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The determinants of capital structure in a regulatory industry: the case of Kenyan banks

Abstract

This paper shows the standard cross-sectional determinants of bank leverage of banks in Kenya using annual statements from 2001 to 2009. Applying a fixed effect model, the authors find a remarkable consistency in sign, significance and economic magnitude. Like non-financial firms, banks appear to have stable capital structures at levels that are specific to each individual bank. The results suggest that large banks tend to be highly leveraged and the more profitable the bank is, the less debt it has. There has been inconclusive debate over the significance of regulatory capital and the extent countercyclical factors influence financial stability in banks. The result also shows that regulatory capital is significant in determining leverage level; that is, the more regulatory capital, the less leveraged the bank is. The authors also found that growth in gross domestic product (GDP) significantly influences the level of leverage with a positive coefficient. The results of the analysis indicate some evidence of the pecking-order theory's expectations.

Keywords: capital structure, banks, regulations, developing economies.
JEL Classification: C42, G21, G32.

Introduction

In order to understand how banks finance their activities, it is critical to examine what determines the capital structure. This strategic decision involves taking into account a wide range of issues ranging from regulation to prevailing interest rates and security prices. Capital structure research has received some broad criticism. For example, Harris and Raviv (1991) noted that empirical work in this area has lagged behind theoretical research. This is probably because the relevant firms' attributes are defined in terms of fairly abstract concepts that are not directly observable (Titman and Wessels, 1988). Moreover, capital structure decision-making is even more complicated when examined in an international context, predominantly in developing countries characterized by market controls and institutional constraints (Boateng, 2004).

Effective financial management and elaborate understanding of what determines capital composition are paramount for banks to enhance operational performance. However, the perceived benefits of capital structure were quashed: Modigliani and Miller (1958) noted that capital structure does not affect a firm's value by just splitting cash flows into two different streams in a perfect capital market.

Most of the literature seeking to explain the relationship between capital structure and firm-specific factors has focused mainly on developed countries. For instance, Rajan and Zingales (1995) used data from 'G7 countries', Diamond and Rajan (2000), Ozkan (2001) and Chui et al. (2002) used data from the United States (US), Bevan and Danbolt (2002) from the United Kingdom (UK), Antoniou et al. (2002) analyzed data from the UK, Germany and France, and Hall et al. (2004) examined data from European small to medium enterprises (SMEs). Despite Rajan and Zingales' (1995) findings, when they applied the capital structure model derived from the US setting to firms in the G7, the variables' association with leverage in the US was found to have the same effects in G7 countries.

Developing countries with many institutional differences have rarely been the subject of research in this field (among the few researchers who focused on developing economies are Schulman et al. (1996) for New Zeland, Wiwattanakantang (1999) for Taiwan, Chen (2004) for China, Boateng (2004) for Ghana and Keshar (2004) for Nepal; all focused on non-financial institutions). Nonetheless, the study of capital structure in banks is extremely limited, and the issue has not been addressed (Marques and Santos, 2003). Nevertheless, a number of empirical works on capital structure in banks have been undertaken in developed countries. For example, Frank and Goyal (2007), Flannery and Rajan (2007) and Berger et al. (2007) for the US, and Gropp and Heider (2009) for European banks concluded with divergent views. Therefore, the objective of this paper is to empirically examine the determinants of bank capital structure in Kenya.

1. The literature review

1.1. Size. Large firms are more likely than small firms to diversify their financing sources. Alternatively, size could be said to be the proxy for the probability of default in that large firms are less likely to fail and go into liquidation (Shumway, 2001). Shumway forecasted bankruptcy by using a hazard model by comparing it with a static model. He collected data for 300 companies from the *Wall Street Journal* and analyzed their bankruptcies. He found that firm size, past market return and standard deviation of the return all forecast failures of a company.

Ogbulu and Emeni (2012) have found that there is a positive association between size and leverage during their cross-sectional study of 110 companies listed in the Nigeria Stock Exchange. A positive

relationship supports the trade-off theory which assumes that large firms are stronger to face bankruptcy and financial distress as they have more stable or less volatile cash flows.

Ferri and Jones (1979) examined capital structure during expansion and recession in different classes of industry. They found that industry class was linked to a firm's leverage. For instance, one expects that banks are more leveraged than non-financial firms. Second, Ferri and Jones found that debt is related to size. One possible reason is that large firms have the advantage of accessing credit markets and can borrow under better terms. Although they examined capital structure during economic growth and during recession, their findings did not provide a clear cut conclusion on the impact of macroeconomic conditions on capital structure.

1.2. Profitability. The relationship between capital structure and profitability can be described by the pecking-order theory which has the premise that firms prefer using retained earnings to external finance. However, DeAngelo and Masulis (1980) noted that those firms which are less profitable have less debt because they believe that debt is more expensive than retained earnings. On the other hand, profitable firms tend to protect profit from taxes and hence use more debt. This is because the profit that will be available for taxation would be less compared to when the company has zero debt.

A negative relationship between profitability and leverage has been observed in the majority of empirical studies undertaken in developed countries. For example, Titman and Wessel (1988) used linear structural modeling to examine determinants of capital structure of 469 firms in America from 1974 and 1982. Barton et al. (1989) analyzed the effects of stakeholder theory on capital structure using a sample of 179 American firms from 1970 to 1974. Rajan and Zingales (1995) and Antoniou et al. (2008) both used international data on 'G7 and G5 countries'[1], respectively. Although one expects that international data cannot be homogeneous, their findings support the pecking-order theory in that, all things being equal, firms which are more profitable would maintain lower leverage because they are able to generate funds from internal sources.

1.3. Dividend policy. Company directors decide on dividend policy as regards to amount and timings. The decision is paramount as it may influence capital structure, stock price and amount of tax the shareholders would pay. Therefore, there are three aspects that link the dividends and capital structure. That is, free cash flow theory to dividends which involve payment of dividends any cash that is left after investing in all available projects with positive net present value. This does not mean that firms pay dividends on the maximum amount available for distribution. Companies normally pay dividends much lower than trading profit for a particular year. However, most shareholders would prefer payment of dividends consistently from year to year. Second, one may expect a retiree to prefer to invest in a company which offers a high dividend yield from year to year. Whereas a person with high perks who is still in employment prefers to avoid dividends due to their marginal tax rate on income.

Modigliani and Miller (1958) argued that payment of dividend does not affect the wealth of the shareholders. They pointed out that the wealth of the shareholders is affected by investment projects that have positive net present value and thus the decision to pay a lower dividend will be compensated by an increase in share price and vice versa. This implies that, if a firm does not pay dividends, the shareholder can create "homemade" dividends by selling a portion of the shares held. If, on the other hand, the firm pays dividends but the shareholder does not wish to receive them, the amount can be reinvested in additional shares in the firm.

Thus the basic tax proposition supports conservative dividend policy and proposes that, if a firm wants to return cash to shareholders, then this should be done through share repurchasing. As a result, share repurchasing has increased since 1980 (Fama and French, 2002). Fama and French examined how long-term leverage and dividend payout ratios vary across firms. They found that more profitable firms and those with fewer growth opportunities have higher dividend payouts and are less leveraged, although their finding had one weakness in that they dropped firms with assets less than US$2.5, hence creating bias in size. Their findings suggest the existence of a clientele effect which has important implications for managers in that dividend policy should be clearly set and consistently applied and managers need not concern themselves in accommodating different types of shareholders.

1.4. Asset structure. A number of empirical evidence suggests that the type of the assets that a firm has determines the leverage level (Rajan and Zingales, 1995). These assets are classified as current and non-current assets. The measure between tangible assets and total assets is called tangibility (Booth et al., 2001; Rajan and Zingales, 1995; Titman and Wessels, 1998).

Despite a number of theories predicting that there is a positive correlation between tangibility and leverage, there are others which find a negative relationship. Those which find a positive relationship – for example, Titman and Wessels (1988), Rajan and

[1] G7 countries are the US, Japan, Germany, France, Italy, the UK and Canada. G5 countries are the G7 countries excluding Italy and Canada.

Zingales (1995), Dess and Roberston (2003), Chen (2004), Faulkender and Petersen (2006), Wald (1999) and Lemon and Zender (2007) – support the trade-off theory and the agency theory from a shareholder's point of view. In addition, Michaelas and Chitterden (1999), Cassar and Holmes (2003) and Hall et al. (2004) found a positive relationship between asset structure and both long-term and short-term debt. Therefore, a bank makes use of tangible assets as a form of security to secure more debt in order to shield profits from tax as interest is tax deductible. Moreover, shareholders prefer banks to be more leveraged so that management can have commitments in payment of interest.

1.5. Risk. Casser and Holmes (2003) investigated 1,555 Austrian firms from 1995 to 1998. The results indicated that a contradiction between a firm's risk and debt level may be due to risk proxies. Deesomsak et al. (2004) investigated the determinants of capital structure in Thailand, Malaysia, Singapore and Australia with the interest of also finding the effect of the 1997 financial crisis. They pointed out that, if the cost of liquidation is low, firms may ignore their volatility in earnings and leverage more. For instance, it is difficult for the government to let any bank go into liquidation because of the repercussions associated with a fall. That is, any fall of a bank is likely to spread across the entire banking network and as a result the credit creation will be affected across the entire economy.

Minimizing bank risk and reducing bank failure to zero is not optimal because, for the regulators, it would imply a shrinking banking system and this might be followed by declining economic growth. Therefore, regulators might restrict the leverage ratio if a high leverage ratio implies high probability of default (Graf, 2010). Graf (2010) investigated the relationship between leverage, profitability and risk for 175 US and 205 European banks by examining commercial banks from 1994 to 2008. He noted that the total risk weighted capital ratio on US banks was not binding in that only five bank year observations undershoot the 10% risk weighted capital. On the other hand, that of European banks is 10% for about 50 bank year observations. Although he excluded small banks, he concluded that bankruptcy costs increase significantly with leverage ratio for European banks; hence there is a decline in profitability.

1.6. Earnings volatility. Froot and Stein (1998) argued that smooth earnings can enable a company to increase its value and hence reduce reliance on external finance. That is, the more profitable the firm is and the greater the ability to maintain profitability, the more it is likely to increase its retained earnings. Also, the more the bank's retained earnings, the less the demands for the external sources of finance, if following the pecking-order theory. In addition, as pointed by Minton and Schrand (1999), it is costly for the firm to have volatile earnings because it will affect the firm's investment policy by increasing the likelihood and cost of raising external funds.

Risky firms like banks are more likely to suffer information asymmetries and they are likely to have higher levels of leverage. Banks suffer from information asymmetries because they finance investment or business which they are not involved in managing. The success from such investment depends on the management of the borrower, among other factors such as economic growth.

1.7. Growth opportunities. Growth is likely to place a greater demand on internally generated funds and push the bank into borrowing (Hall et al., 2004). Hall and colleagues examined to what extent the determinants of capital structure of small and medium enterprises differed between 4,000 firms from eight European countries. Using restricted and unrestricted regression models in order to delineate the country's fixed effects from those of the firms, they found that growth of the firm is likely to put pressure on financing the investment or growth and hence the demand for both short- and long-term debt. Unlike Lemon et al. (2008), who included all non-financial firms in the UK to find out the persistence and cross-section of corporate capital structure from 1965 to 2003, Hall et al. (2004) specifically focused on small and medium firms.

Heshmati (2001), while examining the dynamic of capital structure in 2,261 small and listed firms in Sweden using book leverage, found that there is an inverse relationship between growth opportunities and leverage. That is, firms that are anticipating high growth potential tend to use more equity than debt. Also, this could be attributed to conflicts of interest from different stakeholders and creditors regarding wealth effects because a company with growth opportunities tends to have an array of investment options.

1.8. Non-debt tax shield. The non-debt tax shield could be depreciation or amortization of non-current assets or any other tax benefits expense allowable by the tax authority other than debt interest. Studies carried out by DeAngelo and Masulis (1980), Wald (1999), Ozkan (2001) and Bauer (2004) found a negative relationship between non-tax shield and leverage. This supports the trade-off theory indicating that managers are motivated to use debt over equity in order to avoid or reduce corporation tax bills. DeAngelo and Masulis (1980) attributed the negative relationship to the fact that non-debt tax shield can act as substitute of tax shield on debt financing. The same reason was attributed by Bauer

(2004) when he examined capital structure of listed companies in the Czech Republic, Hungary, Poland and Slovak from 2000 to 2001, although he dropped companies with negative equity. Contrary to these findings, Scott (1977), Moore (1986) and Titman and Wessels (1988) found that a positive relationship existed because firms with substantial non-debt tax shields have collateral assets which they use to secure debt.

1.9. Effective tax rate. Firms pay tax on profit once the interest on debt has been subtracted. This effectively reduces the tax bill compared with another firm of the same size in terms of operating profit in the same industry and legislation which is unleveraged. This is the hallmark of the static trade-off theory model that looks at the benefits and cost of debt. The main benefit of debt is a tax shield while the cost side of bankruptcy may act as a significant countervailing force. This means that, given perfect market assumptions and presence of corporate taxes, the value of the firm increases equivalent to the debt tax shield.

Givoy et al. (1992) considered the effect of the Tax Reform Act of 1986 on US firms. Although they used average past paid taxes, their conclusion was that firms decrease leverage as a result of a drop in the statutory tax rate. In addition, Graham (1999) used a marginal tax rate which is the present value of current and future taxes paid on an additional dollar of income earned today instead of average taxes paid in the past.

Singh and Hamid (1992) collected data from nine developing countries in their study on capital structure. They found that differences in the coefficients and signs are due to differences in the tax system, legal and other institutional factors such as accounting practices and the degree of development of the capital market. Also, Booth et al. (2001) assessed how portable capital structure theories are different to developing countries with different institutional framework. They concluded that, across countries, debt rates are negatively related to tax rule.

Antoniou et al. (2006) used panel data from Britain, France and Germany but found mixed results for tax rate variability. Therefore, the implication of tax depends on the tax policy objectives. A tax system could be designed to favor retention of earnings against dividend payout and vice versa. In addition, variation in the findings on the effects of taxations from developed countries and developing economies could indicate that asymmetric information is more pervasive in developing countries because there is likely to be lax in accounting and auditing in comparison with developed countries.

1.10. Regulation. Brewer et al. (2008) investigated why bank capital ratios differ across the countries with the aim of finding out whether public policy factors affect bank capital structure. Using unbalanced panel data of 78 largest banks headquartered in 12 industrial countries, they noted that, changes in leverage ratios tend to be higher in countries with better external governance, better prompt corrective action and greater emphasis on maintaining adequate regulatory capital. This imply that, the government can immediately effect the decision relating to the level of capital by varying the cost associated with capital level and by providing underpriced guarantees like explicit deposit insurance and explicit guarantees on deposit and other liabilities. They pointed out that the observed differences in capital ratios across different countries could be partially explained by public policy, regulatory regimes and controls put in place. However, their sample only included banks that have their headquarters in developed countries.

Mishkin (2000) reported that banks hold capital because they are required to do so and, because of the high cost associated with holding capital, bank managers prefer to hold less capital than is required. That is, instead of holding the capital, it can be invested in profitable projects or lent out in order to generate income. However, Barth et al. (2005), Flannery and Rangan (2007) and Berger et al. (2007) showed that banks hold more capital than required. This could be because of the cost associated with raising additional capital if the regulators decide to increase the minimum capital. Consequently, as banks tend to hold minimum capital which is above requirements, Allen et al. (2009) noted that capital requirements are not necessary binding. In addition to the regulatory capital, other empirical works posit that the bank capital structure is the outcome of pressure emanating from debt holders, shareholders and depositors (Ashcroft, 2008; Flannery and Rangan, 2008; Flannery and Sorescu, 1996). Besides, under certain circumstances, borrowers may demand banks to commit some of their own capital when extending credit (Allen et al., 2009). Since borrowers do not bother about the cost of raising capital, the level demanded may be above that required by the regulators.

Frank and Goyal (2007) found that managers' preferences have an impact on capital structure in that less risk-averse managers chooses a more aggressive strategy and higher leverage. Using stepwise regression, they investigated which factors were most important in capital structure decisions from 1950 to 2003. Having converted the data to the 1992 dollar using GDP deflectors, they performed multiple imputations on missing data despite the fact that the data predicted was less accurate than the observed.

1.11. Economic growth. Gupta (2005) and Detragiache and Rajan (2008) used cross-country data on the modern banking crisis to estimate the loss in output associated with the systemic banking crisis. These studies found that the banking crisis is associated with reductions for bank-dependent borrowers and a substantial decline in economic activities of a country. In addition, Demirgüç-Kunt and Detragiache (2005), found that the financial crisis is correlated with macroeconomic indicators. That is, the crisis occurs in a period of low GDP growth and high inflation.

Bikker and Metzemaker (2007) observed a range of OECD countries[1] and noted that bank capital varies as economic cycle varies. That is, bank capital is negatively associated with the growth of the economy. However, when Jokipili and Milne (2006) examined the reaction of banks according to size, they concluded that small banks tend to have capital that moves with economic cycles, while large banks move negatively with the cycle. In addition, Stein (2002) found that small banks have a larger loan supply in response to economic shocks than large banks.

2. Data and methodology

2.1. Data. The present study investigates the determinants of capital structure in 19 banks using the annual financial statement from 2001 to 2009 as published in the ORBIS database as our source. Our selection criteria is that the bank must have complete financial statements for the years under review. The dependent variable is the leverage which is measured as total debt to total capital which is in line with Rajan and Zingales (1995), Bevan and Danbolt (2002), Philips and Sipahiglu (2004) and Deesomsak et al. (2004). This is because it specifically shows the degree a firm is using borrowed capital and the risk it faces if it is not able to meet the repayment obligations. The choice of either using market value or book value is also very critical. Market value has been used in the past (Deesomsak et al., 2004) and will be used in the current research as it gives a more tentatively consistent result. However, both book and market values have been used in the literature and yield the same result[2]. The definitions of independent variables are listed in Table 1 below.

Table 1. Measurement of variables

Variables	Proxy/code	Measurement	Expected sign
Size	Log of total assets (TA)	Total assets = Net fixed assets + Total intangible + Total Investments + Net current assets + Other assets	+
Profitability	Net profit margin (NetMarg)	Net income available for common shareholders over sales x x 100%	–
Growth opportunities	Growth in total assets (GRWT)	Annual growth in total assets	+
Asset structure	Tangible assets/Total assets	Ratio of fixed assets to total assets	+
Effective tax rate	Actual tax rate paid (ETR)	The tax paid/total earnings before tax	+
Earnings volatility	Standard deviation of percentage change in operating income (ERNVOL)	SDV of operating income	–
Minimum regulatory capital	Tier 1 capital	Risk weighted assets capital	–
Economic growth	GDP	Real growth in GDP	+/–

Notes: Authors expectations on the movement of the variables.

3. Methodology

This study employed balanced panel data because it increases the sample size considerably and is more appropriate to study the dynamics of change. In order to estimate the effect of regressors on the regressand, we used pooled ordinary least square (OLS), the random effect model and fixed effect model. Under the hypothesis that there is no group or individual effect among firms included in our sample size, we estimated the pooled OLS model which takes the form of:

$$LEV_{it}=\beta_1+\beta_2 SIZE_{2it}+\beta_3 PROF_{3it}+\beta_4 ASST_{i4it}+$$
$$+\beta_5 ERNVO_{5it}+\beta_6 GDPGROWTH_{6it}\ {}_7 GROWTH_{7it}+$$
$$+\beta_8 ETR_{8it}+\beta_9 REGC_{9it}+\mu_{it},$$

where β_1 is the common coefficient and μ is our unobserved variable. The model estimates a common constant for all cross-section firms (Asteriou and Hall, 2011). The main assumption of this estimation method is that the regression coefficients, both the slope and the intercept, are equal for all firms. This estimation method ignores any form of heterogeneity across firms. That is, if heterogeneity is observed for all individual firms, then this means there is only the constant term for all firms, then the entire model can be treated as an ordinary linear model and fit by least square regression method (Greene, 2007).

We also estimated the fixed effect model (FEM) and random effect model (REM). The FEM as-

[1] The OECD (Organization for Economic Co-operation and Development) is an international organization of countries with highly developed economies and democratic governments. Its members include Australia, the United Kingdom, the United States, Sweden, Spain, Belgium, Japan, Italy, Turkey, Germany and Canada.

[2] The exception is Barclays et al. (2006), who focus on book leverage, and Welch (2004), Gropp and Heider (2008), and Song (2005) who used both measures and arrived at the same result.

sumes differences in the intercepts across the firms. Each individual intercept does not vary over time, which means that it is time invariant. The REM estimates the coefficients under the assumption that individual or group effects are uncorrelated with other regressors. The REM allows the intercepts to vary between units but variation is treated as randomly determined. We estimated the three models in order to carry a meaningful comparison. The variance of the error terms is zero; therefore there is no difference between the REM and pooling of data, in which case the use of the pooled OLS is appropriate. In addition, using the unrestricted and restricted model, in our case the pooled OLS and FEM respectively, we found that the F statistic is less than the F critical and also using the Akaike information criterion (AIC) the value of the pooled OLS is less than that of the fixed effect hence using the pooled OLS is appropriate.

However, before undertaking any regression analysis, we checked to ensure that our variables were normally distributed using the Kolmogorov-Smirnov Test as shown in Appendix A, and also checked that there were no outliers that could influence our R squared. We also undertook panel unit root tests on all variables to certify that the series is stationary. This is because a model which coefficients are non-stationary will exhibit the unfortunate property that the previous values of error term will have a non-declining effect on the current value as time progresses. We also tested that there was no multicollinearity of the variables, as shown in Table 2. If two predictors are perfectly correlated – that is, they move together – then the value of β for each variable is interchangeable and it is difficult to distinguish the separate effects of these variables on leverage. As shown in the correlation matrix below, there is no coefficient more than 0.75, which shows that there is no indication of any multicollinearity. To affirm this, we also carried out a collinearity test to make certain that there is no violation of the assumption underlying the use of regression analysis. Bowerman and O'Connel (1990) pointed out that if the variance inflation factor (VIF) is greater than 10, then there would be a cause for concern. As shown in Table 2, we find that there is no multicollinearity concern.

Table 2. Multicollinearity test 1

Models	Collinearity statistics	
	Tolerance	VIF
(Constant)		
Dividend payout ratio	.202	4.950
Effective tax rate	.212	3.140
Non-debt tax shield	.421	2.377
RWAC	.295	3.395
Earning volatility	.214	4.672
Profitability	.401	2.491
Size of the bank	.139	7.207
BRISK	.251	3.990
Growth opportunities	.331	3.019
Asset structure	.125	8.012
GDP real growth	.421	2.374

Source: Dependent variable.

There have been changes in banking regulations in Kenya since 2000. For example, changes in the Banking Act in 2002 which required banks to increase the minimum capital from Kshs 250 to Ksh 350 million and the implementation of International Accounting Standards (IAS) from the year 2000. As a result of such changes, we used the Chow test to test for structural stability. As shown in Table 3, there is no suggestion of any presence of structural break. Table 3 shows that the F statistic is less than the F critical, hence we fail to reject the null hypothesis that there are no structural breaks. Therefore, there is no evidence of significant parameter instability despite changes in banking regulations and tax reforms.

Table 3. Chow forecast test: forecast from 15 to 180

F-statistic	21.29553	Prob. *F*(166,1)	0.1578
Log likelihood ratio	1457.647	Prob. Chi-square (166)	0.0000
R-squared	0.847873	Mean dependent variable	-0.000338
Adjusted *R*-squared	-0.802417	S.D. dependent variable	0.018875
S.E. of regression	0.075938	Akaike info criterion	-5.271793
Sum squared resid	0.000972	Schwarz criterion	-4.710302
Log likelihood	57.01676	Hannan-Quinn criterion	-5.698983

Table 3 (cont.). Chow forecast test: forecast from 15 to 180

F-statistic	21.29553	Prob. *F*(166,1)	0.1578
F-statistic	0.594498	Durbin-Watson statistics	2.014001
Prob (*F*-statistic)	0.849723		
Inverted AR Roots	-00		

The log likelihood ratio statistic is based on the comparison of restricted and unrestricted maximum of the log likelihood function. The LR test statistic has asymptotic λ^2 distribution with a degree of freedom equal to (m-1)*(k+1) under the null hypothesis of no structural break, where m is the number of subsamples and k is the number of independent variables (i.e. m = 2 and k = 11). The computed value for the LR test statistic is 1470.699 which exceeds 21.026 for the 5% level of significance and 26.217 for the 1% level of significance. The reported probability is the marginal significance level of λ^2 test. It supports this result in that rejecting the null hypothesis would be wrong less than 0% of the time.

In addition, we tested for heteroscedacity to check whether the variance of the error terms differ across observations. This is because the variation will cause the standard errors to be biased and hence there will be biased inferences. Using Breusch-Godfrey LM, we also tested the presence of serial correlation of the residuals. However using Durbin-Watson statistics indicated that there is no serial correlation after applying autoregression process.

4. Results

4.1. Descriptive statistics. Appendix B shows that, on average, banks in Kenya are financed by 80% debt. This indicates that the banking industry is characterized with high leverage which is consistent with the finding of Gropp and Helder (2009). In their study on European banks they found that banks are leveraged at an average of 92.6% while the American banks were found to be 88.4%, (Hoffman et al., 2009). While the current findings indicate a maximum of 90% leverage on banks, that of European banking and American banking is 99% and 100% respectively as noted by Gropp and Helder (2009) and Hoffman et al. (2009). A sharp contrast between European and American banking could be attributed to the size of the banks in the regions. That is, banks from developed countries are much more diversified than those in Kenya.

4.2. Correlation of the variables. *4.2.1. Size.* As shown in Table 4, there is a strong positive correlation between size and leverage. This could be attributed to the fact that large banks may be seen to be too big to fail because as, bankruptcy cost theory suggests, the lower the bankruptcy costs, the higher the debt level. That is, not only big banks are large enough to deal with bankruptcy but they are more diversified than small banks. The table also shows that there is a weak negative correlation between profitability and leverage. That is, the more profitable the bank is, the less leveraged it is. This is in opposition to the findings of Abor (2005), who examined the relationship between leverage and profitability of banks in Ghana. The current findings are in line with that of Titman and Wessel (1988), Harris and Raviv (1991), Rajan and Zingales (1995) and Gropp and Heider (2009). Nevertheless, the result does not support the agency theory in that the more profitable the bank is, the more managers are likely to consume large perquisites and hence debt is one way of committing the profits in terms of interest payments and also as a way of controlling the manager's activities. That is, bank managers may use free cash flows to sustain growth; at the same time they may overinvest in the core business or worse strategic drift through acquisition of unfamiliar ones.

While the result does not support the agency and the signalling theories, it supports the pecking-order theory. This is because the transaction costs associated with raising external finance are more than that of internal finance. The results show that less profitable banks are more leveraged. This could be because when banks are not profitable they are not able to meet their day-to-day operational expenses and investment requirements and hence look for external finance. In doing so, they would rather have more debt than raise external equity in order to avoid dilution of control of ownership, especially if they believe their shares are undervalued.

The result shows a weak positive relationship between dividends and leverage. The announcement of dividends signals good news because firms can only pay dividends if there is sufficient profit. Therefore, the capital market continues to monitor the bank's performance and the more profitable it is, the less asymmetrical information when entering the equity market, indicating signs of financial health. These findings support Bhadhuri (2002) and Frank and Goyal (2004). Another possible explanation of positive correlation is that, as dividends are not obligatory and because managers may avoid or reduce the amount to pay especially when the bank is suffering financial distress, the payment of dividends serves as a credible signal of higher expected future cash flows which support the signalling theory.

The pecking-order theory and the agency cost theory seem to contradict one another with regard to growth and leverage. The agency cost theory suggests that

equity-controlled banks have a tendency to invest suboptimally to expropriate wealth and thus the agency costs are likely to be higher in growing firms. Therefore, growth is likely to place greater demand on internally generated funds and, at the same time, if not sufficient will push the bank into borrowing. The results support this view with a positive correlation between growth and leverage. However, the association is weak in both cases. Past studies have also confirmed these findings (Hall et al., 2004; Heshmati, 2001). The positive relationship between leverage and growth opportunities for banks could be attributed to the fact that, as banks grow through different stages from micro finance, small, medium and then large, they are likely to shift their financing avenues.

There is a strong positive relationship between taxation and leverage in banks. This is consistent with Graham (2000) and Graham and Harvey (2001). Therefore the higher the tax rate, the more debt that the bank may have because the interest payment is deducted before tax is computed. This is because of the fact that interest on debt is subtracted before taxation; the tax bill will be reduced marginally compared to the bank with less debt.

Table indicates that there is a weak negative correlation between the business risk and leverage of the bank. This was expected in that the higher the risk the bank faces, the less leveraged it should be to avoid the possibility of bankruptcy. This is because a bank with more risk could have volatile earnings and may experience a more adverse situation in which cash flows are too low for debt finance. In addition, the more the bankruptcy costs a bank faces, the less the incentive to utilize the benefit of interest tax relief and as such reduction of debt.

Macroeconomic factors like GDP real growth can be said to be more pertinent to banks than to other firms because of the exposure to business cycle fluctuations. Moreover, changes in economic growth are likely to affect the bank's profitability. For example, we found that, during a recession, the non-performing loans increase, as shown in Figure 1 below.

Fig. 1. GDP real growth and non-performing loans (NPL)

However, as the economy grows the bank is likely to experience an increase in both short- and long-term deposits compared with when the economy declines, as shown in Figure 2; hence there is a positive correlation. During periods of positive economic growth, expectations are positive for banks and non-financial firms because risks are likely to be relatively low. However, when there is negative economic growth, banks may suffer sudden capital losses as a result of possible risk realisations. For this reason, rather than banks in Kenya having more capital than regulatory capital, especially during an economic upturn as shown in Figure 3 below, the reverse should suffice. This is because more capital may limit the negative effect of adjustment costs that tend to increase during these periods.

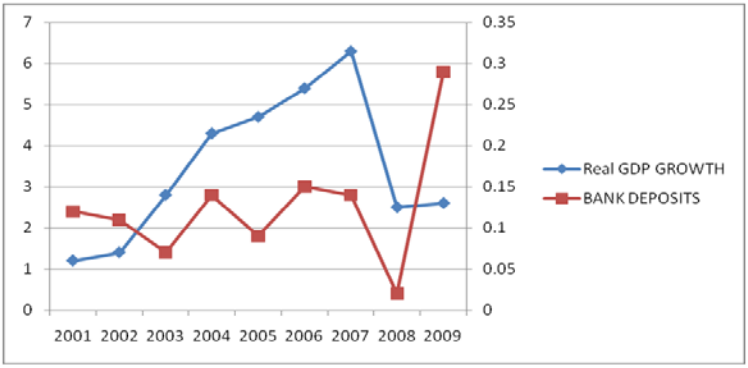

Fig. 2. Real GDP growth and bank deposits

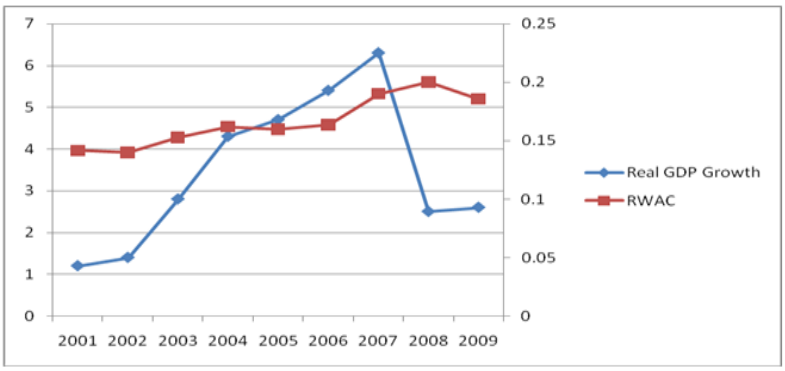

Fig. 3. Regulatory weighted asset capital (RWAC) and real GDP growth

The more the core capital requirement, the less leveraged a bank should be, but because banks trade with customers' money the reverse is true, indicating that capital requirements are not necessarily binding and hence of secondary importance. On the other hand, it shows that capital structure is influenced by not only external factors but also firm-specific factors.

The correlation result also reveals that there is a weak negative correlation between the non-debt tax shield and asset structure with leverage, suggesting that the non-debt tax shield is an instrumental variable for debt collateral. That is, the higher the non-debt tax shield the higher the value of the assets which can be provided as security to secure debt. On the other hand, a firm which invests heavily in tangible assets is able to borrow at a lower rate because it is able to offer the fixed asset as security. By pledging a firm's asset as collateral, the cost associated with moral hazard selection is reduced.

Table 4. Ordinary pairwise correlations

	ASST	*LEV*	*NDBT*	*ERN-VOL*	*DIV*	*PROF*	*ETR*	*RWAC*	*BRISK*	*SIZE*	*GRWT RGDP*
ASST	1.0000										
LEV	-0.1677	1.0000									
NDBT	0.1533	-0.1002	1.0000								
ERNVOL	-0.0209	0.1831	0.0659	1.0000							
DIV	-0.0504	0.0850	0.0178	-0.1760	1.0000						
PROF	0.0178	-0.0184	0.0523	0.0376	0.1591	1.0000					
ETR	0.0017	0.3341	0.0979	-0.0269	0.0263	-0.0028	1.0000				
RWAC	0.0483	-0.6985	0.1120	-0.0343	0.0404	0.2082	-0.1804	1.0000			
BRISK	0.1358	-0.1303	0.0455	0.0296	0.0159	-0.0169	-0.0885	0.0055	1.0000		
SIZE	-0.1480	0.4972	0.0388	0.1590	0.0552	0.2404	0.3056	-0.4395	0.1189	1.0000	
GRWT	0.2107	0.1062	0.1148	0.0689	-0.1452	-0.0108	0.0989	0.2160	-0.1217	0.2074	1.0000
REALGDP	-0.1243	0.1677	0.0330	-0.0191	-0.0522	0.0227	0.1288	0.0296	0.0396	0.2249	0.0231 1.0000

Notes: Where *ASST* is the asset structure, *LEV* is the leverage, *NDBT* is non debt tax shield, *ERNVOL* is the volatility in earnings, *DIV* is dividends payout ratio, PROF is profitability, *ETR* is the effective tax rate, *RWAC* is the risk weighted asset capital, *BRISK*is the bank risk, *SIZE* is the size of the bank, *GRWT* growth opportunities and *REALGDP* is gross domestic product real growth.

Table 5. Regression output summary

Variables	Pooled OLS	Fixed effects	Random effect
C	0.0003 (0.0027)	0.0209 (0.0643)	0.0489 (0.0356)
SIZE	0.2789*** (0.0070)	0.0156 (0.0313)	0.0414 (0.0187)
D2	0.0095 (0.0109)		0.0122 (0.0371)
T2	0.0309 (0.0097)		-0.0580 (0.0297)
PROF	-0.1912*** (0.0183)	-0.0091 (0.0663)	-0.0191 (0.0513)
DIV	0.0282* (0.0114)	0.0053 (0.0340)	0.0300 (0.0302)
ASST	4.2559*** (0.1564)	0.4260 (0.6067)	0.9374 (0.5722)

Table 5 (cont.). Regression output summary

Variables	Pooled OLS	Fixed effects	Random effect
BRISK	0.0755*** (0.0126)	0.1413** (0.0433)	0.1792*** (0.0419)
RWAC	-0.5283*** (0.0258)	-0.2203** (0.0712)	-0.2265** (0.0707)
ETR	0.1559*** (0.0132)	0.1262** (0.0375)	0.1487*** (0.0368)
NDBT	-1.3048*** (0.1807)	-0.3945 (0.4795)	-0.5796 (0.4744)
GRWT	0.0056 (0.0096)	0.0434 (0.0371)	0.0295 (0.0314)
ERNVOL1	0.0001 (0.0005)	0.0005 (0.0015)	0.0015 (0.0014)
GDP REAL GROWTH	-0.2889*** (0.0808)	0.3078 (0.3267)	0.9004 (0.3614)
R squared	75.7%	50.4%	39.7%
Adjusted *R* squared	75.6%	36.7%	32.9%
F-statistic	512.7062	3.6714	5.8824
Prob (F-statistic)	0.000000	0.000000	0.000000
DW	2.003	1.998	2.007
AIC	-1.468	-1.161	
Obs	179	179	179
Hausman test	Chi-sq. stat. 22.81916	Prob. 0.0293	

Note: * Significant at the 10% level;** significant at 5% level,*** significant at 1% level. Standard errors are in brackets.

5. Regression results and discussion

5.1. Size. The results in Table 5 above show that there is a positive significant relationship between size and leverage because they are believed to be too large to fail. Also the capital market tends to have confidence with large banks because, among other reasons, they are more diversified, profitable and have the ability to meet interest obligations as and when they fall due. In addition, depositors tend to have more confidence in large banks.

5.2. Profitability. Confirming the pecking-order theory, this research shows that profitability has a negative significant relationship with leverage. This shows that, the more profitable the bank is, the less leveraged it tends to be. This emanates from retained earnings which could be utilised before resorting to external sources and bank would like to limit its use because of the transaction costs associated with raising debt. Also, banks which are profitable would like to avoid dilution of control and hence are less leveraged.

5.3. Dividends. Dividend payments are a way of rewarding the investors who take risks in investing in a bank; its payment would attract more prospective institutional investors than when there is no payment of dividend, hence this is one of the reasons why the empirical results show a positive association between dividend and leverage. The payment of dividends can only be made after the firm has made sufficient profit and therefore this signals bright future prospects to outsiders. Likewise, in light of the positive association with taxation, the result is consistent with the key implication of the dividend signalling model that signalling the value of the dividend should change with changes in taxation. In this case, as dividends are not taxed in Kenya, the higher the tax rate, the more the dividend is paid by the banks.

According to company laws, dividend payment policy is decided by the managers just as they make decisions on capital structure. Therefore dividend and capital policy constitutes an implicit governance mechanism that determines how much control is exercised over the bank's investment decisions by the managers. Further, if the bank is anticipating dwindling investment opportunities, they tend to increase the dividend payout ratio and the reverse is true.

5.4. Asset structure. The more tangible assets the firm has, the more it is able to offer security to secure a debt. That is, in case the borrower defaults, the lender is able to recover their money by disposing of secured assets. The regression results also demonstrate that the more tangible assets the bank has, the more leveraged it tends to be. Though the tangible assets could be used as collateral, firms also benefit from having them in the form of capital allowances.

5.5. Bank risk. The regression results show that bank risk significantly positively influences leverage, hence supporting the agency theory. The findings also indicate that large banks tend to be riskier than small banks and, because they are big and well known in the capital market, they tend to be more leveraged. This implies that high leveraged banks are not deterred from taking excessive risk.

However, there are some risks that might be hard to quantify and might affect the individual bank (unsystematic risk) such as reputational risk. The implication for the management is to identify the risk, assess if it can be measured and articulate them in both qualitative and quantitative measures.

5.6. Regulatory capital. We found that the core capital held by banks was above the regulatory capital in all banks across the period of study, as shown in Appendix C. The result also shows that regulatory capital has a negative influence on banks' capital structure. All the three models show that risk-weighted capital requirement is significant with negative coefficients. However, because there is a level at which the bank can lend the deposits from outside (reserve ratio currently 6%, Central Bank of Kenya, 2011), requiring more capital will make banks stronger. The findings shows that, the more regulatory capital, the less the bank's risk is . However, the higher capital requirements reduce the amount the bank can lend. In addition, the reserve ratio might affect the monetary policy as the higher the reserve ratio, the less money will be available to lend. Consequently this will lead to lower money creation, hence strengthening the Kenya Shilling. This is also based on a priori reasoning that regulatory capital should be adjusted during the economic boom in which capital requirement increases as real GDP increases. This will require riskier banks to face higher capital requirements without CBK, exacerbating credit bubble and crunches. Therefore, capital regulation should be by economic substance rather than legal form.

5.7. GDP real growth. There has been strong interest in understanding the relationship between bank capital requirements and macroeconomic fluctuations, especially after the recent financial crisis. One of the main concerns has been that bank capital can amplify macroeconomic fluctuations. The current results show that there is a negative association between real growth in GDP and leverage. This implies that, when the economy booms, banks tends to be less leveraged than when it is in recession.

5.8. Effective tax rate. Banks, like any firm, would wish to reduce the amount of tax to pay. While tax avoidance is legal and tax evasion is illegal, banks tend to increase the amount of debt on the balance sheet when the rate of corporation tax increases, hence there is a positive inverse significant relationship with leverage.

Conclusion

Taking together the trade-off theory, the agency theory, the market timing theory, the pecking-order theory and the signalling theory, the research indicates that banks would wish to maximize the benefit of debt, for example interest deductibility, but at the same time consider the cost of debt like the threat of bankruptcy. However, according to the agency theory, shareholders would like bank managers to be committed to paying interest obligation to avoid excessive consumption of perquisites while bank managers would like to protect their interest and hence would like to be less leveraged because of the threat of insolvency.

Interestingly, according to the signalling theory, the more profitable the bank is, the more it pays dividends and it will attract institutional investors and hence will be more leveraged. The result shows to the contrary, as it shows a negative association between profitability and leverage, hence supporting the pecking-order theory. On the other hand, it fails to support the trade-off theory fully because the more profitable the bank is, the more it would wish to shield the profit from taxation by being more leveraged. This could be attributed to the fact that the Kenya Revenue Authority closely monitors those firms that tend to abuse the benefits of debt by thin capitalisation. Therefore, in the current research, the trade-off theory and the pecking-order theory have serious shortcomings that prevent them from explaining capital structure and should be used in more of a complementary way.

Policy implications

The higher capital requirements reduce the amount the bank can lend. In addition reserve ratio might affect the monetary policy as a higher reserve ratio, the less money will be available to lend. Consequently this will lead to lower money creation hence strengthening the Kenyan shilling. Also based on the priori reasoning, regulatory capital should be adjusted during the economic boom in which capital requirements increase in line with the rate of growth of real GDP. This will require riskier banks to face higher capital requirements without central bank exacerbating credit bubble and crunches. Therefore, capital regulation should be by economic substance rather than legal form.

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Appendix A

Table 1. Kolmogorov-Smirnov test of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Dividends	.137	19	.200*	.943	19	.501
Profitability	.197	19	.180	.904	19	.151
Size of the bank	.206	19	.134	.913	19	.199
Brisk	.132	19	.200*	.900	19	.135
Growth oppo	.129	19	.200*	.941	19	.464
Asset structure	.199	19	.165	.916	19	.219
Effective tax rate	.246	19	.145	.707	19	.214
EARNVOL1	.175	19	.200*	.832	19	.124
Non debt tax shield	.235	19	.067	.855	19	.215
Rwac	.189	19	.200*	.910	19	.186
Lev	.245	19	162	162	19	.179
RealGDPGRWT	.198	19	.173	879	19	131

Source: Lilliefors Significance Correction.
Note: *This is a lower bound of the true significance.

Appendix B

Table 2. Descriptive statistics for banks

	N	Minimum	Maximum	Mean	Std. deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. error
Dividends	19	.0068	.6625	.3475	.2059	-.053	.717
Size	19	1.5606	3.2048	2.4777	.5695	-.207	.717
Profitability	19	.0640	.4833	.2968	.1395	-.601	.717
Non debt tax shield	19	.0023	.0366	.0089	.0111	2.410	.717
Asset structure	19	.0166	.0408	.0265	.0083	.357	.717
Growth	19	.1178	.4244	.2516	.1074	.429	.717
Earning volatility	19	1.5456	20.0278	6.0553	6.5418	1.510	.717
Leverage	19	.3756	.9023	.8042	.1644	-2.759	.717
Regulatory capital	19	.1392	1.476	.3391	.4285	2.938	.717
Effective tax rate	19	.0396	.3778	.2571	.1144	-1.175	.717
BRISK	19	.0700	.7849	.5949	.2086	-2.383	.717
GDP realgrowth	19	.0422	.0422	.04221	.0001	-3.000	.717
Valid *N* (listwise)	19						

Appendix C

Table 3. Core capital and RWAC

	2001			2002			2004			2005		
Bank	Core capital	Core capital/ TRWA	Total capita/RWA	Core capital	Core capital/TRWA	Total captal/TRWA	Core capital	Core capital/TRWA	Total capital/TRWA	Core capital	Core capital/TRWA	Total capital/TRWA
Imperial	525	20.70	22.30	617	22.40	24.30	876	20.30	19.50	1072	22.28	22.28
ECOBANK												
Chase	354	73.30	73.30	366	52.80	52.80	526	35.30	35.30	562	28.92	28.92
Prime	417	35.10	35.10	533	18.60	19.20	670	19.60	18.90	721	15.59	15.59
HFCK	799	8.30	9.60	831	9.50	10.60	979	12.90	13.90	757	10.47	15.83
Equity										1412	19.18	19.18
Baroda	383	27.50	27.50	415	23.80	23.80	968	32.70	32.70	1068	28.39	28.39
Fina	498	16.30	16.30	548	15.20	15.90	622	17.30	17.30	684	14.53	14.53
ABC	352	20.60	21.50	382	21.20	22.10	503	21.20	20.30	585	17.60	17.60
BOA	1384	22.40	23.80	1404	22.70	23.80	1700	18.30	17.60	652	17.60	18.50
Bank of India	308	35.30	35.30	482	46.80	48.80	622	36.30	33.90	818	31.00	31.80
CITI	390	47.40	47.40	396	63.60	63.60	416	83.60	83.60	369	78.86	78.6
Family										266	11.12	11.12
	2006			2007			2008			2009		
Bank	Core capital	Core capital/ TRWA	Total capital/TRWA	Core capital	Core capital/ TRWA	Total capital/TRWA	Core capital	Core capital/ TRWA	Total capital/TRWA	Core capital	Core capital/ TRWA	Total capital/TRWA
Standard	8367	18.32	18.88	8967	16.30	16.70	9332	15.70	16.20	10656	14.10	14.50
Barclays	12375	12.12	12.12	1709	13.00	13.90	19980	15.00	18.75	22186	19.20	23.80
KCB	9168	15.75	15.75	10046	13.60	13.60	16187	15.40	15.40	17674	14.80	14.80
CFC	2765	14.28	18.30	3107	15.56	19.13	5952	11.41	14.60	6741	10.30	16.00
Diamond	2530	17.29	20.63	4227	19.10	19.10	4457	15.60	19.80	5279	13.80	18.90
NIC	2699	13.30	14.20	4058	15.80	16.70	5070	14.20	15.10	5382	14.60	15.50
Imperial	1249	19.78	19.78	1455	17.90	18.90	1724	19.00	20.00	2042	s20.40	21.50
ECOBANK							1026	14.20	15.20	1524	15.70	15.70
Chase	622	23.18	23.18	665	15.67	16.24	763	11.32	12.62	1137	12.30	13.40
Prime	800	13.00	13.00	1089	14.94	14.90	1597	16.00	16.00	1851	15.70	15.70
HFCK	706	13.10	16.00	706	13.10	16.20	2867	40.50	40.50	2884	31.00	34.00
Equity	2200	13.86	13.86	13666	45.68	58.90	14272	29.20	40.80	16873	23.60	31.50
Baroda	1263	27.53	27.53	1466	18.94	18.94	1688	18.50	19.70	2081	19.70	20.60
Fina	778	16.97	17.75	852	13.90	14.60	913	12.30	13.20	951	13.80	14.40
ABC	669	17.34	17.52	808	17.00	17.10	959	21.20	21.30	1135	20.60	20.70
BOA	746	16.00	16.90	800	13.59	14.40	1009	12.42	13.19	1709	15.20	15.90
Bank of India	940	25.10	25.10	1168	28.90	30.00	1690	13.00	32.00	2009	33.66	34.00
CITI	353	75.70	73.70	325	77.70	77.90	321	77.90	78.28	314	94.00	94.00
Family	832	24.30	24.60	1146	22.00	22.00	1409	19.00	19.10	1735	18.20	18.20