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What factors drive interest rate spread of commercial banks? Empirical evidence from Kenya☆,☆☆

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Abstract

The paper empirically investigates the determinants of interest rate spread in Kenya's banking sector based on panel data analysis. The findings show that bank-specific factors play a significant role in the determination of interest rate spreads. These include bank size, credit risk as measured by non-performing loans to total loans ratio, return on average assets and operating costs, all of which positively influence interest rate spreads. On the other hand, higher bank liquidity ratio has a negative effect on the spreads. On average, big banks have higher spreads compared to small banks. The impact of macroeconomic factors such as real economic growth is insignificant. The effect of the monetary policy rate is positive but not highly significant. The results largely reflect the structure of the banking industry, in which a few big banks control a significant share of the market.

JEL classification: E43; E44; G21

Keywords: Interest rate spread; Commercial banks; Banking sector; Kenya

1. Introduction

One of the expected benefits of financial liberalization and deepening of the financial sector is the narrowing of the interest rate spreads, i.e. the difference between the interest rate charged to borrowers and the rate paid to depositors. This is predicated on the understanding that liberalization enhances competition and efficiency in the financial sector. Thus, wide deposit-lending interest rate margin could be indicative of banking sector inefficiency or a reflection of the level of financial development (Folawewol and Tennant, 2008). Basically, embedded in the spread is the information to do with the efficiency of the financial intermediation, profitability and monetary policy impact, among other factors. Most countries in Sub Saharan Africa (SSA) are still confronted with high levels of interest rates, despite having undertaken structural adjustment reforms that led to the liberalization of interest rates in several countries in the region. Two decades after the financial sector in Kenya was liberalized in the early 1990s to allow market-determined interest rates, concerns about high interest rate spreads have continued to persist and attracted a lot of debate in both public and policy forums.

The role of financial sector in facilitating economic growth and development is well acknowledged. In Kenya, the banking sector plays a dominant role in the financial sector, particularly with respect to mobilization of savings and provision of credit. An analysis of the high interest rate spreads in the sector is not only useful in its own right, but is also central to the understanding of the financial intermediation process and the macroeconomic environment in which the banks operate. That notwithstanding, there has been little empirical research

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on this issue, particularly with respect to the investigation of industry-level or bank-level determinants of interest rate spreads. This paper examines and empirically investigates factors that drive the interest rate spread in Kenya's banking sector. Both bank-specific and macroeconomic factors are considered. The empirical analysis is based on panel data of commercial banks for the period 2002–2011.

The results show that bank-specific factors play a relatively more fundamental role in the determination of the interest rate spread in the banking sector. These include bank size, liquidity risk, credit risk and return on average assets. In general, the research findings such as the relatively high correlation between bank size and interest rate spread are linked to the structure of the banking sector, in which the market is dominated with a few big banks.

The rest of the paper is organized as follows: Section 2 provides a survey of the literature on the determination of interest spreads while the empirical methodology and description of the variables used in the empirical analysis is outlined in Section 3. Section 4 provides an exploratory analysis followed by empirical analysis and discussion of the results in Section 5. Section 6 concludes.

2. A survey of the literature

2.1. Theoretical literature

The literature on spreads consists of studies on the determination of interest margins as well as interest rate spreads. The most influential theoretical model of determination of interest margins is the bank dealership model by Ho and Saunders (1981), in which the size of bank interest margins is explained on the basis of the uncertainties associated with deposit and loan markets, hedging behaviour and expected utility maximization. Banks are assumed to be risk-averse dealers in their role as financial intermediaries. The model is premised on the fact that banks receive deposits in random intervals while the requests for loans come in a stochastic manner and these requests have to be satisfied. This randomness, and therefore the uncertainty brought about by the manner in which deposits come and the manner by which customers make loan requests implies that banks face an inventory risk, which has to be compensated through a spread between loan and deposit rates—this is the pure interest spread. The interest margin arising from Ho–Saunders model is computed on the basis of banks that offer similar or homogeneous loans and deposits, and differences in interest margins across the banks is on account of average transaction costs, changes in interest rates, risk taking behaviour of bank managers and the extent of competition within the bank's market (see Allen, 1988).

Subsequent studies have modified some of the assumptions in the Ho and Saunders (1981) model, for instance, McShane and Sharpe (1984) assume that banks face uncertainty in the short-term money market interest rates, as opposed to deposit and loan interest rates. In undertaking intermediation between depositors and borrowers, they assume that banks maximize expected utility and risk aversion in loan and deposit markets. They define interest margins as fees for financial intermediation given the randomness of loan requests and receipt of deposits, and the uncertainty in short term interest rates. However, the study notes the narrowness of this definition of interest rate margin and embeds their model in a more general model of profit maximization. The a priori expectations are that there is a positive relationship between bank interest margins and market power, the degree of bank risk aversion, interest rate uncertainty and average transaction size.

In a separate study, Allen (1988) extends Ho–Saunders model (1981) to treat banks as passive dealers akin to specialists on securities exchanges. Consequently, they change their prices as a way of changing demand for their products—deposits and loans. Lending rates are set by discounting default-risk adjusted true prices of the loan while deposit rates are determined by putting a mark-up on default-risk adjusted true price of the deposit. According to Allen (1988), the spreads are influenced by monopoly power and risk premium. In situations of risk neutrality, interest spreads are minimized since there is no need for a risk premium to compensate banks for the uncertainty surrounding the arrival of deposits and request for loans.

In general, a multiple of factors have emerged from the literature on the determination of interest rate spreads and margins. These include degree of bank risk aversion, market structure of the banking sector, volatility of money market interest rates, regulation, efficiency of banks and bank-portfolio. Other factors are credit risks, liquidity of banks, share of foreign capital, bank size, as well as economic factors that are industry-specific or macro in nature.[1]

2.2. Empirical evidence

In general, empirical studies that examine the determination of bank interest rate spreads use variables that basically fall in three categories: (i) individual bank-specific factors such as operating or administrative costs, non-performing loans, return on assets, structure of the balance sheet, non-interest income or non-core revenues, bank size, bank liquidity, among others; (ii) factors specific to the banking sector/industry such as the degree of competition or market concentration, regulatory requirements such as statutory reserve requirements or regulated minimum deposit rates and, (iii) macroeconomic indicators which include real gross domestic product (GDP) growth rate and inflation rate. Some studies focus on one category of factors while others consider two or all the three categories of factors.

Whereas some studies follow the Ho–Saunders approach which involves a two-stage procedure in the empirical determination of spreads[2] (e.g. McShane and Sharpe, 1984; Zarruk and Madura, 1992; Afanasieff et al., 2002; Mannasoo, 2012), other studies particularly on the determination of interest rate

[1] The emphasis on the specific factors varies depending on the type of study and whether the focus is on interest margins or interest rate spreads.

[2] The first step involves an estimation of the pure interest spread obtained by regressing interest spread on a set of bank specific characteristics. In the second step the pure spread is explained on the basis of macroeconomic variables and variables related to the market structure.

spreads follow a more eclectic approach, mainly based on single-equation estimation techniques. The interest rate spreads are modelled by specifying a behavioural model which encompasses the various potential determinants. A review of some of the previous empirical studies on interest rate spread is briefly discussed below.

Studies outside Africa include a study by Brock and Franken (2003) on interest rate spread in Chile which showed that the influence of industry concentration, business cycle variables, and monetary policy variables on interest rate spreads differed markedly depending on whether the spreads are computed from balance sheet data or from disaggregated loan and deposit data. Gambacorta (2004) considered both micro and macroeconomic factors in a study of Italian banks. The variables considered include: (i) loan and deposit demand, (ii) operating cost, credit risk and interest rate volatility, (iii) impact of monetary policy through changes in policy rates and reserve requirements and (iv) the structure of the industry. Results showed that interest rates on short term lending of liquid and well capitalized banks react less to monetary policy shocks. Bank size was found to be irrelevant in influencing interest rate margins while lending rates had a positive relationship with real GDP and inflation. An increase in real economic activity makes projects that would otherwise appear unfeasible become profitable when discounted to the present. The increase in economic activity therefore increases demand for credit.

On the other hand, an increase in real GDP and inflation was found to be negatively related with deposit rates. That is, when the economy is booming, it pushes up demand for deposits and therefore banks have no incentive to increase deposit rates. With respect to operating cost and credit risk, an increase in the cost of financial intermediation leads to higher lending rates as banks attempt to recoup the costs. These include costs incurred in assessing the risk profile of borrowers, monitoring of the various projects for which loans have been advanced and expansion of branch network. On the other hand, an increase in the volatility of the money market interest rate drives up both deposit and lending rates.

Demirguc-Kunt and Huizinga (1998) examine interest spreads using cross-country data covering commercial banks from 80 countries across the world. They find that differences in interest margins and bank profitability are explained by several factors such as bank characteristics, macroeconomic variables, explicit and implicit bank taxation and deposit insurance regulation. After controlling for factors such as differences in bank activity, the extent to which banks are leveraged, and the macroeconomic environment, they show that lower interest margins and lower profits are associated with larger banks asset to GDP ratio and a lower market concentration ratio. Additionally, foreign banks were associated with higher interest margins and higher profits compared to local banks in developing countries while the opposite was true for developed countries.

Grenade (2007) estimates the determinants of commercial banks, interest rate spreads in the Eastern Caribbean Currency Union using annual panel data. The spread was found to increase with an increase in market power, the regulated savings deposit rate, real GDP growth, reserve requirements, provision for loan losses and operating costs. Similarly, based on individual bank specific data for a panel of 22 banks, a study by Siddiqui (2012) shows that administrative costs, non-performing loans ratio and return on assets significantly influence interest spreads in Pakistan.

Afanasieff et al. (2002) apply the two-step approach of Ho and Saunders (1981) to study the interest rate spread in Brazil. Unlike most studies that define the interest rate margin based on interest income and interest expense, they defined the spread on the basis of lending and deposit rates as posted by banks. They found that the spread was higher the larger the bank, the larger the operating costs, bank leverage, ratio of service revenues to operational revenues and ratio of non-interest bearing deposits to total operating assets. However, the spread was found to be negatively related to the ratio of interest-bearing funds to earning assets and foreign-ownership of banks.

Studies on interest rate spreads with specific reference to the African countries include those by Folawewol and Tennant (2008), Beck and Hesse (2006), Aboagye et al. (2008), Ikhide (2009) and Ndung'u and Ngugi (2000), among others. Using dynamic panel data model, Folawewol and Tennant (2008) study the determinants of interest rate spread in 33 SSA countries focusing on macroeconomic variables. Their results show that interest rate spread is influenced by the extent of the crowding out effect of government borrowing, public sector deficits, discount rate, inflation, level of money supply, reserve requirement, level of economic development and population size. A more recent study on determinants of bank interest margins in SSA is by Ahokpossi (2013) using a sample of 456 banks in 41 SSA countries. The results show that whereas bank-specific factors such as credit risk, liquidity risk and bank equity are important, interest margins are not sensitive to economic growth. With respect to Ghana, Aboagye et al. (2008) find that an increase in the following factors increases the net interest margin of banks: market power, bank size, staff costs, administrative costs, extent to which a bank is risk averse and inflation. On the other hand, an increase in excess reserves of banks, central bank lending rate and management efficiency decreases the net interest margin of banks.

Beck and Hesse (2006) use bank-level dataset of the Ugandan banking system to examine the factors behind the consistently high interest rate spreads and margins. While foreign banks had lower interest rate spreads, there was not a robust and economically significant relationship between interest spread and privatization, foreign bank entry, market structure and banking efficiency. Similarly, macroeconomic variables explained little of the over-time variation in bank spreads. Bank-level characteristics, on the other hand, such as bank size, operating costs, and composition of loan portfolio, explained a large proportion of cross-bank, cross-time variation in spreads and margins. On the other hand, Nampewo (2013) studies the determinants of the interest rate spread of the banking sector in Uganda using time series data and finds that the interest rate spread is positively affected by the bank rate, the Treasury bill rate and non-performing loans. On the other hand, M2/GDP ratio and real GDP had a negative influence on the spread. However, the analysis was undertaken at macro

level, hence concealing micro and bank-specific characteristics.

In Kenya, few studies exist that examine the determinants of interest rate spreads. Beck et al. (2010) examine developments in Kenya's financial sector with a specific focus on stability, efficiency and outreach, and use interest rate spreads as a proxy for the efficiency of financial intermediation. They base their analysis on ex post constructed spreads and decompose the spreads into different components based on a set of factors such as overhead costs, loan loss provisions and taxes. Among the most cited studies on factors explaining the interest rate spread in Kenya are Ndung'u and Ngugi (2000) and Ngugi (2001). Ndung'u and Ngugi (2000) derived factors likely to explain the spread and empirically estimated an interest rate spread equation using monthly time series data for the period April 1993 to June 1999, while Ngugi (2001) extended the monthly time series data to December 1999. The factors considered by the former are deposits, loans, Treasury bill rate and interbank rate. They found that the spread was positively related with deposits but negatively related to loans. In addition to the factors above, Ngugi (2001) incorporated excess liquidity and non-performing loans ratio as explanatory variables and found that a rise in non-performing loans ratio leads to a rise in spreads while excess liquidity is negatively related with spreads. Both studies were undertaken at the macro level, mainly focusing on the macro industry-level variables. But even then, they both ignored macroeconomic indicators such as GDP and inflation.

The current study goes beyond the previous Kenyan studies by considering not only macroeconomic variables but also individual bank-specific variables using panel data for the commercial banks. Additionally, the study covers a more recent period ranging from 2002 to 2011 during which there have been significant changes both in the policy and macroeconomic environment. For instance, this is the period within which the Central Bank of Kenya introduced the central bank rate (CBR) which the Monetary Policy Committee (MPC) of the Bank currently uses as the central policy rate to signal the monetary policy stance.

In summary, there are a number of empirical studies on the determination of interest rate margins and spreads, focusing on different set of factors (bank-specific, industry-related and/or macroeconomic factors) and methodologies (time series and panel data methods), depending on the type of data, frequency and coverage (panel of banks, countries or country-specific analyses). That notwithstanding, there is still paucity of empirical studies on determination of interest rate spreads with respect to African countries, particularly at the bank-level or industry level, despite the fact that a number of African countries like Kenya continue to grapple with the challenge of higher interest rate spreads. Moreover, due to data constraints most empirical studies generally limit the empirical analyses of interest rate spreads to ex post computation of spreads based on the balance sheets of banks and income statements, typically using net interest margin as a measure of spreads. There are comparatively fewer studies that directly compute the interest rate spreads based on the observed actual interest rates charged on loans vis-a-viz interest rate on deposits as has been undertaken in this study.

3. Empirical methodology and data

Both exploratory and regression analyses are undertaken. The former is used to show trends and comparative analysis of interest rate spreads and other variables of interest. Regression analysis is undertaken to empirically investigate the determinants of interest rate spreads by employing panel data estimation methodology on a panel of commercial banks using annual data for the period 2002–2011. Panel data models provide much more insights than time series models or cross section data models because it is theoretically possible to isolate the effects of specific effects and actions (Hsiao, 2007). Ignoring bank-specific effects can lead to biased or misleading results. The basic assumption of the fixed and random effects models is that, conditional on the observed explanatory variables, the effects of omitted (excluded) variables are driven by (i) individual time-invariant factors such as individual-bank management style and ability, efficiency, or other technical differences between banks; (ii) period individual-invariant factors—that is, variables that are same for all banks at a given time but vary through time. These are variables that reflect general conditions affecting the operations of all banks but fluctuate over time. Both the time series and the cross section dimensions are important elements to the understanding of bank interest spread.

The empirical model is specified as follows:

$$r_{it} = \alpha_i + X_{it}\beta + Z_t\gamma + \varepsilon_{it}$$

where r_{it} is the interest rate spread for bank i in period t, computed as the difference between lending rate and deposit rate, X_{it} is a vector of bank specific variables, α_i is bank-specific fixed effects capturing the impact of unobservable (omitted) effects, Z_t is a vector of time-specific variables and ε_{it} is the statistical disturbance term.

Interest rate spreads are hypothesized to be a function of bank-specific and industry-specific variables, as well macroeconomic factors, in line with similar studies in the literature (see Chirwa and Mlachila, 2004; Entrop et al., 2012; Bennaceur and Goaied, 2008; Siddiqui, 2012; Demirguc-Kunt and Huizinga, 1998, among others). The bank specific variables include bank size, credit risk as measured by non-performing loans to total loans ratio, liquidity risk (ratio of bank's liquid assets to total assets), return on average assets, operating costs as a ratio of total net operating income and net interest income as a ratio of total income. The macroeconomic variables are real GDP growth rate and inflation rate. The monetary policy variable is the CBR. Panel data used in the empirical analysis is for 31 banks out of the 44 banks, for which complete data on the variables used was available.[3] Definition of the variables used in the empirical analysis and the hypothesized effects are briefly described below.

[3] Recently or newly established banks are excluded from empirical analysis due to lack of historical data.

3.1. Description of variables

Credit risk: Non-performing loans to total loans ratio (NPLR) is used as an indicator of credit risk or quality of loans. An increase in provision for loan losses implies a higher cost of bad debt write-offs. Given the risk-averse behaviour, banks facing higher credit risk are likely to pass the risk premium to the borrowers, leading to higher spreads. Hence the higher the risk, the higher the pricing of loans and advances to compensate for likely loss.

Bank size: Bank size is measured as the log of total bank's assets. Ideally, one would expect bigger banks to be associated with lower interest rate spreads, arguably because of large economies of scale and ability to invest in technology that would enhance efficiency. However, to the extent that bank size connotes control of the market in the deposit and loan markets, a positive relationship between interest rate spreads and bank size should not be surprising.

Operating costs: Computed as operating expenses as a ratio of total net operating income (*OPERAT*). Banks incur costs of financial intermediation such as screening loan applicants to assess the risk profile of borrowers and monitor the projects for which loans are advanced. An increase in operating costs is expected to have positive influence on interest rate spreads. High operating costs are likely to include costs due to inefficiency, leading to higher spreads and hence, this variable is commonly used as an indicator of operational inefficiency. A higher cost of financial intermediation will drive up interest rates on loans while depressing interest rates on deposits.

Liquidity risk: Computed as the ratio of bank's liquid assets to total assets (LQDR). The degree to which banks are exposed to liquidity risk varies across banks. A bank with higher liquidity faces lower liquidity risk hence is likely to be associated with lower spreads due to a lower liquidity premium charged on loans. Banks with high risk tend to borrow emergency funds at high costs and thus charge liquidity premium leading to higher spreads (Ahokpossi, 2013).

Return on average assets: Computed as net income divided by average total assets (ROAVG). This is generally considered as a good indicator to evaluate the profitability of the assets of a firm in comparison to other firms in the same industry. A positive relationship with interest rate spreads is hypothesized.

Net interest income as a ratio of total income (INTRCOM): Banks that traditionally rely on interest income from loans and advances relative to non-interest income assets are likely to be associated with higher spreads since they may not be willing to forego interest income traditionally generated from higher spreads. However, it might also be the case that higher interest income is associated with lower interest rate spreads due to higher probability of loan repayment.

Market concentration: Market concentration measures the degree of competition each bank faces in the market. Theoretically, competitive pressures lead to competitive pricing, thus leading to higher efficiency of intermediation process and lower spreads. However, Gambacorta (2004) notes that the impact of the structure of the banking sector on the spread can be ambiguous. A concentration that makes banks to behave in an oligopolistic manner will lead to higher lending rates and low deposit rates while a concentration that arises because more efficient banks are replacing less efficient banks may lead to lower lending rates and higher deposit rates and hence, lower spreads. Herfindahl–Hirschman Index (HHI) is the commonly used measure of market concentration. The computed HHI shows that market concentration has been declining, implying that Kenya's banking sector is moving from less to a more competitive market.[4] However, due to the relatively high correlation that was found to exist between this variable and the bank size, inclusion of both variables in the same model can lead to misleading results.

Macroeconomic and policy variables: The variables used to capture the impact of the macroeconomic factors are real GDP growth and inflation rate. Increased economic activity can heighten demand for loans leading to higher lending rates. On the other hand, increased economic activity can make projects more profitable, reduce defaults, and increase deposits, all of which reduce the spreads. For both variables, negative as well as positive parameters have been observed. The CBR was included as a regulatory variable to capture the effect of monetary policy stance. According to Gambacorta (2004), changes in monetary policy can affect deposit and lending rates through the interest rate, bank lending and bank capital channels. For instance, monetary policy tightening that raises policy rate and short term interest rates makes it more costly for banks to get funds and they pass these costs to borrowers through higher lending rates. The bank lending channel works through moral hazard and adverse selection. Following a monetary tightening that leads to higher interest rates, banks tend to attract more risky customers and to compensate for the higher risk they increase lending rates.

4. Exploratory analysis

Fig. 1 shows a comparison of interest rate spreads for selected countries and regions. Whereas the interest rate spread for Kenya is closely comparable to the SSA average, it is still higher than the average spreads for South Africa and the East Asia and Pacific region. Within the East African Community (EAC) region, Kenya's interest rate spread has been relatively higher than the average for Tanzania but lower than that for Uganda. The challenge of high interest rate spreads is thus not unique to only Kenya. However, when observed over a long period of time dating back to the 1990s, it can be noted that there has been a general decline in the spread.

There was a general downward trend for different types of interest rates particularly in the early 2000s (see Fig. 2). However, from mid 2000s, the movement in the lending rates has been sticky in comparison to other interest rates. This is the case even for the period that witnessed monetary easing, with the policy rate having been reduced from 8.5% in January 2009 to

[4] In the literature, most empirical studies use HHI as an indicator of both market power and market concentration. HHI shows a decline from about 0.107 in 2002 to 0.071 in 2011. It was computed on the basis of concentration of loans and advances.

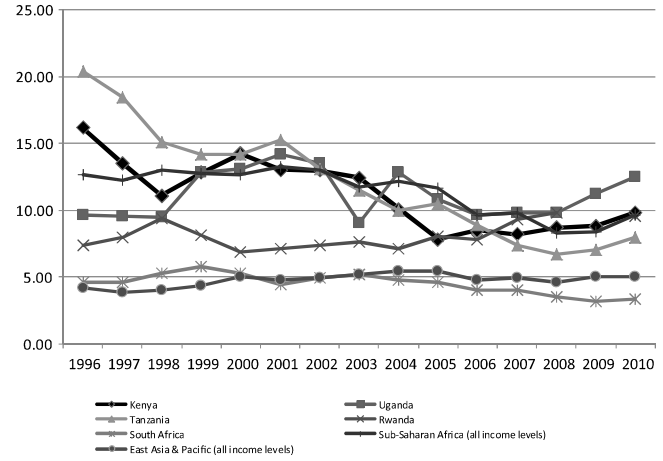

Fig. 1. Interest rate spreads for selected countries and regions: 1996–2010.

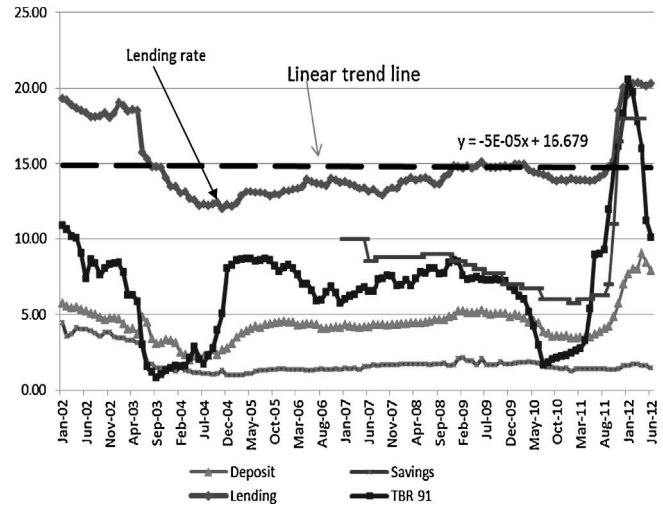

Fig. 2. Trends in interest rates.

5.75% in January 2011, complimented by lowering of the cash reserve ratio from 5% to 4.5% in June 2009. During this period, the 91-day risk free interest rate on the treasury bills (Treasury bill rate (TBR)) declined from an average of about 8.46% in January 2009 to as low as 1.63% in July 2010, whereas the average lending rate declined only negligibly from 14.78% to 14.29% over the same period. In contrast, the shift in monetary policy that saw CBR increased to 18% in December 2011 was followed by a corresponding shift in lending rates to an average of about 20%. Arguably, the lending rates are relatively more flexible upwards but sticky downwards in response to monetary policy changes. In general, the rigidity in the lending and deposit rates, particularly the downward inflexibility of the lending rates remains a subject of debate. On the other hand, the saving rate has remained almost flat at an average of 1.62% from 2009 to 2011. The overall deposit rate has more or less remained stable except for temporary declines and upward movements following monetary policy changes.

An examination of interest rate spreads by banks size shows that interest rate spreads are higher for larger banks than for

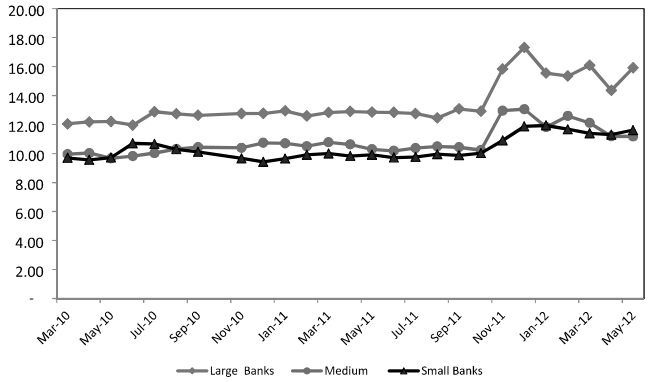

Fig. 3. Interest rate spreads across categories of banks: March 2010 to May 2012.

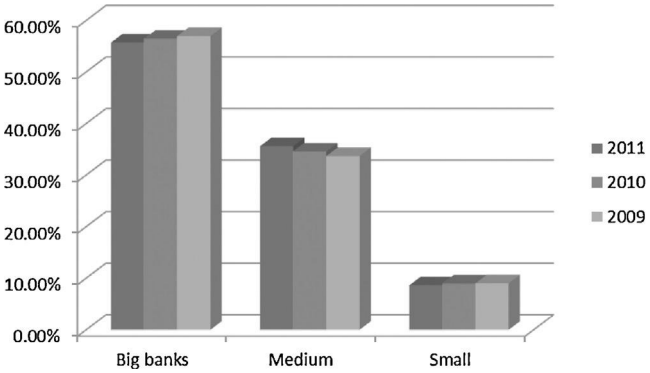

Fig. 4. Market share of loans and advances by bank categories, 2009–2011.

medium and small banks,[5] with high spreads of up to 18% (Fig. 3). On average, small banks have lower spreads. This could possibly be due to the fact that small and low-capitalized banks find it relatively difficult to raise funds and have to increase their deposit rates to attract funds and compensate for the perception that they are more risky relative to large, more liquid, well capitalized banks that are perceived to be 'too-big-to-fail'.[6] Trend analysis shows that the average spread increased slightly from about 9.95% in 2002 to about 10.6% in 2011, rising further to about 12.2% in the first half of 2012.

On the quantity side, Fig. 4 shows that the big banks, which comprise of only 6 banks or 14% of total commercial banks account for over 50% of the total loans and advances and hence, they are the dominant players in the market. On the other hand, the medium-sized banks account for slightly over 30% of the loans and advances, while the small banks, which account for about 52% of all commercial banks account for only less than 10% of the market share. A similar trend applies to the market share of deposits, i.e. the big banks account for over 50% of the deposits while the small banks account for less than 10%

[5] The classification of banks is based on weighted market size index—large (5% above), medium (1–5%) and small (below 1%) (see Bank Supervision Annual Report 2011 by Central Bank of Kenya).

[6] The positive relationship between bank size and spreads is examined further under the section on empirical results and discussion.

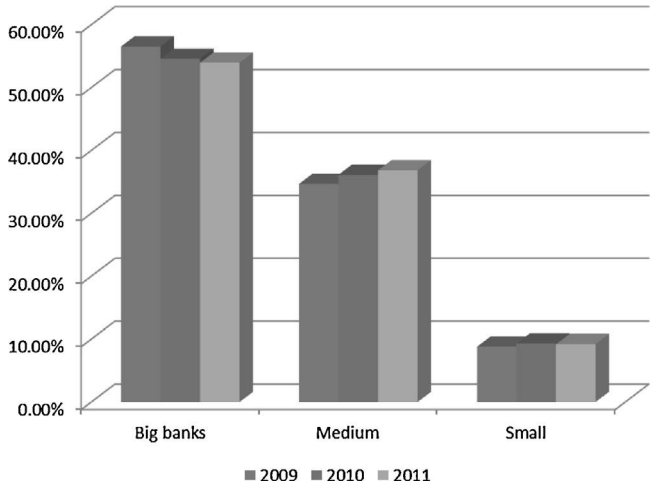

Fig. 5. Percentage share of deposits by bank categories, 2009–2011.

(Fig. 5). To a greater extent, the indicators reflect the nature of segmentation that exists in the banking sector, especially the skewed distribution of deposits and loans, and hence the market dominance by a few banks. However, there has been a slight decline in the share of deposits by big banks from about 56.5% in 2009 to 54% in 2011 and a slight increase in the share of deposits by medium-sized banks from about 34.7% to 36.8% over the same period.

5. Empirical results and discussion

Panel data regression results are reported in Table 1. Estimations were undertaken progressively starting with bank-specific variables in column A. The results in columns B and C were obtained by including the policy rate and macroeconomic variables, respectively. For robustness, heteroskedasticity across banks was controlled for by using cross-section weights, thus leading to robust standard errors. The results reported in Table 1 are based on the fixed effects model. The redundant fixed effects test and the Hausman test were used to determine the suitability of the fixed effects model over random effects model. The null hypothesis that the random effects model is the correct specification was rejected at 7% significance level.[7] The redundant fixed effects test statistic was found to be highly significant at 1% significance level with a t-statistic value of 15.2, hence rejecting the null hypothesis that cross-section effects are redundant. This implies that there are some unobserved or excluded factors that are associated with the variation in interest rate spreads across banks. These may be related to quality of management, management style, differences in the skills of the workforce, among others. The descriptive statistics and correlation matrix of the variables used in the empirical analysis are reported in Appendix Tables A1 and A2, respectively.

The empirical results show that bank-specific factors play a significant role in the determination of interest rate spreads in Kenya's banking sector. All the coefficients for bank-specific variables are highly significant at 1% in all the estimated equations except operating costs ratio which is significant at 5% significance level. There is a positive relationship between bank size and interest rate spreads, further confirming the positive relationship observed under the exploratory analysis—that is, the bigger the bank size, the higher the spread. This finding was robust in all the equations and yielded the highest t-values.[8] The variable also had the highest correlation with the interest rate spread among all the explanatory variables. However, the magnitude of the impact is rather small given the size of the coefficient.[9] Nonetheless, the significant and positive impact of bank size seems paradoxical, particularly given the argument that the reverse should possibly be the case based on the expected benefits of large economies of scale and capacity to invest in efficient technologies. If the higher spreads are merely interpreted as an indicator of inefficiency, one can thus quickly be tempted to conclude that big banks are less efficient–but this may or may not necessarily be the case and even if true, there could be other factors that may mask the observed spreads.

It is also possible that the higher interest rate spreads could be partly explained from the demand side if there is a high demand for loans particularly for big banks relative to supply. Moreover, there is an oligopolistic structure and market segmentation between the bigger and smaller banks whereby the former control a comparatively bigger share of the market (deposits and loans) particularly due to good reputation and customer loyalty. Big banks are generally perceived to be stable, well managed or 'too big to fail'. Consequently, the big banks are able to mobilize more deposits even at relatively low or near-zero deposit rates while at the same time attracting large loan applications despite charging relatively higher rates, hence leading to higher spreads. It seems to be case that for big banks the demand for loans or deposit mobilization is more or less inelastic with respect to the respective interest rates charged.

According to a study by Radha (2011), different segments of the banking sector in Kenya face clients of significantly different size and type, and this segmentation affects lending decisions, deposit mobilization and governance of banks. Radha (2011) further observes that the segmentation of banks is based on size but largely shaped by social factors that define the trust between banks and their clients. A study by Mwega (2012) also suggests that it is monopolistic competition that best characterizes banks' market behaviour and provides further evidence of banking market segmentation in Kenya. The positive relationship between bank size and the spreads is, thus, shaped by the nature and structure of Kenya's banking sector.

There is a positive relationship between credit risk as measured by non-performing loans ratio and interest rate spreads. Banks are compelled to shift the risk premium associated with non-performing loans to the borrowers, which may be coupled

[7] Hausman test has a tendency to accept the null hypothesis in small samples.

[8] Due to the high correlation between bank size and HHI, the latter was found to be insignificant when included together with bank size. Moreover, the results based on bank size were found to be more robust than HHI.

[9] Note that for uniformity all the rates (e.g. interest rate spread and GDP growth rate) in the empirical equation are given as ratios (i.e. divided by 100) for ease of interpretation of results and uniformity with other variables.

Table 1
Regression results.

Variable	Column A	Column B	Column C	Column D
Constant	−0.0214*	−0.031**	−0.030**	−0.006
	(−1.90)	(−2.09)	(−2.09)	(−0.88)
Bank size	0.009***	0.010***	0.010***	0.009***
	(20.9)	(19.0)	(21.0)	(15.4)
OPERAT	0.021**	0.020**	0.019**	–
	(2.02)	(2.12)	(2.05)	
NPLR	0.043***	0.043***	0.044***	0.041***
	(4.85)	(5.38)	(5.06)	(5.76)
LQDR	−0.028***	−0.026***	−0.025***	−0.023***
	(−5.34)	(−5.26)	(−4.47)	(−4.35)
ROAVG	0.213***	0.209***	0.213***	0.114***
	(2.64)	(2.60)	(2.58)	(2.56)
INTRCOM	0.031***	0.033***	0.033***	0.033 ***
	(4.59)	(4.85)	(4.59)	(4.56)
CBR		0.04*	0.04*	0.04
		(1.68)	(1.6)	(1.55)
GDP			−0.014	−0.02
			(−0.30)	(0.42)
No. of obs.	310	310	310	310
R-squared	0.78	0.79	0.79	0.78

NPLR, non-performing loans to total loans ratio; OPERAT, operating expenses as a ratio of total net operating income; LDQR, liquidity ratio; ROAVG, return on average assets; INTRCOM, net interest income as a ratio of total income; CBR, central bank rate; GDP, gross domestic product (growth rate).
t-Statistics in parentheses.
* Statistical significance at 10%.
** Statistical significance at 5%.
*** Statistical significance at 1%.

with squeezing the rates offered to the depositors. The results are consistent with those found by other studies such as Ngugi (2001) and Beck et al. (2010) based on Kenya. Chirwa and Mlachila (2004) and Siddiqui (2012) also found a positive impact of non-performing loans ratio on interest spreads of commercial banks for Malawi and Pakistan, respectively. On the other hand, liquidity availability at the bank level is negatively related with the interest rate spreads. Banks that are highly liquid are associated with lower spreads as they do not have to incur extra costs of sourcing funds when faced with increased demand for credit.

The results also show that higher return on average assets and operating costs ratio have positive impact on interest rate spreads. However, since the two variables were found to be relatively highly correlated (negatively) with each other, another empirical equation (Column D) was re-estimated by excluding the operating costs ratio. This reduced the coefficient for return on average assets from 0.21 to 0.11 but left the results of the other variables virtually unchanged. The positive effect of return on average assets, which also had the highest coefficient, could be interpreted as an indication of profit-maximizing behaviour whereby banks with higher profitability relative to average assets are also inclined to charge higher borrowing rates relative to the deposit rates in a bid to retain or increase their profitability positions. Mwega (2012) provides evidence of profit persistence in Kenya's banking sector. However, the positive relationship can be countered along similar arguments given for bank size if one argues that as an efficiency measure of banks, a higher return on average assets should be associated with lower spreads.

Interest income as a ratio of total income was found to positively determine the interest rate spreads. The higher the bank's income share derived from interest income, the higher the spreads. Column B shows empirical results with the inclusion of the policy rate, while Columns C and D contain results with the inclusion of both policy rate and real GDP growth. A rise in the CBR (monetary policy tightening) was also found to be associated with a rise in spreads but the coefficient was found to be statistically significant only at 10% significance level (Column B and C). These results can be interpreted to imply that whereas commercial banks respond to the monetary policy stance signalled by the Central Bank, the response is weak. The policy rate does not seem to have a significant impact on the interest rate spreads.

With respect to macroeconomic variables, the impact of economic performance as captured by GDP growth rate though negative is highly statistically insignificant. Inflation effect was also found to be insignificant. In general, these results are consistent with those of other studies based on African countries. For instance, studies by Bennaceur and Goaied (2008) based on evidence from Tunisia, Chirwa and Mlachila (2004) based on the case of Malawi and Ahokpossi (2013) using a sample of banks in SSA countries found an insignificant impact of economic growth on the level of different measures of spreads. In

the case of Tunisia, Ben-Khedhiri et al. (2005) also failed to find a significant influence of inflation and real output growth on bank interest margins and profitability. Overall, the results show that bank-specific factors play an important role and are comparatively more significant in influencing the interest rate spreads in Kenya.

6. Conclusion and policy insights

Most SSA economies are faced with the challenge of high interest rate spreads despite the liberalization of the financial sector. Kenya is not an exception. Whereas the determinants of interest rate spreads are likely to be multifaceted, this paper provides some insights from an empirical viewpoint based on panel data analysis, along similar approaches that have been undertaken in the literature. In general, although the banking sector is comprised of over 40 commercial banks, the market is highly skewed, with approximately 14% of banks accounting for nearly more than one-half of the market share.

The empirical results show that bank-specific factors play a significant role in the determination of interest rate spreads in the banking sector in Kenya. These include bank size, liquidity risk, credit risk, return on average assets, net interest income as a ratio of total income and operating costs. For instance, big banks are associated with relatively higher spreads. The macroeconomic variables, i.e. real GDP growth and inflation rate were found to be statistically insignificant in explaining interest rate spreads across banks. The impact of monetary policy as captured by the policy rate was found to be positive but weak. The positive relationship between bank size and interest rate spread is to some extent, a reflection of the market structure of the banking sector in which big banks are associated with more market power. They also enjoy good reputation and trust and hence can easily mobilize deposits even at lower rates and attract higher loan demand even at higher rates. However, if the higher spreads are merely interpreted as an indicator of inefficiency, one can easily conclude that big banks are less efficient. This may or may not necessarily be the case. The higher spreads associated with the size of the banks could be manifestations of other dynamics that require further research beyond this study. For instance, do the shareholders expectations play any role? The same observation applies to the positive relationship between interest rate spreads and return on assets, given that the latter is often considered to be an indicator of profitability.

In sum, the relatively high interest rate spreads remain a subject of debate and continue to pose policy challenges. Although competition in the banking sector has increased over time, there is still more that needs to be done, especially in terms of breaking market dominance. These could entail strategic policy measures aimed at enhancing effective competition and the ability of small and medium-sized banks to penetrate the market, as well as measures towards minimizing credit and liquidity risks. More policy initiatives such as the recent introduction of credit reference bureaus to address information asymmetries should be exploited and nurtured. Additionally, the responsibility also lies with the banking industry as a whole and the individual banks to explore internally and industry-driven strategies that mitigate against some of the bank-specific factors associated with higher spreads, even as further policies that may be deemed important are explored. These include a mix of strategies that could range from diversification of products to investment in cost-saving and efficient forms of technology.

Appendix.

Table A1
Descriptive statistics.

Variable	Mean	Maximum	Minimum
LQDR	0.306	0.728	0.031
INTRCOM	0.476	0.680	0.190
NPLR	0.114	0.556	0.001
OPERAT	0.592	1.260	0.090
ROAVG	0.030	0.104	−0.067
SPREAD	0.095	0.182	0.040
Bank size (log)	9.375	12.709	7.053
CBR	0.087	0.119	0.060
GDP	0.042	0.070	0.005
Observations	310		

LDQR, liquidity ratio; NPLR, non-performing loans to total loans ratio; OPERAT, operating expenses as a ratio of total net operating income; ROAVG, return on average assets; INTRCOM, net interest income as a ratio of total income; CBR, central bank rate; GDP, gross domestic product (growth rate).

Table A2
Correlation matrix.

	Bank size	CBR	GDP	INTRCOM	LQDR	NPLR	OPERAT	ROAVG
Bank size	1.000							
CBR	−0.104	1.000						
GDP	0.034	−0.136	1.000					
INTRCOM	0.129	−0.049	0.111	1.000				
LQDR	−0.121	−0.051	−0.085	−0.290	1.000			
NPLR	−0.161	0.094	−0.181	−0.101	−0.152	1.000		
OPERAT	−0.172	0.093	−0.107	−0.194	−0.169	0.360	1.000	
ROAVG	0.310	−0.112	0.109	0.229	0.129	−0.371	−0.550	1.000
SPREAD	0.434	−0.008	0.003	−0.140	−0.200	0.212	0.062	0.135

LDQR, liquidity ratio; NPLR, non-performing loans to total loans ratio; OPERAT, operating expenses as a ratio of total net operating income; ROAVG, return on average assets; INTRCOM, net interest income as a ratio of total income; CBR, central bank rate; GDP, gross domestic product (growth rate).

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