 informed that endogeneity was a concern because of the significant P-values found for WCIP, WCFP, and the debt ratio (DR).

3.3.2. Panel data model with an endogenous explanatory variable

To overcome the problem of endogeneity, various authors such as Moussa (2018) and Obeng et al. (2021) used a more robust technique termed the dynamic GMM. The dynamic GMM solves all endogeneity issues and produces unbiased estimates by using valid internal instruments during the analysis. Based on comparable studies such as Odusanya et al. (2018) and Obeng et al. (2021), the system GMM technique was preferred ahead of the first difference GMM as it addresses limitations of the first difference GMM in that it incorporates the levels equations in the estimation procedure (Wintoki et al., 2012). The adequateness of the system GMM method of estimation is also hinged on several conditions, which are similar to what is in the current study; few periods and many individuals, a linear relationship, a dynamic dependent variable, and independent variables that are not strictly exogenous (Roodman, 2009; Odusanya et al., 2018). Specification tests will be observed to prove the reliability of the system GMM estimator using the Arellano and Bond test of autocorrelation errors and the Sargan/Hansen tests of overidentification.

3.3.3. Empirical model

The empirical models employed to test the study hypotheses are presented in Equations 1 and 2.]

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 WCIP_{it} + \beta_3 WCFP_{it} + \beta_4 IR_{it} + \beta_5 ER_{it} + \beta_6 INR_{it} + \beta_7 EG_{it} + \beta_8 FS_{it} + \beta_9 DR_{it} + \beta_{10} COVID-19_{it} + \epsilon_{it} \quad (1)$$

$$EVA_{it} = \beta_0 + \beta_1 EVA_{it-1} + \beta_2 WCIP_{it} + \beta_3 WCFP_{it} + \beta_4 IR_{it} + \beta_5 ER_{it} + \beta_6 INR_{it} + \beta_7 EG_{it} + \beta_8 FS_{it} + \beta_9 DR_{it} + \beta_{10} COVID-19_{it} + \epsilon_{it} \quad (2)$$

Where:

ROA_{it} represents the ROA of firm *i at* time *t*, ROA_{it-1} is the lagged value of ROA, EVA_{it} is the Economic Valued added of firm *i at* time *t*, EVA_{it-1} is the lagged value of Economic Value Added, $WCIP_{it}$ is the Working Capital Investment Policy *of* firm *i* at time *t*, $WCFP_{it}$ is the Working Capital Financing Policy of firm *i* at time *t*, IR_{it} is the Interest Rate of firm *i at* time *t*, ER_{it} is the Exchange Rate of firm *i at* time *t*, INR_{it} is the INR of firm *i* at time *t*, EG_{it} is the Economic Growth of firm *i* at time *t*, FS_{it} is the Firm Size of firm *i* at time *t*, DR_{it} is the Debt Ratio of firm *i* at time *t* and COVID-19_{it} is a Dummy Variable.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the variables adopted in the study. ROA is 12.64% on average, with a minimum and maximum value of −22.78% and 59.44.% respectively. This mean value is lower than that found by Chirume (2013) of 15.85% from 2001 to 2010 on the same stock exchange, suggesting that South African firms were not better in utilising the available assets during the period under study than in periods before. EVA has a mean value of 0.03, with a minimum and maximum value of −1.04 and 1.64, respectively. A negative minimum value of the EVA depicts poor financial performance since it suggests that value was not created from the invested funds in the business. The standard deviation of EVA depicts that data is more spread out.

Table 1: Variables description

Variable	Brief description	Adopted from	Hypotheses
Dependent			
ROA	ROA shows the amount of income generated using available assets Gitman et al., 2014) ROA is expressed as Net Income/Total Assets*100.	Rizki et al. (2019).	
EVA[1]	EVA shows the firm's actual economic profit considering the cost of equity (Gitman et al., 2014). EVA is expressed as Net operating Profit after tax-(Weighted average cost of capital * Invested Capital).	Mukeredzi (2019).	
Independent			
WCIP	WCIP entails the target levels of each current assets category (Murugesu, 2013). WCIP is expressed as Current assets/Total assets.	Mulogoli (2015) and Rizki et al. (2019).	Negative and significant
WCFP	WCFP entails the means of financing investments in current assets (Kwenda, 2014). WCFP is expressed as Current liabilities/Total assets.	Mulogoli (2015) and Rizki et al. (2019).	Positive and significant
IR	IR are costs charged to the borrower for borrowing cash from financial institutions (Irungu and Muturi, 2015). IR is expressed as the annual average prime lending rate.	Hackland (2015) and Banda (2017).	Negative and Significant
ER	ER denote the price at which the currency for a particular country is exchanged for another country's currency (Egbunike and Okerekeoti, 2018). ER is expressed as the annual average USD/ZAR.	Hackland (2015) and Yeboah and Takacs (2019).	Negative and significant
INR	INR is the depreciation rate of the actual value of money (Cukierman et al., 2002). INR is expressed as the annual average CPI.	Kana (2017) and Hackland (2015).	Negative/Positive and Significant
EG	EG refers to a rise in the inflation-adjusted market value of the goods and services manufactured in an economy during a particular period (Sheefeni, 2015). EG is expressed as: $(GD_{Pt}–GDP_{t-1})/GDP_t$	Afordofe (2011) and Banda (2017).	Positive and Significant
Control			
FS	FS entails the size of a firm. FS is expressed as the natural logarithm of Total assets. LN (Total assets)	Rizki et al. (2019).	Positive/Negative and significant
DR	DR shows the percentage of a firm's assets financed by debt (Gitman et al., 2014). DR is expressed as Total liabilities/Total assets.	Mulogoli (2015)	Negative and significant
Dummy variable-(COVID-19)	COVID-19 is incorporated to capture the effects of the pandemic.		Negative and Significant

Source: Authors Own construction based on literature review. ROA: Return on assets, EVA: Economic value added, WCIP: Working capital investment policy, WCFP: Working capital financing policy, INR: Inflation rate, IR: Interest rate, ER: Exchange rate, EG: Economic growth, FS: Firm size, DR: Debt ratio

Table 2: Descriptive statistics

Variable	Mean	SD	Min	Max
ROA	12.6386	11.1686	−22.7800	59.4400
EVA	0.0260	0.2845	−1.0392	1.6392
WCIP	0.5878	0.2276	0.0932	0.9642
WCFP	0.3850	0.1927	0.0651	0.8972
Interest rate	9.4036	0.8558	7.8495	10.4020
Exchange rate	12.5606	2.4586	7.2601	16.4414
Inflation rate	5.1122	0.9281	3.3000	6.4000
Economic growth	0.4649	2.6437	−6.9600	3.2890
Firm size	15.3879	1.5189	11.3707	18.8720
Debt ratio	0.5804	0.2220	0.1270	1.1217
COVID-19	0.8955	0.3062	0	1

Std. Dev. is the standard deviation, Min is the minimum, and Max is the maximum. See Table 1 for descriptions of all the used variables. ROA: Return on assets, EVA: Economic value added, WCIP: Working capital investment policy, WCFP: Working capital financing policy

The mean value of WCIP is 0.59, which is lower than that of 0.64 obtained by Kwenda (2014) from 2001 to 2010 on a similar stock exchange in South Africa. However, unlike this study Kwenda (2014) incorporated firms outside the industrial sector, which may account for the differences observed. The minimum value of 0.09 and the maximum value of 0.96 of WCIP portray that some JSE-listed industrial firms pursued aggressive and conservative policies of working capital investment. The value of the standard deviation of the WCIP displays less variability in the data from the mean. WCFP ranges between 0.06 and 0.90, highlighting that some JSE-listed industrial firms pursued conservative and aggressive policies of working capital financing. On average, the WCFP is 0.39, suggesting that nearly a third of the total assets of the sample JSE-listed industrial firms were financed by current liabilities. The value of the standard deviation from the mean value displays less variability in the data.

The macroeconomic variables have positive mean values, and their standard deviations show less variability to their corresponding means, as displayed by their low standard deviations except for EG. IR ranges between 7.85% and 10.40%. These fluctuations can be attributed to various factors, including the INR trend since the South African Reserve Bank uses IRs to control Inflation (Heakal, 2019). On average, the ER is R 12.56, with a minimum and maximum value of R 7.26 and R16.44, respectively. Political instability, among other factors, is credited for the wide gap between the minimum and maximum value of the USD/ZAR ER, as it is widely believed that political unrest chases away investors and intensely impacts the value of the ZAR (Magoane, 2020).

The minimum and maximum values of the INR are 3.30% and 6.40%, respectively, suggesting that the rate was less volatile since it didn't fluctuate extensively. The reasonable INRs attained show the robustness and adequateness of the inflation-targeting policy enforced by the SARB. The standard deviation displays a normal spread of data as it is lower than the mean of Inflation. The mean EG value is 0.46, with a minimum and maximum value of −6.96% and 3.29%, respectively. Van Heerden and Roos (2021) attribute minimum GDP growth of −6.96% to the lockdown regulations implemented due to

1 The EVA is scaled by dividing it by total assets to do away with the issue of size and diverging figures.

the outbreak of COVID-19, which severely strained tourism, trade, and the economy in general. The mean value of the DR is 0.58, signifying that most industrial firms use about 58% of debt to finance their assets, close to the 0.57 obtained by Lehobo (2012) from 2004 to 2008 on a similar stock exchange in South Africa.

4.2. Correlation Analysis

Table 3 shows the correlation matrix for the employed variables, which was also used to check for multicollinearity between the independent variables employed. There was no concern for multicollinearity problems after carefully looking at the correlation coefficients between the adopted independent variables. The highest correlation was 0.73 for IR andEG.

WCIP exhibits a very weak and positive correlation with both profitability measures, consistent with the studies by Obeng et al. (2021) in Ghana and Shajar (2018) in India, particularly for ROA. Although very weak, a positive association was spotted between WCFP and EVA, which is expected. All profitability measures are positively and significantly correlated with IRs which is surprising since the literature highlights that soaring IRs increase borrowing costs while worsening the debt settlement burden, which may negatively influence firm profitability. In accordance to ERs, negative and significant correlations are discovered with both profitability measures, which was expected because the depreciation of the ZAR increases importing costs which may ultimately reduce profits. A positive and significant correlation was discovered between INRs and firm profitability, consistent with Semenova and Vitkova (2019), who suggested that in inflationary periods rising prices and intense demand for different goods and services is a significant driver for firm profitability. EG shares a positive association with both profitability measures, illustrating that favourable economic cycles enhance financial performance, which is in line with Yeboah and Takacs (2019). Firm size (FS) is positively correlated with EVA, coinciding with the idea that bigger firms profit from economies of scale, market power, and better access to external finance, enhancing firm profitability. The negative connection between firm profitability and the DR is in line with the pecking order theory, which anticipates negative relations between these two variables (Samour and Hassan, 2016).

4.3. Structural Break Test

Not identifying structural breaks and correcting them could cause misleading results. The Ditzen et al. (2021) sequential F-test used to test for structural breaks revealed that no breaks were present as depicted in Table 4. The HAC robust variance estimator was used to account for heteroskedasticity and autocorrelation.

4.4. Regression Analysis

The correlation matrix does not imply causation; therefore, regression analysis was employed to determine the impact of WCMP and macroeconomic variables on firm profitability.

From Table 5, the coefficient of WCIP is negative and statistically significant at 5% level, indicating a negative and significant relationship between WCIP and ROA. The results showed that a unit increase in WCIP reduced ROA by 1.588 units. This finding supports the idea of the conservative policy of WCIP, which postulates that maintaining a high level of current assets as a percentage of total assets results in lower firm profitability at the expense of high liquidity (Nazir and Afza, 2009). The empirical finding is consistent with the studies of Vahid et al. (2012), Murugesu (2013), Pai (2014), Puraghajan et al. (2014), and Rizki et al. (2019), who highlighted that increasing investments in current assets and becoming more conservative in WCIP reduced ROA in their respective countries.

The coefficient of WCFP is positive and significant at 1% level, indicating that there is a positive and significant relationship between WCFP and ROA. The result shows that a unit increase in WCFP improved ROA by 5.999 units. The observed findings contemplate that holding other variables constant, financing fluctuating current assets, and a reasonable portion of permanent current assets using a high fraction of short-term sources relative to long-term sources improved ROA, which was expected and consistent with the studies by Mwangi et al. (2014), Puraghajan et al. (2014), Mulogoli (2015), and Rizki et al. (2019).

Contrary to our expectations, IRs demonstrated positive and significant relations with ROA at 1% significance level, coinciding with Yeboah and Takacs (2019). The ER demonstrates negative and statistically significant relations with ROA at 10% significance level. The observed finding implies that increasing ERs (rand depreciation) by a unit reduces the ROA of JSE-listed industrial firms by 0.995 units. The occurrence of a significant negative association between ER and ROA is indicated in previous studies by Pacini et al. (2017), Egbunike and Okerekeoti (2018), and Yeboah and Takacs (2019). Inflation also influenced ROA

Table 3: Correlation analysis

Variable	ROA	EVA	WCIP	WCFP	IR	ER	INR	EG	FS	DR
ROA	1									
EVA	0.51***	1								
WCIP	0.028	0.06	1							
WCFP	−0.13**	0.01	0.51***	1						
IR	0.16**	0.11*	0.027	−0.01	1					
ER	−0.16***	−0.14**	−0.06	−0.04	−0.19***	1				
INR	0.16***	0.11*	0.059	0.05	0.50***	−0.57***	1			
EG	0.21***	0.16***	0.067	0.03	0.73***	−0.73***	0.68***	1		
FS	−0.032	0.14**	−0.21***	0.09	0.01	0.07	−0.05	−0.05	1	
DR	−0.13**	−0.06	0.018	0.64***	−0.04	0.09	−0.04	−0.09	0.39***	1

*P<0.05, **P<0.01, ***P<0.001 indicates 5%, 1%, 0.01% significance level. See Table 1 for descriptions of all the used variables. ROA: Return on assets, EVA: Economic value added, WCIP: Working capital investment policy, WCFP: Working capital financing policy, INR: Inflation rate, IR: Interest rate, ER: Exchange rate, EG: Economic growth, FS: Firm size, DR: Debt ratio

Table 4: Sequential test for multiple breaks

Test statistic		Bai and Perron critical values		
		1% critical value	5% critical value	10% critical value
F (1|0)	2.06	3.82	3.12	2.81
F (2|1)	−7.52	4.05	3.45	3.11
Detected number of breaks:				

Break points: No breaks found

Table 5: WCMP and macroeconomic variables on ROA

Dependent: ROA	Coefficient	Std. err.	t-value	P>|t|
L.ROA	0.740***	0.0158	46.78	0.0000
WCIP	−1.588**	0.687	−2.31	0.0230
WCFP	5.999***	1.227	4.89	0.0000
Interest rate	2.869***	0.907	3.16	0.0020
Exchange rate	−0.995*	0.509	−1.96	0.0540
Inflation rate	−1.072**	0.504	−2.13	0.0360
Economic growth	0.318**	0.156	2.05	0.0440
Firm size	0.204	0.163	1.25	0.2150
Debt ratio	−6.871***	1.278	−5.38	0.0000
COVID-19	−4.050***	0.383	−10.57	0.0000
Observations				625
Number of groups				77
Number of instruments				63
AR (1)				0.000
AR (2)				0.682
Hansen test				0.152

***P<0.01, **P<0.05, *P<0.1. ROA: Return on assets, WCIP: Working capital investment policy, WCFP: Working capital financing policy

negatively and significantly but at 5% level, which was expected. The result also suggests that a unit increase of INRs reduced ROA by 1.072 units. It is perceived that soaring INRs raise production costs while decreasing consumer purchasing power, affecting firm profitability (Soukhakian and Khodakarami, 2019).

As expected, the findings show a positive and significant relationship between EG measured by the GDP growth rate and ROA at 5% level. The spotted relationship between EG and ROA is consistent with the studies of Pacini et al. (2017), Shajar (2018), Egbunike and Okerekeoti (2018), Dewi et al. (2019), Pervan et al. (2019), and Rizki et al. (2019). The coefficient of the lag of ROA (dependent variable) is positive and statistically significant at 1% level, indicating that profitability in the current period depends on the previous year's performance.

The results further reveal that FS is positively and insignificantly related to firm profitability, implying that FS was not a major determinant of ROA. The coefficient of the DR is negative and statistically significant at 1% level, meaning the higher the DR, the lower the firm profitability coinciding with the pecking order theory that anticipates a negative association between debt and firm profitability because profitable firms do not require much debt (Samour and Hassan, 2016). COVID-19, a dummy variable incorporated to capture the effects of the pandemic as a potential control variable, is negative and statistically significant, implying that industrial firms' performance was low during the COVID-19 era.

Table 6 shows the regression results of WCMP and macroeconomic variables on EVA. Consistent with the results in Table 5, where

Table 6: WCMP and macroeconomic variables on EVA

Dependent: EVA	Coefficient	Std. err.	t-value	P>|t|
L.EVA	0.314***	−0.0163	19.270	0.0000
WCIP	−0.150**	−0.0696	−2.150	0.0340
WCFP	0.332**	−0.152	2.170	0.0330
Interest rate	−0.231***	−0.0433	−5.330	0.0000
Exchange rate	−0.0466**	−0.0226	−2.060	0.0430
Inflation rate	−0.111***	−0.0212	−5.260	0.0000
Economic growth	0.0194**	0.0083	2.340	0.0220
Firm size	0.0987***	−0.0089	19.270	0.0000
Debt ratio	−1.260***	−0.141	−8.960	0.0000
COVID-19	−0.180***	−0.0181	−9.940	0.0000
Observations				625
Number of groups				77
Number of instruments				59
AR (1)				0.03
AR (2)				0.357
Hansen test				0.252

***P<0.01, **P<0.05, *P<0.1. ROA: Return on assets, WCIP: Working capital investment policy, WCFP: Working capital financing policy

ROA was used as a dependent variable, the coefficient of WCIP is also negative and statistically significant at 5% level, indicating that the lower the WCIP of industrial firms, the higher the EVA. The negative and significant association can be validated by the fact that maintaining a high level of working capital results in higher working capital requirements, which increases interest costs (cost of capital) while hindering firm profitability (Chirume, 2013). The results indicate that WCFP is positively associated with EVA at 5% significance level, suggesting that a rising current liabilities to total assets ratio (CLTAR) enhanced the economic-based measure of firm profitability. The WCFP coefficient implies that a unit increase in WCFP improves EVA by 0.332 units. Therefore, a positive and significant relationship was spotted between an aggressive WCFP and EVA, which differs from the studies of Bandara and Weerakoon (2014) and Adam and Quansah (2017), who suggested that firms pursuing an aggressive WCFP created lower EVA.

IRs demonstrate a negative and significant coefficient with EVA 1% level, contemplating that increasing borrowing costs are detrimental to the EVA of JSE-listed industrial firms. The observed result aligns with Ramadan (2016). As expected, ER exhibits a negative and significant relationship with EVA at 5% level, signalling that the rand's depreciation reduces the economic-based measure of firm profitability. However, the observed relationship between ER and EVA contradicts the positive and significant association obtained by Atanda et al. (2015) and Massooma et al. (2020).

The INR demonstrates negative and significant relations with EVA at 1% level. The results show that a unit increase in INR reduces JSE-listed industrial firms' EVA by 0.111 units. It is believed that during periods of Inflation, banks and financial institutions are forced to raise the costs of borrowing to counter inflation losses; as such, the cost of capital of firms is increased, which may negatively impact the EVA (Soukhakian and Khodakarami, 2019). The observed result is consistent with Atanda et al. (2015) but differs from Ramadan (2016). In the same vein as ROA, EVA is influenced by EG positively and significantly at 5% level, supporting the argument that growth in the economy increases the income per capita of the population, which increases the variety of goods and

services consumed, resulting in a higher EVA (Soukhakian and Khodakarami, 2019). The positive and significant result between EG and EVA is consistent with Atanda et al. (2015) and Ramadan (2016). The coefficient of FS depicts that a unit increase in the size of an industrial firm improved the firm's EVA by 0.0987 units.

Tables 5 and 6 also reports the results of the specification tests associated with the system GMM, which shows that the estimated models passed the AR (2) test of no serial auto-correlation as the higher P-values of the AR (2) tests (above 5%) infer that we cannot reject the null hypothesis of no correlation. The higher P-values of the Hansen test (above 5%) suggest that the models conveyed in Tables 5 and 6 are not over-identified in instruments highlighting that the models passed the over-identification of instruments test.

In a GMM estimation, the number of instruments must be less than the group number. As shown in Tables 5 and 6, the number of instruments is also less than the number of groups pointing to the correct model specification. Moreover, the lagged-dependent variables firm profitability (ROA and EVA) coefficients are <1 and statistically significant in all the models, which is consistent with dynamic stability. These findings attest to the correct specification of the models. The significant F test also indicates that the coefficients are jointly not equal to zero and that the model is significant.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study examined the impact of WCMP and macroeconomic on the firm profitability of JSE-listed industrial firms measured by ROA and EVA. The industrial sector has been declining, as characterized by major players issuing profit warnings. Before the outbreak of the Coronavirus, in the 2019 financial year, major players in the industrial sector, namely Tongatt Hullet, Telkom, Shoprite, Nissan, Massmart, and many others, issued profit warnings (Creig, 2019). Therefore, one can anticipate that the pandemic outbreak worsened the performance of JSE-listed industrial firms. In such difficult times for JSE-listed industrial firms' immediate attention in the form of improved policies is crucial to enhance the resilience of JSE-listed industrial firms.

Owing to the findings, the study recommends following an aggressive WCIP that maintains a low level of current assets as a percentage of total assets because it proved to enhance both profitability measures due to the significant and negative coefficients found. For WCFP, the study recommends the managers of JSE-listed industrial firms to pursue an aggressive policy where they finance fluctuating current assets and a reasonable portion of permanent current assets using a high fraction of short-term sources relative to long-term sources because it improved both measures of firm profitability. By financing current assets with high levels of short-term debt, such as short-term bank loans and trade credit, the profitability of JSE-listed industrial firms will be enhanced due to less interest payments.

JSE-listed industrial firms are further recommended to abstain from using higher debt levels and seriously consider IRs when borrowing because they significantly affect the economic-based measure of firm profitability. At the same time, the South African Reserve Bank, responsible for determining the country's IRs is encouraged to formulate policies that result in lower IRs so that the profitability of listed firms is improved, which ultimately enhances the South African economy. As far as ERs are concerned, the South African Reserve Bank and the government are encouraged to formulate policies to maintain a stable ER to allow JSE-listed industrial firms to acquire the required raw materials from international markets with ease. On this note, managers of JSE-listed industrial firms are encouraged to use foreign ERs risk management techniques such as future contracts, currency swaps, and hedging to avoid harming their profits. The South African Reserve Bank is recommended to continue formulating meaningful inflation-targeting policies to lower inflation levels that negatively affect firm profitability. The study also recommends the South African government to make meaningful policies such as improving skills and qualifications, establishing new technology, and improving management techniques that will enhance GDP growth, thus ultimately improving the profitability of JSE-listed industrial firms.

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APPENDIX

Appendix 1: Test of endogeneity

H_0: Variables are exogenous				
Dependent: ROA	**Durbin**		**Wu-Hausman**	
Instrumented variable	**Durbin (score)**	**prob**	**Wu-Hausman (F)**	**Prob**
WCIP	27.081	0.0000	28.358	0.0000
WCFP	5.4590	0.0195	5.4527	0.0200
Interest rate	0.0079	0.9292	0.0077	0.9301
Exchange rate	0.0660	0.7972	0.0647	0.7994
Inflation rate	0.9561	0.3282	0.9387	0.3332
Economic growth	1.3461	0.2460	1.3264	0.2502
Firm size	1.6645	0.1970	1.6329	0.2021
Debt ratio	22.137	0.0000	22.932	0.0000
H_0: Variables are exogenous				
Dependent: EVA	**Durbin**		**Wu-Hausman**	
Instrumented variable	**Durbin (score)**	**prob**	**Wu-Hausman (F)**	**Prob**
WCIP	14.223	0.0002	14.478	0.0002
WCFP	4.1384	0.0419	4.1220	0.0429
Interest rate	0.7706	0.3800	0.7542	0.3857
Exchange rate	0.5772	0.4474	0.5662	0.4522
Inflation rate	0.9251	0.3361	0.9058	0.3418
Economic growth	3.7406	0.0531	3.7088	0.0549
Firm size	0.1837	0.6682	0.1796	0.6720
Debt ratio	11.803	0.0006	11.891	0.0006

ROA: Return on assets, EVA: Economic value added, WCIP: Working capital investment policy, WCFP: Working capital financing policy