Journal of Economic and Financial Sciences
ISSN: (Online) 2312-2803, (Print) 1995-7076

The global financial crisis and the speed of capital structure adjustment: Evidence from South Africa

Authors:
Vusani Moyo[1]
Demetris Markou[2]

Affiliations:
[1]Department of Accountancy, Faculty of Management, Commerce and Law, University of Venda, Thohoyandou, South Africa

[2]Department of Statistics and Economics, School of Business and Management, University of Central Lancashire, Larnaka, Cyprus

Corresponding author:
Vusani Moyo,
vusani.moyo@univen.ac.za

Dates:
Received: 21 Jan. 2022
Accepted: 28 June 2022
Published: 25 Aug. 2022

How to cite this article:
Moyo, V. & Markou, D., 2022, 'The global financial crisis and the speed of capital structure adjustment: Evidence from South Africa', *Journal of Economic and Financial Sciences* 15(1), a754. https://doi.org/10.4102/jef.v15i1.754

Orientation: The 2007–2008 global financial crisis (GFC) represented a negative economic shock that financially constrained most firms globally.

Research purpose: This study investigated the impact of the 2007–2008 GFC on firms' speed of adjustment (SOA) towards target leverage and whether this is a good descriptor of corporate financing for Johannesburg Stock Exchange (JSE)-listed nonfinancial firms.

Motivation for the study: There is limited evidence, if any, on how the GFC affected firms' SOA.

Research approach/design and method: This study used panel data drawn from 104 nonfinancial firms listed on the JSE and the partial adjustment model fitted with the random-effects tobit estimator (RE tobit).

Main findings: The study firstly documents that JSE-listed nonfinancial firms had positive SOAs prior to, during and post the 2007–2008 GFC. Secondly, firms' SOA decreased during the financial crisis period, meaning that a global negative economic shock reduces the SOA of all JSE-listed nonfinancial firms. Thirdly, financially constrained firms readily eliminate their target leverage deviation spreads, as they have a persistently higher SOA than financially unconstrained firms. Lastly, the SOA of financially unconstrained firms improved after the 2007–2008 GFC.

Contributions/value-add: The dynamic trade-off theory is a good descriptor of the financing behaviour of JSE-listed non-financial firms. A negative economic shock reduces the firms' SOAs.

Practical/managerial implications: Managers should therefore maintain capital buffers in the form of cash reserves and lines of credit to reduce the impact of a negative economic shock on a firms' SOAs.

Keywords: dynamic trade-off theory; speed of adjustment; random effects tobit; financially constrained; global financial crisis; target capital structure.

Orientation

In their seminal work, Fischer, Heinkel and Zechner (1989) proposed the dynamic trade-off theory of capital structure which attempts to explain the observed financing behaviour of firms in the presence of nontrivial capital structure adjustment costs. The dynamic trade-off theory hypothesises that, owing to the presence of nontrivial capital structure adjustment costs, which include security issuance and information asymmetry costs, firms do deviate from their target leverage ratios and over time, only partially adjust their capital structures towards the target leverage (Flannery & Rangan 2006). The rate at which firms eliminate their target-deviation spreads defines their target speed of adjustment (SOA). The SOA towards the target leverage is very slow, owing to the existence of market imperfections which make it costly for firms to frequently rebalance their capital structures (Hovakimian, Opler & Titman 2002).

The partial adjustment model, which was initially conceptualised by Taggart (1977) and extended by Auerbach (1985), Fama and French (2002), Fischer et al. (1989), Flannery and Rangan (2006) and Jalilvand and Harris (1984) makes it possible for researchers to estimate firms' SOA towards target leverage. Several studies, including those of Chang and Dasgupta (2009), Devos, Rahman and Tsang (2017), Elsas and Florysiak (2011), Getzmann, Lang and Spremann (2014), Oino and Ukaegbu (2015), Qian, Tian and Wirjanto (2009) and Zhou et al. (2016), have used the partial adjustment model to estimate firms' SOA, which validates the dynamic trade-off theory of capital structure.

The 2007–2008 global financial crisis (GFC) was a negative economic shock that affected firms across the globe. There are limited studies, if any, which have investigated how quickly firms adjusted their leverage ratios prior to, during and after a GFC. Campello, Graham and Harvey (2010) contend that this financial crisis financially constrained several firms across the globe, as it affected their financing choices and hence their capital structures. This resulted in several firms either cancelling or postponing investment in their profitable growth options. This impact was severe on firms that were already financially constrained before the crisis began.

The GFC of 2007–2008 began in the United States of America (USA) in August 2007 and was triggered by massive consumer defaults on the subprime mortgages (Duchin, Ozbas & Sensoy 2010). The mortgage consumer defaults led to the collapse of two major US banks, namely Bear Stearns (16 March 2008) and Lehman Brothers (15 September 2008). The third affected bank, the Washington Mutual, was seized by the Federal Regulators on 25 September 2008.

The effects of the mortgage defaults and the collapse of these three major US banks resulted in a financial crisis in the USA which quickly spread to other countries, leading to a GFC. By November and December 2008, global stock markets had declined sharply, and the loan spreads skyrocketed (Poole 2010). The increased volatility of the financial markets across the globe resulted in a huge increase in the cost of borrowing from corporates and banks as well as the cost of equity finance. The crisis had devastating effects on nonfinancial firms, as it represented a negative economic shock to the supply of external capital to these firms. According to Ivashina and Scharfstein (2010), new loans to large borrowers in the USA fell by 47%, and new lending for real investment was reduced by 14% during the peak of the GFC.

The decline in the supply of external finance financially constrained the previously unconstrained firms and worsened the constraints on the already constrained firms (Duchin et al. 2010). According to Campello et al. (2010), the effects of the crisis were severe in those firms which were already financially constrained before the onset of the crisis. The financially constrained firms are firms which are dependent on external financing and are susceptible to the negative consequences of external financing shocks (Bliss, Cheng & Denis 2015). These firms are highly leveraged, have profitable growth options, lower cash balances and high short-term debt levels in their capital structures.

The direct consequences of the crisis were a deep cut in firms' capital expenditures, dividends and share repurchases, as well as technology and employment costs. In their survey of 1050 chief financial officers in the USA, Europe and Asia, Campello et al. (2010) found that financially constrained firms were forced to cut their technology, employment and investment expenditures drastically as a direct consequence of the financial crisis. The financially constrained firms liquidated their assets to fund operations, used up more cash and drew down their credit lines, leading to an increase in firm leverage. In addition, the limited external funding forced these firms to bypass profitable investment opportunities. According to Duchin et al. (2010) and Kahle and Stulz (2013), both capital expenditures and corporate borrowing declined sharply during the crisis period, signalling that the crisis financially constrained most of the nonfinancial firms. As a result of these financial constraints, firms significantly reduced their dividends and share repurchases during the crisis period (Bliss et al. 2015). Dell'Aricca, Detragiache and Rajan (2008) found that firms that were heavily dependent on external financing experienced a significant decline in financial performance during the crisis period.

The South African economy was not spared from the devastating effects of the 2007–2008 GFC (World Bank 2008). The impact of the crisis was diverse and included a reduction in the capital inflows into the country, a reduction in the demand of South African exports, increased household debts and a widening current account deficit. A study by Danso and Adomako (2014) found that the 2007–2008 GFC financially constrained South African firms. This study, together with those of Moyo (2015) and Ramjee and Gwatidzo (2012) did not specifically investigate how this financial crisis affected firms' SOA. Naturally, it is expected that firms' SOAs towards target leverage were also affected by this crisis. The main question is how quickly firms adjusted their capital structures prior to, during and after the GFC.

Information on firms' SOA during and post a major financial crisis like the 2007–2008 GFC is of great theoretical and practical interest. The 2007–2008 GFC provided a natural experiment for researchers to study this effect. There is, however, a dearth of studies that have investigated how firms' SOAs changed during and post the 2007–2008 GFC. The objective of this study is to fill that gap.

Research purpose

This study investigated how quickly firms adjust their leverage ratios prior to, during and after a GFC. The study has four objectives: firstly, to find out if the dynamic trade-off theory is a good descriptor of the financing behaviour of JSE-listed nonfinancial firms. Secondly, the study seeks to establish if financially constrained firms have a persistently lower SOA than their unconstrained counterparts. The third objective of the study is to estimate firms' SOA prior to, during and post the GFC. Lastly, the study seeks to find out if the post-crisis SOAs were higher than the SOAs during the crisis period.

The study firstly documents that the dynamic trade-off theory is a good descriptor of the financing behaviour of JSE-listed nonfinancial firms. Secondly, financially constrained firms have a persistently higher SOA than financially unconstrained firms, meaning that, unlike unconstrained firms, constrained firms readily adjust their capital structures. Thirdly, firms' SOA decreased during the GFC period. Lastly, the SOA of financially unconstrained firms improved after

the GFC. There is, however, inconclusive evidence on whether the financially constrained firms change their target capital structure adjusting behaviour post a major financial crisis.

The remainder of the article is structured as follows: the 'Literature review and hypothesis development' section provides a review of the related literature and gives a basis for hypothesis development. The 'Research design' section explains the data sources and methodology used. The 'Results' section discusses the results of the study, and the 'Conclusion' section concludes the study. The practical implications of the study's findings are presented in the 'Practical implications' section. Finally, the 'Limitations and recommendations' section discusses the limitations of the study and provides some recommendations for future research.

Literature review and hypothesis development

The dynamic trade-off theory of Fischer et al. (1989) hypothesises that, although firms have optimal target ratios as proposed by the traditional static trade-off theory, these are not static. The zero-target deviation financing policy proposed by the static trade-off theory is impossible because of the existence of market imperfections and frictions. According to Leland (1994), the costs of optimal target deviation are trivial, averaging approximately 0.5% of firm value. On the other hand, both Flannery and Rangan (2006) and Leary and Roberts (2005) point out the presence of nontrivial target adjustment costs, which include recapitalisation costs such as security issuance costs, information asymmetry costs and target-deviation opportunity costs. Ju et al. (2005) and Myers (2003) argue that, because of the trivial target-deviation and nontrivial target-adjustment costs, firms do allow their observed debt ratios to temporarily drift away from their optimal debt ratios. However, over time, firms partially eliminate these target deviation spreads through the manipulation of their financing choices (Kayhan & Titman 2007).

Flannery and Rangan (2006) contend that the nontrivial target adjustment costs prevent firms from actively and fully rebalancing their capital structures. Instead, firms infrequently and partially eliminate their target capital structure deviation spreads over time. This means that the capital structure rebalancing process follows a partial adjustment model. The rate at which a firm partially eliminates its target debt ratio deviation spread defines its SOA. Several studies, including those listed in Table 1, have used the partial adjustment model to estimate a firm's SOA. The findings of the studies in Table 1 confirm the usefulness and validity of the partial adjustment model in capital structure research. From Table 1, U.S. firms have the lowest SOA, which ranges from 13.30% (Flannery & Rangan 2006) to 37.80% (Chang & Dasgupta 2009). In continental Europe, the results of UK firms are mixed; however, French and German firms have similar SOAs which are higher than those of the US firms. Lastly, African firms readily adjust their leverage ratios when compared to their American and European counterparts.

TABLE 1: Some empirical estimates of speed of adjustment leverage forwards target leverage.

Study and estimators used	Country of study	SOA	Dependent variables
Moyo (2015) ***Estimators**: System GMM and difference GMM*	INET BFA South Africa	41.80% – 52.82%	MDR and BDR
Ramjee and Gwatidzo (2012) ***Estimator:** Two-step GMM*	INET BFA South Africa	65%	TLDR
Oino and Ukaegbu (2015) ***Estimators**: Pooled OLS and GMM*	Nigeria	47.00% GMM 28% OLS	TDR and LTDR
Qian et al. (2009) ***Estimator**: Two-step system GMM*	China	18.50%	BDR
Dang, Kim and Shin (2012) ***Estimators**: AH-IV and two-step GMM*	Datastream UK	53% – 59.70%	MDR
Dang (2013) ***Estimators**: AH-IV, GMM and system GMM and error-correction model*	UK Germany France	39.00% – 39.70% 42.80% – 45.40% 43.90% – 44%	MDR
Elsas and Florysiak (2015) ***Estimators:** DPF, FE, FM, OLS, system GMM, difference GMM and LSDVC*	Compustat USA	26.30% (MDR) 27.30% (BDR)	MDR and BDR
Flannery and Hankins (2013) ***Estimators**: OLS, FE, system GMM, difference GMM and LSDVC*	Compustat USA	13% – 25%	MDR
Elsas and Florysiak (2011) ***Estimators:** DPF and FE*	Compustat USA	26.30% MDR	MDR
Chang and Dasgupta (2009) ***Estimator:** FE*	Compustat USA	37.80%	BDR
Flannery and Rangan (2006) ***Estimators:** FM and FE*	Compustat USA	13.30% MDR	BDR

GMM, generalised method of moments; DPF, dynamic panel data with a fractional dependent variable; FE, fixed effects; FM, Fama-MacBeth; OLS, ordinary least squares; AH-IV, Anderson–Hsiao instrumental variables; LSDVC, least squares dummy variable; SOA, speed of adjustment.

The key firm-specific determinants of capital structure

Several studies, including those of Chang and Dasgupta (2009), Devos et al. (2017), Elsas and Florysiak (2011), Getzmann et al. (2014), Oino and Ukaegbu (2015), Qian et al. (2009) and Zhou et al. (2016), have identified firm size, profitability (PROF), asset tangibility (TAN), nondebt tax shields (NDTs) and growth opportunities as reliable firm-specific determinants of corporate leverage. The studies have used these as control variables for the estimation of firms' SOAs. Smith et al. (2020) argued that firms can be classified as value and growth firms. Value firms are those firms whose value derives from their assets in place, while growth firms derive their value from their future profitable growth options.

Barclay and Smith (2020), Smith et al. (2020) and Titman and Wessels (1988) argued that value firms tend to be large, mature, financially flexible, profitable and well-diversified firms that generate excess free cash flows. These firms also have high stocks of tangibles, high credit ratings and low stocks of profitable growth options, and they are less financially constrained. These characteristics of value firms increase their debt capacities while reducing their overall financing costs (Dang 2013; Frank & Goyal 2009). On the

other hand, growth firms tend to be small, young, less-profitable and less-diversified firms which generate limited cash flows. These firms have low stocks of tangibles, low credit ratings, low debt capacities and high stocks of profitable growth options, and they tend to be financially constrained (Dang et al. 2012; Smith et al. 2020).

The dynamic trade-off theory argues that debt interest tax shields are more valuable to value firms while NDTs in the form of capital allowances are more valuable to growth firms (Bessler, Drobetz & Kazemieh 2011). The theory argues that the reduced financial distress costs, increased taxable earnings and higher agency costs of free cash flows all push value firms to use more debt than growth firms. (Bessler et al. 2011). Growth firms, on the other hand, will rely more on equity financing to reduce their agency costs of underinvestment. This financing behaviour of both value and growth firms implies that value firms are highly leveraged, whereas growth firms are less leveraged. Thus, based on the trade-off hypothesis, firm leverage is positively related to firm PROF, size and TAN while it is negatively related to firm growth rate and nondebt interest tax shields.

In support of the dynamic trade-off theory, Chang and Dasgupta (2009), Dang et al. (2012), Dang (2013), Elsas and Florysiak (2011), Flannery and Hankins (2013), Moyo (2015), Oino and Ukaegbu (2015), Qian et al. (2009), Ramjee and Gwatidzo (2012) and Zhou et al. (2016) found a positive relationship between leverage and TAN and firm size. Consistent with the predictions of the dynamic trade-off theory, Chang and Dasgupta (2009), Dang (2013), Dang et al. (2012), Elsas and Florysiak (2011), Flannery and Hankins (2013), Flannery and Rangan (2006) and Qian et al. (2009) document a negative correlation between leverage and firm growth rate and NDTs. However, Chang and Dasgupta (2009), Dang et al. (2012), Dang (2013), Elsas and Florysiak (2011), Flannery and Hankins (2013), Moyo (2015), Oino and Ukaegbu (2015), Qian et al. (2009), Ramjee and Gwatidzo (2012) and Zhou et al. (2016) found a negative relationship between leverage and PROF and a positive relationship between leverage and TAN and firm size, which rejects the hypothesis of the dynamic trade-off theory.

The 2007–2008 GFC was a negative economic shock that affected firms across the globe. Campello et al. (2010) contend that this financial crisis financially constrained several firms across the globe as it affected their financing choices and hence their capital structures. This impact was severe on firms that were already financially-constrained prior to the crisis. According to Barclay and Smith (2020), Hadlock and Pierce (2010), Smith et al. (2020) and Titman and Wessels (1988), value firms tend to be large and financially-unconstrained, while growth firms are normally small and financially-constrained. Given their high credit ratings and lower external financing costs, value firms face lower target adjustment costs compared to growth firms. This implies that value firms should rebalance their capital structures more frequently than the growth firms.

This study therefore expects that, prior to, during and after the crisis, financially unconstrained firms will exhibit a persistently higher SOA than financially-constrained firms. Secondly, all firms' SOAs will be at their lowest during the financial crisis, as they were all financially constrained. Thirdly, the effects of the financial constraints will encourage firms to always keep their target-deviation spreads to the minimum. This means frequent adjustments of capital structures; thus, the SOA after the GFC is expected to be higher than that of the precrisis period.

Research design

The empirical model

The partial adjustment model was initially conceptualised by Taggart (1977) and was later extended by Auerbach (1985), Fama and French (2002), Fischer et al. (1989), Flannery and Rangan (2006) and Jalilvand and Harris (1984). Following these studies, the single-step capital structure partial adjustment model is generally stated as follows:

$$LEV_{i,t+1} = (1-\lambda)LEV_{i,t} + \lambda(\boldsymbol{X}_{i,t}\gamma) + \varepsilon_{i,t+1} + \varepsilon_{i,t+1} \quad \text{[Eqn 1]}$$

Where $LEV_{i,t+1}$ is the firm's next year's leverage ratio, measured either by the market-to-debt ratio (MDR) or the book-to-debt ratio (BDR), λ represents the firm's SOA towards the optimal target leverage, where $\boldsymbol{X}_{i,t}$ represents a vector of firm-specific, γ represents a coefficient vector, i is the firm-fixed effect variable and $\varepsilon_{i,t+1}$ is an error term.

Model 1 assumes the validity of the dynamic trade-off theory, and hence the firm's SOA can be estimated. This assumption can only hold if some of the elements of the coefficient vector are greater than zero, that is, $\gamma \neq 0$. This means that λ must lie between 0 and 1, that is, $0 < \lambda < 1$, in order to validate the dynamic trade-off theory. In situations where $\lambda = 1$, it implies that the firm has no target leverage to adjust towards, and hence its SOA is zero. Such a result invalidates the dynamic trade-off theory as a valid theory in explaining the financing decisions of firms. A result where $\lambda = 1$ means that the firm has an optimal leverage ratio which it never deviates from as it continuously adjusts its capital structure (Elsas & Florysiak 2015). A result where $0 < \lambda > 1$ would result in a negative SOA, which means that the firm over-eliminates its target-deviation spread (Qian et al. 2009).

The present study used both the MDR and BDR to estimate firms' SOA as previous studies such as those of Elsas and Florysiak (2015) and Moyo (2015) have shown that SOA depends on the dependent variable used. In line with the previous studies of Drobetz and Wanzenried (2006), Elsas and Florysiak (2011) and Frank and Goyal (2009), the study used PROF, TAN, size (SIZE), market-to-book (growth rate) (MTB) and NDTs as the vector of variables in model 1. The final models that were used in the current study were obtained by expanding model 1 and are specified as follows:

$$MDR_{i,t+1} = (1-\lambda)\,MDR_{i,t} + \beta_1 PROF_{it} + \beta_2 TAN_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 NDTS_{it} + \varepsilon_{i,t+1} \quad \text{[Eqn 2]}$$

The variables are defined as follows:

- **MDR:** Book value of total interest-bearing debt divided by firm market value (market value of equity plus book value of total interest-bearing debt).
- **BDR:** Book value of interest-bearing debt deflated by total assets.
- **PROF:** EBIT deflated by total assets.
- **TAN:** Fixed assets divided by total assets.
- **Size (SIZE):** natural logarithm of total assets.
- **MTB:** market value of equity plus book value of debt deflated by the total assets.
- **NDTs:** depreciation deflated by total assets:

$$BDR_{i,t+1} = (1-\lambda)BDR_{i,t} + \beta_1 PROF_{it} + \beta_2 TAN_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 NDTS_{it} + \varepsilon_{i,t+1} \quad \text{[Eqn 3]}$$

The study used both models to test the following hypotheses of the study:

H1: The dynamic trade-off theory is a good descriptor of the corporate financing behaviour of the nonfinancial firms that are listed on the JSE.

H2: The SOA towards the target optimal capital structure for both financially constrained and financially unconstrained firms was at its lowest during the GFC period.

H3: Financially unconstrained firms had a higher SOA towards target leverage prior to, during and after the financial crisis.

H4: All firms' SOA towards target leverage after the financial crisis period was higher than prior to the financial crisis period.

Data: Sources, collection, ethical considerations and sampling

The study's population was made up of 208 JSE-listed nonfinancial firms that were listed during the period 2001–2018. In this study, all financial services firms were excluded, as their financing is regulated and supervised by the South African Reserve Bank. This regulation limits, for instance, banks' flexibility to alter their capital, as they may breach their minimum capital requirements. A purposive sampling strategy was to construct the final sample of the study. The sample included only nonfinancial firms that were continuously listed for at least 16 years or more in the period 2001–2018. The sample excluded all nonfinancial firms that had missing data for two or more consecutive years. The final sample was made up of 104 nonfinancial firms, and the total number of firm years was 1872.

All the data that were used in the study were extracted from the firms' financial statements, which were ethically obtained from the IRESS Research Domain database. The IRESS Research Domain database has all the published financial statements of all JSE-listed firms from 1972 to date. The collected data were used to construct a panel dataset, with the resulting panel being unbalanced, as some firms had missing observations. According to Baltagi (2009), the main benefits of using panel data are that they allow for the control of individual heterogeneity, and they result in reduced collinearity and more degrees of freedom, leading to increased estimation efficiency. Panel data are also compatible with several efficient modern estimators, such as difference generalised method of moments (GMM), the system GMM, the censored random effects tobit estimator (RE tobit) and the least squares dummy variable (LSDVC) estimators.

Following Almeida and Campello (2007), Denis and Sibilkov (2010) and Fazzari, Hubbard and Petersen (1988), the study used firm size (size was measured by the natural logarithm of total assets) to categorise the firms in the sample as either financially constrained or financially unconstrained. According to Hadlock and Pierce (2010) and Hovakimian and Hovakimian (2009), firm size is a good predictor of the level of financial constraints. The financially constrained firms were those whose average size was lower than the sample's median size of 15.4026.

To enable the investigation of the effects of the GFC on the SOA of the nonfinancial firms listed on the JSE, the full sample (Panel 1, [2001–2018]) was then broken down into three subsamples: Panel 2: pre-financial crisis period (2001–2006); Panel 3: during financial crisis period (2007–2012); and Panel 4: post-financial crisis period (2013–2018). The full sample and subsamples were further subdivided into financially constrained and financially unconstrained firms to investigate if the SOA varied between these two categories of firms in these three subsample periods.

Data analysis

The study used Stata 15 to generate the full sample's summary statistics and to fit the two partial adjustment models using the full sample and subsamples panel datasets described earlier. This econometric data analysis software supports all the leading dynamic panel estimators that include the GMM, system GMM, the censored RE Tobit estimator and the LSDVC. Using Stata 15, all the variables were winsorised at the 1st and 99th percentiles to remove outliers. Variance inflation factors (VIF) were used to detect multicollinearity between the variables. All the variables' VIFs were less than 10; hence, no variables were dropped from the model.

The partial adjustment model is by nature an autoregressive-distributed lag model that is characterised by autocorrelation and heterogeneity among the individuals. The dynamic RE tobit maximum likelihood estimator was to fit models 2 and 3 using the full sample and subsamples panel datasets. The RE tobit estimator is equivalent to Elsas and Florysiak (2011) and Elsas and Florysiak (2015)'s double-censored dynamic panel data with a fractional dependent variable (DPF) estimator. According to Elsas and Florysiak (2015), the DPF estimator yields consistent and unbiased estimates when used to fit autoregressive-distributed lag models using unbalanced panel data that has a fractional dependent variable. This estimator is thus ideal for capital structure research as the partial adjustment model uses debt ratios which are fractional in nature and lie between 0 and 1. The estimator is implemented with the Gauss-Hermite quadrature

integration option. The SOAs were calculated using marginal effects.

Results

The results of the study are presented and discussed below under descriptive statistics and empirical results.

Descriptive statistics

Table 2 contains the descriptive statistics for the study's full sample.

The final full sample was made up of 104 nonfinancial firms listed on the JSE during the period 2001–2018. Only firms that were consecutively listed for at least 16 years during this period were included in the sample. The total observations for the unbalanced panel data set varied between 1658 and 1819.

All the variables were winsorised at the 1st and 99th percentiles to eliminate the outlier observations and most extreme recorded data.

From Table 2, firms' mean MDR and BDR are 0.2400 and 0.1954, respectively. The South African nonfinancial firms are less leveraged than both the US and Nigerian firms whose MDR are 0.2412 and 0.629, respectively (Oino & Ukaegbu 2015; Zhou et al. 2016). Table 2 also shows that the sample's maximum MDR is 0.6004, which is much lower than 0.9980 for Nigerian firms (Oino & Ukaegbu 2015). This implies that South African firms use debt conservatively and thus rely heavily on equity finance. This conservative use of debt may partly explain why few South African firms failed during the 2007–2008 GFC. The sample's mean firm PROF and SIZE ratios are 0.1287 and 15.2647, respectively. Table 2 also shows that the mean asset TAN is 0.2923, while the mean firm MTB is 1.1182. This means that on average, South African nonfinancial firms are smaller, hold lower stocks of tangibles, have lower MTB and have lower PROF ratios than both Nigerian and US firms (Oino & Ukaegbu 2015; Zhou et al. 2016). The variations in both the MDR and BDR of firms between the years 2001 and 2018 are shown in Figure 1.

MDR, winsorised fraction 0.1: is the firms' market-to debt ratio, and BDR, winsorised fraction 0.1: is the firms' BDR. All the ratios are winsorised at the 1st and 99th percentiles to eliminate the outlier observations and most extreme recorded data.

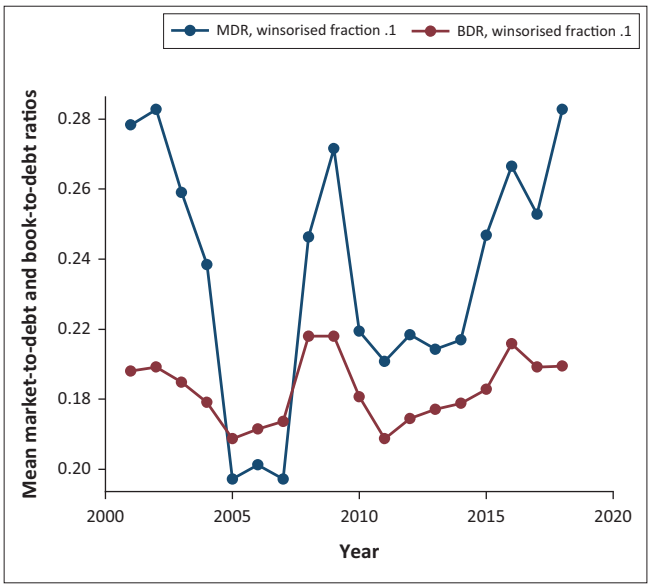
As shown in Figure 1, firms' average MDRs sharply declined from about 0.2953 in 2002 to 0.1728 in 2005 and then increased slightly to 0.1813 in 2006, just before the onset of the GFC in 2007. The BDRs also steadily declined from 0.2092 in 2002 to 0.1790 in 2005, after which they increased slightly to 0.1915 in 2006.

Figure 1 also shows that during the GFC, both average debt ratios increased sharply to 0.2463 for the MDR and 0.2180 for the BDR, respectively. This increase was to be expected as Campello et al. (2010) and Ivashina and Scharfstein (2010) stated that during the financial crisis, borrowers drew heavily from their bank credit lines in fear of future restricted access to the credit lines. The low returns on the stock market exacerbated the debt situation, and this led to the sharp increase in the MDRs of firms. Based on Figure 1, it is clear that both debt ratios continued to increase after the GFC peaking-off in 2009 at 0.2715 for the MDR and at 0.2251 for the BDR. These increases signalled the after-effects of the GFC. Thereafter, the ratios declined steadily until 2011, after which they began to increase again. The upward trend in both debt ratios has continued until 2018, although there was a slight drop in 2017. This increase can be attributed to the country's current macroeconomic problems, which include low stock market returns, slow economic growth, the recent credit downgrade and the depreciation of the rand against the major currencies. The shapes of the two graphs differ in some years because the two measures are different, as they are calculated differently. The BDR is calculated using book values of debt and assets, while the MDR is calculated using the book value of debt and the market value of equity. Thus, the MDR is more volatile than the BDR because of the volatility of the market

TABLE 2: Descriptive statistics for the full sample (2001–2018).

Variable	No. Obs.	Mean	Median	SD	Min.	Max.	Skewness	Kurtosis
MDR	1658	0.2400	0.1897	0.1938	0.0184	0.6004	0.6190	2.0986
BDR	1658	0.1954	0.1733	0.1373	0.0211	0.4546	0.5362	2.1848
PROF	1676	0.1287	0.1148	0.0662	0.0450	0.2515	0.5439	2.1119
SIZE	1819	15.2647	15.4047	1.7653	12.3990	17.8390	-0.1462	1.8335
TAN	1800	0.2923	0.2506	0.2060	0.0394	0.6574	0.4649	1.9358
MTB	1800	1.1182	0.9670	0.5809	0.4154	2.2220	0.6528	2.2383
NDTS	1791	0.0310	0.0291	0.0177	0.0060	0.0606	0.2380	1.8840

MDR, market-to-debt ratio; BDR, book-to-debt ratio; PROF, profitability; TAN, tangibility; SIZE, size; MTB, market-to-book ratio (growth rate); NDTS, nondebt tax shields are defined under model 2.

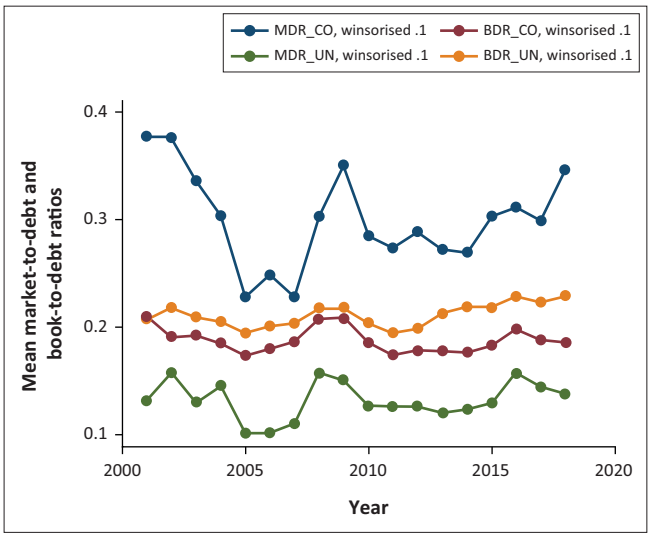


MDR, market-to debt ratio; BDR, book-to-debt ratio.

FIGURE 1: Full sample's mean market-to-debt ratios (2001–2018).

value of equity that is included in its calculation (Fama & French 2002). The MDRs and BDRs of both financially constrained and financially unconstrained firms are shown in Figure 2. As shown in Figure 2, financially constrained firms have higher MDRs than unconstrained firms, and the debt ratios follow the same pattern as those of the full sample shown in Figure 1.

MDR_CO, winsorised 0.1, is the market-to debt ratio of constrained firms; MDR_UN, winsorised 0.1, is the market-to debt ratio of unconstrained firms; BDR_CO, winsorised 0.1, is the book-to debt ratio of constrained firms, and BDR_UN, winsorised 0.1, is the book-to debt ratio of unconstrained firms. All the ratios are winsorised at the 1st and 99th percentiles to eliminate the outlier observations and most extreme recorded data.



MDR, market-to debt ratio; BDR, book-to-debt ratio; MDR_CO, market-to debt ratio of constrained firms; MDR_UN, market-to debt ratio of unconstrained firms; BDR_CO, book-to debt ratio of constrained firms; BDR_UN, is the book-to debt ratio of unconstrained firms.

FIGURE 2: Full sample's mean market-to-debt ratios of constrained and unconstrained firms (2001–2018).

Empirical results

The study's main empirical results are contained in Table 3, Table 4 and Table 5. The Wald χ^2 model fit statistics confirms that all the models are properly fitted. The focus of the study is the impact of the 2007–2008 GFC on firms' SOA towards the optimal target capital structure, and therefore the correlation results are only discussed in brief.

Discussion of full samples' results

The full sample and subsamples panel data sets' results are presented in Table 3.

Both MDR and BDR are negatively correlated with PROF and NDTSs. On the other hand, there is a positive relationship between leverage, firm size, TAN and firm MTB. Most of the coefficients are, however, statistically insignificant at 1% level. The correlation between leverage and firm size, TAN and NDTSs are consistent with the predictions of the dynamic trade-off theory. From the results presented in Table 3, the predictions of the dynamic trade-off theory are, however, rejected by the correlations between leverage and PROF and firm MTB. Thus, the correlations results do not conclusively validate the dynamic trade-off theory as a good descriptor of the corporate financing behaviour of JSE-listed nonfinancial firms. These results are, however, not surprising as Elsas and Florysiak (2011) and Qian et al. (2009) document similar results for the US firms.

From Table 3, all the coefficients of the lagged depended variables, MDRs and BDRs are positive and significant at 1%. This means that JSE-listed nonfinancial firms have positive and significant SOAs. These findings on the SOA validate the hypothesis of the dynamic trade-off theory which states that firms have target debt ratios which they partially adjust towards, over time. This means that the nonfinancial firms listed on the JSE have target debt ratios which they partially adjust towards, over time. The results of Model 2

TABLE 3: All panels' random effects Tobit estimator regression estimates for empirical models 2 and 3† using the full sample and the full subsamples.

Variables	Panel 1: 2001–2018		Panel 2: 2001–2006		Panel 3: 2007–2012		Panel 4: 2013–2018	
	MDR	BDR	MDR	BDR	MDR	BDR	MDR	BDR
PROF	-0.2210***(-3.81)	-0.0435 (-1.09)	-0.3114***(-3.20)	-0.0374 (-0.56)	-0.1732*(-2.05)	-0.0664 (-1.19)	-0.0191 (-0.18)	0.1197 (1.30)
SIZE	0.0043 (1.56)	0.0035*(2.04)	-0.0011 (-0.36)	0.0043 (1.64)	-0.0023 (-0.88)	0.0006 (0.32)	-0.0013 (-0.42)	0.0024 (0.93)
TAN	0.0853***(3.53)	0.0591***(3.75)	0.0706**(2.38)	0.0408 (1.70)	0.0591*(2.32)	0.0536**(3.15)	0.0025 (0.11)	0.0205 (1.03)
MTB	0.0050 (0.66)	0.0075 (1.54)	0.0217 (1.55)	0.0080 (0.84)	0.0028 (0.29)	0.0041 (0.69)	-0.0145 (-1.59)	-0.0021 (-0.31)
NDTS	-0.7739**(-3.11)	-0.4456**(-2.77)	-0.3040 (-1.55)	-0.4142 (-1.51)	-0.2971 (-1.13)	-0.3357 (-1.93)	0.0726 (0.27)	-0.0233 (-0.10)
MDR// BDR	0.6581***(22.35)	0.7265***(26.34)	0.6929***(22.40)	0.7484***(13.24)	0.8606***(31.33)	0.8783***(43.20)	0.8684***(36.35)	0.8253***(27.69)
Speed of adjustment (SOA)	34.19%	27.35%	30.71%	25.16%	13.94%	12.17%	13.16%	17.47%
Half-life (years)	1.66	2.17	1.89	2.39	4.62	5.34	4.91	3.61
Observations	1400	1 400	483	483	513	513	406	406
Wald chi^2 (6)	875.16	1141.36	839.90	274.18	1863.18	2851.57	1605.21	1079.18
Prob > chi^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The term λ represents the firms' SOA towards optimal leverage.

The *t*-statistics are shown in parenthesis and the coefficients marked ***, **, and * are significantly different from zero at 1%, 5% and 10% levels, respectively. The estimates' half-life implied by the SOA of adjustment is calculated as: $T_{1/2} = \log(0.5) / \log(1-\lambda)$. The model's fit statistics are shown on the lower end of the table.

MDR, the variables market-to-debt ratio; BDR, book-to-debt ratio; PROF, profitability; TAN, tangibility; SIZE, size; MTB, market-to-book ratio (growth rate) and NDTS, nondebt tax shields are defined under model 2; SOA, speed of adjustment.

†, $MDR_{i,t+1} = (1-\lambda)MDR_{i,t} + \beta_1 PROF_{it} + \beta_2 TAN_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 NDTS_{it} + \varepsilon_{i,t+1}$

$MDR_{i,t+1} = (1-\lambda)BDR_{i,t} + \beta_1 PROF_{it} + \beta_2 TAN_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 NDTS_{it} + \varepsilon_{i,t+1}$

(MDR regression) show that the SOA for the full sample is 34.19% (with a half-life of 1.66 years). This means that 34.19% of the full sample firms' spread between the actual and target leverages is eliminated in the space of 1 year. The full sample's half-life of 1.66 years means that firms cover 50% of their target deviation spread within 1.66 years, provided a constant SOA is maintained during the adjustment period. In regression Model 3 (BDR regression), the SOA for the full sample is 27.35% (2.17 years). It is expected that the SOAs will differ as the two leverage ratios are computed differently. These SOAs are, however, lower than the 66% – 80% SOA range documented by Ramjee and Gwatidzo (2012) in their study of 178 nonfinancial firms listed on the JSE in the years 1998–2008. The difference may be due to the time considered as well as the firms included in the study. Both the MDR and BDR SOAs of JSE-listed firms are, however, higher than those of firms in the USA but lower than those of firms in Europe. For example, Elsas and Florysiak (2011), Elsas and Florysiak (2015) document a SOA of 26.30% (MDR) and 27.30% (BDR) for the Compustat US firms. A study by Flannery and Hankins (2013) found that the SOA for the Compustat USA ranged between 13% and 25%. In another study, Dang (2013) found that the SOAs for firms in the three major European countries were 39.0% – 39.7% for the UK firms, 42.8% – 45.4% for the German firms and 43.9% – 44.0% for the French firms. The SOAs are also lower than the SOA of 47.0% for Nigerian firms documented by Oino and Ukaegbu (2015).

Furthermore, Table 3 shows that the SOAs for the period 2001–2006 were 30.71% (1.89 years) for MDR and 25.16% (2.39 years) for BDR. These SOAs, however, declined to 13.94% (4.62 years) for MDR and 12.17% (5.34 years) for BDR during the period 2007–2012, meaning that firms adjusted their capital structures less frequently during this period. As this period included the 2007–2008 GFC period, these results show the negative impact of the GFC on the capital markets,

TABLE 4: All panels random-effects tobit estimator regression estimates for empirical model 2†.

Variables	Panel 1: 2001–2018		Panel 2: 2001–2006		Panel 3: 2007–2012		Panel 4: 2013–2018	
	Financially constrained	Financially unconstrained	Financially constrained	Financially unconstrained	Financially constrained	Financially unconstrained	Financially constrained	Financially unconstrained
PROF	-0.2718** (-2.90)	-0.1547* (-2.40)	-0.3722* (-2.29)	-0.1622 (-1.60)	-0.2558 (-1.77)	-0.1787* (-2.07)	-0.3248 (-1.76)	0.2173 (1.57)
SIZE	0.0050 (1.18)	0.0048 (1.49)	-0.0018 (-0.32)	0.0002 (-0.05)	-0.0040 (-0.94)	0.0001 (0.02)	-0.0067 (-1.54)	0.0045 (1.07)
TAN	0.1183** (3.27)	0.0335 (1.19)	0.1156* (1.99)	0.0103 (0.32)	0.1000* (2.49)	0.0240 (0.79)	0.0364 (1.00)	0.0004 (0.01)
MTB	(-0.0190 (-1.23)	0.0130 (1.84)	0.0099 (0.29)	0.0129 (0.98)	-0.0084 (-0.43)	0.0230* (2.43)	-0.0169 (-0.94)	-0.0239* (-2.37)
NDTS	1.1496** (-3.12)	0.0031 (0.01)	-0.3420 (-0.60)	0.1495 (0.40)	-0.5849 (-1.35)	0.0415 (0.14)	-0.4222 (-1.03)	0.2038 (0.52)
MDR	0.5566***(13.61)	0.7323***(16.40)	0.6080***(5.65)	0.7558***(17.19)	0.7538***(15.53)	0.9162***(30.66)	0.8116***(14.88)	0.8413***(20.10)
Speed of adjustment (SOA)	44.34%	26.77%	39.20%	24.42%	26.42%	8.38%	18.84%	15.87%
Half-life (years)	1.18	2.22	1.39	2.48	2.45	7.92	3.32	4.01
Observations	725	675	249	234	265	248	212	194
Wald chi² (6)	420.34	480.43	120.71	434.68	613.77	1199.39	565.56	692.07
Prob > chi²	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The term λ represents the firms' SOA towards optimal leverage.

The *t*-statistics are shown in parentheses, and the coefficients marked ***, ** and * are significantly different from zero at 1%, 5% and 10% levels, respectively. The estimates' half-life implied by the SOA of adjustment is calculated as: $T_{1/2} = \log(0.5) / \log(1-\lambda)$. The models' fit statistics are shown on the lower end of the table.

MDR, the variables' market-to-debt ratio; PROF, profitability; TAN, tangibility; SIZE, size; MTB, market-to-book ratio; and NDTS, nondebt tax shields are defined under model 2; SOA, speed of adjustment.

†, $MDR_{i,t+1} = (1-\lambda)MDR_{i,t} + \beta_1 PROF_{it} + \beta TAN_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 NDTS_{it} + \varepsilon_{i,t+1}$

TABLE 5: All panels' RE tobit estimator regression estimates for empirical model 3†.

Variables	Panel 1: 2001–2018		Panel 2: 2001–2006		Panel 3: 2007–2012		Panel 4: 2013–2018	
	Financially constrained	Financially unconstrained	Financially constrained	Financially unconstrained	Financially constrained	Financially unconstrained	Financially constrained	Financially unconstrained
PROF	-0.1196*(-2.19)	0.0129 (0.22)	-0.0574 (-0.67)	-0.0418 (-0.49)	0.0762 (-0.95)	-0.1347 (-1.73)	-0.0797 (-0.61)	0.4363 (3.12)
SIZE	0.0045 (1.93)	0.0032 (1.19)	0.0114*(2.44)	-0.00059 (-0.20)	0.0002 (0.10)	0.0008 (0.31)	-0.0002 (-0.06)	0.0079 (1.84)
TAN	0.0774***(3.58)	0.0311 (1.28)	0.058 (1.37)	0.0007 (0.03)	0.0616**(2.72)	0.0406 (1.41)	0.0480 (1.83)	(-0.0183 (-0.56)
MTB	0.010 (1.25)	0.0068 (1.07)	-0.0184 (-1.15)	0.0121 (1.10)	0.0039 (0.39)	0.0184*(2.18)	0.0135 (1.27)	-0.0200 (-2.07)
NDTS	-0.7924***(−3.68)	(0.111 (0.05)	-0.8414* (-2.17)	0.2452 (0.79)	-0.4520 (-1.89)	-0.1796 (-0.64)	-0.2063 (-0.73)	0.1883 (0.47)
BDR	0.6301***(17.78)	0.8184***(19.94)	0.5475***(7.79)	0.8642***(19.55)	0.8238***(23.43)	0.9078***(35.90)	0.7786***(17.12)	0.8535***(21.63)
Speed of adjustment (SOA)	36.99%	18.16%	45.25%	13.58%	17.62%	9.22%	22.14%	14.65%
Half-life (years)	1.50	3.46	1.15	4.75	3.58	7.17	2.77	4.38
Observations	725	675	249	234	265	248	212	194
Wald chi² (6)	579.43	662.37	135.28	530.16	1063.47	1625.52	498.51	609.87
Prob > chi²	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The term λ represents the firms' SOA towards optimal leverage.

The *t*-statistics are shown in parenthesis and the coefficients marked ***, ** and * are significantly different from zero at 1%, 5% and 10% levels, respectively. The estimates' half-life implied by the SOA of adjustment is calculated as: $T_{1/2} = \log(0.5) / \log(1-\lambda)$. The models' fit statistics are shown on the lower end of the table.

BDR, the variables' book-to-debt ratio; PROF, profitability; TAN, tangibility; SIZE, size; MTB, market-to-book ratio; and NDTS, nondebt tax shields are defined under model 2; SOA, Speed of adjustment.

†, $BDR_{i,t+1} = (1-\lambda)BDR_{i,t} + \beta_1 PROF_{it} + \beta_2 TAN_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 NDTS_{it} + \varepsilon_{i,}$

firm PROF and ultimately on the leverage and SOAs of the JSE-listed firms. As Campello et al. (2010) found, the 2007–2008 GFC financially constrained all firms, and it worsened the constraints on the already constrained firms. The additional constraints may have resulted from firms' inability to raise external capital, firstly because they had already drawn heavily from their lines of credit, as noted by Campello et al. (2010) and Ivashina and Scharfstein (2010). According to Duchin et al. (2010), the GFC represented a negative economic shock which reduced the banks' supply of new credit lines to the firms. Firms had only to rely on their pre-approved credit lines to boost their declining liquidity.

Secondly, external equity became costly during the GFC period, as firms' share prices were depressed following the stock market meltdown and increased volatility (Duchin et al. 2010; Ivashina & Scharfstein 2010). Kahle and Stulz (2013) documented a sharp decline in net equity issuances in the USA during the GFC period. The net effect of the GFC was that it reduced the supply of external capital, which resulted in firms infrequently eliminating their target leverage deviation spreads thereby reducing their SOAs.

The trend of firms' SOAs after the GFC period 2013–2018 are mixed with model 2 results, showing a further decline in the SOA to 13.16% (4.91 years), while model 3 results show that the SOA improved to 17.47% (3.61 years). Based on these results, the study cannot accept or reject the hypothesis that a firm's SOA improved after the GFC period. Thus, there is inconclusive evidence on whether firms changed their target capital structure adjusting behaviour after the 2007–2008 GFC.

Discussion of subsamples results: Constrained and unconstrained firms' results

The results of models 2 and 3 of the financially constrained and financially unconstrained firms' full and subsample panel datasets are presented in Tables 4 and 5, respectively. As with the full sample results, all the coefficients of the lagged depended variables, MDRs and BDRs are positive and significant at 1% for both models. These results also further validate the hypothesis that the dynamic trade-off theory is the best descriptor of corporate financing behaviour of JSE-listed nonfinancial firms. This means that both constrained and unconstrained firms have target leverage ratios which they use to adjust their capital structures towards, at varying SOAs.

From Tables 4 and 5, the results of the full sample (2001–2018) show that the SOAs for financially constrained firms are 44.34% (1.18 years) for MDR and 36.99% (1.50 years) for BDR, whereas the SOAs for the unconstrained firms are 26.77% (2.22 years) for MDR and 18.16% (3.46 years) for BDR. These results mean that financially constrained firms have higher SOAs than the financially unconstrained firms. This pattern of results is replicated across all the subsamples, meaning that financially constrained JSE-listed firms adjust their capital structures more frequently than their financially unconstrained counterparts.

The expectation was that financially constrained firms do not readily rebalance their leverage ratios as they face financial constraints. There are two possible explanations as to why financially constrained firms actively rebalance their leverage ratios faster than the financially unconstrained firms. The first explanation relates to the nature and investment programmes of financially constrained and financially unconstrained firms.

According to Myers (2001), financially constrained firms tend be young and high-growth firms, with high stocks of profitable future growth options. These growth options help such firms to preserve their values, even though they face high information asymmetries (Drobetz & Wanzenried 2006). Given this argument, the constrained firms will need to frequent the capital markets to raise the capital needed to fund their growth options. This increased capital raising activity results in these firms actively rebalancing their capital structures and hence their high SOA. Thus, financially constrained firms, which are mainly young and high-growth firms, readily rebalance their capital structures. On the contrary, financially unconstrained firms tend to be large, mature and profitable firms with high credit ratings and large stocks of tangibles that can be used as debt collateral (Smith et al. 2020). These firms have limited growth options, which they can fund using their internal equity. These characteristics of financially unconstrained firms make them financeable and thus they can allow their debt ratios to deviate from their optimal capital for long periods, knowing that they can eliminate the deviation spread anytime they need to. This financing behaviour of the financially unconstrained firms ultimately reduces their SOA.

The second explanation relates to the discipline imposed by the capital markets (Myers 2001). The financially constrained firms may be forced by external forces to maintain their capital structures at acceptable levels for them to continue to attract external capital. As firms are active on the capital markets, they may always be under pressure from existing and potential investors for them to always present good and acceptable capital structures. This financing behaviour may imply that these firms should continuously adjust their capital structures even if it means using costly external finance. The financially unconstrained firms face less pressure from the capital markets to maintain an acceptable capital structure, as they are less active on the capital markets (Barclay & Smith 2020). The capital structure adjustment process of financially unconstrained firms is voluntary instead of being imposed by the market forces. As corporate financing tends to be lumpy, financially unconstrained firms will only raise external capital if it makes economic sense for them to do so (Welch 2004). To benefit from the economies of scale, financially unconstrained firms may have to wait until there is a sufficient target deviation spread that justifies a large issue of securities. These two reasons may partly explain why financially constrained firms readily adjust their capital structures when compared to financially unconstrained firms.

Variation of speed of adjustment across the subsamples

In both models 2 and 3, both financially constrained and financially unconstrained firms experienced a decline in their SOAs during the period 2007–2012. For financially constrained firms, the MDR SOAs declined from 39.20% (1.39 years) during the period 2001–2006 compared to 26.42% (2.45 years) for the period 2007–2012. During the same period, the financially constrained firms' BDR SOAs declined from 45.25% (1.15 years) to 17.62% (3.58 years). In the case of unconstrained firms, their MDR SOAs declined from 24.42% (2.48 years) during the period 2001–2006 to 8.38% (7.92 years) for the period 2007–2012. Similarly, these firms' BDR SOAs also declined from 13.58% (4.75 years) to 9.22% (7.17 years) during the same period.

These results mean that both financially-constrained and unconstrained firms adjusted their capital structures less frequently during the period 2007–2012. As this period included the 2007–2008 GFC period, the SOAs may have been slowed down by this crisis. These results therefore further validate the hypothesis that the GFC slowed down the SOAs of both financially constrained and unconstrained firms. As discussed earlier, the GFC reduced firms' access to external capital and thus forced them to make less frequent capital structure adjustments, resulting in their reduced SOAs.

Model 2 results for the post GFC period 2013–2018 samples are mixed with financially constrained firms, showing a further decline in the MDR SOA to 8.84% (3.32 years) while the financially unconstrained firms' MDR SOA improved to 15.87% (4.01 years). Model 2 results show a consistent improvement in both financially constrained and financially unconstrained firms' SOA post the GFC period 2013–2018. During this period, the BDR SOA for financially constrained firms improved to 22.14% (2.77 years), while the SOAs of financially unconstrained firms improved to 14.65% (4.38 years) for BDR. These results mean that the SOA of financially unconstrained firms improved post the GFC. There is, however, inconclusive evidence that the SOA of financially constrained firms improved post the GFC period. This means that the hypothesis that the SOA of both financially constrained and unconstrained firms improved after the GFC can only be partially validated. There is no conclusive evidence that the SOA of financially constrained firms improved post the GFC.

The improvement in the SOA of financially unconstrained firms may have resulted from their improved access to external finance as the stock market performance and corporate bank lending improved after the GFC (Campello et al. 2010). The improved access to external capital thus explains why financially unconstrained firms increased the frequency of rebalancing their capital structures.

Conclusion

The aim of the present study was to investigate the effect of the 2007–2008 GFC on firms' target capital structure adjusting behaviour. The objectives of the study were to firstly find out which theory is the best descriptor of the observed financing behaviour of JSE-listed nonfinancial firms. Secondly, the study sought to find out how quickly firms adjust their leverage ratios prior to, during and post the GFC. Thirdly, the study sought to find out if the postcrisis SOA is higher than the precrisis SOA. The last objective of the study was to investigate if financially constrained firms have a persistently lower SOA than the unconstrained firms.

The findings of the study can be summarised as follows. Firstly, the positive correlations between leverage, firm size and TAN and the negative correlation between leverage and nondebt interest tax shields validate the predictions of the dynamic trade-off theory that value firms use more debt than growth firms. The findings on the negative correlations between leverage and profitability and the positive correlation between leverage and firm growth rate contradict the explanations of the dynamic trade-off theory on corporate financing behaviour. As with previous similar studies, these correlation results do not conclusively support the dynamic trade-off theory as the best descriptor of financing behaviour of JSE-listed nonfinancial firms. Secondly, the JSE-listed nonfinancial firms have a target optimal capital structure but because of the trivial target-deviation and nontrivial target-adjustment costs, firms do allow their observed debt ratios to temporarily drift away from their optimal debt ratios. Firms do, however, partially eliminate their target deviation spreads through the manipulation of their financing choices. Their SOAs are higher than those of US firms but lower than those of Nigerian and European firms.

Thirdly, firms' SOAs declined and their debt ratios rose sharply during the 2006–2012 period. As this period included the 2007–2008 GFC period, the decline in firms' SOAs and the sharp increase in debt ratios signalled the negative effects of the crisis on corporate financing. Firms could not readily rebalance their capital structures, and they relied heavily on their existing credit lines to finance their operations. The poor performing stock markets limited equity financing during this period. Firms' SOAs after the GFC period 2013–2018 are mixed, and thus there is inconclusive evidence on whether firms changed their target capital structure adjusting behaviour after the 2007–2008 GFC. Fourthly, the results of the study show that financially constrained firms have a persistently higher SOA than unconstrained firms, meaning that financially constrained firms eliminate their target capital structure deviation spreads faster than financially unconstrained firms.

Lastly, financially unconstrained firms increased their SOA post the GFC. There is, however, inconclusive evidence on whether financially constrained firms changed their target capital structure adjusting behaviour post the GFC.

Practical implications

The results of this study imply that JSE-listed nonfinancial firms have target leverage ratios which they actively try

to maintain. The target leverage adjustment process defines the firms' SOA, which differs between financially constrained and financially unconstrained firms. Financially constrained firms tend to exhibit a higher SOA, implying that they readily eliminate their target leverage deviation spreads. As these firms are highly leveraged, they continuously raise external capital to fund their profitable growth options and hence their high SOA. A negative economic shock lowers the SOA of all firms as they face increased costs of rebalancing their capital structures.

Limitations and recommendations

The current study is limited to nonfinancial firms listed on the JSE and therefore the results of this study cannot be generalised to unlisted nonfinancial firms. Additionally, the study only investigated a single economic shock, namely the 2007–2008 GFC. Other economic shocks may have different impacts on firms' SOAs because of their different impacts on the firms.

The anomaly that financially constrained firms have higher SOAs than financially unconstrained firms require further investigation. It is expected that financially unconstrained firms will readily adjust their capital structures, as they can raise capital easily and cheaply when compared to the financially constrained firms. This means that they are expected to exhibit a higher SOA than the financially constrained firms. However, the results of the study contradict this line of thought, thus requiring further investigation.

Acknowledgements

Competing interests

The authors have declared that no competing interest exist.

Authors' contributions

V.M. conceptualised and carried out the study and did the write-up under the supervision of D.M. D.M. supervised and reviewed the work of V.M.

Ethical considerations

This article followed all ethical standards for a research without direct contact with human or animal subjects.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for profit sectors.

Data availability

All data was obtained from the IRESS website: https://0-researchdomain.iress.co.za.oasis.unisa.ac.za/Default.aspx

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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