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The Role of Capital Requirements on Bank Competition and Stability: The Case of the Kenyan Banking Industry

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The Role of Capital Requirements on Bank Competition and Stability: The Case of the Kenyan Banking Industry

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Abstract

The Central Bank of Kenya (CBK) has implemented a requirement that all banks need to build their core capital to KES 1 billion (USD 12 million) by December 2012 up from KES 250 million (USD 4 million) in 2008. The argument from the CBK's perspective is that increased capital base is important for financial sector stability and may lead to cost reduction from economies of scale which may lead to lower prices (lending rates). However, other market players with an alternative perspective argue that the banking industry is already too concentrated and increasing the capital requirement further will only create more concentration. In this regard, we investigate the role of capital requirements on bank competition and stability in Kenya for the period 2000-2011.

We estimate the Lerner index and the Panzar and Rosse H-statistic as a measure of competition in Kenya's banking industry. Our estimations of both the Lerner index and the H statistic seem to suggest that competition in the Kenyan banking sector has declined over the study period. In investigating the role of capital requirements on bank competition and stability, we estimate the fixed effects panel regression model for the 36 commercial banks. The panel estimates show significant non-linear effect of core capital on competition. The log of core capital is positive and significant while squared log of core capital is negative and significant. This means that an increase in core capital reduces competition up to a point and then increases competition implying that the benefits of increasing capital requirements on competitiveness start to be realized once consolidation in the banking sector starts to take place. We use return on equity to capture bank performance and stability and the estimation result confirm a positive relationship supporting the evidence that capital regulation improves the performance of banks and financial stability.

1. Introduction

Following the financial crisis of the 2007-2009, stringent regulatory measures, such as higher capital requirements have become more prominent as a move towards having stable and more competitive banking sector (Financial Service Authority, 2009). Banks play a critical role in the allocation of society's limited savings among the most productive investments, and they facilitate the efficient allocation of the risks of those investments (Diamond and Dybvig, 1983). However, the financial crisis showed that a breakdown in this process can disrupt economies around the world. The crises further revealed the importance of bank regulations to hedge against high risks attributed to imbalances in banks' balance sheet.

Prior to the crisis the banking sector of many countries had built up excessive on-and off-balance sheet leverage that was accompanied by the gradual erosion of the level and quality of the banks' capital base (Bank of International Settlements (BIS), (2009)). As a result, the banking system was not able to absorb the resulting systemic trading and credit losses nor could it cope with the re-intermediation of large off-balance sheet exposures that had built up in the shadow banking system. To address the lessons of the crisis and the failures it revealed, bank regulators all over the world undertook fundamental reforms of the international prudential framework for the banking sector to strengthen global capital and liquidity regulations with the goal of creating a more resilient banking sector and ensuring overall financial stability (BIS, 2009; Naceur and Kandil, 2009; Financial Service Authority, 2009).

A major step in this direction was the adoption of the international regulatory reform package known as the Basel III developed by the Basel Committee on Banking Supervision (BCBS). Basel III introduced comprehensive set of reform measures which complemented the Basel II and Basel I frameworks[1]. The Basel III rules were based on the conclusion

that the financial crisis was rooted in low solvency levels on bank balance sheets and therefore recommended tighter capital requirements with the minimum capital ratio being doubled. Banks were directed to hold excess capital as conservation (mandatory) and counter cyclical buffer (discretionary) above the minimum. These reforms aimed at strengthening the regulation, supervision and risk management of the banking sector[2] (BIS, 2012; BIS, 2010; BCBS 2010).

In line with the international standards, Central Bank of Kenya (CBK) increased the minimum capital requirement, aimed at strengthening institutional structures and improving resilience of the banking industry. According to the Finance Act, (2008) new and existing banks had to comply with a minimum capital requirement of KES 1 billion (approximately US$ 12 million) as of December 2012, up from KES 250 million (US$4 million) in 2008, in order to operate as a commercial bank in Kenya. The main reason for the hastened build-up of capital was the perception that stronger banks are likely to withstand financial turbulences and therefore increase banking sector stability. Banks were also expected to benefit from economies of scale and lower their transaction costs, reduce bank lending rates

and consequently increase bank competition and promote financial inclusion. It was further expected that the small banks that found difficulties raising their capital to the required levels would be encouraged to merge.

However, other market players have opposed this move, with the argument that the banking sector is already too concentrated and increasing the capital requirement further will only create more concentration and cartels. Even though the overall picture indicates that Kenya's banking sector is well capitalized, especially the large and medium banks, the small banks which account for almost half the number of existing banks risked being undercapitalized.

In favor of capital adequacy requirement, literature advances two arguments. On the one hand, capital adequacy is seen as an instrument limiting excessive risk taking of bank owners with limited liability and, thus, promoting optimal risk sharing between bank owners and depositors. On the other hand, capital adequacy regulation is often viewed as a buffer against insolvency crises, limiting the costs of financial distress by reducing the probability of insolvency of banks (Barrell et al., 2009; Miles et al., 2011; Caggiano and Calice. 2011). Irrespective of the viewpoint,

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[1]   Basel I was the first global minimum capital adequacy standard for the banking sector and was agreed and adopted in 1988. The Basle Accord of 1988 required banks to maintain minimum capital to asset ratio with the assets weighted using broad risk classifications. The purpose of the risk based standards was to make bank capital requirements sensitive to the risk in a bank's portfolio of assets and off-balance sheet activities.

The calibration of Basel II which came in to effect in 2006 was intended to keep the overall amount of capital required for the banking system as a whole broadly unchanged, while giving firms a modest incentive to incur the costs of building satisfactory models enabling them to adopt more advanced risk-sensitive approaches.

[2]   According to the 1988 Basel Accord, there were two main objectives behind the adoption of minimum capital requirement for internationally active banks; first, higher capital would help strengthen the soundness and stability of the international banking system by encouraging international banking organizations to boost their capital positions. Second, it's believed that higher capital would reduce competitive inequalities. In addition, capital reduces limited-liability-driven incentives of bank shareholders to take excessive risk by increasing their potential loss in case of bank failure (Holmstrom and Tirole, 1997; Perotti, 2011).

a general consensus is that banks with higher capital and liquidity buffers are better able to support businesses and households in bad times since buffers enhance the capacity of banks to absorb losses and uphold lending during a downturn.

Conversely, some authors have argued that stringent capital requirement comes at a cost. By imposing high capital requirements, banks will be constrained to some extent by competitive pressures, which would occur due to competition on loans, deposits and even the sources of equity and debt investments (Agoraki et al, 2011; Bolt and Tieman, 2004). In this case, banks are likely to lend less, charge more for loans and pay less on deposits as part of their actions to restore an acceptable return on the larger capital base. Similarly, as banks became more constrained, their ability to expand credit and contribute to economic growth will be hampered during normal times. In addition, imposing higher capital requirements may hinder competition as this may act as entry barrier for new banks and too prohibitive for small banks to operate.

On financial stability, emerging evidence reveal that regulatory policy that restrict entry and banks' activities are negatively associated with bank stability. Specifically, Barth, Caprio and Levine (2004) and Beck et al. (2006 a,b) find that banking systems with more restrictions on banks' activities and barriers to bank entry are more likely to suffer systemic banking distress, while capital regulations are not significantly associated with the likelihood of suffering a crisis. Moreover, in highly concentrated markets, financial institutions may believe they are "too-big-to-fail" and

this may lead to riskier investments (Berger et al., 2008). Empirically, there are several recent studies which have supported this hypothesis. Boyd et al. (2006) and De Nicolo and Loukoianova (2006) both find an inverse relationship between higher market concentration and financial stability suggesting that the risk of bank failures increase in more concentrated markets.

From the preceding discussion, whereas the primary goal of capital regulation is fairly well understood, its precise impact on bank competition and financial system stability is still ambiguous. Given the prominence of capital requirements in today's regulation, the empirical relationship between the minimum capital requirement on bank competition and stability is thus of great interest to policy makers. In this regard, main policy concerns remains as to the consequences of increasing capital requirement on competition in the financial sector. Furthermore the extent of how banks are able to respond, given their size, earnings power, the potential for mitigation, and their capital-raising capacity.

Using annual bank level data for the period 2000-2011, this paper examines the banking sector in Kenya in relation to raising the minimum capital requirement and its implications on bank competition and stability. Specifically the paper estimates competitive index within the banking sector in Kenya and analyze the impact of higher minimum capital requirement on banks' competition; and in addressing this relationship, we compare the measures of competition for different groups of banks. In particular, we conduct tests to examine differences in competition within

the large banks, medium sized banks and small banks. Further the paper ascertains the effect of minimum capital requirements on competition before the introduction of new capital requirement of Ksh 1 billion (2000-2007) and after (2008-2011).

The remainder of the paper is organized as follows. Section 2 presents recent developments on capital adequacy requirements in Kenya. Section 3 reviews literature relating to the impact of capital requirements and bank competition. Section 4 outlines the methodology, data and model specification while Section 5 presents the results and discussions of results. Section 6 gives the summary, conclusions and policy recommendations.

2. Capital adequacy requirements in Kenya

CBK makes and enforces rules which govern the minimum capital requirement for Kenyan banks and are based on the international standards developed by the Basel Committee. In the year 2008, CBK reviewed the minimum capital requirements for commercial banks and mortgage finance institutions with the aim of maintain a more stable and efficient banking and financial system. According to the Banking Act (2008), every institution was expected to maintain:-

a)   A minimum core capital of at least KES 1 billion (USD 12 million) by 2012
b)   A core capital of not less than 8% of total risk adjusted assets plus risk adjusted off balance sheet items;
c)   A core capital of not less than 8% of its total deposit liabilities;
d)   A total capital of not less than 12% of its total risk adjusted assets plus risk adjusted off balance sheet items;

In addition to the above minimum capital adequacy ratios of 8% and 12%, commercial banks were required to hold a capital conservation buffer of 2.5% over and above these minimum ratios to enable the institutions withstand future periods of stress (CBK, 2013)[3]. This brings the minimum core capital to risk weighted assets and total capital to risk weighted assets requirements to 10.5% and 14.5%, respectively.

In comparison with the international set standards, the regulatory capital within Basel III framework require banks to hold 6% of Tier I capital (up from 4% in Basel II) of risk-weighted assets and 8% of Tier II total capital (8% in Basel II) of risk-weighted assets. Basel III also introduced additional capital buffers (mandatory capital conservation buffer of 2.5% and a discretionary counter-cyclical buffer which would

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3   Capital Conservation Buffer is a ratio of extra capital to risk weighted assets (comprising mainly of common equity, premium reserves and retained earnings) over and above the set minimum capital ratios, required to be maintained by institutions as a buffer for losses during periods of financial and economic stress (CBK, 2013).

Figure 1: Core Capital and Minimum Capital Requirement of the Banking Sector
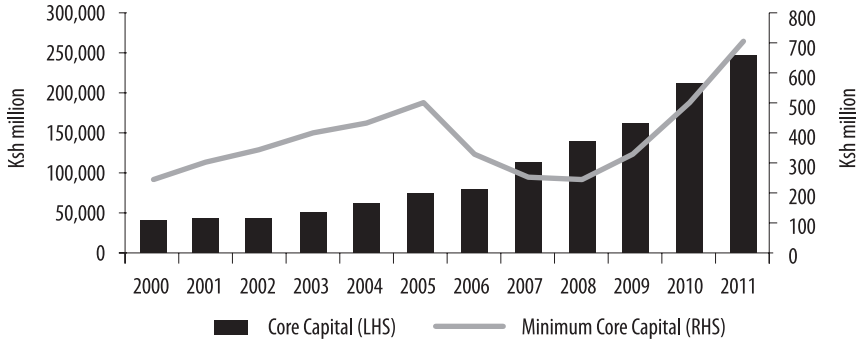
allow national regulators to have up to another 2.5% of capital during periods of high credit growth. The minimum capital ratios will be phased in between January 2013 and January 2015, and the conservation buffer will be phased in from January 2016 to December 2018.

In terms of implementation, the Kenya's banking sector has over the years complied with the implementation of the Basel accords, with implementation of Basel I and Basel II

being done in phases. The amendments by CBK through the Finance Act 2008 raised the minimum capital was intended to strengthen institutional structures in the banking sector. The new capital requirement was to be met progressively as follows:- KES 350 million by 31st December 2009; KES 500 million by 31st December 2010; KES 700 million by 31st December 2011; and KES 1 billion by December 2012. In absolute terms, banks progressively built their core capital towards the fulfillment of these requirements.

Table 1: Bank performance Indicator, 2005-2011

	2005	2006	2007	2008	2009	2010	2011
Core Capital/Total Risk Weighted Assets	15.98	16.06	18.06	18.16	18.56	20.12	18.12
Total Capital/Total Risk Weighted Asset	16.88	17.09	19.33	20.34	20.80	22.38	20.52
Return on Assets	3.70	2.40	2.60	2.60	2.60	3.80	4.40
Return on Equity	41.10	27.70	27.50	26.10	24.90	27.90	30.70
Gross Net Non Performing Loans/Gross loans	19.90	16.20	10.60	9.20	8.00	6.30	4.40
Capital Adequacy-Bank Rating	2.00	1.00	2.00	1.00	1.00	1.00	1.00

Figure 2: Measures of Capital Adequacy, 2000-2011
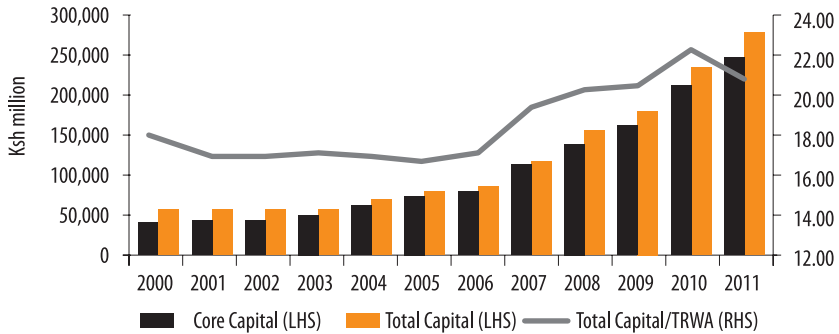
Source: CBK's Bank Supervision Annual Report Various Issues

During the period 2008-2011, the Kenyan banking system showed resilience, which was attributed in part to the low financial integration in the global financial market and the intensive supervision and sound regulatory reforms (Bank Supervision Annual Report 2009, 2010; IMF, 2009). The financial sector performance indicators improved substantially and the sector remained profitable with return on asset indicator rising from 2.6 percent in 2007 to 4.4 percent in 2011 while the ratio of gross non-performing loans to gross loans improving from 10.6 percent to 4.4 percent over the same period (see Table 1).

Issues

Kenya's banking sector was well capitalized and on average most banks meet the four minimum capital requirements, for example the minimum core capital required increased from an average of KES 3.5 billion in 2008 to an average of KES 5.6 billion in 2011, against a statutory minimum requirement of KES 250 million in 2008 to KES 700 million in 2011. However, these amounts and ratios varied substantially among the large, medium and small banks. In 2008, the core capital to total risk weighted assets (Tier 1) ratio stood at 18.2% above the statutory minimum requirement of 8%; the total core capital to total risk weighted assets (Tier II) ratio stood at 20.3% against the statutory minimum requirement of 12%. The values increased in 2009-2011 as the banks geared up for new requirements to be achieved by 2012.

3. A Survey of the Literature

Several strands of theoretical literature have analyzed the effects of capital adequacy requirements on banks behavior. The first strand of literature uses portfolio approach of Pyle (1971) and Hart and Jaffee (1974), where banks are treated as utility maximizing units (see Koehn and Santomero, 1980; Rochet 1992). In a mean-variance analysis, Koehn and Santomero (1980) showed that the introduction of higher leverage ratios will lead banks to shift their portfolio to riskier assets.

As a solution to such a situation, Kim and Santomero (1988) suggested that this problem can be overcome if the regulators use correct measures of risk in the computation of the solvency ratio. Subsequently, Rochet (1992) extended the work of Koehn and Santomero (1980) and found that effectiveness of capital regulations depended on whether the banks were value-maximizing or utility-maximizing. In the former case, capital regulations cannot prevent risk-taking actions by banks. In the latter case, capital regulations could only be effective if the weights used in the computations of the ratio are equal to the systematic risk of the assets. A further theoretical ground argued that banks choose portfolios with maximal risk and minimum diversification.

The second strand of literature on the topic utilizes option models. Furlong and Keeley (1989) and Keeley (1990) developed several models under this framework and showed that higher capital requirements reduce the incentives for a value-maximizing bank to increase asset risk. Other authors argue that capital requirements reduce monitoring incentives, which reduces the quality of banks' portfolios (Besanko and Kanatas, 1993; Boot and Greenbaum, 1993) while others argue that more stringent capital adequacy requirements leads banks to set stricter acceptance criteria for granting new loans (Bolt and Tieman 2004).

The empirical literature undertaken to analyze the effects of capital requirements on the behavior of banks has focused on the analysis of either cross country or individual countries' banking system. The first group of studies on cross country analysis has mainly focused on developed economies and emerging markets (Agoraki et. Al, 2011; Barth et.al, 2004; Demirguc¸-Kunt et.al, 2003; Van Roy, 2003; Chiuri et,al, 2002). Agoraki et.al (2011) used panel data estimation techniques to analyze the interplay between regulation, competition and bank risk taking behavior in transition countries for the period 1998-2005. The study defined regulation as capital requirements, restrictions on banks activities and official supervisory power. The study findings revealed that banks with lower market power tend to take on lower credit risk and have lower probability of default. The findings also revealed that capital requirements reduce credit risk, but this effect weakens for banks with sufficient market power.

Barth et.al (2004) used data on bank regulations and supervision in 107 countries to assess the relationship between specific regulatory and supervisory practices and banking-sector development, efficiency, and fragility. The results raise a cautionary flag regarding government policies that rely excessively on direct government supervision and regulation of bank activities. The study by Demirguc¸-Kunt et.al (2003) analyzed the impact of bank regulations as well as other internal determinants; including concentration, and institutions, on bank profit margins. The study analyzes the impact of bank regulations, concentration, and institutions using bank-level data across 72 countries while controlling for a wide array of macroeconomic, financial, and bank-specific traits.

Single country studies on the impact of capital requirements on bank competition and performance include (Naceur and Kandil, 2009; Lin et.al, 2005; Kamau et.al, 2004; Angelini and Cetorelli, 2003; Yudistira, 2003). Naceur and Kandil, (2009) used bank scope data base for 28 banks for the period 1989-2004 to analyze the effects of capital regulations on the performance and stability of banks in Egypt. The study analyzed two measures of performance: cost of intermediation and banks' profitability- measured by return on assets. The findings showed that as the capital adequacy ratio internalizes the risk for shareholders, banks increase the cost of intermediation, which supports higher return on assets and equity pointing out the importance of capital regulation to the performance of banks and financial stability in Egypt. The study recommends the use of structural reforms aimed at establishing more competition in the banking industry to ensure that performance indicators are commensurate with the optimal practices of the intermediation function that guarantees financial stability over time.

Kamau, et.al (2004) used the simultaneous equations approach to model the regulatory impact of minimum capital requirements on bank risk behavior and capital levels in Kenya for the period 2000-2002. The study used the Hirschman-Herfindall index (HHI) and concentration ratio (CR4) to estimate the competitive index. The HHI and CD4 indices confirmed that the Kenya's banking sector has an oligopolistic market structure or (monopolistic competition). Using the three stage least square method, the study estimated the relationship between capital adequacy ratio and the risk portfolio in the banking sector. The study findings revealed that risk-based capital requirements have been effective in increasing capital for

the capitalized bank while the effect has been minimal for the under-capitalized banks. According to the study findings, regulatory constraints affect bank behavior particularly for the capitalized banks. Capital requirements cause banks to increase their capital. The main conclusion of the study is that prudential capital requirements should not be set so high, such that they enhance risky behavior in banks. Rather, they should be set low or at a fair enough level to ensure asset quality and non-risky tendencies.

Angelini and Cetorelli (2003) examined the effect of regulatory reform on competition in the Italian banking industry using firm-level balance sheet data for the period 1984-1997. They estimated the Lerner's index as a measure of competitiveness within the banking sector. The study revealed that competitive conditions were relatively unchanged until 1992, however, competition improved substantially thereafter, as signaled by the decline in estimated markups. Concluding that the deregulation process in Italy which culminated with the implementation of the Second Banking Directive in 1993, significantly contributed to improving bank competition and that it may also have been an important determinant of the consolidation process recorded by the Italian credit system during the 1990s.

Vlaar (2000) analyzed how capital requirements affect the profitability of two banks that compete as Cournot duopolists on a market for loans. The results showed that higher capital requirements impose a higher burden on the inefficient bank than on the efficient one, even though the requirement may only be binding for the efficient bank. Capital requirements strongly improve the profitability of the efficient bank when the inefficient bank pursues a fail strategy in absence of regulation.

A general conclusion drawn from the survey of the body of literature above is that capital regulation has some effect on the degree of competition in the banking sector. Our paper focuses on the impact of capital regulation as measured by capital requirement on the competition in the banking industry in Kenya. A variety of factors underlies the contribution of our research to existing literature.

- First, the banking sector in Kenya has in the recent past undertaken major structural and policy changes mainly aimed at improving performance in the banking sector and this include prudential regulation and supervision, financial innovation among others.

- Second, the study by Kamau et al (2004) analyzed that relationship between capital adequacy and the risk behavior of banks in Kenya their study used the HHI and CD4 indices to analyze the competitive behavior of the banking sector. However, the study did not estimate the direct relationship between capital requirements and competitive behavior of the banks. Our study therefore, uses the Lerner index to derive the competitive index and estimate the effects of capital regulation on banks' competition and stability. We estimate the competitive index for the Kenyan banks in terms of bank size and period when capital requirements were raised substantially.

- Thirdly, our estimation technique utilizes recent innovations in panel estimation that incorporates dynamics to take into consideration persistence in the behavior of dependent variables over time. The study findings will guide policymakers towards upgrading quality and enhancing the competitiveness and stability of an industry that is considered by many to be the core of economic development.

4. Methodology

AAs mentioned earlier, the main objective of this study is to determine whether increased capital requirement is good for competition and banking sector stability compared to lower capital base.

The hypotheses being tested are:
1.   High capital requirement reduce bank competition.
2.   High capital requirement is negatively related to stability in the banking sector.

4.1.   Measures of Banking Stability and Competition
The Central Bank of Kenya categorizes indicators of bank soundness into five broad groups namely capital adequacy, asset quality, earnings and profitability, liquidity and sensitivity to market risk. Return on equity is an indicator of earnings and profitability of the banking sector. We therefore use the return on equity as a measure of financial stability. To measure Bank competition we estimate the Lerner Index and The Panza Ross H Statistic.

Lerner Index

The Lerner index defines the difference between the price (interest rate) and marginal cost expressed as a percentage of prices, taking into account that divergence between product price and marginal cost of production is the essence of monopoly power. The Lerner Index is a more direct measure of competition because it focuses on the pricing power apparent in the difference between price and marginal cost thereby capturing the degree to which a firm can increase its marginal price beyond marginal cost (Berger et al., 2009).

Even though there are other measures of bank competition applied in the literature, the Lerner index is more appealing because it is a more accurate measure of market power than the standard concentration measures. In addition, it shows where a firm's market power is located between perfect competition and maximal market power, and the role that demand elasticity plays in determining a firm's mark-up (Sanya and Gaertner, 2012; Rojas, 2011; Demirguc-Kunt and Peria, 2010).

The index Llit is defined as the difference between price and marginal cost, divided by price. It is a level indicator of the proportion by which price exceeds marginal cost, and is calculated as:

$$LI_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \qquad \ldots\ldots\ldots\ldots\ldots (1)$$

Where: P_{it} is the price of banking outputs for bank i at time t, MC_{it} is the marginal costs for bank i at time t.

Following the approach in Fernandez de Guevara et al. (2005), Berger et al. (2009), Demirguc- Kunt and Peria (2010) or Fungáčová et al. (2010), who proxy banking production by total assets, P is calculated as the ratio of total bank revenues to total assets. **MC** is estimated on the basis of a translog cost function with one output (total assets) and three input prices (price of labor, price of physical capital, and price of borrowed funds). Symmetry and linear homogeneity restrictions in input prices are imposed. The cost function in line with Berger et.al is specified as follows:

$$\ln TC_{it} = \alpha_0 + \alpha_1 \ln y_{it} + \frac{1}{2}\alpha_2 \left(\ln y_{it}\right)^2 + \alpha_3 \ln \sum_{j=1}^{3} w_{jit} + \varepsilon_{it}$$

$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where **TC** denotes total costs, **y** total assets, **wj** (**w1, w2** and **w3**) indicate three input prices (i.e. labor, capital and funds). **w1** indicates the price of labor, which is the ratio of personnel expenses to total assets, **w2** is the price of physical capital, which is the ratio of other non-interest expenses to fixed assets and **w3** is the price of borrowed funds, which is the ratio of interest expenses to total funds. Total cost is the sum of personnel expenses, other non-interest expenses and interest expenses.

The estimated coefficients of the cost function are then used for computing the marginal cost. Indeed, as marginal cost is the derivative of total cost to output, it can be derived that the derivative of the logarithm of total cost to logarithm of output is the ratio of marginal cost to total cost multiplied by output. As a consequence, marginal cost is equal to the product of the derivative of the logarithm of total cost to output multiplied by the ratio of total cost to output. The derivative of the logarithm of the total cost with respect to the logarithm of output is computed using the cost function specified in Eq. (2). The marginal cost is based on the estimation of the cost function. We estimate a translog cost function with one output and three input prices.

The estimated coefficients of the cost function are then used to compute the marginal cost (**MC**): (See equation 3)

$$MC_{it} = \frac{TC_{it}}{y_{it}} \left(\alpha_1 + \alpha_2 \ln y_{it} + \alpha_3 \ln w_{it} \right)$$

.... (3)

Once marginal cost is estimated and price of output computed, we calculate Lerner index for each bank and obtain a direct measure of bank competition[4]. The Lerner index ranges between zero and one. When **P = MC**, the Lerner index is zero and the firm has no pricing power. A Lerner index closer to one indicates the higher mark-up of price over marginal costs and hence market power for the firm (Ariss, 2010). In general, **LI = 0** indicates perfect competition, while **LI = 1** indicates monopoly.

Figure 3 shows the evolution of the Lerner index for the Kenyan Banking sector for the period 2000-2011. The findings indicate that the Lerner index for Kenya's banking sector lies between 23 percent and 31 percent which means that banks price between 23 percent and 31 percent above

marginal costs. The value of the Lerner index has increased over time from 25 percent in the period between 2000 and 2005 to 30 percent in the period between 2006 and 2011 implying that the banking sector in Kenya has become less competitive over time.

Panzar and Rosse H-statistic

As a measure of bank competition, the Panzar and Rosse H-statistic shows that the sum of the elasticities of a firm's revenue with respect to the banks's input prices and it varies between zero and one, with less than zero being monopoly, between zero and one being monopolistic competition and one being perfect competition (Panzar and Rosse, 1987).

Using the panel data estimation technique, the findings for fixed effects with cross-section weights showed that the H-statistic for the period 2000-2011 was 0.50; implying that during this period, the banking sector in Kenya exhibited

Figure 3: Lerner Index of the Kenyan Banking Sector, 2000-2011
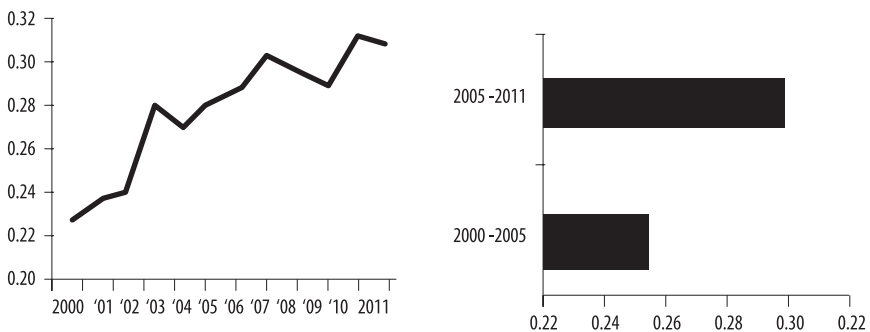
It should be noted that the constructed Lerner index does not capture risk premia in the prices of banks' product and services, breaking down its positive association with the size of monopoly rents. However, it is the only measure of competition that is computed at the bank level (Berger et al., 2009).

Table 2: Panzar and Rosse H-statistic for the Kenyan Economy, 2000-2011

	2000-2007	2008-2011	2000-2011	Large Banks	Medium & Small Banks	All Banks
Fixed Effects No weights	0.64	0.42	0.45	0.57	0.48	0.45
Fixed Effects Cross section weights	0.59	0.47	0.50	0.53	0.57	0.50
Random Effects Model						
	0.62	0.42	0.50	0.51	0.52	0.50

monopolistic competition. At the same time, there was a decline in the H-statistic from 0.59 in the period 2000-2007 (i.e. before amendments of the capital requirements in the Banking Act) to 0.47 in the period 2008-2011 (i.e. after the amendments of the capital requirements) implying that competition in the banking sector has reduced over this period.

We also categorized the banking sector according to bank size and estimate the H statistic for 36 commercial banks – six large banks and thirty medium and small sized commercial banks – with the H statistic for large banks at 0.53 compared to medium and small banks at 0.57. These findings compare well with other studies on the Kenyan banking industry (Sanya and Gaertner, 2012 and Kamau et.al., 2004). Sanya and Gaertner, (2012) estimated the competitive index within the EAC region for the period 2002-2008 and found the H Statistics of 0.60 for Kenya. Kamau et.al, (2004) used the HHI and CD4 indices for the period 2000-2002 and found a monopolistic competition in the banking industry.

4.2. Model Specification

This study estimates two equations to capture the relationship between capital requirements and bank competition and secondly to capture the relationship between capital requirements and bank stability. To analyze the impact of changes in capital requirements on bank competition of the banking sector in Kenya, we formulate a dynamic multivariate panel regression model in which the competitive index, as measured by the Lerner Index (LI) depends on changes in capital requirement and a set of other conditioning variables. To date we have had three successive increases in absolute capital requirements all of differing magnitude; KSh 100 million, KSh 150 million and KSh 200 million by December 2009, December 2010 and December 2011 respectively. An increase in regulatory capital requirements leads banks to increase their core capital levels (Kamau et.al, 2004). Hence, we focus on absolute core capital levels in the study. Formally the model is stated as follows

$$LI_{i,t} = \alpha_0 + \beta_1 X_{i,t} + \delta_2 Z_{it} + \varepsilon_{i,t}$$

. . . . (4)

Where LI in equation 4 is the Lerner Index and it measures competitiveness in the banking sector at firm level. To analyze the impact of capital on bank competition we estimated two measures of bank competition, the Lerner Index and the H-index. However, the study uses the Lerner index because we were able to derive competitive index at firm level. The conditioning variables X include macroeconomic and financial sector variables. Z is the absolute level of core capital. As an indicator of the macroeconomic stability we include the inflation rate. It is expected that banks will be less competitive in an environment of high inflation since interest rates lose their information content (Claessens & Laeven, 2003). We also include ratio of loans to assets as a way of controlling for variations in bank specific characteristics. To account for contestability, we include an index of banking freedom obtained from the Heritage Foundation. This variable represents the overall burden of regulation as well as the

efficiency of government in the regulatory process. A higher score of the index indicates a better environment with respect to regulation and government efficiency.

The impact of capital on financial stability is analyzed using the following model

$$RoE_{i,t} = \alpha_0 + \beta X_{i,t} + \delta Z_{it} + \varepsilon_{i,t}$$

……………………………………….…..(5)

Where RoE in equation 5 is the return on equity and is a measure of banks' profitability and earnings. RoE is a traditional performance measure of banking stability. The higher RoE is the more banks can be expected to absorb losses. X is a vector of explanatory variables and includes GDP growth rate as an indicator of macroeconomic stability. Z is the absolute level of core capital.

Figure 4: Index of Business Freedom – Kenya
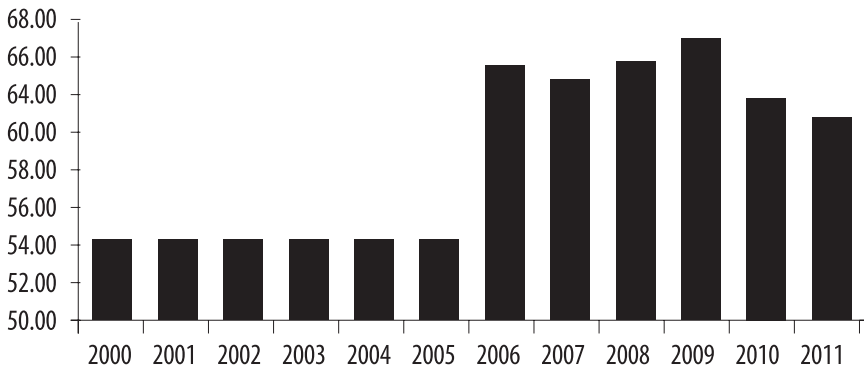
Source: 2012 Index of Economic Freedom, Heritage Foundation

4.3. Data

This study uses annual bank level data covering the period 2000-2011. The data was obtained from Bank Scope database and Central Bank of Kenya. The study also makes use of Bank Supervision Annual reports for various years. GDP estimates are obtained from the economic survey for various years. We apply filtering rules to eliminate seven banks with non-representative data, and out of the 44 banks in Kenya we analyze 36 commercial banks. The final sample selection includes six large banks, fifteen medium sized banks and fifteen small sized banks. We use panel data estimation method to analyze the determinants of competition and bank performance. For the analysis on competition, we use the empirically measured Lerner index for the Kenyan banking sector. In addition, we also empirically measure the H-statistic.

5. Estimation and discussion of the results

The results of the regression on competition are presented in table 4. The analysis shows that macroeconomic factors play a key role in enhancing competitive environment for the banking sector. In particular there is a negative relationship between inflation and competition. This is due to the fact that interest rates no longer serve as a useful benchmark for financial services in an inflationary environment (Sanya & Gaertner, 2012). The panel estimates show a significant nonlinear effect of core capital on competition. The log of core capital is positive and significant while squared log of core capital is negative and significant. This means that an increase in core capital reduces competition up to a point and then increases competition implying that the benefits of increasing capital requirements on competitiveness start to be realized once consolidation in the banking sector starts to take place.

We find that the index of banking freedom is negatively related to Lerner Index. The negative relation between the index of banking freedom suggests that contestability has an important effect on competition in the banking industry. In particular an increase in the index implies a decline in the Lerner index, or an improvement in competition. In terms of bank size, bank specific characteristic, we find a negative and significant relation between the loan asset size and Lerner Index.

Table 3: Determinants of the Lerner Index

	Macroeconomic Stability	Bank Structure	Contestability
Core Capital		0.07***	
Core Capital squared			
		-0.003**	
Inflation Rate	-0.001**		
Banking Freedom			-0.06***
Loan size (ratio of loans to assets)		-0.05***	
Lerner index (–1)		0.23***	
Number of Banks	36	36	36
Number of observations	324	324	324

Results from the model explain the determinants of bank competition. *, **, *** represents significance at the 10, 5 and 1 percent significance levels. The degree of bank competition is proxied by the Lerner index.

With regard to financial stability, we find that bank performance can be explained by improved core capital levels. In particular, we find a positive relationship between core capital and return on equity, a measure of bank performance and profitability and an indicator of financial soundness. This is supported by the findings of Naceur and Kandil, (2009) for Egypt which show that capital regulation improves the performance of banks and financial stability.

Table 4: Determinants of Bank Performance

	Macroeconomic Stability	Bank Structure
Core Capital		0.04***
GDP	0.01***	
RoE (–1)		0.23***
Number of Banks	36	36
Number of observations	324	324

Results from the model explain the determinants of bank competition. *, **, *** represents significance at the 10, 5 and 1 percent significance levels. Banking sector soundness is proxied by the return on equity.

6. Conclusion and policy recommendation

Banking sector competitiveness is important due to the role played by banks in the economy. In this regard, we examined the banking sector in Kenya in relation to minimum capital requirement and its implications on bank competition. Using two empirical measures of competition we analyzed the impact of core capital on banks' competition and performance. When we relate the Lerner index, which is the indicator of competitiveness to a number of variables, we find that regulatory efficiency improves competition in the banking sector. These results support previous evidence that regulatory efficiency is important for competition (Claessens & Laeven, 2003). We find evidence that capital has a nonlinear effect on competition. The benefits of increasing capital requirements on competitiveness are realized once consolidation starts to take place (captured by core capital squared). Bank structure also has a significant and important effect on banking performance.

Overall, the results point to the role of capital regulation on bank competition and the performance of banks and financial stability in Kenya. Moreover, the state of the macroeconomic condition is a major factor that determines the competition and performance of the banking industry. For policy implications, the results indicate the importance of reducing barriers to contestable markets. In this regard, reforms in the financial sector should aim at establishing more competition in the banking industry to ensure that performance indicators are commensurate with the optimal practices of the intermediation function that guarantees financial stability over time.

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