Institutional, macroeconomic and firm-specific determinants of capital structure
The African evidence

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Abstract

Purpose – The study aims to investigate the role of institutions, macroeconomic conditions, industry and firm characteristics on firm's capital structure decision within the context of nine African countries.

Design/methodology/approach – A sample of 986 firms over the period 1999-2008 were analysed using a series of models that link institutional, macroeconomic, industry and firm-specific characteristics, on the one hand, and measures of capital structure, on the other. The paper used system generalized method of moments and seemingly unrelated regression which are robust to data heterogeneity and endogeneity problems to estimate the relationships between variables. Furthermore, the paper checked the robustness of findings using various estimation procedures.

Findings – The paper found evidence that the legal and financial institutions, income level of the country in which a firm operates, growth rate of the economy and inflation matter in capital structure choices of firms in the sample countries. Furthermore, capital structure choice of firms in the sample countries was affected by industry and firm-specific characteristics. These findings signify the role that probability of bankruptcy, agency costs, transaction costs, tax issues, information asymmetry problems, access to finance and market timing play in capital structure decisions of firms in Africa.

Research limitations/implications – As in most empirical studies, this study focused on listed firms. Nonetheless, future studies that focus on non-listed firms could add additional insights to the extant literature.

Practical implications – The findings have practical implications for corporate managers, governments, legislators and policymakers in the African continent.

Originality/value – The study focuses on firms in African countries for which cross-country studies such as this are rare. It also explicitly models industry variable as one of the determinants of capital structure, a marked departure from previous studies on capital structure decision of firms.

Keywords Institutions, Africa, Determinants, Capital structure, Firm-specific factors, Macroeconomic conditions

Paper type Research paper

1. Introduction

Capital structure research, arguably, is at the core of modern corporate finance. Cross-country studies show that capital structure decisions hinge not only on firm characteristics but also on the country's institutional and macroeconomic environment (Beck *et al.*, 2002; De Jong *et al.*, 2008; Rajan and Zingales, 1995; Lopez-Iturriaga and Rodriguez-Sanz, 2008; Antoniou *et al.*, 2008; Antoniou *et al.*, 2006). Understanding the role of these country contexts in capital structure decisions of firms is important both at macro- as well as at micro-level (Singh and Hamid, 1992; Prasad *et al.*, 2001; Green *et al.*, 2003).

The hitherto literature on the nexus between country milieu and capital structure decisions certainly advanced our understanding of financing decisions. Until recently, most empirical works were mainly skewed to advanced economies or, at best, non-African economies. However, there are profound institutional and macroeconomic differences between advanced and developing economies and these differences are likely to result in differences in capital structure decisions of firms in these economies (Booth *et al.*, 2001). For instance, Eldomiaty (2007) discusses that emerging/developing economies in general and African economies in particular are epitomized by:

- relatively inefficient and incomplete markets;
- noticeably higher information asymmetry; and
- somehow different financing arrangements compared to advanced economies.

Thus, studies carried out in the context of developed economies could be of limited applicability for decision making in the context of African economies.

Cognizant of this limitation, recent literature experienced small but growing strand of studies dealing with the subject of capital structure within the context of African economies[1]. Nevertheless, as most of these studies were single-country studies, we could not know the influence of institutional and macroeconomic factors on capital structure decisions of firms in Africa. To our knowledge, empirical work that directly investigates the influence of institutional and macroeconomic variables on capital structure decisions of firms in Africa is virtually non-existent. Gwatidzo and Ojah's (2009) work apparently is the first cross-country study investigating capital structure decisions of firms within the African setting. Although these authors report that there are differences in the capital structure of firms in their sample countries, they did not venture into examining how institutional and macroeconomic variables impact capital structure decisions of firms in their sample countries.

The present study attempts to fill this gap in the literature by directly examining the nexus between institutional, macroeconomic, industrial and firm factors, on the one hand, and capital structure decisions, on the other, within the context of Africa. It contributes to the existing literature in several ways. First, to our knowledge, it is a first attempt to directly test the influence of institutional, macroeconomic and industry factors on capital structure decisions of firms in Africa. As such, it documents evidence on the role of institutions, macroeconomic conditions, and industry factors on capital structure decisions of firms in Africa. Second, as all of the sample countries in Gwatidzo and Ojah (2009) were common law countries, by including civil law countries, the study investigates fully the role of legal institutions in explaining the variations in capital structure decisions of firms in Africa. Third, although there is ample evidence that industry characteristics impact on capital structure decisions

of firms, we are yet to witness studies that examine inter-industry variations in capital structure decisions of firms in Africa. This study, to our knowledge, is a first attempt to document inter-industry variations in capital structure decisions within the African setting. Fourth, despite the fact that firm heterogeneity and endogeneity problems are typical issues that plague finance research (Parsons and Titman, 2007; Getzmann *et al.*, 2010), empirical research on capital structure decisions in the African setting ignored these problems. The current study used generalized method of moments (system-GMM) and seemingly unrelated regression (SUR) methods which are robust to these problems.

Our empirical analysis focused on ten years (1999-2008) data pertaining to a sample of 986 non-financial firms drawn from nine African countries which have functioning stock exchanges. We analysed the data using five sequentially ordered models. First, we examined results for a baseline model – Model 1 – which specifies capital structure as a function of firm characteristics. Second, we further examined the data to see if the results in Model 1 persist after controlling for industry effects – Model 2. Third, we considered cross-country variations in capital structure by including country dummies – Model 3. Fourth, we introduced some broad measures of cross-country differences (i.e. legal family and level of development) that are known to effect on capital structure – Model 4. Finally, we injected more specific and direct measures of institutional and macroeconomic conditions to see if such variables affect capital structure decisions of firms in our sample countries – Model 5.

Our main finding is that:

- macroeconomic conditions (i.e. overall size of the economy, growth rate of real GDP per capita, inflation);
- legal institutions (i.e. shareholder and creditor rights protection and rule of law); and
- financial institutions (i.e. relative size of banking sector and stock market development) impact on capital structure decisions of firms in Africa.

The evidence also confirms the view that there are inter-industry variations in capital structure decisions of firms in our sample countries. Furthermore, we found that firm size has a positive influence on capital structure while firm profitability has an inverse influence on the same variable. One the other hand, we confirm that the influence of asset tangibility, non-debt-related tax-shield and dividend payout on capital structure decisions is a function of how we measure the latter. Also, we note that income group to which a country belongs moderates the influence of firm factors on capital structure decisions.

The practical implications of the findings of the study are many. First, the evidence that firm-level factors influence capital structure decisions of sample firms suggests that corporate (financial) managers in Africa have some sway over capital structure, and hence cost of capital and value. Second, the evidence that country-level factors impact on capital structure implies that regulators and policymakers in Africa could influence capital structure, and hence cost of capital and firm value, through regulations. Third, managers, regulators and policymakers in Africa, through their influence on capital structure of firms, could impact on quality of corporate governance at firm level. The remainder of the paper proceeds as follows. Section 2 presents a brief review of the literature on capital structure. Section 3 proffers an empirical setup for the present study. Section 4 presents the results and discussions and Section 5 concludes.

2. Literature review

2.1 Theories of capital structure

Ever since the seminal work of Modigliani and Miller (MM, 1958), capital structure decisions of firms have become a subject of intense research. Nonetheless, there has been no one universal theory that explains capital structure decisions of a firm. Rather, there are only conditional theories (Myers, 2001). For the purpose of understanding the many and disperse theoretical contributions to explain the "capital structure puzzle", we classify capital structure theories into two major groups: trade-off theory and information asymmetry theory. Of course such simplification is open to criticism, but our classification is ample enough to encompass theoretical work done so far, yet discriminating enough to point out the fundamental differences between each group.

The trade-off theory is based on the proposition that capital structure is determined by a trade-off between benefits and costs of debt. Two major theories may conveniently be clustered under trade-off theories – tax/bankruptcy trade-off and agency theories. The tax/bankruptcy trade-off theory views (Kim, 1978; Kraus and Litzenberger, 1973; Miller, 1977; MM, 1963) the firm as setting a target capital structure which involves a trade-off between benefits of debt and its costs to arrive at a value maximizing capital structure (Graham and Harvey, 2001). The agency theory, on the other hand, points to the potential conflict of interest between a firm's stakeholders and conjectures that firm's capital structure is a result of its financial manager trying to balance agency costs of debt against benefits of debt (Harris and Raviv, 1991; Myers, 2001; Jensen and Meckling, 1976).

Another whole family of theories derives from the asymmetric information problems that exist between insiders and outsiders of the firm. The first of these is the pecking order theory, which suggests that a firm goes through a specific hierarchy of securities in financing its investments. This theory is based on the argument that there are information asymmetries and transactional costs that a firm faces in raising capital (Myers, 1984, 2001; Myers and Majluf, 1984)[2].

Also within the asymmetric information mind set, capital structure can also be regarded as a tool used by firms to credibly signal the superiority of its projects to the market (Graham and Harvey, 2001; Harris and Raviv, 1991; Barclay and Smith, 1999; Ross, 1977). Finally, market timing theory suggests that firms look at the current conditions in the securities market and time the raising of funds in accordance with the conditions in these markets. Thus, according to this theory, firms tend to raise funds from markets that currently look more favourable (Baker and Wurgler, 2002). Advocates of this theory contend that capital structure is a cumulative outcome of past attempts to time the equity market, thus, is strongly related to historical market values of the firms' own securities.

Based on these theories, the literature identifies a number of firm, industry and country characteristics that determine capital structure of a firm. However, neither theoretical predictions nor empirical results are uniform. Table I presents a summary of the theoretical predictions and empirical results.

2.2 Measuring capital structure

As in the competing theories, there has been no universally accepted definition of capital structure in the literature. Researchers agree that measures of capital structure should vary depending on the purpose of analysis. What is more, not only the competing

(*continued*)

Table I.
Capital structure,
theoretical hypotheses,
and empirical findings

Panel A: institutions and macroeconomic conditions and capital structure

		Theoretical framework			Summary of empirical results		
S. no.	Variables	Tax/ bankruptcy	Agency	Market timing	Positive influence on capital structure	Negative influence on capital structure	No influence on capital structure
1	Shareholder rights		−		Song and Philippatos (2004)	Chen et al. (1999)	± De Jong et al. (2008)
2	Rule of law	+	+/−			De Jong et al. (2008), Antoniou et al. (2008)	
3	Creditor rights	+	+/−		Deesomsak et al. (2004), Cheng and Shiu (2007)	De Jong et al. (2008)	
4	Taxation	+			Rajan and Zingales (1995), Booth et al. (2001), Cheng and Shiu (2007)	Song and Philippatos (2004)	Mayer (1994)
5	Inflation	+/−		+		Cheng and Shiu (2007), Beck et al. (2002)	Fan et al. (2008)
6	Size of economy			−	Singh and Hamid (1992), Singh (1995), Song and Philippatos (2004), Booth et al. (2001), Chui et al. (2002), Fan et al. (2008)	Cobham and Subramaniam (1998), Beck et al. (2002), Cheng and Shiu (2007)	
7	Economic growth	+	+/−	−	Chui et al. (2002), Song and Philippatos (2004), De Jong et al. (2008)	Beck et al. (2002)	De Haas and Peeters (2006)
8	Market capitalization	−	+			Song and Philippatos (2004)	Cheng and Shiu (2007)
9	Stock market turnover	−	+			Song and Philippatos (2004)	Cheng and Shiu (2007)

S. no.	Variables	TBT	Agency	POT	ST*	Positive influence on capital structure	Negative influence on capital structure	No influence on capital structure
10	Size of banking sector	+	+			Song and Philippatos (2004), Booth et al. (2001)	Demirgüç-Kunt and Maksimovic (1999), Cheng and Shiu (2007)	Rajan and Zingales (1995)

Panel B: firm characteristics and capital structure

Summary of empirical results

S. no.	Variables	*Theoretical predictions*				*Positive influence on capital structure*	*Negative influence on capital structure*	*No influence on capital structure*
		TBT	*Agency*	*POT*	*ST**			
				+/−				
1	Firm size	+	+	+/−	+	Prasad et al. (2001), Wiwattanakantang (1999), Barclay and Smith (1999), Abor (2008), Booth et al. (2001), Deesomsak et al. (2004), Song and Philippatos (2004), Antoniou et al. (2008), Salawu and Ile-Ife (2007)	Fan et al. (2008)	± Bhaduri (2002a, b), Bevan and Danbolt (2002), Titman and Wessels (1988), De Jong et al. (2008), Rajan and Zingales (1995), De Jong et al. (2008)
2	Profitability	+	−	−	+	Song and Philippatos (2004), Booth et al. (2001), Abor (2008), Friend and Lang (1988), Bevan and Danbolt (2002), Rajan and Zingales (1995), Mazur (2007), Antoniou et al. (2008), Eldomiaty (2007), Salawu and Ile-Ife (2007)	Titman and Wessels (1988)	Deesomsak et al. (2004)
3	Growth opportunities	−	−	+	+	Bevan and Danbolt (2002), Abor (2008), Chen et al. (1999), Salawu and Ile-Ife, 2007)	Barclay and Smith (1999), Song and Philippatos (2004)	Bevan and Danbolt (2002), Bhaduri (2002a, b), Rajan and Zingales (1995), Deesomsak et al. (2004), Booth et al. (2001), De Jong et al. (2008)

Table I.

No.	Determinant	TBT	POT	ST			
4	Asset tangibility	+	+	+/−	Bradley et al. (1984), Rajan and Zingales (1995), Prasad et al. (2001), De Jong et al. (2008)		Abor (2008), Bevan and Danbolt (2002), Salawu and Ile-Ife (2007), Bevan and Danbolt (2002), Booth et al. (2001)	Bhaduri (2002a, b), Titman and Wessels (1988), Wiwattanakantang (1999), Deesomsak et al. (2004)
5	Tax shield	−		−	Song and Philippatos (2004)	Deesomsak et al. (2004), Song and Philippatos (2004), Wiwattanakantang (1999)		Barclay and Smith (1999)
6	Earnings volatility	−	+	−		Eldomiaty (2007)	Abor (2008), De Jong et al. (2008), Booth et al. (2001)	Titman and Wessels (1988), Wiwattanakantang (1999), Deesomsak et al. (2004)
8	Dividend policy	−	+	+/−			Abor (2008)	

Notes: The table presents a summary of the theoretical predictions and empirical results regarding the relationship between institutional and macroeconomic variables and capital structure; TBT refers to tax/bankruptcy trade-off theory; POT denotes pecking order theory; ST signifies signalling theory; when a theory is silent or when there is significant ambiguity regarding the appropriate interpretation, the cell is left blank; the (+/−) sign signifies the possibility that plausible arguments could be made for a positive as well as a negative relationship using a given theory; ± denotes the sensitivity of empirical results either to the way the dependent variable is defined or country variations; 0 denotes that there were studies which reported support for no relationship between the variable indicated and financing decisions

Table I.

theories have different implications for different measures of capital structure but also empirical studies show that different measures of capital structure produce different results. Cognizant of this, the literature emphasizes the importance of considering:

- both short- and long-term; and
- market- and book-based measures of capital structure (Lemma and Negash, 2011; Rajan and Zingales, 1995).

Ostensibly, most studies do not use market-based measures of capital structure because:

- most theoretical predictions apply to book-based values;
- book-based measures may better reflect management's target capital structure since market values of equity depend on a number of factors that often cannot be controlled by the firm;
- information obtained from financial statements are more credible; and
- market values of debt are often not available (Thies and Klock, 1992; Fama and French, 2002).

On the other hand, many researchers report that the use of book values delivers similar results to market values as the two are highly correlated (Bowman, 1980). Also, Welch (2010) shows how the use of financial-debt-to-asset ratio as a measure of capital structure is flawed. Hence, we employed three book-based measures of capital structure, namely, short-term leverage, long-term leverage and total leverage.

2.3 Firm characteristics and capital structure
The literature suggests that earnings volatility impacts capital structure of a firm since it represents probability of financial distress (Frank and Goyal, 2009; Deesomsak *et al.*, 2004)[3]. Likewise, firm size and asset tangibility are additional firm level factors that the literature usually identifies as determinants of firm's capital structure. This is because they are oftentimes considered as inverse proxies for probability of bankruptcy, information asymmetry, agency and transaction costs (Titman and Wessels, 1988; Rajan and Zingales, 1995; Jensen and Meckling, 1976; Frank and Goyal, 2009). In a similar vein, firm's past profitability and future growth opportunities are considered to be important determinants of capital structure and are usually taken as proxies for probability of bankruptcy, agency costs, tax advantage and need for additional fund (Jensen, 1986; Mazur, 2007; Titman and Wessels, 1988; Barclay and Smith, 1999; Myers and Majluf, 1984). Following the correction work of MM (1963), the literature routinely examines the relationship between taxes and corporate debt. A few studies see dividend policy as proxy for additional fund needed, information asymmetry and a tool for managing agency problems, and hence, consider it as one of the determinants of capital structure (Mazur, 2007; Martin and Scott, 1974; Frank and Goyal, 2009; Miller and Rock, 1985). In Table I (Panel B), we present a summary of theoretical predictions and empirical findings regarding the relationship between firm characteristics and capital structure of a firm.

2.4 Industry classification and capital structure
Prior literature proffers ample evidence on inter-industry variation in capital structure. For instance, in a response to Remmers *et al.* (1974) who questioned the presence

of a nexus between industry classification and financial structure, Scott and Martin (1975), using Kruskal-Wallis one-way ANOVA, proffer evidence that financial structures of firms vary across industries. 15 years later, Harris and Raviv (1991) highlight that capital structure of firms within an industry is more similar than that of firms in a different industry. This could be due to:

- inter-industry differences in operating characteristics;
- managers benchmarking industry's capital structure when they decide on their own firm; and
- a set of some correlated, but otherwise omitted, factors which influence capital structure at industry level (Frank and Goyal, 2009).

2.5 Institutions and capital structure
In sync with institutional theory, recent literature highlights the importance of legal and financial institutions in capital structure decisions of a firm (Lopez-Iturriaga and Rodriguez-Sanz, 2008; Booth *et al.*, 2001; Cheng and Shiu, 2007; Antoniou *et al.*, 2008). In Table I (Panel A), we present a summary of theoretical predictions and empirical evidence pertaining to the nexus between institutional variables and capital structure. In what follows, the impact of legal and financial institutions on firm's capital structure decisions is explored.

2.5.1 Legal institutions. The literature accentuates the critical role of legal institutions in understanding patterns of corporate finance in different countries (La Porta *et al.*, 1998). Theory suggests that a major factor in firm's choice of capital structure is the existence of agency costs. And, the legal environment in which contracting takes place affects the extent of agency problems that exist between corporate insiders and outsiders, and thus, influences outsiders' confidence in the markets and consequently their development (Djankov *et al.*, 2008; Fan *et al.*, 2008). Prior empirical works indicate that there are varying degrees of disparities between the laws in the books and laws in action. This phenomenon is particularly conspicuous when one considers the African continent as all African countries had adopted (or "transplanted") laws from Western origin (Berkowitz *et al.*, 2003). We consider the legal tradition on which a country's legal system is based to investigate cross-country disparities in capital structures. We further examine capital structure of sample firms by considering variables that are known to more specifically define legal institutions in a country – shareholder rights protection; creditor rights protection; and quality of law enforcement[4].

2.5.2 Financial institutions. The literature also considers the level of development of financial institutions as another set of important factors in capital structure decisions of a firm. At the core of this argument is that financing patterns "fit" the governance system in the sense that those to whom the governance system gives most power to influence the policies of corporations would also be the main providers of funds (Antoniou *et al.*, 2008; Hackethal and Schmidt, 2004; Lopez-Iturriaga and Rodriguez-Sanz, 2008). This study examines the influence of stock market and banking sector development on capital structure decisions of a firm. It uses two of the most commonly used measures of stock market development – stock market size and stock market liquidity – and a measure of banking sector development[5].

2.6 Macroeconomic conditions

The literature alludes to the important role that macroeconomic contexts play in the determination of capital structure decisions of firms. The macroeconomic literature chronicles the vast debate on how to succinctly measure macroeconomic condition of a country and yet remains unsettled. In what follows, we explore how macroeconomic conditions influence firm's capital structure decisions by invoking a select set of macroeconomic variables. The variable selection was largely based on the capital structure literature and data availability.

2.6.1 Economic development and its growth. The notion that economic development of a given country is associated with the financing pattern of firms in that country is not new (Rajan and Zingales, 1995; Booth *et al.*, 2001). At the core of the argument is the view that economic development reflects wealth disparity between countries and hence access to finance. Also, the literature conjectures that a firm's capital structure decisions might be impacted by the rate at which a country's economy grows as the latter is believed to be correlated with firm growth which is a proxy for firm's investment opportunity set and its financing needs (Smith and Watts, 1992; Demirgüç-Kunt and Maksimovic, 1998, 1999; Beck *et al.*, 2002; Wanzenried, 2006).

However, the fact that economic growth could be taken as a proxy for a multitude of factors partly explains the lack of consensus noted in both theoretical and empirical literature. For instance, one line of argument puts forward economic growth as a possible driver for decline in expected bankruptcy cost, increase in the collateral values of assets, increase in stock prices and increase in free cash flow. Alternatively, another line of argument presents economic growth as an inverse proxy for agency conflicts between insiders and outsiders (Booth *et al.*, 2001; De Haas and Peeters, 2006; Frank and Goyal, 2009; Korajczyk, 2003; Wanzenried, 2006).

As indicated previously, zeroing on a succinct measure of economic development and its growth has been difficult and, expectedly, all of the indicators have limitations (Mahmud *et al.*, 2009). We first explore the potential relationship between economic development and capital structure by trifurcating the sample countries into income groups (Model 4) and then introduce more specific measures of the overall size of the economy (i.e. GDP per capita) and its growth rate (growth rate of real GDP per capita) as barometers to gauge the economic context within which a firm operates (Model 5).

2.6.2 Taxation. Taxation has long been recognized as a factor that effects on capital structure decisions of a firm (Borio, 1990; Fan *et al.*, 2008) as debt is expected to have tax advantage over equity. Notwithstanding the attention that taxation and tax institutions received in capital structure research, there has not been one easy way of measuring them. One common approach considers effective (or marginal) tax rates computed from the financial statements to account for tax code differences between countries (Coates and Wooley, 1975; Cheng and Shiu, 2007). Such an approach fails to accurately measure differences in tax institutions, at least, for two reasons. First, it measures not only differences in statutory corporate tax rates in different countries but also differences in effective (marginal) tax rates due to firm-specific characteristics. Second, it suffers from a disadvantage that effective tax rate also serves as a proxy for profitability because less profitable firms pay lower taxes than more profitable firms, or even pay no taxes (Cheng and Shiu, 2007).

Another approach considers categorizing time periods and countries based on tax regimes (Fan *et al.*, 2008; Pattenden, 2006). Although this approach mitigates the

limitations of the previous approach, it wrongly assumes that capital structure of firms within the same tax regime is identical. Hence, it losses information related to differences in firm's tax expenses within a given tax regime. A third approach to measuring tax effects is the one employed by Rajan and Zingales (1995) and Booth *et al.* (2001), etc. This approach uses a "tax-advantage-index" called Miller's tax advantage (Miller, 1977). Although this approach solves many of the limitations linked with the previous two, computing the personal tax component of the index and capturing tax code details required in the formula usually makes it non-parsimonious (Booth *et al.*, 2001). In this study, we employ highest marginal corporate tax rate as a proxy to measure differences in taxation systems across countries.

2.6.3 Inflation. The argument that inflationary situations affect the financing patterns of firms is, arguably, as old as capital structure research itself. Inflation rate is usually considered as a proxy for a government's ability to manage the economy and it provides information about the stability of a given currency in long-term contracting (Demirgüç-Kunt and Maksimovic, 1999). We use the log difference of consumer price index to proxy inflation.

3. The empirical framework
3.1 Model specification
In an attempt to determine which set of factors are determinants of capital structure, Fan *et al.* (2008) used a sequential approach to modelling capital structure. A similar approach is adopted in this study. First, we analyse the data using a baseline model (Model 1) that defines capital structure as a function of firm characteristics $\left(X_{i,t}^{f}\right)$. The model is written as:

$$Lev_{i,t} = \alpha + X_{i,t}^{f}\beta_{f} + \varepsilon_{i,t} \tag{1}$$

where $Lev_{i,t}$ is a measure of capital structure, $X_{i,t}^{f}$ is a vector of firm characteristics, β_{f} is a column vector containing the corresponding coefficients.

Second, we control for industry effects by introducing dummies $\left(D_{i}^{s}\right)$ for each industry to examine if the industry in which a firm operates matters in capital structure decisions of a firm (Model 2). The model is written as:

$$Lev_{i,t} = \alpha + X_{i,t}^{f}\beta_{f} + \sum_{s}\beta_{s}D_{i}^{s} + \varepsilon_{i,t} \tag{2}$$

where D_{i}^{s} is a dummy variable for industry classification to which firm i belongs and β_{s} is the corresponding coefficient. To avoid a dummy variable trap, we used the manufacturing industry as a reference industry. Thus, the coefficient β_{s} is interpreted as the significance of a particular measure of capital structure relative to firms in the manufacturing industry.

Third, we further control for cross-country variations by introducing country dummies to see if the country in which a firm operates matters in capital structure decisions of a firm (Model 3). The model is written as follows:

$$Lev_{i,t} = \alpha + X_{i,t}^{f}\beta_{f} + \sum_{s}\beta_{s}D_{i}^{s} + \sum_{c}\beta_{c}D_{i}^{c} + \varepsilon_{i,t} \tag{3}$$

where D_i^c is a country-dummy and β_c is the corresponding coefficient. Again, to avoid a dummy variable trap, we use South Africa as a reference country. South Africa was considered a reference country as it arguably has the most advanced institutional and macroeconomic infrastructure among the sample countries (Gwatidzo and Ojah, 2009).

Fourth, we introduce legal, market and macroeconomic variables that broadly define cross-country differences in institutional and macroeconomic contexts (Model 4). At this stage, we introduce dummies for origin of legal systems $\left(D_i^L\right)$ – 1 for common law based legal systems, and 0 for civil law based legal systems – and economic development $\left(D_i^y\right)$ – upper-middle-income groups, lower-middle-income group, and low-income group. We also include interaction variables between country and firm characteristics to examine how the cross-sectional determinants of capital structure vary from country to country. The model is as follows:

$$Lev_{i,t} = \alpha + X_{i,t}^f \beta_f + \sum_L \beta_L D_i^L + \sum_y \beta_y D_i^y + \sum_L \sum_y \beta_{L \cdot y} D_i^L D_i^y + \varepsilon_{i,t} \qquad (4)$$

where D_i^L is a dummy variable for legal group to which firm i belongs and β_L is a column vector containing the corresponding coefficients; D_i^y is a dummy variable for income group to which firm i belongs and β_y is a column vector containing the corresponding coefficients.

Finally, in Model 5, we introduce rather more specific legal, market and macroeconomic variables $\left(X_{i,t}^c\right)$. The models are written as follows:

$$Lev_{i,t} = \alpha + X_{i,t}^f \beta_f + \sum_s \beta_s D_i^s + X_{i,t}^C \beta_c + \varepsilon_{i,t} \qquad (5)$$

where $X_{i,t}^c$ is a vector of institutional and macroeconomic variables that are known to have effect on capital structure and β_c is a column vector containing the corresponding coefficients.

3.2 A brief comment on estimation procedures

The econometrics literature alludes to the superiority of panel data regression over cross-sectional regression procedures (Baltagi, 2005; Hsiao, 1985)[6]. It identifies three basic panel data estimation procedures: pooled ordinary least square (OLS), fixed effects (FE), and random effects (RE). Although empirical literature favours FE over RE in basic capital structure research, the fact that our sample was not randomly drawn makes the sole use of FE problematic. However, Parsons and Titman (2007) and Getzmann *et al.* (2010) observe that endogeneity is a typical problem that plagues capital structure research in particular. Heeding to this observation and established precedence in capital research, the present study employed system-GMM and SUR procedures which are robust to data endogeneity problems (Menard, 2008; Owusu-Gyapong, 1986; Gujarati, 2003; Johnston and Dinardo, 1997; Lemmon *et al.*, 2008; Cameron and Trivedi, 2005). We check the robustness of our results using the basic panel data procedures.

3.3 The sample and data

The present study focused on firms in nine selected countries in Africa including Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia.

The choice of these countries was motivated by several factors. First, they are all in Africa where the literature on the role of institutions, macroeconomic conditions, and industry and firm characteristics on capital structure decisions is virtually non-existent. Second, these countries have different institutional setups, such as financial markets, legal traditions and level of economic development. In particular, Botswana, Ghana, Kenya, Nigeria and South Africa are members of the British Commonwealth, and thus, have some common attributes in corporate governance and corporate control whereas Egypt, Mauritius, Morocco and Tunisia are civil law based countries. In addition, while the stock exchanges in Botswana, Ghana, Kenya, Nigeria, Mauritius, Morocco and Tunisia are recently emerging exchanges those in South Africa and Egypt are more established markets. Furthermore, although not as wide, there is considerable difference in the level of economic development of these countries. This diversity offers an interesting opportunity to assess the effects of different institutional and macroeconomic environments on firm's capital structure decision.

The firm-specific data used in this study was extracted from the financial statements of listed firms in sample countries. The data were sourced from OSIRIS database of Bureau DIJK that maintains a comprehensive financial database of over 70,000 firms across the globe. We started with all the firms listed in all of the functioning stock exchanges in 17 African countries that had data in the OSIRIS database as at 31 December 2009. We required that firms in the sample should have at least three years of available data over the study period and countries should have at least ten firms. We dropped firms in the financial industry (US SIC code 6000 ∼) as the capital structure of such firms is subject to different set of regulations. The final dataset analysed comprised of ten-year (1999-2008) data pertaining to 986 non-financial firms drawn from the sample countries. The sampled companies represented *circa* 48 per cent of listed companies which were active by the end of December 2009. We adjusted differences in fiscal years of firms in the sample to provide a more accurate empirical work. Hence, if the date of preparation of financial statements for a firm is on or before 30 June, its year was stamped as one-year prior to its fiscal year and if a firm's fiscal year is after 30 June, that same year was stamped as the firm's fiscal years.

Data on country specific variables were collected from various sources. Data on the legal variables, except for the rule of law data, were downloaded from the webpage of Andrei Shelifer[7]. The rule of law data were taken from Kaufmann *et al.* (2009). All the data on country's macroeconomic and market conditions were taken either from World Development Indicators or Financial Structure Database of the World Bank. Additional country-level data were obtained from previous studies including Berkowitz *et al.* (2003).

4. Results and discussion
4.1 Descriptive statistics
4.1.1 The sample. To provide an insight about the sample, we present an overview of the number of firms included in the dataset by country and industry (Table II). Firms from Egypt and South Africa may heavily influence the sample; they constitute *circa* 79 per cent of firms included in the sample. On the other hand, those from Botswana and Ghana have little influence on the sample as they constitute only 2 per cent of firms included in the sample.

Industry-wise, we observe that firms in non-durables, manufacturing and service industries may dominate the results with participation of 18, 18 and 11 per cent, respectively.

Table II.
Composition
of the sample

Industry	Egypt	South Africa	Botswana	Ghana	Kenya	Mauritius	Morocco	Nigeria	Tunisia	All firms	All firms (per cent)
Non-durables	107	26	1	3	8	9	8	14	3	179	18
Durables	18	9	1	0	1	1	0	1	1	32	3
Manufacturing	114	31	0	2	4	1	7	11	3	173	18
Oil and gas	7	41	0	0	3	1	4	2	1	59	6
Chemicals and construction	75	16	0	1	1	0	3	5	4	105	11
Business equipment	11	35	0	1	0	0	5	2	2	56	6
Regulated	23	15	0	0	5	2	2	1	2	50	5
Wholesale and retail	51	38	6	2	4	7	6	10	3	127	13
Health	38	5	0	1	0	0	1	6	2	53	5
Service and other	80	36	3	0	6	4	3	19	3	153	16
All firms	522	252	11	10	32	25	39	71	24	986	100
All firms (per cent)	53	26	1	1	3	3	4	7	2	100	

Country (column group header over the country columns)

Notes: The table provides a country-by-country and industry-by-industry composition of the sampled firms; non-durables (IND1) include industries which fall within the following US SIC classifications: 0100-0999, 2000-2399, 2700-2799, 3100-3199, and 3940-3989; durables (IND2) include industries which fall within the following US SIC classifications: 2400*, 2500-2519, 2590-2599, 3630-3659, 3710-3711, 3714-3714, 3716-3716, 3750-3751, 3792-3792, 3900-3939, and 3990-3999; manufacturing (IND3) includes industries which fall within the following US SIC classifications: 2520-2589, 2600-2699, 2750-2769, 3000-3099, 3200-3569, 3580-3629, 3700-3709, 3712-3713, 3715-3715, 3717-3749, 3752-3791, 3793-3799, 3830-3839, and 3860-3899; oil and gas industry (IND4) includes industries which fall within the following US SIC classifications: 1000*, 1400*, 1200-1399, and 2900-2999; chemical and construction industries (IND5) include industries which fall within the following US SIC classifications: 1500*, 1600*, 1700*, 2800-2829, 2840-2899; business equipment industry (IND6) includes industries which fall within the following US SIC classifications: 3570-3579, 3660-3692, 3694-3699, 3810-3829, 7370-7379; regulatory industries (IND7) include industries which fall within the following US SIC classifications: 4000*, 4400*, 4500*, 4600*, 4800-4899, 4900-4949; wholesale and retail industries (IND8) include industries which fall within the following US SIC classifications: 5000-5999, 7200-7299, 7600-7699; health industries (IND9) include industries which fall within the following US SIC classifications: 2830-2839, 3693-3693, 3840-3859, 8000-8099; service and other industries (IND10) include all others

Firms from durables and health industries are at the other end of the spectrum, with only 3 and 5 per cent participation, respectively.

4.1.2 Overview of capital structure of firms in Africa. The capital structure of African firms has been evolving over the sample period. Table III presents descriptive statistics of measures of capital structure and its determinants for sample firms. The overall mean leverage-ratio of sample firms is 49.3, 11.8 and 37.5 per cent for measures of total, long-term and short-term leverage-ratios, respectively.

Four salient patterns pertaining to capital structure decisions of sample firms during the sample period are noteworthy (Table III). First, all the three measures of capital structure were varying over time. This might be considered as an indication that firms in Africa might be attempting to adjust their capital structure toward a target. Second, we note generally upward trend in all the three measures of capital structure during the sample period. Total leverage-ratio, for example, increased from 41.3 per cent in 1999 to 47.6 per cent in 2008 while long-term leverage-ratio went from 9.9 to 13.9 per cent over the same period. As financial theory suggests, this trend could be attributed to a confluence of expansion in the economies and stock markets and increasing inflation in the sample countries during the study period. It may also be due to the steady increase in profitability, growth opportunities and dividend payout experienced by sample firms.

Third, short-term leverage was on the decline over the second half of the sample period. This could be due to the effect of expanding stock markets in the sample countries which may have encouraged quoted firms from using short-term debt to long-term debt. The steady increase in the size, profitability, and growth opportunities of the sampled firms during the study period might also have triggered the decline in short-term leverage-ratio (Barclay and Smith, 1995; Deesomsak *et al.*, 2009; Ozkan, 2002). Finally, disaggregation of total leverage-ratio into its components (Tables III and IV) shows that short-term leverage dominates the capital structure of sampled firms. For example, long-term leverage-ratio varied between a low of 9.9 per cent and a high of 13.9 per cent while short-term leverage-ratio varied between a low of 31.4 per cent and a high of 39.2 per cent over the sample period. We observe qualitatively similar results for the sub-samples (Table IV Panels A-C). Prior empirical efforts in the context of African countries proffer broadly similar results (Toby, 2005; Negash, 2002; Mutenheri and Green, 2003; Salawu and Ile-Ife, 2007; Abor and Biekpe, 2006; Yartey, 2006; Gwatidzo and Ojah, 2009). The tendency to rely on short-term capital structure by firms in Africa is consistent with the often small (if not non-existent) corporate bond markets; underdeveloped stock markets; relatively high information asymmetries; poor legal protection and enforcement systems; and macroeconomic instability (especially inflation) that epitomized African economies (Eldomiaty, 2007; Ncube, 2007).

We probed the descriptive statistics to see if there are inter-industry variations in capital structure (Table IV Panel A). The results imply a preliminary inference: the mean leverage-ratios of industries are rather heterogeneous. For instance, in terms of total leverage-ratio, we note that firms in chemical and construction, regulated and wholesale and retail industries were the most levered in that order. In contrast, those in durables and health industries were the least levered. In terms of short-term leverage-ratio, we observe that firms in chemical and construction, business equipment and wholesale and retail industries were the most levered in that order. In contrast, those in oil and gas industry were the least levered.

Panel A: descriptive statistics of firm characteristics[a]

Year	Firm size	Earnings volatility	Profitability	Growth opportunities	Asset tangibility	Dividend payout	Tax shield
1999	5.221	0.244	0.274	0.024	0.543	0.293	0.031
2000	5.108	0.270	0.059	0.034	0.457	0.634	0.030
2001	5.150	0.274	0.124	0.058	0.390	0.553	0.038
2002	4.968	0.216	0.086	0.029	0.369	0.675	0.036
2003	4.961	0.235	0.094	0.056	0.362	0.687	0.036
2004	4.973	0.219	0.106	0.053	0.348	0.632	0.034
2005	5.067	0.234	0.118	0.035	0.337	0.584	0.033
2006	5.170	0.208	0.114	0.078	0.326	0.601	0.031
2007	5.321	0.225	0.130	0.086	0.322	0.614	0.031
2008	5.417	0.209	0.122	0.075	0.325	0.613	0.033
Overall	5.116	0.224	0.112	0.059	0.350	0.619	0.034

Panel B: descriptive statistics of institutional and macroeconomics characteristics[b]

Year	Total leverage	Long-term leverage	Short-term leverage	Taxation	Inflation	Size of economy	Growth of economy	Size of stock market	Liquidity of stock market	Size of banking sector	Creditor rights	Shareholder rights	Rule of law
1999	0.413	0.099	0.314	35.108	4.098	3.188	2.332	73.484	26.960	0.660	2.384	3.550	–
2000	0.448	0.100	0.348	34.985	4.213	3.199	2.621	58.206	28.824	0.657	2.384	3.550	−0.077
2001	0.488	0.121	0.367	34.985	4.821	3.206	1.677	46.577	18.948	0.691	2.384	3.550	–
2002	0.501	0.115	0.386	34.985	5.363	3.210	1.034	61.606	30.713	0.702	2.384	3.550	−0.102
2003	0.500	0.109	0.392	34.863	5.797	3.220	2.206	62.971	20.428	0.699	2.384	3.550	−0.125
2004	0.500	0.112	0.388	34.863	8.252	3.233	3.202	85.285	23.278	0.705	2.384	3.550	−0.036
2005	0.499	0.115	0.384	34.863	5.530	3.246	2.980	112.525	35.167	0.709	2.384	3.550	−0.030

(continued)

Table III.
Evolution of firm and country characteristics

2006	0.498	0.121	0.377	34.531	7.001	3.266	4.609	125.792	44.854	0.691	2.384	3.550	−0.099
2007	0.490	0.131	0.359	23.404	8.021	3.285	4.592	144.504	42.829	0.679	2.384	3.550	−0.119
2008	0.476	0.139	0.337	23.404	NA	NA	NA	NA	51.166	–	2.384	3.550	−0.100
Overall	0.493	0.118	0.375	32.599	5.899	3.228	2.806	85.661	32.317	0.688	2.384	3.550	−0.086

Notes: [a]Firm size refers to the average of the natural logarithm total sales; earnings volatility refers to the average of absolute value of first difference of the natural logarithm of profit after tax; profitability refers to the average of the ratio of earnings before interest and taxes to total assets; growth opportunities refer to the average of the first difference of the natural logarithm of sales; asset tangibility refers to the average of the ratio of tangible fixed assets to total assets; dividend payout refers to the average of the ratio of cash dividend paid to profit after tax; tax shield refers to the average of the ratio of depreciation, amortization and depletion to total assets; [b]total leverage refers to the average of the ratio of total liabilities total assets; long-term leverage refers to the average of the ratio of non-current liabilities to total assets; short-term leverage denotes the average of the ratio of current liabilities to total assets; taxation refers to the average of the highest corporate marginal tax rate (per cent); inflation refers to the average of the consumer price index which is the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly; size of economy is measured by the average of the logarithm of GDP per capita (constant US$2,000); growth of economy denotes the average of the logarithm of GDP per capita growth (constant US$2,000); size of stock market refers to the average of the value of listed shares to GDP, calculated using the following deflation method: $\{(0.5)*[Ft/P\_et + Ft − 1]\}/[GDPt/P\_at]$ where F is stock market capitalization, P_e is end-of period CPI, and P_a is average annual CPI; liquidity of stock market refers to the average of ratio of the value of total shares traded to average real market capitalization, the denominator is deflated using the following method: $Tt/P\_at/\{(0.5)*[Mt/P\_et + Mt − 1/P\_et − 1]\}$ where T is total value traded, M is stock market capitalization, P_e is end-of period CPI P_a is average annual CPI; size of banking sector denotes the average of claims on domestic real nonfinancial sector by deposit money banks as a share of GDP, calculated using the following deflation method: $\{(0.5)*[Ft/P\_et + Ft − 1/P\_et − 1]\}/[GDPt/P\_at]$ where F is deposit money bank claims, P_e is end-of period CPI, and P_a is average annual CPI; creditor rights protection index refers to an index aggregating creditor rights, following La Porta et al. (1998); a score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations: first, there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization; second, secured creditors are able to seize their collateral after the reorganization petition is approved, i.e. there is no "automatic stay" or "asset freeze"; third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers; finally, if management does not retain administration of its property pending the resolution of the reorganization; the index ranges from 0 (weak creditor rights) to 4 (strong creditor rights) and is constructed as at January for every year from 1978 to 2003; shareholder rights protection index refers to an index of anti-director rights is formed by adding one when: (1) the country allows shareholders to mail their proxy vote; (2) shareholders are not required to deposit their shares prior to the general shareholders = meeting; (3) cumulative voting or proportional representation of minorities on the board of directors is allowed; (4) an oppressed minorities mechanism is in place; (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders = meeting is less than or equal to ten per cent (the sample median); or (6) when shareholders have pre-emptive rights that can only be waived by a shareholders meeting; the range for the index is from 0 to 6

Table III.

	Short-term leverage			Long-term leverage			Total leverage		
	Mean	SD[a]	Obs.[b]	Mean	SD[a]	Obs.[b]	Mean	SD[a]	Obs.[b]
Panel A: summary statistics of measures of capital structure by industry									
Non-durables	0.345	0.209	1,006	0.109	0.159	1,055	0.467	0.288	1,011
Durables	0.342	0.178	167	0.088	0.115	170	0.432	0.212	167
Manufacturing	0.357	0.194	921	0.124	0.176	958	0.482	0.245	922
Oil and gas	0.265	0.233	385	0.197	0.206	383	0.477	0.321	386
Chemicals and construction	0.445	0.224	523	0.108	0.164	536	0.555	0.230	523
Business equipment	0.429	0.243	346	0.078	0.105	350	0.526	0.316	346
Regulated	0.367	0.200	304	0.182	0.194	310	0.546	0.226	305
Wholesale and retail	0.428	0.229	697	0.095	0.119	748	0.545	0.309	705
Health	0.352	0.189	283	0.074	0.138	294	0.435	0.232	283
Service and others	0.318	0.226	814	0.132	0.160	862	0.462	0.293	814
Panel B: summary statistics of measures of capital structure by country									
Egypt	0.377	0.235	2,685	0.083	0.149	2,702	0.471	0.296	2,697
South Africa	0.349	0.199	1,664	0.167	0.176	1,663	0.523	0.261	1,665
Botswana	0.291	0.173	74	0.151	0.167	74	0.442	0.167	74
Ghana	0.483	0.249	52	0.085	0.169	54	0.608	0.418	53
Kenya	0.309	0.186	150	0.200	0.157	163	0.509	0.202	151
Mauritius	0.286	0.188	173	0.181	0.113	173	0.467	0.211	173
Morocco	0.356	0.182	288	0.085	0.121	289	0.441	0.221	288
Nigeria	0.504	0.256	184	0.098	0.155	371	0.649	0.298	185
Tunisia	0.319	0.182	176	0.155	0.147	177	0.475	0.241	176
Panel C: summary statistics of measures of capital structure by legal origin									
Common law	0.367	0.210	3,322	0.092	0.174	3,341	0.468	0.266	3,334
Civil law	0.361	0.228	2,122	0.156	0.148	2,325	0.533	0.284	2,128
Panel D: summary statistics of measures of capital structure by income group									
Upper-middle-income countries	0.341	0.198	1,911	0.168	0.171	1,910	0.515	0.254	1,912
Lower-middle-income countries	0.372	0.229	3,149	0.088	0.148	3,168	0.469	0.287	3,161
Low-income countries	0.425	0.248	388	0.125	0.163	588	0.589	0.292	389

Notes: [a]SD – standard deviation; [b]obs. – number of observations; this table presents a summary of descriptive statistics by industry, by country, by legal origin and by income group; common law refers to countries that had adopted their legal codes from the English common law tradition; civil law refers to countries that had adopted their legal codes from the French civil law tradition; classification of countries into income groups is based on the World Banks classification of countries as upper-middle-income, lower-middle-income, and low-income countries

Table IV.
Summary statistics of measures of capital structure by sub-sample

Table IV also presents a country-by-country summary statistics for all the three measures of capital structure. In terms of total leverage-ratio, firms in Nigeria and Ghana were the most levered while those in Morocco and Botswana were the least levered. In terms of short-term leverage-ratio, on the other hand, firms in Mauritius and Botswana were the least levered. Furthermore, firms in French civil law countries appeared more highly levered, in terms of total and long-term leverage-ratios, than those in English common law countries. The nature of the variation in leverage-ratios across income groups was dependant on the specific measure of capital structure considered. Specifically, firms in upper-middle-income countries generally tended to have higher long-term leverage-ratio and lesser short-term leverage-ratio compared to their counterparts in lower-middle-income and low-income countries. Overall, this variation in capital structures of firms in the

sub-samples is, perhaps, an indication of potential heterogeneity in underlying factors that determine capital structure.

Previous cross-country studies on capital structure report that firms in developing countries exhibit lower leverage-ratio than those in developed countries (De Jong *et al.*, 2008). As such, we assessed whether the leverage-ratios in our sample countries were comparable with those for developed and other developing economies[8] reported in Cheng and Shiu (2007)[9]. We note from Table IV that the average total leverage-ratio for the sample firms varies from a low of 44.1 per cent in Morocco to a high of 64.9 per cent in Nigeria[10]. On the other hand, Cheng and Shiu (2007) report the average total leverage-ratio varies from a low of *circa* 41.9 per cent in Taiwan to a high of 66.9 per cent in Indonesia for developed countries and from a low of 31.8 per cent in Venezuela to a high of *circa* 62.9 per cent in Pakistan for other developing countries. Thus, unlike the allusions in other studies, in terms of total and long-term leverage, the level of leverage-ratio of the sample firms was more or less similar to those in other developing and developed economies.

4.1.3 Overview of the characteristics of sample firms. The present study considered firm-specific factors based on those often suggested in the extant literature. Table V Panel B presents descriptive summary of firm characteristics of sample firms. From the table, we observe that Ghana and Tunisia had firms with smaller (median) firm size while Mauritius, Nigeria and Morocco had those with large firm size. On the other hand, firms in Ghana exhibited the largest variation in firm size whereas those in Tunisia came last in terms of firm size variation. We also observe earnings volatility for firms in Nigeria, South Africa and Ghana was the highest while it was the lowest in Tunisia. The median return on assets (ROA) was highest in Botswana, Nigeria and South Africa while it was the lowest in Mauritius, Tunisia and Morocco. However, the ROA of firms in Nigeria was the most dispersed. In terms of median growth opportunities, firms in Ghana had four times the median growth opportunities experienced by those in Tunisia.

Our results also indicate that firms in Mauritius and Nigeria had the most tangible assets while those in South Africa and Botswana had the least tangible assets. While firms in Tunisia and Egypt had the highest dividend payout ratio, those in Nigeria and Ghana had the least. In terms of non-debt-related tax-shield, firms in Tunisia had the biggest shield while those in Nigeria had the smallest. By way of summary, results in Table V affirm the view that firm characteristics exhibit cross-country and within-country variations. We conjecture that these differences might have resulted in differences in capital structure of firms.

4.1.4 Overview of the legal and financial institutions. In accordance with the view that legal and financial institutions shape capital structure decisions of firms, the study explored legal and financial institutions of sample countries. Table V presents descriptive summary of the proxies for level of development of legal and financial institutions in sample countries. The results show that there were considerable cross-country variations in these institutions as measured by creditor rights protection index (from a low of 0 in Tunisia to a high of 4 in Kenya and Nigeria), shareholder rights protection index (from a low of 2 in Kenya and Morocco to a high of 5 in Ghana and South Africa), rule of law index (from a low of − 1.31 in Nigeria to a high of 0.85 in Mauritius) and origin of legal systems. The legal systems of four of the sample countries (i.e. Egypt, Mauritius, Morocco and Tunisia) were based on civil law tradition while those of five countries (i.e. South Africa, Botswana, Ghana, Kenya and Nigeria)

Table V.
Summary statistics of measures of capital structure

Panel A: summary of country characteristics[a]

Country	Taxation	Inflation	Size of overall economy	Growth rate of real GDP	Income group	Stock market size	Stock market liquidity	Size of banking sector	Creditor rights	Shareholder rights	Rule of law	Origin
Egypt	36.00	5.38	3.20	2.91	LMI	53.74	32.97	0.78	2.00	3.00	-0.04	0.00
South Africa	29.50	5.31	3.51	2.53	UMI	201.47	48.02	0.73	3.00	5.00	0.12	1.00
Botswana	15.00	8.26	3.60	4.40	UMI	27.01	3.21	0.18	3.00	3.50	0.62	1.00
Ghana	29.90	17.93	2.43	2.82	LI	16.56	3.07	0.24	1.00	5.00	-0.10	1.00
Kenya	30.30	8.82	2.62	1.15	LI	25.79	7.35	0.33	4.00	2.00	-0.95	1.00
Mauritius	23.00	6.03	3.62	3.36	UMI	42.15	6.65	0.84	2.25	3.50	0.85	1.00
Morocco	35.00	1.66	3.17	2.93	LMI	44.57	18.76	0.64	1.00	2.00	-0.03	0.00
Nigeria	25.00	11.76	2.61	2.92	LI	17.88	14.05	0.18	4.00	4.00	-1.31	0.00
Tunisia	31.34	2.92	3.35	3.93	LMI	12.00	17.44	0.62	0.00	3.00	0.20	1.00
	21.06	6.38	2.38	2.39	NA	20.66	7.84	0.34	1.56	2.48	-0.08	NA

Panel B: summary of firm characteristics by country[b]

Country	Statistic	Firm size	Earnings volatility	Profitability	Growth opportunities	Asset tangibility	Dividend payout	Tax shield
Egypt	Mean	4.912	0.220	0.095	0.055	0.362	0.714	0.030
	Median	4.903	0.132	0.086	0.052	0.328	0.567	0.024
	SD	0.816	0.246	0.189	0.191	0.254	0.898	0.027
	Observation	2,686	1,784	2,706	2,155	2,702	1,570	2,427
South Africa	Mean	5.343	0.241	0.123	0.072	0.278	0.462	0.037
	Median	5.520	0.163	0.119	0.061	0.206	0.262	0.032
	SD	1.187	0.238	0.569	0.233	0.232	0.981	0.029
	Observation	1,629	1,053	1,655	1,357	1,621	211	1,401
Botswana	Mean	5.112	0.235	0.171	0.070	0.248	0.665	0.035
	Median	4.934	0.127	0.134	0.059	0.240	0.466	0.030
	SD	0.678	0.265	0.163	0.213	0.178	0.805	0.030
	Observation	73	53	74	62	74	30	44

Country	Statistic						
Ghana	Mean	4.428	0.229	0.099	0.120	0.428	0.258	0.036
	Median	4.545	0.154	0.110	0.103	0.367	0.158	0.033
	SD	1.513	0.203	0.181	0.086	0.256	0.303	0.037
	Observation	54	28	54	33	53	41	48
Kenya	Mean	5.322	0.184	0.121	0.054	0.410	0.487	0.036
	Median	5.665	0.123	0.102	0.054	0.369	0.341	0.033
	SD	1.060	0.194	0.140	0.142	0.220	0.634	0.025
	Observation	163	114	159	135	149	88	116
Mauritius	Mean	5.514	0.203	0.081	0.040	0.490	0.554	0.040
	Median	5.841	0.125	0.069	0.043	0.502	0.421	0.029
	SD	1.021	0.223	0.076	0.092	0.187	0.560	0.035
	Observation	173	122	168	144	142	42	63
Morocco	Mean	5.405	0.204	0.104	0.047	0.271	0.587	0.044
	Median	5.563	0.125	0.086	0.044	0.242	0.473	0.036
	SD	0.943	0.238	0.093	0.140	0.205	0.587	0.032
	Observation	289	231	289	250	280	130	286
Nigeria	Mean	5.449	0.234	0.206	0.056	0.600	0.248	0.018
	Median	5.612	0.175	0.126	0.067	0.530	0.000	0.000
	SD	0.971	0.230	0.629	0.201	0.354	0.597	0.026
	Observation	379	228	371	326	340	245	265
Tunisia	Mean	4.566	0.188	0.077	0.040	0.327	0.693	0.054
	Median	4.604	0.107	0.083	0.026	0.311	0.576	0.050
	SD	0.532	0.213	0.066	0.092	0.154	0.677	0.028
	Observation	177	115	177	153	177	91	162

Notes: [a]The table presents average values for country-level characteristics; all variables are averaged over the period 1999-2008; the exact definition of the variables is as in Table III; data on country specific variables were obtained from World Development, Financial Structure Database of the World Bank, Berkowitz et al. (2003) and Kaufmann et al. (2009) and the personal webpage of Andrei Shelifer; [b]this table presents mean (median in parenthesis) values for firm characteristics and number of observations for the sample countries; all variables are averaged over the period 1999-2008, in which data are required to be available at least for three years; the exact definition of the variables is as in Table III

Table V.

were based on common law. These variations in legal institutions of sample countries could explain disparities in the optimal contract between firms and lenders and creditors' ability to recoup loans which may affect the capital structure firms (Demirgüç-Kunt and Maksimovic, 1999).

In terms of financial institutions, the banking sector relative to GDP was the largest in Mauritius, Egypt and South Africa in that order whereas it was the smallest in Nigeria, Botswana and Ghana. The share of banking sector relative to GDP in Mauritius was close to five times that in Nigeria, three times that in Kenya, one and half times those in Morocco and Tunisia indicating a huge difference in the importance of banking sector in sample countries. We also observe that there were considerable disparities in the level of stock market development as measured by liquidity and size of stock market. For instance, in terms of size, the Johannesburg Stock Exchange was ten times the average stock market size for sample countries and *circa* 17 times larger than the stock market in Tunisia and four times larger than the first runner up (stock market size of Egypt) (Table V). We conjecture that these variations in the relative size of banking sector and stock market development could result in cross-country disparity in access to external finance and diversification opportunities available to firms.

4.1.5 Overview of macroeconomic conditions of sample countries. To gain an insight into the dissimilarities in macroeconomic conditions of sample countries, we review macroeconomic variables known to define macroeconomic conditions, *inter alia*:

- taxation;
- inflation;
- size of overall economy;
- real GDP growth rate; and
- income group to which the sample country belongs.

We note that average marginal corporate tax rates in sample countries spanned from a low of 15.0 per cent (Botswana) to a high of 36.0 per cent (Egypt) while average inflation rates spanned from a low of *circa* 1.7 per cent (Morocco) to a high of *circa* 17.9 per cent (Ghana) over the sample period (Table V). These variations in marginal corporate tax rates and inflation rates could be reflections of differences in the way governments manage the economy and the ability of local currencies to provide stable measures of value to be used in long-term contracting.

We also observe that income levels of sample countries were fairly diverse ranging from upper-middle-income countries (Botswana, Mauritius and South Africa) to lower-middle-income (Egypt, Morocco, and Tunisia) to low-income countries (Ghana, Kenya and Nigeria). Table V also indicates that GDP per capita and its growth rates varied considerably implying the existence of disparity in the wealth of sample countries. These variations in macroeconomic conditions could explain part of the cross-country differences in leverage-ratios observed earlier (Demirgüç-Kunt and Maksimovic, 1999).

4.2 Correlation analyses

We present Pearson's pairwise correlation coefficients of variables along with their statistical significances in Table VI. We note stronger correlation between short-term and total-leverage-ratios than long-term and total-leverage-ratios. This, perhaps, is because short-term debt is the dominant form of financing in the sample countries.

Table VI. Correlation matrices

Panel A: capital structure and firm characteristics[a]

	Total leverage	Long-term leverage	Short-term leverage	Earnings volatility	Profitability	Growth opportunities	Firm size	Asset tangibility	Dividend payout	Tax shield
Total leverage	1.000***			0.030	-0.085***	-0.002	0.104***	-0.085***	-0.095***	-0.009
Long-term leverage	0.436***	1.000***		0.061***	-0.052***	0.055***	0.023***	0.230***	-0.099***	0.130***
Short-term leverage	0.744***	-0.181***	1.000***	-0.008	-0.039***	-0.019	0.120***	-0.309***	-0.039*	-0.096***

Panel B: capital structure and country variables[b]

	Taxation	Inflation	Size of economy	Growth of economy	Size of stock market	Liquidity of stock market	Size of banking sector	Creditor rights	Shareholder rights	Rule of law
Total leverage	-0.026	0.043***	-0.033	0.019	0.049***	0.000	-0.081***	0.100***	0.097***	-0.075***
Long-term leverage	0.052*	-0.037	0.122***	0.045***	0.155***	0.068***	-0.032***	0.123***	0.168***	0.049***
Short-term leverage	-0.130***	0.068***	-0.114***	-0.019	-0.050***	-0.049***	-0.042***	0.012	-0.011	-0.111***

Panel C: pairwise correlation analysis of independent variables[c]

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]
Firm size [1]	1.000***																
Earnings volatility [2]	-0.044***	1.000***															
Profitability [3]	0.077***	-0.011	1.000***														
Growth opportunities [4]	0.111***	0.077***	0.124***	1.000***													
Asset tangibility [5]	-0.020	-0.009	0.016	0.018	1.000***												
Dividend payout [6]	-0.031	0.134***	-0.040***	-0.121***	-0.015**	1.000***											
Tax shield [7]	0.029*	-0.020	-0.010	0.003	0.288***	0.045**	1.000***										
Taxation [8]	-0.186***	0.006	-0.050***	-0.039***	-0.042***	0.090***	-0.005	1.000***									
Inflation [9]	0.023**	-0.011	0.034**	0.048***	0.169***	-0.115***	-0.117***	-0.394***	1.000***								
Size of economy [10]	0.034**	0.022	-0.031	0.018	-0.258***	0.127***	0.128***	-0.070***	-0.388***	1.000***							
Growth of economy [11]	0.081***	-0.024	0.008	0.041***	-0.072***	-0.008	0.006	-0.235***	0.150***	0.106***	1.000***						
Size of stock market [12]	0.145***	0.041***	0.029*	0.057***	-0.196***	-0.019	0.023	-0.347***	-0.051***	0.649***	0.161***	1.000***					
Liquidity of stock market [13]	0.092***	0.022	0.008	0.029***	-0.152***	0.034*	0.010	-0.213***	-0.026**	0.513***	0.363***	0.696***	1.000***				
Size of banking sector [14]	-0.096***	0.011	-0.068***	0.001	-0.188***	0.157***	0.042***	0.533***	-0.475***	0.669***	-0.053***	0.245***	0.330***	1.000***			
Creditor rights [15]	0.178***	0.034**	0.061***	0.026	0.078***	-0.124***	-0.101***	-0.384***	0.350***	-0.200***	-0.135***	0.325***	0.062***	-0.532***	1.000***		
Shareholder rights [16]	0.127***	0.052***	0.033**	0.044	-0.084***	-0.111***	0.028	-0.346***	0.125***	0.435***	-0.041***	0.747***	0.388***	-0.073***	0.515***	1.000***	
Rule of law [17]	-0.035**	0.021	-0.011	0.005	-0.176***	0.097***	0.096***	0.129***	-0.457***	0.852***	-0.080***	0.338***	0.217***	0.769***	-0.516***	0.144***	1.000***

Notes: [a]Correlation coefficients that are significantly different from 0 at: *10, **5 and ***1 per cent levels; the table reports the correlation coefficients between the three measures of leverage and firm-specific variables; the exact definition of the variables is as presented in Table III. [b]Correlation coefficients that are significantly different from 0 at: *10, **5 and ***1 per cent levels; this table reports the correlation coefficients between the three measures of leverage and macroeconomic and institutional variables; the exact definition of the variables is as presented in Table III. [c]Correlation coefficients that are significantly different from 0 at: *10, **5 and ***1 per cent levels; this table reports the pairwise correlation coefficients between the independent variables; the exact definitions of the variables is as presented in Table III

Also, we observe a significantly positive association between firm size and earnings volatility, on the one hand, and capital structure, on the other, regardless of how the latter is measured. In addition, we note that dividend payout and firm profitability are inversely associated with capital structure independent of how capital structure is measured. Not surprisingly, the association between asset tangibility and leverage is sensitive to how the latter is defined; it is positively related with long-term leverage and inversely related with short-term leverage.

Likewise, our results indicate that the association between most of macroeconomic, institutional and capital structure variables is a function of which measure of capital structure is used in the analysis. For instance, the highest marginal corporate tax rate, size of overall economy and rule of law are negatively related with total and short-term-leverage-ratio while they are positively associated with long-term leverage-ratio. What is more, creditor and shareholder rights protection indices are positively associated with total and long-term leverage ratios. The results also indicate that the relative size of a country's banking sector is negatively associated with all three measures of capital structure.

The association between measures of stock market development (i.e. its size and liquidity) and capital structure is sensitive to how the latter is measured. Specifically, both measures of stock market development are inversely related with short-term leverage-ratio while they have the opposite association with the other two measures of capital structure. Finally, we note that the correlation coefficients between country-level determinants of capital structure are very high. To keep the estimation problem tractable and avoid problems of multicollinearity when estimating equation (5) in the presence of high correlations, we develop slightly different specifications of equation (5) by excluding highly correlated variables.

4.3 Regression results
In this section, we report regression results and their interpretation for equations (1)-(5). We report results of system-GMM and SUR. However, pooled, FE and RE regression procedures were considered to examine if results are robust to econometric procedures.

4.3.1 Firm characteristics. We begin our analyses with a perusal of results of Model 1. Table VII presents the parameter estimates and the corresponding statistical significances.

Our results show that the nexus between firm size and capital structure is positive and robust to estimation procedures and model specifications (Tables VII-IX and XI). This result renders credence to the tax/bankruptcy trade-off argument that larger firms are likely to be more diversified and hence pose less default risk to the lender which in turn affords larger firms more capacity to borrow. Our evidence is also consistent with information asymmetry argument that larger firms are more visible, and hence, have lesser information asymmetry problems which in turn affords larger firms to borrow more. Many prior empirical endeavours reported similar results (Wiwattanakantang, 1999; Barclay and Smith, 1999; Abor, 2008; Booth *et al.*, 2001; Deesomsak *et al.*, 2004; Antoniou *et al.*, 2008; Salawu and Ile-Ife, 2007).

In sync with the pecking order theory, we find robustly significant and inverse relationship between profitability and all measures of capital structure. Tables VIII and IX indicate that this inverse relationship persists even after the influence of industry and country variables was controlled. This signifies that firms in our sample

Dependent variable	Short-term leverage		Long-term leverage		Total leverage	
	GMM	SUR	GMM	SUR	GMM	SUR
Earnings volatility	-0.015	-0.022	0.002	0.049^{***}	-0.010	0.027
Firm size	0.010^{*}	0.037^{***}	-0.010	0.006^{*}	-0.017	0.046^{***}
Profitability	-0.040^{*}	-0.126^{***}	-0.022	-0.110^{***}	-0.101^{*}	-0.217^{***}
Growth opportunities	-0.004	0.038	-0.005	0.009	-0.024	0.041
Asset tangibility	-0.087^{*}	-0.282^{***}	0.012	0.175^{***}	-0.006	-0.089^{***}
Dividend payout	0.011	-0.007	0.007	-0.020^{***}	0.018	-0.027^{***}
Tax shield	-0.599^{**}	-0.193	-0.639^{*}	0.295^{**}	-0.872^{*}	0.023
Constant	0.241^{***}	0.247^{***}	0.016	-0.003	0.194^{*}	0.252^{***}
χ^2	129.81^{***}	339.45^{***}	413.53^{***}	340.12^{***}	169.08^{***}	121.67^{***}
n	1,662	1,695	1,725	1,743	1,664	1,696

Table VII.
Firm characteristics and
capital structure

would borrow less to fund their investment if they had increased internal fund. Although this finding is in contrast with propositions based on tax/bankruptcy and signalling theories, it is consistent with empirical results reported in similar studies (Booth *et al.*, 2001; Abor, 2008; Friend and Lang, 1988; Bevan and Danbolt, 2002; Rajan and Zingales, 1995; Mazur, 2007; Antoniou *et al.*, 2008; Eldomiaty, 2007; Salawu and Ile-Ife, 2007).

Not surprisingly, the relationship between asset tangibility and capital structure is a function of how the latter is measured. The relationship is generally negative and statistically significant for short-term leverage-ratio while it is somehow positive for long-term leverage-ratio. This seems to suggest that firms with more tangible assets tend to use their tangible assets as collateral to access long-term debt, and hence, depend less on short-term debt. This is in line with reasoning based on both tax/bankruptcy and agency theories which contend that firms with more tangible assets tend to have lower cost of bankruptcy and lower agency costs of debt (De Jong *et al.*, 2008; Rajan and Zingales, 1995; Frank and Goyal, 2009; Abor, 2008; Antoniou *et al.*, 2008; Jensen and Meckling, 1976). Bevan and Danbolt (2002) and Abor (2008) report similar results.

It is also interesting to note that the relationship between non-debt-related tax-shield and capital structure depends on how we measure capital structure; while it negatively influences short-term and total leverage-ratios, it positively influences long-term leverage-ratio. This finding partially supports the argument that the higher the non-debt-related tax-shields, the lower the tax advantage that arises from interest deduction (Antoniou *et al.*, 2008; Barclay and Smith, 1999; Deesomsak *et al.*, 2004). While the inverse relationship corroborates the findings reported in Wiwattanakantang (1999) and Deesomsak *et al.* (2004), the direct relationship supports Song and Philippatos (2004).

Our results also indicate that the dividend payout variable negatively influences long-term leverage-ratio proffering support for the argument forwarded by agency theory which sees dividend payment and debt issues as substitutes in mitigating agency problems (Bhaduri, 2002a, b). This evidence also provides support for the

Dependent variable	Short-term leverage		Long-term leverage		Total leverage	
	GMM	SUR	GMM	SUR	GMM	SUR
Earnings volatility	− 0.018	− 0.021	− 0.006	0.052***	− 0.009	0.031
Firm size	0.029	0.034***	− 0.007	0.008**	− 0.011	0.046***
Profitability	− 0.027*	− 0.110***	− 0.020*	− 0.117***	− 0.121*	− 0.206***
Growth opportunities	− 0.010	0.029	− 0.006	0.008	− 0.023	0.033
Asset tangibility	− 0.060**	− 0.245***	0.009*	0.184***	0.003	− 0.042*
Dividend payout	0.010	− 0.007	0.006	− 0.018***	0.016	− 0.025***
Tax shield	− 0.687*	− 0.144	− 0.626*	0.234**	− 0.680*	0.002
Non-durables	− 0.022	− 0.005	− 0.025	0.005	− 0.069*	− 0.001
Durables	0.127	− 0.001	− 0.049	− 0.007	0.027	− 0.005
Oil and gas	0.001	0.000	0.029*	0.045***	0.010	0.041
Chemicals and construction	− 0.031	0.057***	− 0.031	0.016	0.002	0.078***
Business equipment	− 0.022	0.023	− 0.038	− 0.007	− 0.086	0.023
Regulated	0.058	0.009	− 0.011	0.087***	0.027	0.095***
Wholesale and retail	0.054*	0.065***	0.004	0.016	0.101*	0.073***
Health	0.002	− 0.010	− 0.008	0.004	− 0.049	− 0.005
Service and others	− 0.024*	− 0.030**	0.009	− 0.005	− 0.041	− 0.040**
Constant	0.257*	0.238***	0.068	0.002	0.210*	0.215***
χ^2	177.67***	394.4***	474.02***	424.78***	347.33***	199.14***
n	1,662	1,695	1,725	1,743	1,664	1,696

Table VIII.
Firm characteristics, industry classifications and capital structure

argument that dividend announcements provide the missing pieces of information about the firm and allow the market to estimate firm's current earnings which in turn allows the firm to more readily access external sources of fund (Miller and Rock, 1985). As in the present study, an empirical study by Abor (2008) notes the sensitivity of the relation between dividend payout and capital structure to how capital structure is measured.

4.3.2 Industry characteristics. With a view to directly examine inter-industry variations in capital structure of sample firms, the paper provides (Table VIII) parameter estimates for Model 2.

We note that the short-term and total leverage-ratios of firms in the wholesale and retail and chemical and construction industries are significantly higher than is the case in manufacturing industry[11]. The results also indicate that the long-term and total leverage-ratio of firms in regulated industries tend to be higher than is the case in manufacturing industry. It is noteworthy that our evidence is robust to model specifications and estimation procedures (Tables VIII-IX). This finding corroborates the view that industry-specific characteristics such as technologies and assets employed by industries and regulations to which industries are subjected influence capital structure of firms (Frank and Goyal, 2009). It also supports findings reported in other similar studies (Remmers *et al.*, 1974;

Dependent variable	Short-term leverage		Long-term leverage		Total leverage	
	GMM	SUR	GMM	SUR	GMM	SUR
Earnings volatility	-0.008	-0.025	-0.015	0.048^{***}	-0.005	0.022
Firm size	0.019^{**}	0.032^{***}	-0.008	0.001	-0.002	0.037^{***}
Profitability	-0.010^{*}	-0.117^{***}	-0.031^{*}	-0.128^{***}	-0.135^{*}	-0.220^{***}
Growth opportunities	-0.001	0.020	-0.010	0.009	-0.018	0.021
Asset tangibility	-0.049^{*}	-0.260^{***}	0.013^{**}	0.182^{***}	0.028	-0.057^{**}
Dividend payout	0.014^{*}	-0.006	0.004	-0.014^{***}	0.016	-0.021^{***}
Tax shield	-0.448	0.031	-0.606^{*}	0.160	-0.551	0.077
Non-durables	-0.053	-0.011	-0.043	0.000	-0.097	-0.014
Durables	0.131	0.010	-0.042	-0.019	0.005	-0.005
Oil and gas	0.005	0.012	-0.010	0.002	0.026	0.016
Chemicals and construction	-0.040	0.060^{***}	-0.043	0.018^{*}	-0.004	0.082^{***}
Business equipment	-0.005	0.044^{*}	-0.092^{*}	-0.034^{**}	-0.151	0.020
Regulated	-0.042	0.013	-0.039	0.068^{***}	-0.068	0.083^{***}
Wholesale and retail	0.074^{*}	0.067^{***}	-0.030	-0.006	0.104^{*}	0.052^{***}
Health	-0.053	-0.009	-0.050	0.005	-0.103	-0.003
Service and others	-0.033^{*}	-0.036^{**}	-0.033^{*}	-0.019^{**}	-0.072^{*}	-0.060^{***}
Egypt	0.116^{**}	0.029^{*}	-0.031^{**}	-0.102^{***}	0.080	-0.063^{***}
Botswana	0.141	-0.053	0.164	-0.024	0.474	-0.057
Ghana	0.131	0.056	0.011	-0.120^{***}	0.132	-0.050
Kenya	0.060	0.052^{**}	0.044	-0.014	0.157	0.039
Mauritius	0.239^{*}	0.032	0.128	-0.007	0.199	0.035
Morocco	0.114	-0.012	-0.034^{*}	-0.085^{***}	0.063	-0.092^{***}
Nigeria	0.128^{*}	0.168^{***}	0.012	-0.049^{***}	0.107^{**}	0.151^{***}
Tunisia	0.245^{**}	-0.025	-0.008^{*}	-0.058^{***}	0.207	-0.067^{**}
Constant	0.110	0.230^{***}	0.161	0.126^{***}	0.142	0.319^{***}
χ^{2}	155.81^{***}	491.42^{***}	753.97^{***}	629.64^{***}	215.86^{***}	345.66^{***}
n	$1,662$	$1,695$	$1,725$	$1,743$	$1,664$	$1,696$

Notes: The parameter estimates that are significantly different from 0 at: $^{*}10$, $^{**}5$ and $^{***}1$ per cent levels; Tables VII-IX report the regression results for short-term, long-term and total leverage using Sys-GMM and SUR regression procedures; the exact definition of the variables is as presented in Table III

Table IX.
Firm characteristics,
industry and country
dummies and capital
structure

Hovakimian *et al.*, 2001; Faccio and Masulis, 2005). Song and Philippatos (2004) particularly report that leverage-ratios of regulated, chemical and construction and wholesale and retail industries are higher than those of other industries. Firms in durables industry, although sensitive to model specification and estimation procedures, also tend to have higher leverage-ratios than those in manufacturing. In contrast, firms in service and other industries tend to have lower leverage-ratios than those in the referent manufacturing industry.

4.3.3 Institutions and macroeconomic conditions. Earlier, we highlighted that institutional and macroeconomic factors could decisively affect firm's capital structure. Within the same mindset, we examined cross-country variations in capital structure decisions of sample firms (Table IX).

Our evidence shows that firms in Nigeria had higher short-term and total and lower long-term leverage-ratios than is the case in South Africa (Table IX). This could be due to the confluence of lower corporate marginal tax, higher inflation rate, smaller size of overall economy, relatively less developed financial markets, weaker protection of shareholder rights and inefficient law enforcement that epitomized Nigeria relative to South Africa (Table V Panel A). This evidence only partially supports the findings reported in Gwatidzo and Ojah (2009). Ostensibly, the discrepancy in the findings could be due to differences in model specifications used in the studies. We also observe that firms in Egypt and Morocco had lower long-term and total leverage-ratios relative to those in South Africa (Table IX). Similarly, firms in Ghana and Tunisia had lower total leverage-ratios. Overall, the evidence corroborates the view that cross-country variations in institutional arrangements and macroeconomic conditions do matter in capital structure decisions of firms in Africa.

We estimate Model 4 with the aim of investigating the effect of contextual factors on capital structure decisions of sample firms (Table X).

Table X indicates that firms in low-income countries tend to have higher short-term and total-leverage ratios compared to those in upper-middle-income countries. This is consistent with the view that firms in less developed countries tend to use far more short-term debt than those in more developed countries (Deesomsak *et al.*, 2009; Fan *et al.*, 2008).

Model 4 also included interaction variables to see if firm characteristics impact on capital structure differently in different institutional and macroeconomic setups (Table X). We observe that the negative influence of profitability on short-term leverage-ratio is stronger in lower-middle-income countries than in other income group countries. Similarly, the positive influence of dividend payout on long-term and total-leverage ratios is stronger in low-income countries than in the other two groups. Although econometrically not robust, our results show that the origin of the legal system of a country influences the way firm-specific factors determine capital structure. Taking a cue from the literature (Song and Philippatos, 2004; De Jong *et al.*, 2008; Fan *et al.*, 2008), our interpretation of this results is that country characteristics, in addition to their direct impact on capital structure, indirectly influence capital structure by enhancing or mitigating the impact of firm-specific factors.

We further refine our definition of institutional and macroeconomic factors that define a country in Model 5. In this model, we include ten variables that more-narrowly define country characteristics. Because of the high correlation between the variables, we could not include all the variables in a single regression. Rather, we estimate separate regressions for a group of variables which do not have sever multicollinearity problems. For reasons of brevity, we present regression results of only SUR procedure in Table XI.

The evidence shows that overall size of economy is positively related with long-term leverage-ratio; while it is negatively related with short-term and total leverage-ratios (Table XI). That is, firms in richer countries tend to have more long-term and less short-term leverage-ratios relative to their counterparts in poorer countries. This could

Dependent variable	Short-term leverage		Long-term leverage		Total leverage	
	GMM	SUR	GMM	SUR	GMM	SUR
Earnings volatility	0.286	− 0.177	− 0.110	0.005	0.184	− 0.172
Firm size	0.137	0.047*	− 0.179	− 0.007	0.223	0.040
Profitability	− 1.097	1.140**	− 0.282	− 0.480	− 1.869	0.656
Growth opportunities	− 0.974	− 0.546	0.359	− 0.108	− 0.549	− 0.661
Asset tangibility	0.162	− 0.463***	1.187*	0.408***	0.847	− 0.054
Dividend payout	− 0.012	− 0.016	− 0.008*	− 0.018*	0.005	− 0.031*
Tax shield	− 10.466*	0.035	7.432	− 0.170	− 5.796	− 0.109
Non-durables	− 0.084*	− 0.013	− 0.031	− 0.002	− 0.087*	− 0.020
Durables	0.139	0.013	− 0.016	− 0.007	− 0.065	0.005
Oil and gas	0.072	− 0.010	− 0.050	− 0.008	− 0.002	− 0.016
Chemicals and construction	− 0.021	0.058***	− 0.050	0.018*	− 0.030	0.078***
Business equipment	− 0.101	0.025	− 0.065*	− 0.026*	− 0.058	0.007
Regulated	− 0.043	0.008	0.022*	0.071***	− 0.026	0.074***
Wholesale and retail	0.017*	0.054***	− 0.003	− 0.003	0.092*	0.044**
Health	− 0.197*	− 0.006	0.002	0.000	− 0.070	− 0.006
Service and others	0.024	− 0.027*	− 0.015	− 0.009	− 0.003*	− 0.045**
Common	1.111	0.032	0.739	0.124	1.205	0.050
Dev2	1.224	− 0.017	0.249	− 0.145	1.391	− 0.164
Dev3	0.780*	0.344***	− 0.453	− 0.105	0.324*	0.222*
Common*profitability	1.072	− 1.130**	0.264	0.353	1.789	− 0.753
Common*asset tangibility	− 0.217	0.198	− 1.084	− 0.103	− 0.701	0.113
Common*tax shield	9.919	0.611	− 7.420	− 0.342	4.825	0.317
Common*growth opportunities	0.981	0.647	− 0.410	0.155	0.517	0.863
Common*earnings volatility	− 0.145	0.112	0.095	0.000	− 0.295	0.105
Common*firm size	− 0.277	− 0.022	0.039	− 0.016	− 0.175	− 0.024
Dev2*earnings volatility	− 0.183	0.168	0.189*	0.042	− 0.260	0.210
Dev3*earnings volatility	0.047	0.073	0.038	0.055	0.050	0.086
Dev2*dividend payout	0.022*	0.008	0.007	− 0.001	0.010	0.005
DEV3*dividend payout	0.003	0.021	− 0.003	0.034**	− 0.018	0.044*
Dev2*growth opportunities	1.005	0.562	− 0.368	0.101	0.592	0.671
Dev3*growth opportunities	0.133	− 0.191	0.057	− 0.020	0.179	− 0.347**
Dev2*firm size	− 0.269	0.000	0.118	0.020	− 0.184	0.019
Dev3*firm size	− 0.115*	− 0.031*	0.077	0.009	− 0.045	− 0.018
Dev2*profitability	0.975	− 1.310**	0.224	0.340	1.565	− 0.970
Dev3*profitability	− 0.116	− 0.051	− 0.013	0.003	− 0.040	0.078
Dev2*asset tangibility	− 0.202	0.218	− 1.157*	− 0.254***	− 0.908	− 0.031
Dev3*asset tangibility	− 0.105	− 0.093	− 0.084*	− 0.115***	− 0.203	− 0.067
Dev2*tax shield	9.924	− 0.249	− 7.779	0.521	4.930	0.227
Dev3*tax shield	0.535	− 0.934	0.020	0.584	0.823	− 1.320
Constant	− 1.054	0.199	− 0.251	0.119	− 1.127	0.328
χ^2	284.46***	492.99***	509.35***	662.56***	524.24***	368.01***
n	1,662	1,695	1,725	1,743	1,664	1,696

Notes: The parameter estimates that are significantly different from 0 at: *10, **5 and ***1 per cent levels; this table reports regression results for short-term, long-term and total leverage using system-GMM and SUR; the exact definition of the variables is as presented in Table III

Table X.
Firm, industry,
institutional and
macroeconomic dummies
and capital structure

	Model A	Model B	Model C	Model D	Model E
Panel A: dependent variable – short-term leverage					
Earnings volatility	-0.012	-0.046	-0.010	-0.008	-0.0114
Firm size	0.030^{***}	0.027^{**}	0.033^{***}	0.031^{***}	0.0306^{***}
Profitability	-0.096	-0.067	-0.073	-0.087	-0.0910
Growth opportunities	0.015	0.001	0.014	0.020	0.0199
Asset tangibility	-0.265^{***}	-0.247^{***}	-0.264^{***}	-0.258^{***}	-0.2650^{***}
Dividend payout	-0.002	-0.003	-0.005	-0.004	-0.0046
Tax shield	-0.099	-0.242	-0.070	-0.208	-0.0767
Non-durables	-0.005	-0.024	-0.002	-0.004	-0.0054
Durables	0.015	0.028	0.019	0.013	0.0187
Oil and gas	0.003	-0.039	0.019	-0.002	0.0092
Chemicals and construction	0.068^{**}	0.069^{**}	0.068^{**}	0.068^{**}	0.0689^{**}
Business equipment	0.035	0.007	0.043	0.024	0.0452
Regulated	0.009	0.005	0.011	0.007	0.0059
Wholesale and retail	0.065^{**}	0.022	0.064^{**}	0.051	0.0648^{**}
Health	-0.004	-0.017	-0.005	-0.003	-0.0001
Service and others	-0.032	-0.055^{*}	-0.034	-0.034	-0.0326
Economic growth	0.001	-0.004	0.007	0.002	
Shareholder rights	0.017^{*}			0.012	
Rule of law	-0.082^{***}				
Taxation		0.002			
Stock market liquidity		-0.098			
Inflation			0.010^{***}		
Stock market size			-0.006		
Banking sector size				-0.131^{***}	
Creditor rights					0.0195^{**}
Size of economy					-0.1010^{***}
Constant	0.164	0.201	0.159^{*}	0.260^{*}	0.0000
χ^2-statisitc	400.68^{***}	152.320^{***}	391.800^{***}	380.560^{***}	$6{,}185.04^{***}$
Test for time effect	10.68^{*}	4.77	21.700^{***}	13.940^{*}	10.8800
R^2	0.219	0.215	0.211	0.207	0.215
Number of observations	$1{,}432$	556	$1{,}462$	$1{,}456$	$1{,}462$
Panel B: dependent variable – long-term leverage					
Earnings volatility	0.036^{**}	0.063^{***}	0.045^{***}	0.047^{***}	0.042^{**}
Firm size	0.007	0.006	0.006	0.006	0.003
Profitability	-0.126^{***}	-0.150^{***}	-0.124^{***}	-0.131^{***}	-0.146^{***}
Growth opportunities	0.006	-0.009	0.001	-0.001	0.001
Asset tangibility	0.191^{***}	0.151^{***}	0.187^{***}	0.178^{***}	0.178^{***}
Dividend payout	-0.019^{***}	-0.022^{***}	-0.017^{***}	-0.016^{***}	-0.017^{***}
Tax shield	0.234	0.589^{*}	0.233	0.272	0.316
Non-durables	0.005	0.005	0.006	0.005	0.004
Durables	-0.006	-0.010	-0.006	-0.007	-0.005
Oil and gas	0.030	0.021	0.034^{*}	0.034^{*}	0.032
Chemicals and construction	0.017	0.011	0.016	0.016	0.016
Business equipment	-0.017	-0.041^{*}	-0.016	-0.022	-0.007

Table XI.
Firm, industry, institutional and macroeconomic factors and capital structure

(*continued*)

	Model A	Model B	Model C	Model D	Model E
Regulated	0.088***	0.072***	0.088***	0.088***	0.083***
Wholesale and retail	0.012	−0.001	0.020	0.008	0.014
Health	0.001	0.024	0.003	0.002	0.005
Service and others	−0.017	−0.015	−0.012	−0.016	−0.017
Economic growth	−0.003	−0.016***	0.002	−0.002	
Shareholder rights	0.024***				0.022***
Rule of law	−0.017				
Taxation		−0.001			
Stock market liquidity		0.113*			
Inflation			0.002		
Stock market size			0.028***		
Banking sector size				−0.059**	
Creditor rights					0.031***
Size of economy					0.052**
Constant	0.000	0.000	−0.087	−0.175*	−0.335*
χ^2-statisitc	1,324.810***	578.020***	388.870***	424.900***	436.260***
Test for time effect	21.740***	25.350***	11.010	35.210***	30.700***
R^2	0.224	0.238	0.205	0.220	0.224
Number of observations	1,462	583	1,510	1,504	1,510
Panel C: dependent variable – total leverage					
Earnings volatility	0.025	0.014	0.033	0.038	0.030
Firm size	0.040***	0.040***	0.044***	0.042***	0.039***
Profitability	−0.195**	−0.200***	−0.168*	−0.185**	−0.206**
Growth opportunities	0.017	0.045	0.006	0.001	0.012
Asset tangibility/ maturity	−0.052	−0.073	−0.056	−0.051	−0.062
Dividend payout	−0.021***	−0.024***	−0.022***	−0.021***	−0.021***
Tax shield	0.027	0.254	0.072	−0.105	0.108
Non-durables	−0.002	−0.021	0.002	−0.002	−0.004
Durables	0.014	0.025	0.019	0.011	0.019
Oil and gas	0.029	−0.015	0.052	0.025	0.037
Chemicals and construction	0.090**	0.089**	0.089**	0.091***	0.090**
Business equipment	0.027	−0.015	0.038	0.010	0.048
Regulated	0.096**	0.094**	0.099**	0.095**	0.088*
Wholesale and retail	0.071**	0.008	0.075**	0.047	0.071*
Health	−0.001	0.015	−0.001	0.001	0.006
Service and others	−0.053*	−0.075**	−0.052	−0.056*	−0.055*
Economic growth	−0.004	−0.024**	0.007	−0.009	
Shareholder rights	0.041***				0.035***
Rule of law	−0.108***				
Taxation		0.001			
Stock market liquidity		−0.019			
Inflation			0.013***		
Stock market size			0.016		
Banking sector size				−0.220***	
Creditor rights					0.049***

(*continued*)

Table XI.

	Model A	Model B	Model C	Model D	Model E
Size of economy					-0.067^{*}
Constant	0.000	0.206	-0.010	0.218^{*}	0.000
χ^{2}	$7,237.500^{***}$	89.910^{***}	225.870^{***}	263.710^{***}	$7,356.770^{***}$
Test for time effect	4.680	11.560^{*}	31.710^{***}	8.530	15.630^{**}
R^{2}	0.156	0.139	0.134	0.153	0.153
Number of observations	1,433	556	1,463	1,457	1,463

Table XI.

Notes: The parameter estimates that are significantly different from 0 at: *10, **5 and ***1 per cent levels; the table reports the regression results for short-term, long-term and total leverage using OLS, RE, FE, GMM and SUR; the exact definition of the variables is as presented in Table III

be due to the more developed financial and legal institutions (i.e. bigger and more liquid stock markets, bigger banking sector, superior shareholder rights protection, and more efficient rule of law) that epitomized richer countries in our sample (Table VI). Our interpretation of this result is that the relationship between size of overall economy and capital structure is dependent on how the latter is measured and is moderated by the influence that economic development has on the development of financial and legal institutions. This evidence signifies the role of access to finance, bankruptcy, agency and transaction costs in capital structure decisions of sample firms. However, it does not support the suggestion by some earlier studies (Singh, 1995; Singh and Hamid, 1992) that there is a positive relationship between economic development and capital structure regardless of how the latter is defined. Rather, it confirms the "qualified" relationship reported in Booth *et al.* (2001) which underscored the definitional sensitivity of the relationship.

Besides size of overall economy, its growth rate also affects firm's capital structure decisions. We observe that growth rate of real GDP per capita negatively influences long-term and total capital structure (Table XI) supporting the proposition that the likely increase in stock price during times of economic growth should lead to lower leverage-ratio by firms. This evidence also renders credence to the view that the likely increase in profits during times of economic growth should lead to lower leverage-ratio by firms (Booth *et al.*, 2001; Song and Philippatos, 2004; Wanzenried, 2006). Cheng and Shiu (2007) and Beck *et al.* (2002) report similar results. Our finding suggests that the issue of market timing; agency, transaction and bankruptcy costs; and information asymmetry might well be at play in the capital structure decisions of sample firms (Frank and Goyal, 2009; Korajczyk, 2003; De Haas and Peeters, 2006; Booth *et al.*, 2001; Wanzenried, 2006).

In line with the conjecture that a firm is likely to issue more debt under inflationary environment since inflationary situations not only decrease the real value of debt but also increase the real tax advantage of debt for firms (Frank and Goyal, 2009; Taggart, 1985), we find a positive association between inflation and leverage (Table XI). Arguments based on tax/bankruptcy and market timing theories lead to conjectures that propose a positive association between the two variables.

Also, we document clear evidence that investor rights protection positively influences firm's capital structure. The direct relationship between shareholder rights

protection and capital structure variables is consistent with the view that strong protection of shareholder rights protracts demise of firms during financial distress, and hence, firms in such countries are likely to use more debt (De Jong *et al.*, 2008). Song and Philippatos (2004) in a study of firms in 30 OECD countries reports similar results. On the other hand, the positive relationship between creditor rights protection and capital structure variables is in congruence with the view that stronger creditor rights protection reduces creditor's risk, and hence, promotes development of debt markets which in turn increases the likelihood that firms use debt to finance investments (Djankov *et al.*, 2007; La Porta *et al.*, 2000). Evidence reported in Deesomsak *et al.* (2004) and Cheng and Shiu (2007) corroborate our results.

The inverse relationship between rule of law and capital structure (Table XI) that we observe in our results appears to be in line with Fan *et al.*'s (2008) view that poor quality of law enforcement discourages lenders from lending as it increases the likelihood that they will be expropriated by insiders, thus, reducing borrowing opportunities of firms. However, this result is in stark contrast with the hypotheses that better quality of law enforcement is likely to reduce agency costs, and hence, enhances the development of debt markets which in turn increases firm leverage (Gul, 2001). In a study which examined the role of firm-and country-specific factors in the determination of capital structure, De Jong *et al.* (2008) report similar results. In a similar vein, Antoniou *et al.* (2008) carried out a comparative study of determinants of capital structure of firms in European countries and found that rule of law is negatively related with leverage.

In terms of the effect of size of banking sector variable on capital structure, we note that the former has a negative influence on the latter (Table XI) implying that the bigger the relative size of banking sector of a country is, the less levered would a firm in such a country be. We, however, find this result to be in contradiction with the expectation that more developed banking sectors reduce costs related with information asymmetry, agency and bankruptcy, and hence, likely to increase the level of leverage by firms (Antoniou *et al.*, 2008; Levine, 2002). Our interpretation of this result is that the stronger creditor rights protection and better quality of law enforcement that characterized those countries with bigger banking sectors in our sample (Table VI) may have discouraged firms from borrowing money, as they may want to reduce the risks that come with debt. Our results are consistent with findings reported in Demirgüç-Kunt and Maksimovic (1999) and Cheng and Shiu (2007).

We find that the role of stock markets development on capital structure depends on how the latter is measured. We observe that the two variables that measure stock market development influence long-term leverage-ratio positively while their relationship to short-term and total leverage variables is negative and statistically weak. This partially supports the view that developed stock markets reduce information asymmetry problems faced by creditors, and hence, enhance the borrowing opportunities of a publicly quoted firm. As in this study, Cheng and Shiu (2007) report that the relationship is dependent on how leverage is measured.

Finally, following Gwatidzo and Ojah (2009) and many others, we re-estimated the parameters employing the simple pooled, FE and RE regression for the purpose of checking robustness of our results to econometric procedures. The results were qualitatively similar to those reported in Tables VI-X.

5. Conclusions

Based on mainstream capital structure theory, this paper argued that capital structure of firms is a function of not only firm characteristics but also of institutional, macroeconomic and industry characteristics. We interrogated the data by employing a sequence of models to investigate the role of different factors and checked robustness of results through various econometric procedures.

We document evidence that leverage, independent of how it is measured, tends to be higher in larger firms whilst it is likely to be lower in smaller ones. In addition, asset tangibility is observed to have a positive influence on long-term debt whilst it has an inverse influence on short-term debt. On the other hand, we find that more profitable firms tend to have less debt while less profitable firms tend to have more debt. Furthermore, the paper established that non-debt-related tax-shield is positively related to long-term debt while is negatively related short-term debt. Finally, the study indicates that dividend payout negatively influences long-term debt. Overall, the empirical relationships observed between firm characteristics and capital structure signify the role that probability of default, information asymmetry and adverse selection, transaction and agency costs and tax-shield benefits play in the capital structure decisions of firms in the sample countries.

The industry in which firms operate also seems to have influence on capital structure decisions. We observe that inter-industry differences appear to be a function of how capital structure is defined. We particularly document that short-term and total-leverage ratios of firms in wholesale and retail and chemical and construction industries are significantly higher than those of firms in the manufacturing industry. On the other hand, long-term debt of firms in regulated industry tends to be higher than those of firms in manufacturing industry. These inter-industry variations signify that industry specific operating characteristics and regulations play important role in capital structure decisions of firms in our sample.

In terms of macroeconomic conditions, firms in richer countries tend to have more long-term and less short-term debt than is the case in poorer countries. On the other hand, the rate of economic growth is indirectly related with long-term and total leverage-ratios. Also, firms in sample countries are likely to issue more debt under inflationary environment. In addition to direct influences, we observe that the negative influence of profitability on short-term debt was stronger in lower-middle-income countries than was the case in other income group countries. Similarly, the positive influence of dividend payout ratio on long-term and total leverage-ratios was stronger in low-income countries than was the case in the other two groups. At institutional level, the study showed that there is:

- a direct relationship between investor rights protection and a firm's capital structure decisions;
- an inverse relationship between rule of law, size of banking sector and capital structure; and
- a "definitionally-sensitive" relationship between development of stock markets and leverage-ratios.

These findings also suggest that probability of default, agency cost, market timing, financing needs and access to finance, firm's investment opportunities and quality of law enforcement have central role in the determination of capital structure in our sample firms.

5.1 Implications of the study
The empirical evidence documented in this study has a number of implications for firm managers and decisions makers, regulators and policymakers and researchers. First, the findings suggest that managers of firms in our sample countries could influence the capital structure of firms, and hence cost of capital and firm value, by influencing the firm level factors considered in this study. Thus, managers and decisions makers should pay closer attention to firm characteristics. Second, the evidence also suggests that regulators and policymakers could influence firms' capital structure in African countries, and hence cost of capital and firm value, through formulation of macroeconomic policies, enactment of legislations that improve protection of investor (both creditors' and shareholders') rights, and taking measures that strengthen law enforcement. Third, the literature suggests that firm capital structure decision is not only a mere decision on alternative financing instruments but also a decision on alternative forms of corporate governance (Brown *et al.*, 2011; Gillan, 2006; Williamson, 1988). Thus, through their influence on capital structure of firms, managers and decision makers, regulators and policymakers could have sway on corporate governance of firms in Africa. Fourth, the inter-industry heterogeneity in capital structure we observed in the sample firms implies that any attempt to change capital structure of a firm should take cognizance of the industry in which the firm operates.

5.2 Limitations and future research directions
Notwithstanding the contributions that this study attempts to make, some circumspection is essential in interpreting the results. As in most empirical studies on the subject, this study uses firms listed in stock exchanges as units of analyses. Our decision to consider only listed firms was guided by two factors. First, financial reports of listed firms tend to be more credible than those of non-listed firms as the latter group, in most of the cases, might not have to adhere to the strict financial reporting requirements and standards that the listed group will have to adhere to. Second, lack of data availability on non-listed firms meant that we restrict our analyses to listed-firms. Nonetheless, listed firms tend to be larger and also likely to have relatively better access to finance and hence their corporate finance decisions are less subject to the institutional constraints compared to non-listed firms. Thus, the results presented in this study may be biased towards large firms.

This study belongs to "a club of many other efforts" that were directed at understanding cross-country differences in capital structure decisions of firms. To this end, we attempted to explain cross-country differences in capital structure decisions of firms in Africa by considering a range of formal institutions and macroeconomic factors. However, in a twist from conventional wisdom, Gleason *et al.* (2000) point to the possibility that managers in different cultures may be conditioned to opt for firm-specific strategies that are culturally oriented, which may result in capital structures unique to the cultures. In a further rebuke to the entrenched practice in capital structure research, Chui *et al.* (2002) argue that differences in formal institutions provide only a partial answer to capital structure "puzzle". In a study that covered 5,591 firms drawn from 22 countries, the authors provide evidence that national culture is a missing piece in explaining the "puzzle". Very recently, we note that Li *et al.* (2011) document evidence that national culture affects capital structure decisions of foreign joint ventures in China. Although we could not consider national culture variable in the

current study due to data (un)availability, it would be appealing and worthwhile to test the findings here after controlling for culture variables.

Lately, the literature in financial economics witnessed an avalanche of efforts that examine the role of corporate ownership patterns in capital structure decisions of firms (Moh'd *et al.*, 1998; Mahrt-Smith, 2005). Although within a single-country context, we note that the literature on firms in Africa has witnessed efforts that investigate the nexus between the corporate ownership structure and capital structure (Boateng, 2004; Abor, 2008; Bokpin and Arko, 2009; Ezeoha and Okafor, 2009). The present study did not venture into the investigation of the relationship between corporate ownership patterns and its capital structure decisions. However, a cross-country study that models the relationship between ownership structure variables and capital structure decisions, within the context of Africa, would contribute to global knowledge.

It is now fairly established that corporate governance correlates with capital structure decisions of firms (Graham and Harvey, 2001; Abor, 2007). The current study could not examine the role of corporate governance factors on capital structure decisions mainly due to lack of data. However, a cross-country study that examines how corporate governance variables such as board structure influences capital structure decisions of firms, especially within the context of Africa, is another promising area for future research.

Notes

1. Mutenheri and Green (2003) examine the impact of the economic reform programme on the financing choices of Zimbabwean listed companies. Yartey (2006) investigates the effect of stock market development on the importance of debt relative to external equity in the balance sheet of Ghanaian firms. Abor (2008) investigates the impact of firm charaterisitcs on capital structure decisions within the context of Ghana. Negash (2001, 2002) examine the association between taxes, debt, and capital strucutre. Toby (2005) investigates the role of Nigerian banks in funding the short-term and long-term financing requirements of Nigerian quoted manufacturing enterprises.

2. In addition to information asymmetry and transaction costs, the potential dilution of "voting control" is also presented as a justification for the pecking order theory, especially in the case of closed (or "privately held") corporations.

3. In addition, Mazur (2007) argues that firms with high volatility of earnings might tend to accumulate cash during good years to avoid underinvestment in the future.

4. Although there are some critiques of the "law and finance" theory (Graff, 2008; Spamann, 2010) pioneered by La Porta *et al.*, it remains the dominant view that explains differences in protections afforded to different classes of investors.

5. See Demirguc-Kunt and Levine (1996) for detailed discussion regarding the various measures of size and efficiency of financial intermediaries.

6. Baltagi (2005) provides an elaborate discussion of the benefits and limitations of panel data procedures.

7. We thank Andrei Shleifer for making several creditor rights, shareholder rights, legal origin freely available on his page (www.economics.harvard.edu/faculty/shleifer/dataset).

8. The categorization of a country into developed and developing economy was based on the World Bank's income group of countries.

9. Comparisons in most studies make reference to Rajan and Zingales (1995). However, since we note that Cheng and Shiu (2007) is more recent and comprehensive we opted to compare our results with Cheng and Shiu (2007).

10. Average leverage ratio figures of our sample countries appear to be invariably greater than five countries sampled in Gwatidzo and Ojah (2009). These differences may probably have resulted due to the bigger sample we examined and some differences in definitions of leverage ratios.

11. As agriculture is still the main stay of most African economies, it would have been interesting to see how capital structures of firms in other industries compare against those in the agriculture sector. However, since we did not have enough number of listed companies for the agriculture sector in all the countries we considered, we opted to using manufacturing as our reference industry.

References

Abor, J. (2007), "Corporate governance and financing decisions of Ghanian listed firms", *Corporate Governance*, Vol. 7 No. 1, pp. 83-92.

Abor, J. (2008), "Determinants of the capital structure of Ghanaian firms", AERC Research Paper 176.

Abor, J. and Biekpe, N. (2006), "What determines the capital structure of listed firms in Ghana?", *African Finance Journal*, Vol. 7 No. 1, pp. 37-48.

Antoniou, A., Guney, Y. and Paudyal, K. (2006), "The determinants of debt maturity structure: evidence from France, Germany and the UK", *European Financial Management*, Vol. 12 No. 2, pp. 161-194.

Antoniou, A., Guney, Y. and Paudyal, K. (2008), "The determinants of capital structure: capital market-oriented versus bank-oriented institutions", *Journal of Financial and Quantitative Analysis*, Vol. 43 No. 1, pp. 59-92.

Baker, M. and Wurgler, J. (2002), "Market timing and capital structure", *The Journal of Finance*, Vol. 57 No. 1, pp. 1-32.

Baltagi, B.H. (2005), *Econometric Analysis of Panel Data*, Wiley, New York, NY.

Barclay, M. and Smith, C. Jr (1995), "The maturity structure of corporate debt", *Journal of Finance*, Vol. 50 No. 2, pp. 609-631.

Barclay, M. and Smith, C. Jr (1999), "The capital structure puzzle: another look at the evidence", *Journal of Applied Corporate Finance*, Vol. 12 No. 1, pp. 8-20.

Beck, T., Demirgüç-Kunt, A. and Maksimovic, V. (2002), "Financing patterns around the world: the role of institutions", World Bank Policy Research Working Paper No. 2905.

Berkowitz, D., Pistor, K. and Richard, J.F. (2003), "Economic development, legality, and the transplant effect", *European Economic Review*, Vol. 47 No. 1, pp. 165-195.

Bevan, A.A. and Danbolt, J. (2002), "Capital structure and its determinants in the United Kingdom – a decompositional analysis", *Applied Financial Economics*, Vol. 12 No. 3, pp. 159-170.

Bhaduri, S.N. (2002a), "Determinants of capital structure choice: a study of the Indian corporate sector", *Applied Financial Economics*, Vol. 12 No. 9, pp. 655-665.

Bhaduri, S.N. (2002b), "Determinants of corporate borrowing: some evidence from the Indian corporate structure", *Journal of Economics and Finance*, Vol. 26 No. 2, pp. 200-215.

Boateng, A. (2004), "Determinants of capital structure: evidence from international joint ventures in Ghana", *International Journal of Social Economics*, Vol. 31 Nos 1/2, pp. 56-66.

Bokpin, G.A. and Arko, A.C. (2009), "Ownership structure, corporate governance and capital structure decisions of firms: empirical evidence from Ghana", *Studies in Economics and Finance*, Vol. 26 No. 4, pp. 246-256.

Booth, A., Dermirguc-Kunt, A. and Makismovic, V. (2001), "Capital structures in developing countries", *Journal of Finance*, Vol. 56 No. 1, pp. 87-129.

Borio, C. (1990), *Leverage and Financing of Non-financial Companies: An International Perspective*, BIS, Monetary and Economic Department, Basle.

Bowman, R. (1980), "The importance of a market-value measurement of debt in assessing leverage", *Journal of Accounting Research*, Vol. 18 No. 1, pp. 242-254.

Bradley, M., Jarrell, G. and Kim, E.H. (1984), "On the existence of an optimal capital structure: theory and evidence", *Journal of Finance*, Vol. 39, pp. 857-878.

Brown, P., Beekes, W. and Verhoeven, P. (2011), "Corporate governance, accounting and finance: a review", *Accounting & Finance*, Vol. 51 No. 1, pp. 96-172.

Cameron, A. and Trivedi, P. (2005), *Microeconometrics: Methods and Applications*, Cambridge University Press, New York, NY.

Chen, S., Ho, K. and Yeo, G. (1999), "The determinants of debt maturity: the case of bank financing in Singapore", *Review of Quantitative Finance and Accounting*, Vol. 12, pp. 341-350.

Cheng, S. and Shiu, C. (2007), "Investor protection and capital structure: international evidence", *Journal of Multinational Financial Management*, Vol. 17 No. 1, pp. 30-44.

Chui, A.C.W., Lloyd, A.E. and Kwok, C.C.Y. (2002), "The determination of capital structure: is national culture a missing piece to the puzzle?", *Journal of International Business Studies*, Vol. 33 No. 1, pp. 99-127.

Coates, J. and Wooley, P. (1975), "Corporate gearing in the EEC", *Journal of Business Finance & Accounting*, Vol. 2 No. 1, pp. 1-18.

Deesomsak, R., Paudyal, K. and Pescetto, G. (2004), "The determinants of capital structure: evidence from the Asia Pacific region", *Journal of Multinational Financial Management*, Vol. 14 Nos 4/5, pp. 387-405.

Deesomsak, R., Paudyal, K. and Pescetto, G. (2009), "Debt maturity structure and the 1997 Asian financial crisis", *Journal of Multinational Financial Management*, Vol. 19 No. 1, pp. 26-42.

De Haas, R. and Peeters, M. (2006), "The dynamic adjustment towards target capital structures of firms in transition economies", *Economics of Transition*, Vol. 14 No. 1, pp. 133-169.

De Jong, A., Kabir, R. and Nguyen, T.T. (2008), "Capital structure around the world: the roles of firm-and country-specific determinants", *Journal of Banking & Finance*, Vol. 32 No. 9, pp. 1954-1969.

Demirgüç-Kunt, A. and Levine, R. (1996), "Stock markets, corporate finance, and economic growth: an overview", *World Bank Economic Review*, Vol. 10 No. 2, pp. 223-239.

Demirgüç-Kunt, A. and Maksimovic, V. (1998), "Law, finance, and firm growth", *The Journal of Finance*, Vol. 53 No. 6, pp. 2107-2137.

Demirgüç-Kunt, A. and Maksimovic, V. (1999), "Institutions, financial markets, and firm debt maturity", *Journal of Financial Economics*, Vol. 54 No. 3, pp. 295-336.

Djankov, S., Mcliesh, C. and Shleifer, A. (2007), "Private credit in 129 countries", *Journal of Financial Economics*, Vol. 84 No. 2, pp. 299-329.

Djankov, S., La Porta, R., Lopez-De-Silanes, F. and Shleifer, A. (2008), "The law and economics of self-dealing", *Journal of Financial Economics*, Vol. 88 No. 3, pp. 430-465.

Eldomiaty, T. (2007), "Determinants of corporate capital structure: evidence from an emerging economy", *International Journal of Commerce & Management*, Vol. 17 Nos 1/2, pp. 25-43.

Ezeoha, A.E. and Okafor, F.O. (2009), "Local corporate ownership and capital structure decisions in Nigeria: a developing country perspective", *Corporate Governance*, Vol. 10 No. 3, pp. 249-260.

Faccio, M. and Masulis, R.W. (2005), "The choice of payment method in European mergers and acquisitions", *The Journal of Finance*, Vol. 60 No. 3, pp. 1345-1388.

Fama, E. and French, K. (2002), "Testing trade-off and pecking order predictions about dividends and debt", *Review of Financial Studies*, Vol. 15 No. 1, pp. 1-33.

Fan, P.H.J.P., Titman, S. and Twite, G.J. (2008), "An international comparison of capital structure and debt maturity choices", SSRN eLibrary.

Frank, M.Z. and Goyal, V.K. (2009), "Capital structure decisions: which factors are reliably important?", *Financial Management*, Vol. 38 No. 1, pp. 1-37.

Friend, I. and Lang, L.H.P. (1988), "An empirical test of the impact of managerial self-interest on corporate capital structure", *Journal of Finance*, Vol. 43 No. 2, pp. 271-281.

Getzmann, A., Lang, S. and Spremann, K. (2010), *Determinants of the Target Capital Structure and Adjustment Speed – Evidence from Asian Capital Markets*, available at: www.uibk.ac. at/ibf/sonstiges/seminar/targetcapitalstructureasia.pdf (accessed 10 February 2011).

Gillan, S. (2006), "Recent developments in corporate governance: an overview", *Journal of Corporate Finance*, Vol. 12 No. 3, pp. 381-402.

Gleason, K.C., Mathur, L.K. and Mathur, I. (2000), "The interrelationship between culture, capital structure, and performance: evidence from European retailers", *Journal of Business Research*, Vol. 50 No. 2, pp. 185-191.

Graff, M. (2008), "Law and finance: common law and civil law countries compared – an empirical critique", *Economica*, Vol. 75, pp. 60-83.

Graham, J.R. and Harvey, C.R. (2001), "The theory and practice of corporate finance: evidence from the field", *Journal of Financial Economics*, Vol. 60 Nos 2/3, pp. 187-243.

Green, C.J., Murinde, V. and Suppakitjarak, J. (2003), "Corporate financial structures in India", *South Asia Economic Journal*, Vol. 4 No. 2, pp. 245-273.

Gujarati, D. (2003), *Basic Econometrics*, McGraw-Hill, New York, NY.

Gul, F.A. (2001), "Law, enforcement and corporate debt policies around the world", SSRN eLibrary.

Gwatidzo, T. and Ojah, K. (2009), "Corporate capital structure determinants", *African Finance Journal*, Vol. 11 No. 1, pp. 1-23.

Hackethal, A. and Schmidt, R. (2004), "Financing patterns: measurement concepts and empirical results", Working Paper Series: Finance and Accounting.

Harris, M. and Raviv, A. (1991), "The theory of capital structure", *Journal of Finance*, Vol. 46 No. 1, pp. 297-355.

Hovakimian, A., Opler, T. and Titman, S. (2001), "The debt-equity choice", *The Journal of Financial and Quantitative Analysis*, Vol. 36 No. 1, pp. 1-24.

Hsiao, C. (1985), "Benefits and limitations of panel data", *Econometric Reviews*, Vol. 4 No. 1, pp. 121-174.

Jensen, M.C. (1986), "Agency cost of free cash flow, corporate finance, and takeovers", *American Economic Review*, Vol. 76 No. 2, pp. 323-329.

Jensen, M.C. and Meckling, W. (1976), "Theory of the firm: managerial behaviour, agency costs and ownership structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-360.

Johnston, J. and Dinardo, J. (1997), *Econometric Methods*, McGraw-Hill, New York, NY.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2009), "Governance matters VIII: aggregate and individual governance indicators, 1996-2008", SSRN eLibrary.

Kim, C. (1978), "A mean-variance theory of optimal capital structure and corporate debt capacity", *Journal of Finance*, Vol. 33 No. 1, pp. 45-63.

Korajczyk, R.A. (2003), "Capital structure choice: macroeconomic conditions and financial constraints", *Journal of Financial Economics*, Vol. 68 No. 1, pp. 75-109.

Kraus, A. and Litzenberger, R. (1973), "A state-preference model of optimal financial leverage", *Journal of Finance*, Vol. 28 No. 4, pp. 911-922.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A. and Vishny, R.W. (1998), "Law and finance", *Journal of Political Economy*, Vol. 106 No. 6, pp. 1113-1155.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A. and Vishny, R.W. (2000), "Agency problems and dividend policies around the world", *The Journal of Finance*, Vol. 55 No. 1, pp. 1-33.

Lemma, T.T. and Negash, M. (2011), "Rethinking the antecedents of capital structure of Johannesburg securities exchange listed firms", *Afro-Asian Journal of Finance and Accounting*, Vol. 2 No. 4, pp. 299-332.

Lemmon, M.L., Roberts, M.R. and Zender, J.F. (2008), "Back to the beginning: persistence and the cross-section of corporate capital structure", *Journal of Finance*, Vol. 63 No. 4, pp. 1575-1608.

Levine, R. (2002), "Bank-based or market-based financial systems: which is better?", *Journal of Financial Intermediation*, Vol. 11 No. 4, pp. 398-428.

Li, K., Griffin, D., Yue, H. and Zhao, L. (2011), "National culture and capital structure decisions: evidence from foreign joint ventures in China", *Journal of International Business Studies*, Vol. 42 No. 4, pp. 477-503.

Lopez-Iturriaga, F. and Rodriguez-Sanz, J. (2008), "Capital structure and institutional setting: a decompositional and international analysis", *Applied Economics*, Vol. 40 No. 14, pp. 1851-1864.

Mahmud, M., Herani, G., Rajar, A. and Farooqi, W. (2009), "Economic factors influencing corporate capital structure in three Asian countries: evidence from Japan, Malaysia and Pakistan", *Indus Journal of Management & Social Sciences*, Vol. 3 No. 1, pp. 9-17.

Mahrt-Smith, J. (2005), "The interaction of capital structure and ownership structure", *Journal of Business*, Vol. 78 No. 3, pp. 787-816.

Martin, J.D. and Scott, D.F. (1974), "A discriminant analysis of the corporate debt-equity decision", *Financial Management*, Vol. 3 No. 4, pp. 71-79.

Mayer, C. (1994), "Financial systems, corporate finance and economic growth", World Bank Working Paper.

Mazur, K. (2007), "The determinants of capital structure choice: evidence from Polish companies", *International Advances in Economic Research*, Vol. 13 No. 4, pp. 495-514.

Menard, S. (2008), *Handbook of Longitudinal Research: Design, Measurement, and Analysis*, Academic Press, New York, NY.

Miller, M.H. (1977), "Debt and taxes", *Journal of Finance*, Vol. 32 No. 2, pp. 261-275.

Miller, M.H. and Rock, K. (1985), "Dividend policy under asymmetric information", *Journal of Finance*, Vol. 40 No. 4, pp. 1031-1051.

Modigliani, F. and Miller, M.H. (1958), "The cost of capital, corporation finance and the theory of investment", *American Economic Review*, Vol. 48 No. 3, pp. 261-297.

Modigliani, F. and Miller, M.H. (1963), "Corporate income taxes and the cost of capital: a correction", *American Economic Review*, Vol. 53 No. 3, pp. 433-443.

Moh'd, M.A., Pery, L.G. and Rimbey, J.N. (1998), "The impact of ownership structure on corporate debt policy: a time series cross sectional analysis", *Financial Review*, Vol. 33 No. 3, pp. 85-98.

Mutenheri, E. and Green, C.J. (2003), "Financial reform and financing decisions of listed firms in Zimbabwe", *Journal of African Business*, Vol. 4 No. 2, pp. 155-170.

Myers, S. (1984), "The capital structure puzzle", *Journal of Finance*, Vol. 39 No. 3, pp. 575-592.

Myers, S. (2001), "Capital structure", *The Journal of Economic Perspectives*, Vol. 15 No. 2, pp. 81-102.

Myers, S. and Majluf, N. (1984), "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics*, Vol. 13 No. 2, pp. 187-221.

Ncube, M. (2007), "Financial services and economic development in Africa", *Journal of African Economies*, Vol. 16, Suppl. 1, pp. 13-57.

Negash, M. (2001), "Debt, tax shield and bankruptcy costs: some evidence from JSE", *Investment Analysts Journal*, No. 54, pp. 33-44.

Negash, M. (2002), "Corporate tax and capital structure: some evidence from the JSE", *Investment Analysts*, No. 56, pp. 17-27.

Owusu-Gyapong, A. (1986), "Alternative estimating techniques for panel data on strike activity", *The Review of Economics and Statistics*, Vol. 68 No. 3, pp. 526-531.

Ozkan, A. (2002), "The determinants of corporate debt maturity: evidence from UK firms", *Applied Financial Economics*, Vol. 12 No. 1, pp. 19-24.

Parsons, C.A. and Titman, S. (2007), "Capital structure and corporate strategy", in Eckbo, B.E. (Ed.), *Handbook of Empirical Corporate Finance*, Elsevier B.V., Amsterdam.

Pattenden, K. (2006), "Capital structure decisions under classical and imputation tax systems: a natural test for tax effects in Australia", *Australian Journal of Management*, Vol. 31 No. 1, pp. 67-92.

Prasad, S.J., Green, C.J. and Murinde, V. (2001), "Corporate financial structures in developing economies: evidence from a comparative analysis of Thai and Malay corporations", Finance & Development Research Programme Working Paper.

Rajan, R.G. and Zingales, L. (1995), "What do we know about capital structure? Some evidence from international data", *Journal of Finance*, Vol. 50 No. 5, pp. 1421-1460.

Remmers, L., Stonehill, A., Wright, R. and Beekhuisen, T. (1974), "Industry and size as debt ratio determinants in manufacturing internationally", *Financial Management*, Vol. 3 No. 2, pp. 24-32.

Ross, S. (1977), "The determination of financial structure: the incentive-signalling approach", *Bell Journal of Economics*, Vol. 8 No. 1, pp. 23-40.

Salawu, R.O. and Ile-Ife, N. (2007), "An empirical analysis of the capital structure of selected quoted companies in Nigeria", *The International Journal of Applied Economics and Finance*, Vol. 1 No. 1, pp. 16-28.

Scott, D.F. and Martin, J.D. (1975), "Industry influence on financial structure", *Financial Management*, Vol. 4 No. 1, pp. 67-73.

Singh, A. (1995), *Corporate Financial Patterns in Industrializing Economies: A Comparative International Study*, International Finance Corporation, Washington, DC.

Singh, A. and Hamid, J. (1992), *Corporate Financial Structures in Developing Countries*, World Bank Office of the Publisher, Washington, DC.

Smith, C. Jr and Watts, R. (1992), "The investment 5921opportunity set and corporate financing, dividend, and compensation policies", *Journal of Financial Economics*, Vol. 32 No. 3, pp. 263-292.

Song, J. and Philippatos, G. (2004), "Have we resolved some critical issues related to international capital structure? Empirical evidence from the 30 OECD countries", working paper, University of Tennessee, Knoxville, TN.

Spamann, H. (2010), "The 'anti-director rights index' revisited", *Review of Financial Studies*, Vol. 23 No. 1, pp. 467-486.

Taggart, R.A. (1985), "Secular patterns in corporate finance", NBER Working Paper.

Thies, C. and Klock, M. (1992), "Determinants of capital structure", *Review of Financial Economics*, Vol. 1 No. 3, pp. 40-53.

Titman, S. and Wessels, R. (1988), "The determinants of capital structure choice", *Journal of Finance*, Vol. 43 No. 1, pp. 1-19.

Toby, A.J. (2005), "Analysis of the role of banks in the corporate financing mix of Nigerian quoted manufacturing enterprises", *Journal of African Business*, Vol. 6 No. 1, pp. 73-92.

Wanzenried, G. (2006), "Capital structure dynamics in the UK and continental Europe", *The European Journal of Finance*, Vol. 12 No. 8, pp. 693-716.

Welch, I. (2010), "A bad measure of leverage: the financial-debt-to-asset ratio", SSRN eLibrary.

Williamson, O.E. (1988), "Corporate finance and corporate governance", *The Journal of Finance*, Vol. 43 No. 3, pp. 567-591.

Wiwattanakantang, Y. (1999), "An empirical study on the determinants of the capital structure of Thai firms", *Pacific-Basin Finance Journal*, Vol. 7 Nos 3/4, pp. 371-403.

Yartey, C.A. (2006), *The Stock Market and the Financing of Corporate Growth in Africa: The Case of Ghana*, International Monetary Fund, Washington, DC.

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