


“Determinants of debt financing in South African state-owned entities”

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DETERMINANTS OF DEBT FINANCING IN SOUTH AFRICAN STATE-OWNED ENTITIES

Abstract

Using debt to finance investments is a common feature in the balance sheets of state-owned entities (SOEs). The greater the degree of financial leverage, the higher the proportion of debt resulting in greater interest payments that negatively affect the earnings attributable to shareholders. This paper considers the determinants of debt financing in light of the debt crisis that the South African economy faces and, more so, the public sector and its validity under capital structure theories. The data set was analyzed for the financial period from 1995 to 2020 of thirty-three commercial SOEs in South Africa. Multiple regression models were tested using the Generalized Method of Moments estimator. The results highlighted that significant variables affecting state-owned entities' debt levels are profitability, age, growth opportunities, liquidity, probability of bankruptcy, and non-debt tax shield. The policy recommendations are that the government prioritizes reducing debt levels for South Africa to develop and achieve sustainable development. The changes in firm-specific factors that affect the optimal capital structure and the entity's value must be considered.

Keywords

leverage, capital structure, GMM, firm-specific factors,
trade-off theory, pecking order theory

JEL Classification

G32, G34, L11, L14, M21

INTRODUCTION

State-owned entities (SOEs) in developing countries play a significant role in the economic growth of critical public services and service delivery. When these entities are not performing well, they can pose severe challenges in the country's growth and development and further increase fiscal risks. In most developing and transition economies, SOEs are labeled as loss-making and inefficient enterprises that burden governments' finances and scarce resources. In effect, performance affects their service delivery and their ability to fulfill the governmental growth developmental objectives (Marimuthu, 2020).

The South African history of using SOEs as economic advancement instruments goes back decades to contribute to the country's development. However, they are plagued by structural and operational problems that have affected their service delivery and infrastructural development and caused irregular and unequal development patterns. These SOEs continuously find themselves in precarious financial positions where they cannot meet their financial obligations forcing them to call up the government to bail them out (Marimuthu, 2020).

Debt or equity financing can satisfy the financing needs of firms, however, the source of financing and the proportion of debt and equity financing to be used has been a controversial topic. Financing is a complex issue that poses a challenge in developing rational theories, as

there are no explicit demarcated capital structure theories applicable to these entities (Nyamita, 2014). SOEs are more likely to absorb socio-political benefits from the government. Hence, their risk-taking is far greater than private entities regarding their decisions on capital structure. They are exposed to far more significant moral hazards due to leverage where there are incentives to take on excessive risks (Ahmad et al., 2017).

There has been extensive empirical evidence and theoretical arguments on the factors that influence the firms' capital structure in developed and developing economies. These factors have been found to shape the financing policy of firms in developed economies and the private sector. However, they may not be fully portable to emerging economies and, more so, the public sector. These traditional capital structure theories may be applied to South African SOEs that pursue commercial objectives. However, social and political influences may affect their pursuit of fully attaining these commercial influences (Capalbo & Palumbo, 2013) and hence affect the portability of these theories. A study on the determinants of debt financing is vital in determining the impact on the firm's capital structure and value. There has been continuity in theoretical development on capital structure and the determinants. However, the results obtained in empirical studies have shown little homogeneity, suggesting that this issue requires further empirical research. Hence, the objective of this study is to examine the factors that impact the debt financing structure of SOEs in a developing economy from the perspective of capital structure theories.

1. LITERATURE REVIEW

This section commences with an overview of the capital structure theories, followed by a review of literature relating to the research constructs on the determinants of capital structure. The literature review also provides insight into the empirical studies conducted on capital structure and its influencing factors.

1.1. Capital structure theories

The capital structure debate began with the seminal work of Modigliani and Miller (1963), which laid the foundation for the capital structure puzzle upon which various theorists have contributed. There was an attempt to understand the best combination of debt and equity that maximizes the firm's value. Management also seeks to maximize its value by employing an optimal capital structure that can influence its environment and long-term survival. Capital structure theories were developed to provide a framework for understanding the financing decisions and firms' capital structure. These theories can be categorized first into those theorized by the existence of an optimal debt level, which includes the trade-off theory and agency theory. Secondly, those theories are not based on an optimal debt level, including the pecking order theory.

The trade-off theory grew out of shortcomings of Modigliani and Miller (1963) proposition that when corporate taxes were added, resulting in a benefit of debt, assuming that the firm earns its debt obligation with certainty. One of the criticisms of this theory was that it did not take into account financial distress costs, which increases as more leverage is used; hence Kraus and Litzenberger (1973) formally introduced the tax advantage of debt and costs of bankruptcy into the framework, confirming the existence of an optimal capital structure in the trade-off theory.

The agency theory assumption was that the separation between owners, managers, and debt holders could create conflicts of interest and information asymmetries amongst the principal and agent (Jensen, 1986). Myers (1984) pointed out another potential agency cost of debt incurred when firms are on the verge of bankruptcy. In this case, shareholders see no incentive to invest more equity capital, even if projects with positive net present values are available. The reason being that the debt holders will mainly benefit from any values derived from the projects. This implies that value-increasing projects may be rejected in the case of a high debt level. In the case of debt financing, managers must explain their investment decisions to investors placing themselves under constant monitoring that they detest and would instead prefer internal funding such

as retained earnings. The use of debt in the capital structure is often used as a measure by shareholders to ensure their wealth maximizes. From an agency theory perspective, debt financing disciplines managers and reduces agency costs by mitigating agency problems which can be seen as a trade-off between costs and benefits of debt in the trade-off theory. Managers have to pay off the debt to avoid bankruptcy (Jensen, 1986).

The pecking order theory suggests that firms follow a particular financing hierarchy where internal funding is preferred over external financing, and debt is preferred over equity (Myers, 1984). Hence, the main assumption behind the theory is that there is a pecking order of corporate financing whereby investments are financed first through retained earnings, thereafter debt and lastly external equity as firms will rather use debt financing instead of issuing equity when the internal sources of finance are inadequate to finance expenditure.

The theory suggests that a target debt ratio does not exist, and the observed debt ratio reflects the firm's cumulative requirements for external financing. The pecking order indicates that management will consider all financing sources, and then the cheapest source will then be used (De Vries, 2010).

1.2. Capital structure and its determinants

This section discusses the key firm-specific factors affecting capital structure decisions established by empirical studies considered for this study.

1.2.1. Profitability

Mixed theoretical and empirical findings surround the relationship between profitability and leverage. The pecking order theory predicts that more profitable firms prefer to use more internal finance when financing their activities and access debt financing only after retained earnings reach near exhaustion. This results in a lower debt ratio, and there is a higher cost of external finance due to information asymmetries and bankruptcy costs (Cheng, 2015). On the other hand, the static trade-off theory illustrates a positive relationship between leverage and profitability as more profitable firms finance their activities with external fi-

nance since the bankruptcy risks are lower, resulting in a benefit from the tax shield (Cheng, 2015). More profitable firms have higher target debt levels due to higher tax shield benefits and may, therefore, have more valuable assets (Hovakimian et al., 2004). The dynamic trade-off theory predicts a negative relationship as firms accumulate the cash flows in the capital structure to finance investments (Hovakimian et al., 2004) and decrease their debt levels. The accumulation of earnings continues while there is a deviation from the optimal debt level as long as the adjustment costs exceed the costs of having a target debt level. This negative relationship between profitability and leverage occurs due to its effect on the deviation from the target capital structure and not as a result of its effect on the target (Hovakimian et al., 2004).

The agency theory predicts a positive relationship between leverage and profitability due to fewer agency problems between shareholders and managers. This finding is supported by Chen and Strange (2005), who established that more profitable firms prefer to issue debt to minimize conflicts between managers and shareholders.

1.2.2. Age

This variable has been found to follow the firm's life cycle stage with firms that are using less leverage due to the limited availability. As the firm becomes more mature, more capital is needed, which is then sourced through external debt or equity. The trade-off theory suggests a positive relationship between age and leverage as older firms are more established, have fewer bankruptcy issues and lower agency costs (Frank & Goyal, 2009). The pecking order theory suggests a negative relationship between age and leverage as older firms have higher cash flows generated internally, therefore having a lower debt level. Gwatidzo et al. (2016) found a negative relationship between age and leverage. It was explained that firms acquire a reputation to develop alternate, cheaper financing sources over time other than debt.

Chen and Strange (2005) found evidence of age being positively correlated with book value leverage, indicating that older firms have a long track record and are better monitored by creditors, reducing the agency costs associated with debt financing.

1.2.3. Tangible assets

A firm's asset structure would directly influence its capital structure in a world of information asymmetries, considering that tangible assets act as collateral sources to lenders for borrowing and securing a debt. The trade-off theory predicts a positive relationship between tangible assets and leverage (De Vries, 2010), an indication that tangible assets are associated with higher leverage as they provide higher security for loans at a lower interest rate as the agency costs of debt is reduced for the lender, and tangible asset value of the firm at liquidation is higher. Gwatidzo et al. (2016) suggested that collaterals play significant roles in mitigating information asymmetry in South African debt markets despite having more developed capital markets than other countries in Africa.

Studies have had varying results between tangible assets and leverage depending on whether a short-term or long-term debt was the case of studies by Nyamita (2014), Lemma and Negash (2013), who found that tangibility negatively influenced leverage measured by total debt and short-term debt. However, a positive result with long-term debt was found, implying that firms with more tangible assets use them for collaterals to access long-term debt.

Tangible assets are easier for outsiders to value, implying fewer information asymmetries. The lower asymmetric information would make it cheaper to issue equity; therefore, firms with higher tangible assets should have lower debt levels, and this negative prediction supports the pecking order theory (Harris & Raviv, 1991). Bharath et al. (2008) suggested that tangibility is a proxy for a firm's information asymmetry problems; therefore, the modified pecking order theory predicts that leverage increases with an increase in tangible assets due to severe adverse selection with lesser tangible assets. A result of Frank and Goyal (2008) attributes to intrinsically greater debt capacity of the firm.

1.2.4. Growth

As a firm's growth opportunities increase, so too does its costs of financial distress and debt-related agency problems; however, it reduces the free cash flow problem. In light of this, the trade-off theory predicts a negative relationship between a

firms' growth opportunity and leverage. Soekarno et al. (2016) found that growth negatively affected leverage using both the static and dynamic models explaining that since Indonesian SOEs equity levels are high, there's no need for them to issue debt. Lemma and Negash (2013) also found a negative prediction using short-term debt and attributed this to a steady increase in growth opportunities during the study period. Frank and Goyal (2009) used four leverage measures and found a strong negative relationship between growth and leverage.

The predictions of the agency theory indicate a dual relationship between growth opportunities and leverage. A negative prediction is supported as increased growth is associated with increased risk, leading to moral hazard effects (Dasilas & Papasyriopoulos, 2015). Growth opportunities are intangible and cannot be used as collateral for debt security; therefore, firms tend to employ less debt to fully benefit from the opportunities of growth in the future that may be eroded by commitments associated with debt. The agency theory also predicts a positive effect considering that this creates room for managers' opportunistic behavior when firms grow. This can be mitigated by employing more debt in the capital structure (Yinusa, 2015).

The pecking order theory predicts a positive relationship as growth implies more investments, with profitability remaining constant, firms should accumulate more debt to finance investments (Frank & Goyal, 2009). Firms with increased growth opportunities are likely to raise new funds externally as internal funds would be insufficient (Dasilas & Papasyriopoulos, 2015)

1.2.5. Firm risk

Firms with volatile cash flows would be expected to have increased costs of financial distress due to difficulty in honoring interest payments, and there is an increased probability that the tax shield benefit will not be fully utilized. Hence they should use less debt (Alzomaia, 2014). An increase in risk is detrimental to shareholders therefore the prediction with the trade-off theory is that more risky firms should use less debt. This negative relationship between risk and leverage is supported by Mouton and Smith (2016)

and Alzomaia (2014). Mixed findings have been reported by Vatavu (2013) between different industries, with some accessing short-term debt when there is a reduction in business risk while others accessed debt when an increase in risk was recorded. Disagreeing with the predictions of the trade-off and pecking order theories, Chen and Strange (2005) found statistically significant evidence that risk positively influenced the market value of the leverage, explaining that debt is not a major constraint in Chinese firms structures as in other economies. A positive finding is also supported by Gwatidzo et al. (2016), who suggested that since banks are the main source of debt finance in SA and they compete for clients, they might be offering finance to riskier firms who may be avoiding issuing equity considering that their risk levels may make this a more expensive source of finance.

1.2.6. Taxation

One of the key benefits of debt is the interest tax deductibility that is the more debt a firm has in its capital structure, the fewer taxes it pays. Hence, the trade-off theory predicts a positive relationship between the tax rate and leverage, implying a higher interest tax shield and higher debt. Vatavu (2013) concluded that taxation directly impacts debt maturity and leverage significantly in larger firms. Contradictory evidence by Chen and Strange (2005) was found when using market values and book values, but this was not statistically significant. As a result, it was noted that Chinese firms did not find the tax advantage attractive. Mouton and Smith (2016) and Vatavu (2013) also found the tax shield to be an insignificant variable in the study of Romanian and South African listed firms, respectively. Gwatidzo et al. (2016) found a negative relationship between tax and leverage, contradicting the trade-off theory.

1.2.7. Liquidity

The pecking order theory predicts that an increase in liquidity levels results in a decrease in debt levels; therefore, an indirect relationship is predicted as liquid assets serve as internal sources of funds and will be used initially instead of debt. Mouton and Smith (2016) found liquidity to be an insignif-

icant variable in their study of SA firms listed on the stock exchange. Companies that have abundant liquidities tend to use less debt. Therefore, a statistically significant negative relationship is predicted between liquidity and leverage by Vatavu (2013), who suggested that high levels of liquidity are not necessarily beneficial and can imply that the firm's ability to commit to investments is reduced.

1.2.8. Probability of bankruptcy

The trade-off theory predicts a negative relationship between leverage and the probability of bankruptcy due to higher bankruptcy costs being expected when the probability of bankruptcy increases. Firms reduce their debt levels to reduce bankruptcy costs. The probability of bankruptcy can be reduced if managers perceive bankruptcy to be costly. Debt can create an incentive for them to reduce this probability by working harder, consuming fewer perquisites, and making better investment decisions (Harris & Raviv, 1991). A decrease in profitability causes a rise in bankruptcy costs and the threat of bankruptcy forces firms with lower profitability to reducing their target debt levels.

1.2.9. Non-debt tax shield

Non-debt tax shields, which exclude the debt tax shield of interest expense but include, for example, depreciation allowances and provision for doubtful debts, are generally seen as a substitute for the tax shield benefit from debt financing. This results in a negative influence on leverage because they reduce the incentive to issue external debt. In other words, firms that have sufficient non-debt tax shields are more likely to issue less debt. In contradiction, Lemma and Negash (2013) established that the effect depends on the measure used for leverage and negatively affects short-term debt and total debt while positively affecting long-term debt. The pecking order theory predicts a positive relationship between non-debt tax shield and leverage, as supported by Bradley et al. (1984), who found a positive influence suggesting that firms with higher investments in tangible assets would have higher depreciation levels and tax credits.

2. HYPOTHESES DEVELOPMENT

Based on the preceding discussion, it can be shown that the theoretical and empirical literature does not offer a cohesive view on the determinants of debt financing. Taking into consideration that this study aimed to determine the determinants of debt financing of South African SOEs, the following hypotheses were developed:

- H1: Profitability is negatively related to leverage.
- H2: Age is negatively associated with leverage.
- H3: Tangible assets are negatively related to leverage.
- H4: Growth is positively associated with leverage.
- H5: Business risk is positively associated with leverage.
- H6: Tax rate is negatively associated with leverage.
- H7: Liquidity is negatively related to leverage.
- H8: Probability of bankruptcy shield is positively related to leverage.
- H9: Non-debt tax shield is negatively associated with leverage.

3. METHODOLOGY

The quantitative approach was adopted in this study. SOEs that were commercialized formed part of the final sample of 33 entities. As per the Public Financial Management Act (PFMA), commercial entities were included under Schedule 2 (Public Entities), Schedule 3b (National Business Enterprises), and Schedule 3d (Provincial Business Enterprises). External data sources included the McGregor BFA Library and Bloomberg, which provided financial data feeds and analysis tools, covering JSE and global share prices and entity information, including annual reports and standardized financial statements. The data set for this study contained cross-sectional dimensions and longitudinal dimensions for the period 1995–2020.

3.1. Data and variables

This study used an unbalanced panel dataset to achieve the objectives. The variables selected were based on previous empirical studies and the predictions of the capital structure theories. The independent and dependent variables are displayed in Table 1.

Table 1. Summary of variables and measures

Variables	Measurement	Formulae/Proxy
Firm-specific factors for independent variables		
Profitability	PROF	Operating profit/Sales
Age	AGE	Number of years in existence
Asset tangibility	TANG	Tangible assets/Total assets
Growth	GROW	% change in total assets
Business risk	RISK	Standard deviation of operating profit/total assets
Tax rate	TAX	Tax charge/Profit before tax
Liquidity	LIQ	Current assets/Current liabilities
Probability of bankruptcy	BKCY	Interest expense/Operating profit
Non-debt tax shield	NDTS	Depreciation/Total assets
Firm-specific factors for dependent variables		
Total debt	TDL	Total debt/Total assets
Long-term debt	LDL	Long-term debt/Total assets
Short-term debt	SDL	Short-term debt/Total assets

3.2. Model specification

Panel data regression models most frequently analyze the impact of firm-specific factors on capital structure. Capital structure decisions are dynamic by nature and hence should be modeled as such. Therefore, a dynamic panel data model was used, which helps to deal with endogeneity problems. The lagged values of the dependent variables are also included as regressors to account for the impact of past leverage. The model was adapted from previous empirical studies (Frank & Goyal, 2009).

$$Y_{it} = \alpha_0 + \rho Y_{it-1} + \sum_{k=1}^N \beta_k X_{kit} + \eta_i + u_{it}, \quad (1)$$

where Y_{it} is leverage measured by STD, LTD and TD for firm i in year t , X_{it} is the set of exogenous observable firm-specific factors as listed in Table 1, ρ and β

are parameters to be estimated. The fixed effects are contained in the error term ε_{it} , which consists of the unobserved firm-specific effects, η_p , and the observation-specific errors u_{it} . The lagged leverage, (Y_{it-1}) is included in the regression model since trends in leverage are dynamic. The lagged dependent variable's inclusion in the estimation model helps determine whether the leverage levels are persistent over time. Furthermore, a lagged variable alleviates the heteroscedasticity and autocorrelation issues that may arise from any misspecification.

4. RESULTS

4.1. Descriptive analysis

This section presents the summary statistics for the financial data for the period under investigation. The mean for total debt leverage (TDL) is 57%, long-term debt leverage (LDL) 30% and short-term debt leverage (SDL) 27%. The average profitability (PROF), measured by operating profit as a ratio of sales, is 7%, which indicates the poor performance of SA SOEs. The average liquidity (LIQ) is equal to the

general norm of 2 for this ratio. This high liquidity is an indication that internal debt financing is greater than external debt financing, which supports the pecking order theory (Frank & Goyal, 2008). The overall growth was 10.8%, which indicated a need to finance more long-term expansion projects for SOEs in SA. Most of the variables have a relatively low standard deviation, revealing a slight variation of the actual data from the mean or expected values. All the variables indicate a high level of consistency as their mean values and standard deviation fall within the minimum and maximum range.

4.2. Correlation analysis

This section presents the degree of association between pairs of variables revealing the linear relationship and whether any multicollinearity exists between the variables. This can pose serious issues in the estimations. The Pearson correlation coefficients (r) reported in Table 3 show the pairwise relationship between the variables used in the study to assess the degree of multicollinearity. None of the correlation coefficients was above 0.80, indicating the absence of multicollinearity issues.

Table 2. Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
TDL	0.5708891	0.324499	0.0020266	2.118497
LDL	0.3001097	0.270392	0	1.656702
SDL	0.2707794	0.219648	0.0020266	1.412478
PROF	0.07010	0.24821	-1.3985	0.80301
AGE	10.5616	6.04133	1.00000	23.0000
TANG	0.99135	0.02861	0.46711	1.00000
GROW	0.10816	0.18083	-0.26491	1.25891
RISK	0.11062	0.11379	0.01178	0.77778
TAX	0.09339	0.17506	-0.58869	1.00412
LIQ	2.00384	1.83950	0.20575	13.0053
BKCY	0.02369	0.96507	-5.9137	2.59025
NDTS	0.03243	0.02334	0.00000	0.10719

Table 3. Correlation matrix

Variable	TDL	LDL	SDL	PROF	AGE	TANG	GROW	RISK	TAX	LIQ	BKCY	NDTS
TDL	1.000	-	-	-	-	-	-	-	-	-	-	-
LDL	0.760	1.000	-	-	-	-	-	-	-	-	-	-
SDL	0.551	-0.124	1.000	-	-	-	-	-	-	-	-	-
PROF	0.014	0.071	-0.069	1.000	-	-	-	-	-	-	-	-
AGE	-0.048	-0.094	0.049	0.046	1.000	-	-	-	-	-	-	-
TANG	-0.211	-0.289	0.049	-0.138	0.055	1.000	-	-	-	-	-	-
GROW	0.054	0.027	0.048	0.014	-0.124	0.013	1.000	-	-	-	-	-
RISK	-0.095	-0.128	0.020	-0.048	-0.397	0.054	-0.018	1.000	-	-	-	-
TAX	-0.010	-0.007	-0.006	0.077	0.012	0.022	0.024	0.046	1.000	-	-	-
LIQ	-0.385	-0.173	-0.366	-0.131	-0.094	0.088	-0.022	0.246	0.032	1.000	-	-
BKCY	0.042	0.082	-0.041	-0.001	0.013	0.010	-0.002	-0.032	-0.010	-0.002	1.000	-
NDTS	0.179	0.149	0.082	-0.016	-0.220	0.088	-0.037	0.258	0.110	-0.174	-0.066	1.000

5. DISCUSSION

Table 4 displays the regression analysis results for the financial leverage variables based on the GMM estimator. As measured by operating profit as a ratio of sales, profitability reports a significant negative relationship with the short-term debt ratio (significant at 0.01). This indicates that more profitable SOEs would generate more cash flows and usually prefer to utilize internal funds to finance projects rather than short-term debt financing. Since there is an increase in retained earnings when profits increase, the need for debt financing decreases as profitability increases. The negative prediction supports the dynamic version of the trade-off theory and the pecking order theory; however, the reasoning differs. The accumulation of cash flows used to finance investments from a dynamic trade-off theory perspective results from high adjustment costs. The pecking order theory is due to the cost of adverse selection that arises from issues with information asymmetries (Hovakimian et al., 2004). This negative prediction supporting the dynamic trade-off theory arises from profitability affecting the deviation from the target. This significant negative prediction supports the pecking order theory, showing that SOEs prefer to use internal sources (retained earnings) of funding when profits are high to fund investments rather than external financing sources. This could be due to a lack of autonomy in major decision-making about debt financing, resulting from political influence by the government (Nyamita, 2014). Ahmad et al. (2017) also found a negative influence of profitability on leverage stating the Malaysian SOEs utilize more internally generated funds due to their outstanding performance. Sia et al. (2016) found that government-owned firms in Malaysia are more orientated with service delivery than on profitability. This argument is supported by Deesomsak et al. (2004), who also found insignificant findings between leverage and profitability in state-owned firms in Singapore, suggesting that the capital structure of firms owned by the government in Singapore is not affected by their profitability. Compared to other SOEs in developing economies, the mixed empirical findings of those in this study indicate that the SOEs in SA are more orientated with being a profit-making body than towards their objectives SOEs towards the provision of services.

The results show that age negatively affects leverage and this negative sign is consistent among all three leverage measures. The statistically significant negative prediction of firm age on the long-term debt ratio at the 1% significance level is an indication that older firms reduce their debt levels, especially long-term debt. This prediction is consistent with the theoretical expectation of the pecking order theory. Older SOEs use more internal funds to finance their investments, as found in Kenyan SOEs (Nyamita, 2014). Older firms are more established and should reduce their reliance on debt as they have more internally generated cash flows, therefore reducing their dependence on debt. Most of the SOEs sampled in this study were already in existence from the beginning of the study period. However, one particular SOE, namely Broadband Infracore, a fiber-optic infrastructure that was one of the younger SOEs formed in 2007, has the highest debt level than all other SOEs. This supports the negative prediction between age and leverage where younger SOEs have higher debt levels. Despite already high debt levels, the SOE has appealed to the government for further cash injections and bailouts to continue operations. These requests for increased guarantees will increase the debt levels even further due to using the security for additional borrowing, compromising its liquidity position.

The negative coefficients between tangibility and leverage are consistent with all three models. The coefficients are statistically significant under the long-term debt and short-term models. The lower asymmetric information associated with higher tangible assets would make it cheaper to issue equity; therefore, firms with higher tangible assets should have lower debt levels. This negative prediction supports the pecking order theory (Harris & Raviv, 1991). Tangible assets are more accessible for outsiders to value, implying fewer information asymmetries; therefore, they are linked to reduced agency costs as firms can collateralize their debt (Frank & Goyal, 2009). This finding indicates that SOEs in SA have less tangible assets to be used as collaterals would face higher information costs and prefer debt. This implies that an increase in asset tangibility would decrease debt levels and increase external equity financing due to decreased information costs. Soekarno et al. (2016) explained that Indonesian SOEs do not have to

use their assets as collateral as they have sufficient retained earnings to finance their capital expenditures. These findings suggest that the strong political influence in SOEs may discourage them from using their assets as collaterals and use their tangible assets to issue more equity or negotiate for increased guarantees or more subsidies as suggested by Nyamita (2014) in the case of Kenyan SOEs.

Growth, measured by the percentage change in total assets, reveals a statistically significant positive influence on TDL and LDL with a weak, insignificant negative effect on SDL. The strong positive coefficients for growth with total debt and long-term debt indicate the pecking order theory, where the prediction is that firms with high growth opportunities are expected to accumulate more debt over time.

The mixed findings, even though the coefficient with short-term debt is insignificant, indicate that there is also the support of the dual relationship predicted by the agency theory. The agency theory's negative prediction were firms with a greater value of growth opportunities are expected to use less risky debt. When firms grow, this creates room for managers' opportunistic behavior, which can be mitigated by employing more debt in the capital structure, resulting in a positive prediction (Yinusa, 2015). Short-term debt financing is associated with more monitoring and shorter repayment obligations. A decrease in short-term debt and an increase in long-term debt used to finance growth opportunities are an indication that management wants to ensure that they continue to exert control and enjoy perks and perquisites that may be difficult to employ more short-term debt (Yinusa, 2015). The findings of this study contradict those of Nyamita (2014) in the case of Kenyan SOEs. It was found that since the government is the majority shareholder, the agency theory's negative predictions suggest that SOEs with higher tangible assets issue equity to avoid the conflict between the government and debt holders. These findings indicate that these SOEs would have no other option but to use long-term debt financing when they need financing once their internal sources of finance are depleted. Long-term financing is more suited to growth opportunities based on capital expansion, acquisition, and share repurchase, among others.

Firms that have volatile cash flows would be expected to have increased costs of financial distress due to difficulty in honoring interest payments, and there is an increased probability that the tax shield benefit will be underutilized. Hence, they should use less debt (Alzomaia, 2014). An increase in risk is detrimental to shareholders; therefore, the trade-off theory predicts that more risky firms should use less debt. Results are mixed for this variable with a significant (5% confidence level) positive influence found with total debt while a significant negative impact is found with long-term debt. Mixed findings have been reported by Vatavu (2013) between different industries, with some accessing short-term debt when there is a reduction in business risk while others accessed debt when an increase in risk was recorded. Disagreeing with the predictions of the trade-off and pecking order theories, Chen and Strange (2005) found statistically significant evidence that risk positively influenced the market value of the leverage, explaining that debt is not a major constraint in Chinese firms structures in other economies. Significant positive findings are found between risk and total debt, indicating that when risk increases, the total debt of SOEs increases. Banks, who are the primary source of debt finance in SA, and who compete for clients, might be offering finance to riskier firms who may be avoiding issuing equity, considering that their risk levels may make this a more expensive source of finance (Gwatidzo et al., 2016). SOEs that experience high levels of risk may want to avoid additional financial risk by issuing less long-term debt (Danso, 2014). Furthermore, SOEs that experience high earnings volatility may be granted financial assistance by the government, in which case they may be subject to strict conditions in terms of the grant.

The inverse relationship between taxation and leverage is statistically significant at the 10% confidence level. This negative finding between taxation and long-term debt contradicts the trade-off theory, which predicts that firms increase their debt levels to benefit from the tax savings derived from the interest on the debt. Hence, it can be argued that SOEs in SA do not find the tax advantage attractive. This could also indicate that the debt levels are too high as reflected in the trend analysis section. Hence, SOEs are no longer benefiting from the tax shield.

The inverse relationship between liquidity and leverage is consistent among all models and statistically significant (1% confidence level) with short-term debt. This negative finding supports the prediction of the pecking order theory. It can be concluded that the SOEs that have high levels of liquidity use their high cash flows from the current assets to finance their investments rather than issuing debt and facing the debt overhang problem. The current low levels of liquidity in many SOEs could result in increased use of guarantees, adding pressure to government finances (Thukwana, 2018). Despite already high debt levels in most SOEs, they continually request cash injections and bailouts from the government to continue operations. Increased guarantees will increase the debt levels even further due to using the guarantee for further borrowing, which will compromise the liquidity position of many of these SOEs (Thukwana, 2018). As liquidity levels decrease, the level of debt in SOEs increases, which may negatively impact government finances, especially if SOEs draw on guarantees.

The positive influence of the probability of bankruptcy and leverage is consistent with all three measures of leverage. The results indicate a significant influence at the 1% confidence level with the probability of bankruptcy and the long-term debt ratio supporting previous findings of Harris and Raviv (1991). This implies that when there is an increase in bankruptcy chances, SOEs issue more long-term debt, which is a contradiction of the predictions of the trade-off theory where firms are expected to reduce their debt levels.

Non-debt tax shields that exclude the debt tax shield of interest expense have a consistent negative sign in all three models. The statistically significant (1% confidence level) negative influence on total leverage is an indication that SOEs that have sufficient non-debt tax shields reduce their debt levels as non-debt tax shields reduce the incentive to issue external debt. In other words, firms with sufficient non-debt tax shields are more likely to issue less debt; the trade-off theory supports a prediction.

The findings presented vary from those in other African countries. Nyamita (2014) indicated that profitability, asset tangibility, and growth were

the only significant determinants applicable to the capital structure of Kenyan SOEs. These findings also vary from the private sector of South Africa, where Gwatidzo et al. (2016) found that size, asset tangibility, growth, and risk positively influence leverage, whereas profitability and tax negatively influence leverage. These differences indicate that the results from other developing economies and the private sector cannot be generalized to the SOEs in SA and vice versa.

Table 4. Regression results

Variables	GMM regression		
	Model 1	Model 2	Model 3
	TDL	LDL	SDL
<i>L1</i>	-0.0107 (0.673)	-0.204 (0.452)	1.795** (0.711)
<i>PROF</i>	0.363 (0.271)	0.275 (0.18)	-0.582*** (0.203)
<i>AGE</i>	-0.0356 (0.382)	-1.432*** (0.535)	-0.376 (0.272)
<i>TANG</i>	-4.773 (3.672)	-18.37* (10.93)	-6.289** (3.089)
<i>GROW</i>	0.339* (0.194)	0.689*** (0.213)	-0.106 (0.0752)
<i>RISK</i>	4.363** (2.17)	-12.07* (6.365)	-2.627 (2)
<i>TAX</i>	-0.00474 (0.0519)	-0.145** (0.0726)	-0.065 (0.049)
<i>LIQ</i>	-0.0398 (0.0394)	-0.0945 (0.0677)	-0.159*** (0.0441)
<i>BKCY</i>	0.00906 (0.00704)	0.0173*** (0.00624)	0.000389 (0.00216)
<i>NDTS</i>	-7.873*** (2.896)	-3.27 (4.66)	-10.87 (7.436)
Constant	6.218 (4.132)	24.38** (11.93)	7.812** (3.163)
Observations	466	466	466
Number of id	31	31	31
No. of instruments	26	25	26
<i>AR2</i>	0.691	0.836	0.814
Hansen Prob	1.000	1.000	0.999
Wald stats	0.000	0.000	0.000

Note: Corrected standard errors in parentheses: *** means $p < 0.01$, ** means $p < 0.05$, * means $p < 0.1$.

Table 4 presents the Arellano Bond *AR1*, and *AR2* tests were also run to test autocorrelation at the first and second difference levels. The *AR* (2) test results for serial autocorrelation reflected by the non-significant p -value were 0.691, 0.836, and 0.814 for the three models, respectively, which indicated that auto-correlation of order 2 was absent.

Hence, these results were an indication that the models passed the test.

The Wald test was applied to the system-GMM results to test the reliability of the estimators in the models, whereby the $p(\chi^2) < 0.05$, which is an indication that the estimators are reliable

at the 95% confidence level. The Hansen instruments-identification tests indicate the validity of the models under system-GMM by testing the variables' over-identification. Higher values indicate the robustness of the model; hence, all models passed the over-identification of instruments test.

CONCLUSION

Several South African SOEs find themselves in precarious financial positions with the need for government to bail them out of their debt obligations. This study aimed to examine the factors that affect the debt financing structure to determine the strongest determinants of South African SOEs capital structure. The findings presented in the previous section highlight several significant determinants. These findings of a change in behavior of the debt ratios based on several factors support predictions made by the pecking order and trade-off theories.

Based on the findings, the conclusion is that the prominent theory that explains the debt financing decisions of South African SOEs is the pecking order theory. The most significant variables affecting the debt levels in South African SOEs, as highlighted in the previous section, are profitability, age, growth, liquidity, probability of bankruptcy, and non-debt tax shield. Many of the SOEs' debt levels in South Africa have reached excessively high levels, threatening the country's financial stability. Hence, the findings of this study can assist the relevant parties to reduce debt levels by focusing on the significant determinants that affect the SOEs capital structure. These changes in firm-specific factors that influence the capital structure are significant as they can affect the entity's value and investors' perceptions. The policy recommendations are that the government prioritizes reducing debt levels for South Africa to develop and achieve sustainable development.

AUTHOR CONTRIBUTIONS

Conceptualization: Ferina Marimuthu.

Data curation: Ferina Marimuthu.

Formal analysis: Ferina Marimuthu.

Investigation: Ferina Marimuthu.

Methodology: Ferina Marimuthu.

Project administration: Ferina Marimuthu.

Visualization: Ferina Marimuthu.

Writing – original draft: Ferina Marimuthu.

Writing – reviewing & editing: Ferina Marimuthu.

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