Post IPO dynamics of capital structure on the Johannesburg Stock Exchange

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This paper examines the dynamics of capital structure for firms engaging in initial public offerings (IPOs) on the Johannesburg Stock Exchange (JSE). Censored Tobit regressions are used to model capital structure targeting behaviour. The findings suggest evidence of targeting behaviour consistent with the static trade off theory of capital structure. On average, IPO firms adjust towards the capital structure target at a faster pace than seasoned firms; IPO firms take, on average, 0.77 years to cover half the financing gap, whereas seasoned firms take an average of 2.65 years. In the first year following the IPO, hot market IPOs significantly reduce their total debt, while cold market IPOs increase the total debt significantly. In terms of the total debt ratio, hot market IPOs adjust at a marginally faster pace than cold market IPOs. However, the opposite is true when the long term debt ratio is considered. In addition, hot market IPOs adjust faster than cold market IPOs in the first year following the IPO. The average first year adjustment speed of hot market IPO firms is 45.61 percent higher than the speed of adjustment for the average cold market IPO firm.

Background and motivation

The concept of capital structure received much attention after Modigliani and Miller (1958) argued in their seminal work, that the value of the firm is independent of its capital structure. Ever since then, a growing body of literature on capital structure has documented, for the most part, factors that are reliably important in the determination of capital structure (Rajan & Zingales, 1995; Booth, Aivazian, Demirguc-Kunt & Maksimovic, 2001; Frank & Goyal 2009). However, further empirical work on capital structure needs to be conducted especially in the context of firms in the developing markets of Africa. For example, the majority of studies on capital structure in South Africa have largely focused on the determinants of capital structure for seasoned firms (Gwatidzo & Ojah, 2009; Chipeta, Wolmarans & Vermaak, 2012; Ezeoha & Botha, 2012). Limited research has been conducted on the dynamics of capital structure for IPOs on the JSE. For example, Auret and Britten (2008) find that South African firms de-leverage immediately after going public, suggesting that these firms list to rebalance their capital structure rather than financing growth. There is therefore a need to conduct further empirical work on the extent of capital structure adjustments of IPOs on the JSE.

The choice of IPOs over larger and more established firms is motivated by several reasons: Firstly, IPO firms issue equity to minimise the cost of capital (Brau & Fawcett, 2006). From this, there is *a priori* expectation that aftermarket transaction costs for IPOs could be relatively low, and the related speed of adjustment to the desired target leverage could be high. Secondly, the high growth opportunities experienced by IPO firms increases the likelihood for these firms to access external funding (Helwege & Liang, 1996). Lastly, Ritter and Welch (2002) argue that an IPO can add value to the listing firm by attracting investors, customers and creditors. This improves the credibility of firms, thus provides further avenues for the IPO firm to negotiate for further capital on favourable terms. This could influence the pace of adjustment towards the optimal capital structure. It is thus plausible to track the evolution of capital structure speeds of adjustment for these firms. Hence, this paper aims to contribute to the capital structure literature by addressing three main research questions: Firstly, what are the determinants of capital structure for IPO firms? Secondly, how does the adjustment speed towards the optimal capital structure for IPO firms differ from the adjustment speeds for size adjusted seasoned firms? Lastly, how do the dynamics of capital structure differ between hot and cold market IPO firms? Thus the contribution of this paper to the extant body of knowledge is to fill the research gap on capital structure dynamics of IPO firms on the JSE.

The rest of the paper is organized as follows: Section two discusses the literature on the determinants of capital structure across the globe. Section three discusses the data sources and the methodology. Section four reports the results, and Section five concludes the paper and makes recommendations for further research.

Literature review

Traditional determinants of capital structure

The four main potential determinants of capital structure are firm size, profitability, growth prospects and asset tangibility. These factors have consistently shown to be correlated to leverage. (Rajan & Zingales, 1995; Barclay & Smith, 2005; Huang & Song, 2006; Delcoure, 2007; De Jong, Kabir & Nguyen, 2008).

Size

The main theoretical premise regarding size as a potential determinant of capital structure is based on two opposing schools of thought. The first school of thought argues that large firms are more diversified with stable cash flows. This reduces the overall risk of these firms, thereby leading to a lower probability of default. Consequently, these firms will borrow more (Eriotis *et al.*, 2007). The second school of thought argues that large firms are expected to have lower information asymmetries (Rajan and Zingales, 1995) due to sufficient analyst coverage (Drobetz and Wanzenreid, 2006). Further, the fixed costs of issuing equity are lower than those encountered by smaller firms. As a result, large firms will access equity markets with relative ease. The implication arising from this conjecture is that size will be inversely correlated to capital structure. The empirical evidence on size as a predictor of capital structure is unanimous in terms of size as a significant predictor of capital structure. However, the evidence regarding the association between size and capital structure is mixed. Dejong Kabir and Nguyen (2008) perform a comprehensive analysis of firm and country specific determinants of capital structure for firms in 42 countries, and they find that size is positively and significantly correlated to leverage in 21 of the 42 countries. This confirms the earlier argument that large firms borrow more due to lower risk associated with stable cash flows. The majority of the insignificant coefficients were also positive. Rajan and Zingales (1995) conduct a cross country study to establish the determinants of capital structure across seven industrialised economies. They show that size, measured by log of sales is positively related to book leverage, with the exception of Germany. The negative correlation for Germany is also consistent when within industry regressions are run. This suggests that size, does not only proxy for a low probability of default. The information asymmetry argument discussed earlier should plausibly explain the negative association. The negative association between size and leverage is confirmed in several other studies (Chen, 2004; Delcoure, 2007; Nunkoo & Boateng, 2010).

Profitability

Profitability and its effects on variations in firm capital structure can be explained by several theoretical predictions. First and foremost, the trade-off theory of capital structure posits that, in order to take advantage of the interest tax shields associated with debt, profitable firms will borrow more. In this case, a positive relationship between firm profitability and leverage is expected. Secondly, the pecking order theory of Myers and Majluf (1984) predicts that profitable firms will make use of internally generated revenues to fund investment projects, and thus will issue less debt. An inverse relationship between profitability and leverage is thus expected. Lastly, Jensen's (1986) free cash flow theory posits that mature and profitable firms with limited investment opportunities are prone to invest sub optimally. To resolve this overinvestment problem, Myers (2001) suggests that debt can be used to bond the future excess cash flows and to discipline managers from suboptimal use of the extra free cash flows. Therefore, a positive relationship between profitability and leverage is also expected.

The empirical evidence from both the developed and developing economies seems to support the predictions of Myers and Majluf (1984) that profitable firms borrow less. For instance, Rajan and Zingales (1995) shows a consistent negative correlation between profitability and leverage for firms in seven industrialised economies. Likewise, De Jong *et al.*, (2008) show that profitability is negatively associated with leverage for firms in 25 countries across the developed and developing economies. Similar results are confirmed in Strabulaev (2007) for firms in the US and in Antoniou, Guney and Paudyal (2008) for firms across five industrialised economies. The evidence from South Africa is also consistent with the set of results for firms in other developed economies. For example, Gwatidzo and Ojah (2009) find a negative and significant relationship between profitability and leverage for firms in South Africa and Ghana. However, Nigeria showed positive correlations suggesting evidence for the static trade off theory of capital structure for Nigerian corporate data.

Asset tangibility

The potential conflict of interest between bondholders and shareholders is illustrated by Jensen and Meckling (1976). They argue that managers acting on behalf of shareholders can shift to high risk and high return investments at the expense of the bondholders. In the event of default, shareholders can exercise limited liability and walk away, leaving the assets in the hands of the bondholders. Therefore, in order to mitigate these agency conflicts, financiers are likely to lend money to firms with a high collateral value of assets. The empirical literature largely confirms a positive relationship between asset tangibility and leverage. For example, De Jong *et al.*, (2008) document positive and significant relationship between asset tangibility and leverage for almost all the firms in their study in 42 different countries across the world. Similar correlations are reported in Huang and Song (2006), Ezeoha and Botha (2012) and Chipeta, Wolmarans, Vermaak and Proudfoot (2013). However, it is not uncommon to find a negative correlation between collateral value of assets and firm leverage. For instance, Chipeta *et al*., (2012) split their sample into two periods; the pre and post liberalisation phases, and they show that asset tangibility effects are not significant in the pre liberalization epoch, albeit negative. A negative and statistically significant relationship is however observed for the post liberalization period data. Similar results are documented in Booth, *et al.*, (2001) for firms in some developing countries, Mutenheri and Green (2003) for firms in the pre liberalisation phase in Zimbabwe and in Abor and Biekpe (2005) for firms in Ghana.

Several reasons have been advanced for this negative association between the collateral value of assets and leverage. Firstly, Long and Malitz (1985) argue that firms with a high collateral value of assets are already highly levered. This means that further issues of debt could increase the probability of financial distress. Secondly, as elaborated

in Mutenheri and Green (2003), asset tangibility can serve as a proxy for non-debt tax shields especially in a tax regime where purchase of fixed assets provides substantial tax shelters. Thirdly, Abor and Biekpe (2005) argue that the negative correlation could be due to high levels of operating risk associated with firms with a high value of fixed assets. Lastly Sheikh and Wang (2011) note that the negative relationship could be due to the tendency for management to empire build at the expense collateralized assets. All these reasons have their own merits, but are merely conjectures that require further empirical analysis.

Growth prospects

The contracting cost theory hypothesizes that young, growth firms, with a high value of intangible assets are less likely to borrow more because the collateral value of their assets is low. As a consequence, in periods of financial distress, these firms are more likely to default (Barclay & Smith, 2005). Such firms would be in a better position to issue equity to finance their investments, mainly because dividend payments can be deferred during periods of financial distress. A negative association is therefore expected between growth prospects and leverage. The empirical literature regarding contracting costs is mixed. This is largely due to the measure used to capture growth opportunities. A majority of the studies that utilise the market to book ratio usually report a negative relationship between growth prospects and leverage (Rajan & Zingales, 1995; Barclay & Smith, 2005; Ngugi, 2008; Ezeoha & Botha[1], 2012). This is expected as a high value of the share price in relation to the book value per share proxies for intangible growth opportunities (Barclay & Smith, 2005). However, it appears like if a different measure is used to capture growth prospects, a positive association is found (Titman & Wessels, 1988; Abor & Biekpe, 2005) and in some cases, insignificant results are generated. For example, Delcoure (2007) uses the five-year geometric average ratio of sales growth to growth in total assets and fails to find any significant correlations between growth and leverage for firms in four European transitional economies.

Capital Structure dynamics across the world

The trade-off theory of capital structure hypothesizes that firms will attempt to balance the benefits of interest tax shields against the costs of financial distress (Myers, 2001). This suggests that an "optimal" or "target" capital structure exists and that firms will actively adjust towards this target. Firms faced with high adjustments costs will consequently adjust at a slower pace than firms facing lower transaction costs. The existence of transaction costs and related speeds of adjustment towards the target has been widely documented. Flannery and Rangan (2006) observe that a typical US non-financial firm closes about one-third of the gap between its actual and target level of leverage. Ozkan (2001) study capital structure dynamics in the UK and they find evidence of transaction costs and a relatively fast pace of capital structure adjustment speeds. In a similar study, De Miguel and Pindado (2001) find that transaction costs in Spanish firms are lower compared to firms in the US. Antoniou *et al*., (2008) confirm the existence of transaction costs for firms in five industrialised economies.

An emerging strand of capital structure literature in Africa also confirms evidence of transaction costs and related speeds of adjustment for non-financial firms in select African economies. For instance, Ngugi (2008) and Ramjee and Gwatidzo (2012) provide evidence of targeting behaviour and relatively fast capital structure adjustment speeds for firms in Kenya and South Africa, respectively. Ezeoha and Botha (2012) confirm the existence of transaction costs for South African nonfinancial firms.

Data and methodology

Data sources

The data includes firms that successfully concluded an IPO on the main board of the JSE for the years 1996 to 2011. The data on IPOs is sourced from McGregor Bureau of Financial Analysis (BFA). Financial firms are excluded because their leverage decisions are influenced by regulation. Because of the dynamic nature of the study, firms with less than two years of consecutive observations are excluded. To be included in the analysis, firms should report consistently for at least four years after listing. These exclusions limit the sample to 141 firms and 619 firm year observations. To isolate the effects of extreme outliers, extreme values of the variables are reset. Following Faulkender and Petersen (2006), book values of total debt and long term debt ratios greater than 1 are reset to 1. Market to Book ratios greater than 20 are reset to 20[2].

Estimation technique

Panel data estimation techniques are used to carry out the empirical analysis. Panel data presents several benefits over cross sectional data. Firstly, panel data accounts for firm heterogeneity by allowing for individual firm specific variables. Secondly, panel data is suited for modelling the dynamics of change over a relatively short period of time. This study considers a relatively short period of time (four years) for a relatively large cross section of firms. Lastly, panel data techniques are more flexible in the choice of variables to control for endogeneity. Equation 1 is tested on a sample of IPOs and similar size matched firms, and the coefficient on the lagged dependent variable $(1-\delta)$ is compared for the two samples. The rationale here is to compare the leverage targeting behaviour and the costs of issuing securities for both sets of firms.

The model is estimated using the Censored Tobit regression with corner solutions at 0 and 1 (Elsas & Florysiak, 2011; Chipeta & Mbululu, 2013). Censored Tobit regressions are

[1] The negative association is found for the market debt ratio regressions

[2] Alti (2006) drop firms with market to book ratios greater than 10. Chipeta *et al.*, (2012) drop firms with market to book ratios greater than 20.

suitable for this analysis because of two main reasons. Firstly, they control for "mechanical mean reversion", a phenomenon that could bias capital structure speed of adjustment estimates as shown in Hovakimian and Li (2011)[3]. As argued in Shyam-Sunder and Myers (1999) debt piles up in periods of financial deficits and trends downwards in periods of financial surpasses, thus causing "mechanical mean reversion". Secondly, Censored Tobit regressions have been shown to exhibit the least bias in estimating the capital structure speed of adjustment, especially in the presence of a fractional dependent variable (Elsas & Florysiak, 2011). Although the Blundell and Bond (1998) System GMM and the Han, Hausman and Kuersteiner (2007) long difference GMM models account for autocorrelation in the presence of lagged dependent variables, they have generated biased estimates of the speed of adjustment (Elsas & Florysiak, 2011). The regression model is therefore specified as follows:

$$LEV^*_{i,t} = \alpha + (1-\delta)LEV_{i,t-1} + \beta_1 SIZE_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 MTB_{i,t-1} + \beta_4 TANG_{i,t-1} + \beta_5 IPO_t + e_{i,t} \quad (1)$$

where $LEV^*_{i,t}$ is the target leverage for firm i at time t, and is calculated as total interest bearing debt divided by total assets. The coefficient $(1-\delta)$ is a measure of transaction costs. It therefore follows that if δ (a measure of the speed of adjustment towards the target leverage) is 1, then there are no transaction costs, and firms adjust immediately to the target leverage. Conversely, if δ is 0, then adjustment costs will be high, thus making it impossible for firms to adjust their leverage. $SIZE_{i,t-1}$ is measured as the natural logarithm of total assets for firm i at time $t-1$. $ROA_{i,t-1}$ is the return on total assets for firm i at time $t-1$ and is measured by operating profits before interest and taxes divided by total assets. $MTB_{i,t-1}$ is the market to book ratio for firm i at time $t-1$, and is calculated as market price per share divided by book value per share. $TANG_{i,t-1}$ captures the tangibility of the asset base of firm i at time $t-1$. It is calculated as the ratio of fixed assets to total assets. These four variables have shown in the literature to be correlated with leverage (Rajan & Zingales 1995; De Miguel & Pindado 2001; Frank & Goyal 2009). Additionally, the year dummy is interacted with the lagged leverage ($IPO_t * LEV_{i,t-1}$). This exercise tracks the evolution of adjustment costs of leverage following an IPO.

In order to test the capital structure dynamics of hot versus cold market IPOs, the data is split into two subsamples. The Hot market IPOs are firms that list during periods of high volumes and cold market IPOs are firms that list in low volume years. Hot market periods are identified as 1997, 1998 and 1999. The IPO volumes as a percentage of total IPOs for the 1996-2010 period were 14.22%, 22.89% and 16.89% for 1997, 1998 and 1999 respectively. This accounts for 54% of the total number of IPOs for the 14 year period. A closer inspection of Figure 1 reveals that the number of IPOs almost doubled from 34 in 1996 to 64 in 1997. The IPO issuing activity peaked in 1998 and dropped from 76 in 1999 to 17 in 2000. Thus the hot market period is defined as 1997 to 1999[4].

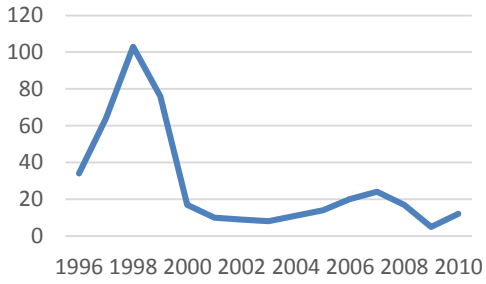

Figure 1: Number of IPOs in South Africa

Results

Descriptive results

The statistics in Table 1 show mean values of the firm specific variables. The analysis is performed for three different samples namely, full sample, hot market and cold market IPOs. In Panel A, all leverage measures for IPOs are relatively stable over the years. Profitability is negative for the first three years, and turns positive in the fourth year. When the sample is split into hot versus cold market IPOs, some notable differences are observed. Hot market firms are under levered in terms of the total debt to equity and long term debt ratios. The average first year long term debt ratio for the hot market IPO is 8.85 percent lower than the average long term debt ratio for the cold market IPO. The first year average debt to equity ratio for the hot market IPO is 113 percent lower than the total debt to equity ratio for the cold IPO firms.

In terms of the total debt ratio, hot market firms are 3.89 percent under levered in the first year following the IPO. This observation is similar to Alti (2006) who found a difference of 3.7 percent for US firms. Hot market firms increase their leverage in the third year after the IPO, whereas cold market firms maintain their levels of leverage. This shows that the effect of market timing on leverage is not persistent. Consistent with the market timing theory, IPOs list during periods of high market to book ratios; the average market to book ratio of firms in all the three samples declines steadily. As reported in Panels A and B, hot market firms report negative profitability in the first three years following listing, whereas cold market firms remain profitable in all the four years following the IPO. It appears like the negative profitability of the full sample of IPOs is due to the underperformance of hot market firms. The

[3] Mechanical mean reversion can also be controlled by estimating the target leverage in the first step and including the coefficient of the target leverage as an independent variable in the second stage (Hovakimian & Li 2011; Chipeta *et al.*, 2012). Alternatively, eliminating extreme leverage ratios can resolve the problem (Hovakimian & Li, 2011).

[4] This approach of identifying hot IPO markets is followed by Lowry, Officer and Schwert (2010) for US IPOs and they use the 1998 to 2000 period.

underperformance of hot market firms has been documented in the South African literature (Mkombe & Ward, 2002; Chipeta & Jardine, 2014). The average asset tangibility and size variables are fairly stable over the years. Table 1 reports unconditional averages and the statistical significance of these results needs to be established while controlling for firm characteristics as shown in the next section. Table 2 reports the correlation between all the variables used in the analysis. The correlations between the variables are not large enough to suggest that there may be a problem of multicollinearity.

Table 1: Descriptive statistics

PANEL A: FULL SAMPLE							
YEAR	**TD**	**DE**	**LTD**	**MTB**	**ROA**	**TANG**	**SIZE***
1	0.4596	1.6719	0.2671	4.4243	-0.0045	0.2496	5.1800
2	0.4672	1.5567	0.2506	2.2628	-0.0523	0.2741	5.3228
3	0.4945	1.2376	0.2776	1.6012	-0.0973	0.2701	5.3782
4	0.4659	2.1677	0.2444	1.4652	0.0264	0.2693	5.2823
PANEL B: HOT MARKET IPOs							
YEAR	**TD**	**DE**	**LTD**	**MTB**	**ROA**	**TANG**	**SIZE**
1	0.4551	1.0245	0.2272	3.3191	-0.0608	0.2057	5.2364
2	0.4650	1.4357	0.1759	2.4570	-0.1682	0.2088	5.2824
3	0.6128	2.2954	0.2090	1.5811	-0.2968	0.2072	5.2622
4	0.5496	1.3933	0.2167	0.7496	0.0168	0.1932	5.0392
PANEL C: COLD MARKET IPOs							
YEAR	**TD**	**DE**	**LTD**	**MTB**	**ROA**	**TANG**	**SIZE**
1	0.4940	2.1832	0.3157	3.1867	0.0337	0.2962	5.5428
2	0.4938	1.7059	0.3132	2.6276	0.0118	0.3251	5.6787
3	0.4700	0.7936	0.3394	1.7759	0.0447	0.3347	5.9040
4	0.4544	2.7038	0.2773	1.8307	0.0340	0.3311	5.7899

*measured as the average log of total assets

Table 2: Correlation matrix

	TD	**DE**	**LTD**	**MTB**	**ROA**	**TANG**	**SIZE**
TD	1.0000						
DE	0.1680*	1.0000					
LTD	0.2101*	0.1535*	1.0000				
MTB	0.0461	0.5828*	0.1102*	1.0000			
ROA	-0.3091*	0.0212	0.1038*	-0.0894*	1.0000		
TANG	0.0065	0.0998*	0.4708*	0.1037*	0.0613	1.0000	
SIZE	-0.0524	0.0090	0.1419*	0.0307	0.1565*	0.2878*	1.0000

*Denotes statistical significance at the 1 percent level

Empirical results

Determinants of capital structure of IPOs in South Africa

Table 3 reports the regression results on the capital structure dynamics of IPOs on the JSE. The results in Panel A show that the four determinants of capital structure for IPO firms on the JSE are by and large, strongly correlated to leverage. IPO firms with high growth prospects increase their capacity for more debt. This contradicts the prediction by Myers (1977) that in order to avoid the potential underinvestment problem associated with excessive debt, firms with intangible growth prospects will borrow less. However, in the case of IPOs, the access to equity lowers their cost of capital (as evidenced by the lower transaction costs) and increases their bargaining power due to their credibility as a result of the listing. This can increase their capacity to lever up.

The coefficient on the profitability variable is negative and statistically significant at all conventional levels, thus confirming the pecking order theory of Myers and Majluf (1984) which postulates that profitable firms will use less debt, due to their ability to utilise internally generated funds. The positive and statistically significant coefficient on the profitability variable for the long term debt ratio supports the trade-off theory of capital structure which posits that, in order to take advantage of interest tax shields, profitable firms will issue more debt, at least up to a point where the benefits of interest tax shields are maximised. The positive association between the debt ratios and asset tangibility confirms most of the empirical evidence on capital structure studies that firms with a high proportion of fixed assets in relation to total assets have the capacity to support more debt (Rajan & Zingales, 1995; Huang & Song, 2006; Gwatidzo & Ojah, 2009; Sheikh & Wang, 2011). Likewise, large firms listing on to the JSE support more debt as evidenced by the strong positive correlations on the SIZE variable.

Capital structure dynamics of IPOs in South Africa

Consistent with the trade-off theory of capital structure, IPO firms have a capital structure target. As shown in Panel A, of Table 3, the coefficient on the lagged variables ($LEV_{i,t-1}$) for all measures of leverage is positive and statistically significant at all conventional levels. The related speed of

adjustment for these firms is 0.59, 0.97 and 0.55 for the total debt, debt equity and Long term debt ratios respectively. This means that, it takes an IPO firm less than a year (0.77 years for the total debt ratio) to cover half of its financing gap[5]. In Figure 2, the speed of adjustment for the seasoned firms and size adjusted seasoned firms is 0.24 and 0.23 respectively. This translates to 2.53 and 2.65 years to cover half of the financing gap for similar listed firms. The same pattern is observed for the long term debt ratio; IPO firms take an average of 0.86 years to cover half the financing gap, whereas the two sets of seasoned firms take 2.17 and 2.26 years respectively. The plausible explanation for the higher speed of adjustment is that firms list firstly, to rebalance their capital structure (Pagano, Panetta & Zingales, 1998), and secondly, to take advantage of windows of opportunity (Auret & Britten, 2008). In the period running up to the IPO, firms may find themselves with limited financing options, which may be too expensive. The aftermarket rebalancing increases the IPO speed of adjustment accordingly.

Panel B of Table 3 reports the interactive estimates between the post IPO years and transaction costs. The purpose of this exercise is to test the evolution of transaction costs and the related speed of adjustment for the years after the IPO. The coefficients on the interaction terms are positive and statistically significant suggesting evidence of transaction costs and targeting behaviour for firms in the first four years after listing.

Hot versus cold market IPOs

Table 4 reports the regression results for hot and cold market IPOs, and both sets of firms show evidence of targeting behaviour which is consistent with the trade-off theory of capital structure[6]. As shown in Figure 3, the total debt adjustment speeds for hot market firms are marginally higher than cold market firms. However, when the long term debt ratio is considered, hot market firms adjust at a slower pace compared to cold market firms. When the total debt ratio is considered, it takes a hot market firm an average of 1.47 years to close half of the financing gap, whereas the average cold market firm takes 1.64 years to cover half of is financing gap. The IPO year dummies are interacted with the lagged total debt variable to establish the adjustment speeds for each year following the IPO, and the results are reported in Figure 4. Hot market firms adjust faster in the earlier years and slower in the later years. The average first year adjustment speed of hot market firms is 0.83 compared to 0.57 for the average cold market firm, a difference of 45.61 percent. This faster first year average adjustment speed is consistent with the evidence provided by Auret and Britten (2008) that South African IPO firms deleverage immediately after going public. In later years, cold market firms catch up and increase their adjustment speeds more steadily.

After controlling for firm specific effects, hot market firms reduce their total leverage in the first year, whereas cold market firms increase their leverage. The coefficients on the first year IPO dummies are statistically significant at the 10 and 5 percent levels, respectively. Hot market firms also reduce their total leverage in the third year after listing, although the reduction is mildly significant at the 10 percent level.

Table 3: Regression outputs

PANEL A				**PANEL B**			
TRADITIONAL DETERMINANTS OF IPO LEVERAGE				**EVOLUTION OF SPEED OF ADJUSTMENT**			
	TOTAL DEBT	**DEBT EQUITY**	**LONG TERM DEBT**		**TOTAL DEBT**	**DEBT EQUITY**	**LONG TERM DEBT**
$LEV_{i,t-1}$	0.4081***	0.0279***	0.4453***				
$MTB_{i,t-1}$	0.0029***	0.0412***	0.0023**	$MTB_{i,t-1}$	0.0029***	0.0404***	0.0020**
$ROA_{i,t-1}$	-0.0757***	0.0186	0.0343***	$ROA_{i,t-1}$	-0.0712***	0.0142	0.0311***
$TANG_{i,t-1}$	0.0126	0.1457*	0.3815***	$TANG_{i,t-1}$	0.0177	0.1489*	0.3161***
$SIZE_{i,t-1}$	0.0327***	0.1140***	0.0130	$SIZE_{i,t-1}$	0.0305***	0.1078***	0.0177**
IPO1	-0.0152	-0.1145	0.0653*	$LEV_{i,t-1}$***IPO1**	0.1331***	0.0144*	0.2739***
IPO2	0.0067	0.0483	0.0283	$LEV_{i,t-1}$***IPO2**	0.4108***	0.0246**	0.7087***
IPO3	-0.0266	-0.0061	0.0709*	$LEV_{i,t-1}$***IPO3**	0.3403***	0.0167*	0.6215***
IPO4	0.0020	0.0303	0.0182	$LEV_{i,t-1}$***IPO4**	0.3956***	0.2430***	0.5274***
CONSTANT	0.0858	-0.0446	-0.1077	**CONSTANT**	0.1514	-0.0423	-0.0779
Observations	619	619	619	Observations	619	619	619
Prob > chi2	0.0000	0.0000	0.0000	Prob > chi2	0.0000	0.0000	0.0000
R-Squared	0.4345	0.1254	0.5452	R-Squared	0.3505	0.1428	0.6789
Left Censored	19	32	115	Left Censored	19	32	115
Uncensored	571	359	503	Uncensored	571	359	503
Right Censored	29	228	1	Right Censored	29	228	1

[5] The applicable formula is log 0.5/log(1-SOA).

[6] Regressions are only run for the total debt and long term debt ratios. The F statistics for the D/E regressions for hot and cold market firms are insignificant.

Notes: This Table reports the regression results for the determinants of capital structure of IPOs. $LEV_{i,t-1}$ is the target leverage for firm i at time t, and is calculated as total interest bearing debt divided by total assets. $MTB_{i,t-1}$ is the market to book ratio for firm i at time $t-1$ and is calculated as market price per share divided by book value per share. $ROA_{i,t-1}$ is the return on total assets for firm i at time $t-1$ and is measured by operating profits before interest and taxes divided by total assets. $TANG_{i,t-1}$ captures the tangibility of the asset base of firm i at time $t-1$. It is calculated as the ratio of fixed assets to total assets. $SIZE_{i,t-1}$ is measured as the natural logarithm of total assets for firm i at time $t-1$. The interaction term between the year dummy and the lagged leverage ($IPO_t * LEV_{i,t-1}$) tracks the evolution of adjustment costs of leverage following an IPO.

Table 4: Evolution of IPO speeds of adjustment; hot versus cold market IPOs

	PANEL A HOT MARKET IPOs			PANEL B COLD MARKET IPOs	
	TOTAL DEBT	**LONG TERM DEBT**		**T0TAL DEBT**	**LONG TERM DEBT**
$LEV_{i,t-1}$	0.6232***	0.7065***	$LEV_{i,t-1}$	0.6553***	0.5911***
$MTB_{i,t-1}$	-0.0007	0.0042	$MTB_{i,t-1}$	0.0028***	-0.0005
$ROA_{i,t-1}$	-0.0419	-0.0490**	$ROA_{i,t-1}$	-0.0284	0.0176
$TANG_{i,t-1}$	-0.0151	0.0659	$TANG_{i,t-1}$	-0.0103	0.2650***
$SIZE_{i,t-1}$	-0.0700***	-0.0182	$SIZE_{i,t-1}$	0.0149	0.0099
IPO1	-0.1059*	0.0221	**IPO1**	0.0796**	-0.0303
IPO2	-0.0350	-0.0679	**IPO2**	0.0046	0.0140
IPO3	-0.0827*	0.0136	**IPO3**	-0.0278	0.0326
IPO4	0.0034	-0.0014	**IPO4**	-0.0038	-0.0451
CONSTANT	0.6006***	0.1062	**CONSTANT**	0.0642	-0.0529
Observations	159	159	Observations	324	324
Prob > chi2	0.0000	0.0000	Prob > chi2	0.0000	0.0000
R-Squared	0.8950	0.7968	R-Squared	1.0935	0.7184
Left Censored	4	32	Left Censored	13	62
Uncensored	144	127	Uncensored	299	262
Right Censored	11	0	Right Censored	12	0

Notes: This Table reports the regression results for the determinants of capital structure for hot versus cold market IPOs. $LEV_{i,t-1}$ is the target leverage for firm i at time t, and is calculated as total interest bearing debt divided by total assets. $MTB_{i,t-1}$ is the market to book ratio for firm i at time $t-1$ and is calculated as market price per share divided by book value per share. $ROA_{i,t-1}$ is the return on total assets for firm i at time $t-1$ and is measured by operating profits before interest and taxes divided by total assets. $TANG_{i,t-1}$ captures the tangibility of the asset base of firm i at time $t-1$. It is calculated as the ratio of fixed assets to total assets. $SIZE_{i,t-1}$ is measured as the natural logarithm of total assets for firm i at time $t-1$.

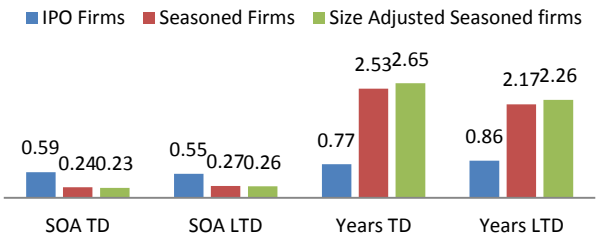

Figure 2: Comparison of speeds of adjustment for IPO and seasoned firms

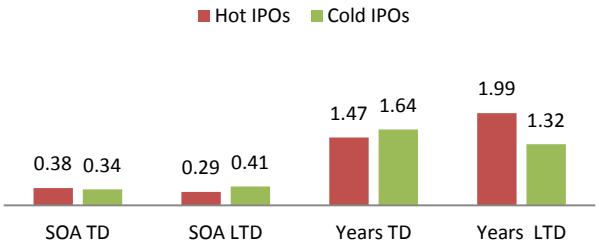

Figure 3: Comparison of speeds of adjustment for hot and cold market IPOs

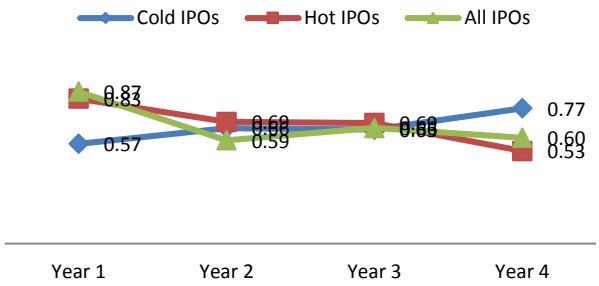

Figure 4: Evolution of speeds of adjustment for hot vs cold IPOs (total debt ratios)

Conclusions and recommendation for future research

This paper examined the dynamics of IPO capital structures on the JSE. The key findings suggest evidence of targeting behaviour consistent with the static trade off theory of capital structure. On average, IPO firms adjust towards the capital structure target at a faster pace than seasoned firms. When the sample is split between hot and cold market IPOs, some new patterns are observed. In the first year following the IPO, hot market IPOs significantly reduce their total debt in the first year, whereas cold market IPOs increase the total debt significantly. On average, hot market IPOs adjust at a marginally faster pace than cold market IPOs. However, the opposite is true when the long term debt ratio is considered.

Further, hot market IPOs adjust faster than cold market IPOs in the first year following the IPO. The average first year adjustment speed of hot market IPO firms is 0.83 compared to 0.57 for the average cold market IPO firm.

The paper also shows that size, profitability, growth and asset tangibility play a significant role in explaining capital structure of IPOs on the JSE. Specifically, large IPO firms increase their leverage significantly. In terms of the total debt ratio, the more profitable firms borrow less. However, when the long term debt ratio is considered, profitable firms borrow more. Furthermore, growth firms increase their capacity to borrow more. This evidence is consistent across the three measures of leverage.

This paper has opened up avenues for future research on IPOs in African markets. Specifically, further research should focus on the capital structure of IPOs in African stock markets and incorporating institutional and country level data to explain the differences, if any, in IPO leverage.

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