

# **The Effect of Managerial Overconfidence on Firm Value: Evidence from the Johannesburg Stock Exchange**

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## **ABSTRACT**

*Managers of a company are responsible for enhancing shareholder wealth. However, decisions made by managers are not always rational, and such irrational decisions could have a direct impact on the value of a firm, and thus, the wealth of its shareholders. Therefore, the objective of this study is to investigate the effect of managerial overconfidence on the value of firms trading on the Johannesburg Stock Exchange. The results of this study indicate that managerial overconfidence exhibits an insignificant effect on a firm's leverage and innovation levels. Interestingly, this study reports that managerial overconfidence exhibits a significant negative effect on firm value. This finding implies that investors should avoid investing in firms with overconfident managers because such investments could result in a reduction of their wealth. As such, it is important that regulators and policymakers introduce policies to mitigate overconfident and biased decision-making processes.*

**KEYWORDS:** *firm value; innovation; leverage; managerial overconfidence.*

**JEL CLASSIFICATION:** *G11; G32; G41.*

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## **1. INTRODUCTION**

The primary goal of any company and its managers is to maximise shareholder wealth. In order to maximise shareholder value, managers need to invest in profitable projects which lead to an increase in the company's net worth. As such, managers of a company play an important role in increasing the company's net worth as well as maximising the wealth of its shareholders. Whilst traditional theories of finance propose that managers are rational and make rational decisions, behavioural finance theories assert that managers are not always rational and different biases influence managerial decisions. For instance, Zavertiaeva, et al. (2018) mention that managers may be influenced by various biases, such as, loss aversion, framing, anchoring, and overconfidence. However, Li, et al. (2019), Gao and Han (2020), and Wang, et al. (2020) argue that overconfidence is one of the most prominent biases influencing managerial decisions.

Managerial overconfidence refers to the tendency of managers to overestimate their own knowledge, capabilities, and chances of success (Zaher, 2019). As a result, overconfident

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managers overestimate the future returns of the firm's investments and underestimate the firm's risk exposures (Wang et al., 2020). Interestingly, Heaton (2002) argues that overconfidence is more prevalent in managers than the average population. Amongst other factors, managerial overconfidence may be caused by an illusion of control, unrealistic optimism, the 'better than average' effect or the planning fallacy. Previous research show that managerial overconfidence influences various corporate decisions including decisions relating to capital investments, dividend policies, capital structure, and corporate risk management.

Through its effect on corporate decision making, managerial overconfidence can also influence the value of a firm. On one hand, managerial overconfidence may be beneficial for the value of a firm. For instance, overconfidence helps managers exploit innovative opportunities for growth, assists managers in providing better leadership, and leads to higher stock performances which may contribute positively to a firm's value. On the other hand, managerial overconfidence can destroy the value of a firm. This negative effect could be attributed to the excessive debt levels, suboptimal investment choices, and inefficient research and development expenditures caused by managerial overconfidence.

Empirically, Dashtbayaz and Mohammadi (2016) report that managerial overconfidence exhibits a negative effect on the value of a firm. However, Zavertiaeva, et al. (2018) and Gao and Han (2020) find that managerial overconfidence exhibits a positive effect on firm value. Interestingly, Ye and Yuan (2008) report that the effect of managerial overconfidence on firm value is positive at the beginning and becomes negative later on. Shah, et al. (2018) find evidence of both a positive and negative relationship between managerial overconfidence and firm value, however, this relationship is dependent on the proxy of firm value. Therefore, the empirical results surrounding the effect of managerial overconfidence on firm value is inconsistent. Moreover, there are no existing studies that investigate the effect of managerial overconfidence on the value of firms in South Africa. As such, the primary objective of this study is to investigate the effect of managerial overconfidence on the value of firms in South Africa. Additionally, this study examines the effect of managerial overconfidence on the level of leverage and innovation of firms in South Africa. This is because, managerial decisions relating to leverage and innovation directly impact the value of firm (Zavertiaeva, et al., 2018).

This study contributes to existing literature in several ways. Firstly, by examining the effect of managerial overconfidence on the value of firms in South Africa, this study provides insight into the influence of behavioural biases on managerial decisions. According to Gao and Han (2020), measures of firm value reflect market conditions. Therefore, the second contribution of this study is that it sheds light on the market's response to managerial overconfidence by focusing on firm value rather than accounting performance. Wang, et al. (2020) note that weak domestic conditions in emerging markets exacerbate the possible hurdles and challenges to obtaining leverage and innovation. Hence, the third contribution of this study is that contributes to existing literature on whether overconfident managerial behaviour increases a firm's chance of obtaining leverage and innovation in an emerging market, like South Africa. As such, the results of this study could assist South African organisations in their decision to hire overconfident managers. Moreover, investors can also use the results of this study when deciding whether to invest in companies with overconfident managers. Additionally, the results of this study can be used by policymakers and regulators to implement policies that ensure the protection of shareholder wealth by eliminating harmful managerial overconfidence behaviour.

The next section provides a review of literature relating to managerial overconfidence and its effect of leverage, innovation, and firm value. Thereafter, the data and methodology employed in this study is outlined. Following this, the results of this study are analysed. Finally, this study concludes by providing concluding remarks and recommendations for future research.

## **2. LITERATURE REVIEW**

### **2.1 Theoretical Considerations**

The value of a firm is influenced by the level of leverage employed due to conflicts of interest between shareholders, creditors, and managers (Aggarwal et al., 2008). Therefore, managerial overconfidence may affect firm value through its influence on leverage. Similarly, managerial overconfidence may affect firm value through its influence on innovation because innovation is a key factor in gaining a competitive advantage which influences firm value (Wang, et al., 2020). Therefore, the theoretical concepts which are discussed in this section relate to the effect of managerial overconfidence on leverage, innovation, and firm value.

Traditional finance theories assume that managers making corporate decisions are rational (Schwartz, Ben-Haim & Dacso, 2011). These rational decision makers are expected to be averse to risk and, thus, require a higher managerial compensation as an incentive to take on the additional risk (Baker and Ricciardi, 2014). According to the Agency Cost Theory, managers have an obligation to make corporate decisions that are in the best interest of shareholders (Rashid, 2015). However, agency costs arise when managers choose to pursue their own interests instead of the shareholders' interests (Rashid, 2015). From the perspective of the Agency Cost Theory, overconfident managers overinvest in order to obtain private benefits such as large empires, entrenchments and other perks (Malmendier & Tate, 2005). Given this, the agency problem suggests that overconfident managers may have an incentive to make sub-optimal decisions, consequently, resulting in a reduction in the value of a firm (Fairchild, 2007). However, whilst these standard finance theories assume that managers are rational, behavioural finance theories suggest that managers do not always make rational decisions (Kapoor & Prosad, 2017).

Behavioural finance theories postulate that decisions made by managers are influenced by their emotions, beliefs, and state of minds (Kapoor & Prosad, 2017). Therefore, decisions made by managers may be irrational and suboptimal. For instance, Ramiah et al. (2016) show that managerial decisions are influenced by several biases, including loss aversion, anchoring, and overconfidence. However, this study focuses on managerial overconfidence which is one of the most prominent biases influencing managerial decisions. Zaher (2019) defines managerial overconfidence as the tendency of managers to overestimate their own capabilities and knowledge. This results in an underestimation of their risk exposures and an overestimation of their chance of success.

Managerial overconfidence may be prompted by the 'better than average' effect which occurs when managers appraise themselves more favourably than an average peer (Alicke & Govorun, 2005). Overconfidence due to the better-than-average effect may cause managers to make decisions that positively influence firm value so that the manager's reputation is improved (Margolin, 2014). Managerial overconfidence is also influenced by an individual's belief in their ability to carry out tasks (Zaher, 2019). Gigerenzer et al. (1991) mention that the Probabilistic Mental Model suggests that when managers are unable to solve problems with logic or their memory, they tend to make decisions based on a perspective which depends on the confidence they have in their knowledge. As a result, managers may only engage in those

tasks in which they have high confidence in their skills and knowledge. This could lead to better decision-making processes which positively contribute to firm value. Additionally, managerial compensation may influence the level of managerial overconfidence. Specifically, Hambrick (1997) claims that managers who receive higher compensations become more overconfident. As a result, high compensations received by overconfident managers may result in higher work levels which positively contribute to the value of the firm.

With regards to the implications of managerial overconfidence, overconfident managers often invest in more innovative ventures than managers who are rational (Hirshleifer et al., 2012). This is because, overconfident managers tend to overestimate future cash flows and underestimate the related risks (Slothouber, 2010). However, by underestimating their risk exposures, overconfident managers may also engage in value-destroying mergers and projects which could negatively affect firm value (Malmendier & Tate, 2005). Another consequence of managerial overconfidence is that overconfident managers tend to underestimate financial distress costs which leads to the adoption of suboptimal debt levels (Slothouber, 2010). Consequently, when overconfident managers pursue aggressive financial policies and excessive amounts of debt, financial distress costs increase, potentially harming firm value (Fairchild, 2005). Theoretically, the debate on whether managerial overconfidence positively or negatively impacts firm value remains inconsistent, thus, highlighting the need for further research on the subject.

## **2.2 Review of Empirical Studies**

In recent years, research on the effect of managerial overconfidence has grown substantially. However, this study only reviews existing research that are relevant to this study, that is, research on the effect of managerial overconfidence on financial leverage, innovation, and firm value. Whilst there exists a substantial number of studies on the effect of managerial overconfidence on financial leverage, innovation, and firm value, the results obtained by these studies are relatively inconsistent. For instance, Park and Kim (2009) observe companies trading on the Korean Stock Exchange between 1985 and 2007, and report that managerial overconfidence exhibits a positive and significant effect on leverage. Similar findings are reported by Ben-David et al. (2013) who analyse medium and large companies in the United States. Specifically, Ben-David, et al. (2013) find that firms with overconfident managers tend to adopt more aggressive corporate policies and use more debt financing than companies with rational managers. Rihab and Lotfi (2016) examine Tunisian companies from 1997 to 2001, and report that managerial confidence is positively and significantly related to a firm's level of debt, which confirms the notion that overconfident managers misjudge the likelihood of financial distress and tend to choose higher levels of debt than rational managers. Similarly, Abdeldayem (2018) examine firms listed on the Egyptian Stock Exchange, and find that managerial overconfidence exhibits a positive and significant influence on a company's leverage ratio. Interestingly, Tomak (2013) examines firms listed on the Istanbul Stock Exchange from 2002 to 2011, and reports that the relationship between managerial overconfidence and leverage is ambiguous. Therefore, Tomak (2013) concludes that there is insufficient evidence to prove that overconfident managers tend to use a higher debt level. Contrary to the general consensus, Ting, Azizan, and Kweh (2016) assess companies trading in Malaysia from 2002 to 2011, and report that the overconfidence of executive managers is negatively and significantly related to leverage.

Similar to studies on the effect of managerial overconfidence on leverage, studies on the effect of managerial overconfidence on innovation have also found mixed results. Galasso and Simcoe (2011) examine firms in the United States between 1980 and 1994, and report that managerial overconfidence is positively and significantly related to a firm's level of innovation. Likewise, Hirshleifer et al. (2012) report that companies in the United States with overconfident executive management invest in more innovative projects, attain more patents, and are more successful with their research and development expenditures. In this way, managerial overconfidence helps managers exploit innovative growth opportunities which is beneficial to shareholders since it adds to the firm's value. Wang, et al. (2018) report that, for Chinese companies, managerial overconfidence leads to an increase in the research and development intensity, and hence, innovation. Similarly, Zavertiaeva et al. (2018) who examine companies trading in France, Germany, Italy, Netherlands, Spain, Switzerland, and the United Kingdom from 2008 to 2013 report that companies with overconfident managers have higher investments in research and development and innovative projects. On the contrary, Herz et al. (2014) find a negative and significant association between managerial overconfidence and innovation for managers in Switzerland.

Like the theoretical concepts discussed in Section 2.1, the results of empirical research on the effect of managerial overconfidence on firm value also remain inconsistent. For instance, Dashtbayaz and Mohammadi (2016) assess companies trading on the Tehran Stock Exchange from 2011 to 2015, and find that managerial overconfidence exhibits a significant negative relationship with firm value. Accordingly, Dashtbayaz and Mohammadi (2016) conclude that firms should refrain from hiring overconfident managers. On the contrary, van der Velde (2017) analyse companies in the United States from 2006 to 2016, and finds that managerial overconfidence positively influences the value of firms. Similarly, Vitanova (2019) finds that managerial overconfidence positively influences the value of firms in the United States between 2006 and 2011. Mundi and Kaur (2019) examine companies on the Bombay Stock Exchange between 2000 and 2015, and also report that managerial overconfidence exhibits a significant positive effect on firm value. More recently, Gao and Han (2020) managerial overconfidence positively influence the value of Korean-listed firms between 2011 and 2016. Interestingly, Shah, et al. (2018) examine firms on the Pakistani Stock Exchange and find evidence of both a positive and negative effect of managerial overconfidence on firm value. According to Shah, et al. (2018), the sign of this relationship depends on which measure of firm value is employed.

Based on the review of existing empirical results, it is evident that existing research provides inconsistent results regarding the effect of managerial overconfidence on leverage, innovation, and firm value. Moreover, there is an evident lack of research on the effect of managerial overconfidence on leverage, innovation, and firm value for South African companies. Notably, Lawa, et al. (2017) report that managerial overconfidence positively and significantly influences the prices of JSE-listed companies. Therefore, the results of Lawa, et al. (2017) provide evidence of the presence of managerial overconfidence in South Africa, subsequently, necessitating the need to investigate the effect of managerial overconfidence on leverage, innovation, and firm value as these factors directly impact a company's ability to maximise shareholder wealth.

### **3. DATA AND METHODOLOGY**

#### **3.1 Data Sample**

This study investigates the effect of managerial overconfidence on the value of non-financial large market capitalisation firms trading on the JSE from January 2012 to December 2019. The choice of large market capitalisation stocks is because larger firms are more inclined to having overconfident managers relative to firms that are smaller in size (Banerjee, et al., 2015).

Accordingly, this study observes only companies constituted in the JSE Top 40 (J200) Index which comprises of the 40 largest companies (ranked by market capitalization) trading on the JSE. To mitigate the survivorship bias issue, all non-financial companies (including companies that were removed from the index) that were constituted in the index for at least four consecutive years between January 2012 and December 2019 are included in this study's sample. This results in a total sample of 25 firms – 18 of which are still listed on the index, and 7 of which were removed from the index.

Data of annual frequency is employed for this analysis and secondary data relating to total assets, total debt, total equity, book value of assets, market value of assets, sales, net income, cash and cash equivalents, R&D expense, total fixed assets, tangible fixed assets, inventories, and capital expenditure are obtained for each company. This data is obtained from each company's annual fiscal year-end financial statements as published, provided by the IRESS database.

### 3.2 Methodology

Following Gao and Han (2020), this study employs an investment-based proxy of managerial overconfidence because it is suitable for companies with publicly available data. In this method, a regression of total asset growth on sales growth is estimated and the residuals of the regression are used to determine the presence of managerial overconfidence (Gao and Han, 2020). Specifically, if the residual is greater than zero, overinvestment is present and the manager is regarded as overconfident, thus,  $MO$ , which is a dummy variable representing managerial overconfidence, takes a value of 1, and 0 otherwise.

Following Mundi and Kaur (2019) and Vitanova (2019), panel data regressions are used to investigate the effect of managerial overconfidence on financial leverage, innovation, and firm value. Panel data regressions help to control for cross-sectional heterogeneity and reduce problems associated with omitted variables, multicollinearity, measurement errors, and heteroscedasticity (Baltagi, 2005; Hsiao, 2007). The basic panel regression is as follows:

$$DV_{i,t} = \beta_0 + \beta_1 IV_{i,t} + \sum_{r=1}^R \beta_r C_{i,t} + e_{i,t} \quad (1)$$

where  $DV_{i,t}$  denotes the dependent variable,  $IV_{i,t}$  represents the independent variable,  $C_{i,t}$  represents the control variables, and  $e_{i,t}$  is the error term in that model. In this study, firm size ( $SIZE_{i,t}$ ), profitability ( $PROF_{i,t}$ ), cash holdings ( $CASH_{i,t}$ ), and tangibility ( $TANG_{i,t}$ ) are included as control variables in order to account for alternative explanations of firm value, innovation, and leverage. Firm size ( $SIZE_{i,t}$ ), profitability ( $PROF_{i,t}$ ), cash holdings ( $CASH_{i,t}$ ), and tangibility ( $TANG_{i,t}$ ) are included as control variables because several studies find that these variables significantly effect financial leverage ( $LEV_{i,t}$ ), innovation ( $INV_{i,t}$ ), and firm value ( $FV_{i,t}$ ) (Frank and Goyal, 2009; Park and Kim, 2009; van der Velde, 2017; Zaveritiaeva, et al., 2018). Table (1) provides a summary of how each variable is computed.

As such, the pooled OLS models which investigate the relationship between managerial overconfidence and leverage, innovation, and firm value is estimated using the following specifications:

$$LEV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + e_{i,t} \quad (2)$$

$$INV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + e_{i,t} \quad (3)$$

$$FV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + e_{i,t} \quad (4)$$

In Equations 2, 3 and 4, the subscripts  $i$  and  $t$  refer to cross-sectional units and time units, respectively. The term  $e_{i,t}$  is the disturbance term. The dependent variable in each equation,  $LEV_{i,t}$ ,  $INV_{i,t}$ , and  $FV_{i,t}$  denote the financial leverage, innovation, and firm value for company  $i$  at the end of year  $t$ .  $\beta_0$  is the constant term,  $\beta_1$  represents the coefficients of the independent variable, managerial overconfidence, and  $\beta_2 - \beta_5$  are the coefficients of the control variables.  $MO_{i,t}$ ,  $SIZE_{i,t}$ ,  $PROF_{i,t}$ ,  $CASH_{i,t}$ , and  $TANG_{i,t}$  denote managerial overconfidence, firm size, profitability, cash holdings, and tangibility for firm  $i$  in year  $t$ .

The random effects models which investigate the relationship between managerial overconfidence and leverage, innovation, and firm value are estimated as follows:

$$LEV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + (\mu_i + e_{i,t}) \quad (5)$$

$$INV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + (\mu_i + e_{i,t}) \quad (6)$$

$$FV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + (\mu_i + e_{i,t}) \quad (7)$$

where  $\mu_i \sim \text{i.i.d}(0, \sigma_\mu^2)$  is the unobserved random effect that varies across firms or time, depending on the results of the BP(LM) test, and  $e_{it} \sim \text{i.i.d}(0, \sigma_e^2)$  is the idiosyncratic error term.

The fixed effects models which investigate the relationship between managerial overconfidence and leverage, innovation, and firm value is estimated using the following specifications:

$$LEV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + \delta_i + e_{i,t} \quad (8)$$

$$INV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + \delta_i + e_{i,t} \quad (9)$$

$$FV_{i,t} = \beta_0 + \beta_1(MO_{i,t}) + \beta_2(SIZE_{i,t}) + \beta_3(PROF_{i,t}) + \beta_4(CASH_{i,t}) + \beta_5(TANG_{i,t}) + \delta_i + e_{i,t} \quad (10)$$

where the term  $\delta_i$  represents the firm-specific or time period fixed effects, depending on the results of the Hausman test, and  $e_{i,t}$  is the idiosyncratic disturbance term.

Notably, the Breusch-Pagan Lagrange Multiplier and Hausman tests are employed to identify the model of best fit for each dependent variable. In this study, only the results of the model of best fit is presented and analysed. The statistical significance of each coefficient in the model of best fit is then examined using the t-test and its associated p-value. It is also important to that the regressions are estimated using the EViews 11 statistical software programme.

**Table 1. Computation of Variables**

Variable	Measurement
Panel A: Dependent Variable	
Financial Leverage	The ratio of total debt to total equity.
Innovation	The ratio of total capital expenditure to total sales.
Firm Value	The Tobin's Q ratio, that is, the market value of the total assets divided by the book value of the total assets.
Panel B: Variable of Interest	
Managerial Overconfidence	A dummy variable that takes the value of 1 when overinvestment is present, and 0 otherwise.
Panel C: Control Variables	
Firm Size	The natural logarithm of total assets.
Profitability	The ratio of net income to total assets.
Cash Holdings	The ratio of cash and cash equivalents to total assets.
Tangibility	The ratio of the sum of inventories and tangible fixed assets to total assets.

Source: Authors own.

## 4 RESULTS

### 4.1 Descriptive Statistics

Table 2 shows that the independent variable, *MO*, exhibits a mean value of 0.995 with a maximum and median of 1. This implies that managers tend to overinvest in projects, suggesting that, on average, managers are overconfident. The debt-to-equity ratio which is used as a proxy for *LEV* exhibits an average of 2.781 suggesting that firms have more debt financing than equity financing on average.

The average of *INV* is 0.001 suggesting that innovation levels are low. The average *FV*, as computed using the Tobin's Q ratio, is 2.032 which implies that the market value of the firm's assets exceed its book value. With regards to the series distribution, the skewness values indicate that all series, except *MO*, are positively skewed. Additionally, the Jarque-Bera test indicates that only *TANG* is normally distributed whilst the remaining variables are not normally distributed. However, non-normality is a common feature of financial data (Adu, et al., 2015) and, thus, does not affect the results of this study.

**Table 2. Descriptive Data**

	LEV	INV	FV	MO	SIZE	PROF	CASH	TANG
Mean	2.781	0.001	2.032	0.995	8.231	10.999	0.672	0.432
Median	0.900	0.000	1.490	1.000	8.138	10.550	0.078	0.432
Maximum	288.970	0.009	7.050	1.000	9.429	40.350	24.212	0.924
Minimum	-25.950	0.000	0.410	0.000	7.002	-34.660	0.005	0.006
Std. Dev.	21.469	0.001	1.410	0.073	0.533	10.694	2.988	0.227
Skewness	12.712	2.708	1.206	-13.528	0.373	0.060	5.520	0.058
Kurtosis	169.100	11.983	3.745	184.005	2.514	4.763	34.836	2.385
Jarque-Bera	222353.5	866.451	50.206	259586.1	2.240	24.587	8941.279	3.088
Probability	0.000	0.000	0.000	0.000	0.044	0.000	0.000	0.214

Notes:

1. LEV refers to financial leverage; INV refers to innovation; FV refers to firm value; MO refers to managerial overconfidence; SIZE refers to firm size; PROF refers to profitability; CASH refers to cash holdings; and TANG refers to tangibility.
2. Source: Authors own.

### 4.2 Correlation Analysis

Table 3 shows that the variables exhibit low to medium correlations, thus, implying that variables exhibit weak relationships. Notably, *PROF* and *FV* exhibit the highest correlation coefficient of 0.569 which is considered a medium correlation. The low to medium correlations between the variables suggest that multicollinearity will not be a problem. Managerial overconfidence (*MO*) exhibits a significant correlation only with *FV*, and this correlation is negative. However, it is important to note that correlation does not imply causation (Lee, 2012), therefore, there is a need to conduct panel data regressions.



**Table 3. Correlation Matrix**

Variable	LEV	INV	FV	MO	SIZE	PROF	CASH	TANG
LEV	1.000							
INV	-0.044	1.000						
FV	-0.007	-0.040	1.000					
MO	0.008	0.037	-0.180**	1.000				
SIZE	-0.072	0.011	-0.112	-0.019	1.000			
PROF	-0.046	0.080	0.569***	0.064	-0.166**	1.000		
CASH	-0.022	-0.099	-0.053	0.014	0.046	-0.236***	1.000	
TANG	0.156**	0.093	-0.386***	0.108	-0.134*	-0.064	-0.099	1.000

Notes:

1. LEV refers to financial leverage; INV refers to innovation; FV refers to firm value; MO refers to managerial overconfidence; SIZE refers to firm size; PROF refers to profitability; CASH refers to cash holdings; and TANG refers to tangibility
2. \*\*\*, \*\*, \* represents significance at a 1%, 5%, and 10% level of significance, respectively.
3. Source: Authors own.

### 4.3 Model of Best Fit

The results of the Breusch-Pagan Lagrange Multiplier test in Panel A of Table 4 suggest that the null hypothesis which states that cross-sectional or time-specific variance components are zero is not rejected for both cross-sectional and time-specific effects when *LEV* is the dependent variable. This implies that the pooled Ordinary Least Squares (OLS) panel regression would yield better results when *LEV* is the dependent variable. However, when *INV* and *FV* are the dependent variables, cross-sectional random effects are present at 1% level of significance. Hence, the Hausman test is conducted in order to determine whether the fixed or random effects models are a better model fit. Panel B in Table 4 shows that, when *INV* is the dependent variable, the Hausman test statistic is statistically insignificant and fails to reject the null hypothesis, thus, implying that the cross-sectional random effects model is the preferred model. However, when *FV* is the dependent variable, the Hausman test statistic is significant at a 1% level of significance and, therefore, the cross-sectional fixed effects model is preferred over the cross-sectional random effects model. The results of the best fit models are analysed in the subsequent sections.

**Table 4. Results for the Model of Best Fit Tests**

Dependent Variable	Test hypothesis		
	Cross-section	Time	Both
Panel A: Breusch-Pagan Lagrange Multiplier Test			
LEV	0.239	0.055	0.294
INV	292.064***	2.270	294.334***
FV	186.202***	0.015	186.217***
Panel B: Hausman Test			
INV	2.608		
FV	36.834***		

Notes:

1. LEV refers to financial leverage; INV refers to innovation; and FV refers to firm value.
2. \*\*\*, \*\*, \* represent significance at 1%, 5%, and 10% level of significance, respectively.
3. Source: Authors own.

### 4.4 Empirical Results

The results in Table 5 illustrate the effect of managerial overconfidence on the leverage of firms. Specifically, the results in Table 5 indicate that managerial overconfidence exhibits a

negative relationship with leverage. However, this relationship is statistically insignificant, thus, indicating that managerial overconfidence cannot explain a firm's leverage. These results are consistent with studies by Tomak (2013) and Beli, et al. (2019) which report a negative and insignificant relationship between *MO* and *LEV*. Additionally, the results in Table 5 indicate that a firm's size, profitability, and cash holdings cannot significantly explain its leverage. Instead, leverage can be significantly explained by a firm's asset tangibility because tangibility exhibits a significant positive relationship with leverage. This positive relationship between tangibility and leverage is because firms with higher asset tangibility have lower bankruptcy risks, thus, enabling them to take on higher leverage (Frank and Goyal, 2009).

**Table 5. Effect of Managerial Overconfidence on Leverage**

Dependent Variable: LEV	Pooled OLS Model
C	19.977 (33.595)
MO	-1.639 (21.878)
SIZE	-2.458 (3.055)
PROF	-0.102 (0.156)
CASH	-0.121 (0.547)
TANG	13.648* (7.158)

Notes:

1. LEV refers to financial leverage; MO refers to managerial overconfidence; SIZE refers to firm size; PROF refers to profitability; CASH refers to cash holdings; and TANG refers to tangibility.
2. \*\*\*, \*\*, \* represent significance at 1%, 5%, and 10% level of significance, respectively.
3. Values in parenthesis '( )' represent standard errors.
4. Source: Authors own.

**Table 6. Effect of Managerial Overconfidence on Innovation**

Dependent Variable: INV	Random Effects Model
C	0.003 (0.003)
MO	0.0002 (0.001)
SIZE	-0.0004 (0.0003)
PROF	1.63E-06 (8.97E-06)
CASH	-1.78E-05 (5.20E-05)
TANG	0.002 (0.001)
Cross-sectional random effects	Yes

Notes:

1. INV refers to innovation; MO refers to managerial overconfidence; SIZE refers to firm size; PROF refers to profitability; CASH refers to cash holdings; and TANG refers to tangibility
2. \*\*\*, \*\*, \* – p-value significance at 1%, 5%, and 10%
3. Values in parenthesis '( )' represent standard errors.
4. Source: Authors own.

The results in Table 6 show the effect of managerial overconfidence on innovation. Whilst managerial overconfidence exhibits a positive relationship with innovation, this relationship is statistically insignificant. This finding, therefore, indicates that managerial overconfidence does not explain a firm's level of innovation. Similar findings are reported by Slothouber (2010) who find a positive but insignificant relationship between managerial overconfidence and innovation. Remarkably, the results in Table 6 also indicate that a firm's size, profitability, cash holdings, and asset tangibility also does not significant explain its level of innovation.

The results in Table 7 show that managerial overconfidence is negatively related to firm value, and this negative relationship is significant at a 5 percent level of significance. This implies that, when managerial overconfidence increases (decrease), firm value decreases (increases). These results are consistent with studies conducted by Dashtbayaz and Mohammadi (2016) and Shah, et al. (2018) which infer that managerial overconfidence harms firm value. This significant negative relationship between managerial overconfidence and firm value can be attributed to the lack of managerial effort during decision making. Specifically, Goel and Thakor (2008) mention that managers who are overconfident do not acquire adequate information, subsequently, resulting in errors during project selection -which harms the value of a firm. Furthermore, this negative relationship between managerial overconfidence and firm value can be attributed to the agency problem. Specifically, the agency problem suggests that an overconfident manager may have an incentive to exercise a sub-optimally low level of effort in their duties, subsequently, leading to a decrease in firm value (Fairchild, 2007).

For completion, Table 7 also shows that a firm's value can be significantly explained by its profitability and cash holdings but not by its size and asset tangibility. Specifically, firm value is positively and significantly related to both profitability and cash holdings. This could be because an increase in profitability and cash holdings is viewed as a positive signal by investors, thus, increasing the value of the firm.

**Table 7. Effect of Managerial Overconfidence on Firm Value**

Dependent Variable: FV	Fixed Effects Model
C	3.565 (2.490)
MO	-1.445** (0.640)
SIZE	-0.045 (0.297)
PROF	0.031*** (0.007)
CASH	0.082* (0.042)
TANG	-0.275 (0.799)
Cross-sectional fixed effects	Yes

Notes:

1. FV refers to firm value; MO refers to managerial overconfidence; SIZE refers to firm size; PROF refers to profitability; CASH refers to cash holdings; and TANG refers to tangibility
2. \*\*\*, \*\*, \* represent significance at 1%, 5%, and 10% level of significance, respectively.
3. Values in parenthesis '(') represent standard errors.
4. Source: Authors own.

In summary, the results obtained above suggest that managerial overconfidence exhibits a negative but statistically insignificant relation with leverage, and therefore, managerial overconfidence cannot be used to explain a firm's level of debt. Additionally, this study finds that managerial overconfidence exhibits a positive relationship with innovation, but this

relationship is also statistically insignificant. Noteworthy is that this study reports that managerial overconfidence exhibits a significant negative relationship with firm value implying that an increase in managerial overconfidence as associated with a decrease in firm value. This significant negative relationship between managerial overconfidence and firm value can be attributed to the agency problem as well as a lack of managerial effort during decision making as previously discussed.

## 5. CONCLUSION AND RECOMMENDATIONS

Decisions made by managers directly impact the wealth of the company's shareholders. However, managerial decisions may not always be rational, and such irrational decisions could have an adverse impact on the value of the firm and, thus, shareholder wealth. Therefore, the objective of this study is to investigate the effect of managerial overconfidence on the leverage, innovation and value of firms trading on the JSE from 2012 to 2019. The results of this study indicate that managerial overconfidence does not significantly influence the level of leverage and innovation in South African firms. However, managerial overconfidence exhibits a significant negative influence on firm value, thus, implying that managerial overconfidence harms firm value.

These findings have significant implications for various stakeholders. Firstly, given that managerial overconfidence adversely influences firm value, employers should be more restrained towards the employment of overconfident managers. In addition, managers should also undergo training on how to avoid making overconfident and biased decisions, firms should monitor managerial decisions more vigilantly to ensure that they do not steer away from the company's objectives. Secondly, investors should avoid investing in firms with overconfident managers because such investments could lead to a decrease in their wealth. Thirdly, since decisions made by managers ultimately impact a firm's shareholders, it is crucial for policymakers and regulators to introduce mechanisms to mitigate overconfident and biased decision-making processes.

Future research can focus on managerial overconfidence in countries outside of South Africa, and in companies of different sizes, such as small and medium market capitalisation firms. Further studies can also examine the effect of managerial overconfidence under changing market conditions. Additionally, given that a commonly accepted overconfidence measure does not exist, further research is required to find a credible and accepted measure of managerial overconfidence.

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