Do Capital Requirements Affect Cost of Intermediation? Evidence from a Panel of South African Banks

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Abstract

Since the 2007 sub-prime financial crisis, world bank capital ratios have increased. In this paper, we investigate the impact of increased bank capital requirements introduced under the Basel Accord framework on the costs of intermediation. We attempt to answer this central question by running panel regressions using 2001 – 2012 annual bank-level data for ten banks constituting inter alia the four largest South African banks. We conclude that high capital requirements are associated with increased costs of intermediation. Our fixed effects estimations show that a one percent increase in capital requirements lead on average to a range of 12 – 14 basis points increase in the cost of intermediation during our period of analysis. We also find evidence that the Basel II capital requirements effected from 1 January 2008 contributed to increased cost of intermediation by an average 7 basis points for the period 2008 – 2012. We therefore caution that while maintaining adequate capital levels is crucial for obvious reasons, there is need for supervisory authorities to ensure that such regulation is effective and well-balanced to guarantee safety and stability of the sector without endangering the ability of the banks to service the economy.

Keywords: Bank performance, Bank capital, Basel accord, Capital adequacy ratio, Financial regulation, Intermediation costs.

JEL classification: C33, G21, G28

1 Introduction

According to van Roy (2005, p. 2) the adoption of the 1988 Basel Accord was initially intended for 12 developed countries including the G10 countries for two reasons. To create an equal playing field for banks by increasing the

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capital ratios and secondly to promote financial stability by distorting incentives against risk-taking behaviour by banks. However, owing to the simplistic nature of the scope of Basel I, the development of Basel II was an improvement aimed at aligning the required minimum capital with risk. This was based on the understanding that not all assets are equally risky, certain assets are associated with a particular level of risk. As such a ratio of capital of a particular category (tier) for every asset of a particular risk was set. The agreed minimum capital-to-risk-weighted-assets ratio under Basel II was 8 percent implying that banks would hold 8 percent of their risk-weighted assets in the form of capital. The intuition being to induce "high risk" banks to cut their risky activities or else provide enough buffer capital to counter any unexpected catastrophe. In the wake of the sub-prime financial crisis in 2010, a global position under the Basel III Accord was then taken to set standards and practices that would guarantee the preservation of adequate capital for the stability of the banking industry and to prevent another banking crisis.

South African banks began implementing the capital agreements of Basel II and Basel III accord in January 2008 and 2013 respectively (SARB, 2015). In addition to international minimum capital requirements, South African banks depending on systemic and idiosyncratic risk assessments may be required by the registrar of banks to hold capital adequacy ratios over and above the stipulated global minimum requirement (Bank Supervision, 2010). As a result, since the 2007 global financial crisis, world bank capital ratios have increased. Jensen-laerkholm (2013, p. 2) argues that while increased capital requirements ensures that the financial system is resilient to financial and economic shocks they also carry a cost. Wider spreads affect a bank's basic function of intermediation and hence distort prices thus slowing down the role of the banking system in contributing to economic growth (Ikhide, 2008, p. 586). In particular increased cost of intermediation in the form of wider spreads weakens demand for investment loans and discourages savings. Hence the issue of capital adequacy in banking cannot be underestimated. The purpose of this paper is therefore to empirically address the fundamental question of whether capital requirements generally and in particular those introduced under Basel II affects a banks' cost of intermediation using South African banking data.

This particular study is important for several reasons. Empirical evidence on the nexus between capital requirements and intermediation costs has important implications on the lending market and is therefore of interest to policy makers. Financial regulators have the potential to influence the degree of intermediation efficiency with which banks operate. On a larger perspective, financial regulation has crucial implications on the economic growth prospects of a country. In addition, higher cost of intermediation retards progress towards expanding wider access to financial inclusion for all. In South Africa, broader access to bank services for all remains an important issue especially as one way of redressing the present challenges of high income inequalities and expanding economic opportunities. It is against this background that bank capital regulation must be effective and well-balanced to guarantee financial stability without endangering the ability of the banks to service the economy.

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This paper is organized as follows: The next section presents a synopsis of financial regulation in the context of South Africa's banking followed by empirical literature review in section 3. Data analysis and the methodology are presented in section 4. A discussion of results and conclusion are presented in section five and six respectively.

2   The South African Banking Sector Overview

The South African banking sector comprises 44 banks; 3 mutual banks, 17 domestic banks and 14 branches of international banks (SARB, 2013, p. 5). In addition, South Africa has 43 foreign banks with approved local representative offices since 2013. However, in December 2011 the four largest banks represented 84.1 percent of the total banking sector assets (SARB, 2011, p. 55). Overall, the number of banks has been declining over the years particularly domestic banks since 2001 until present (*see* **Table 1**). There are various reasons for this trend ranging from liquidation, mergers or amalgamation. In South Africa, foreign banks hold a large share of banking system assets. According to SARB Annual Report (2011, p. 56), foreign shareholders held 43.2 percent of the nominal value of the total banking sector's shares in issue at the end of 2011. The high percentage of foreign shareholding in the South African banking industry is attributed to ABSA, the second largest bank in the country. Foreign shareholders represented 55.5 percent of the nominal value of ABSA's total shares in issue at the end of 2011.

In 2004, Deloitte (2004) found that South African banking fees were the world highest with roughly 2 percent of an average individual's gross income paying bank charges. An empirical study by Mlambo and Ncube (2011, p.12) found that for the period 1999 – 2008, the structure of the South African banking industry was characterized by monopolistic competition. This result is clear revelation of dominance by four large banks. Greenberg and Simbanegavi (2009, p. 6) argue that this high market share has the potential to induce banks to engage in collusive behaviour for example lowering their deposit rate and raising their lending rate. In an investigation of the banking industry, the Competition Commission (2008, p. 18) revealed evidence of abuse in the setting of certain fees and charges and found poor disclosure practices that made it difficult for customers to do interbank comparisons. In recent years, there have been regular complaints that bank fees and charges are exorbitantly high in South Africa.

Regarding compliance to stipulated minimum capital levels, **Figure 1** is a general portrayal of the soundness of South Africa's banking sector for the period 2005 – 2011. One of the factors often attributed for the resilience of South Africa's banking sector during the financial crisis despite its exposure to foreign assets was the fact that it was adequately capitalized and profitable. **Table 2** provides a general comparison of South Africa with other emerging markets on capital adequacy ratios. This comparative analysis is intended to partly shed some light as to why the South African banking industry despite the presence of foreign banks relatively managed to come out of the crisis unscathed.

Contrary to experience in many emerging and developed countries, the SARB Supervision report (2009, p. 4) noted that South African banks did not require any form of liquidity support from either the government or the Reserve bank. In particular, the report identified adequate capital levels, low leverage ratio, and limited exposure to foreign assets and funding among the main factors contributing towards the resilience of South African banking sector during the financial crisis.

3   Literature Review

In their paper, Cumming and Nel (2005, p. 641) identifies three possible ways that banks meet minimum regulatory capital ratios. Banks capitalize their retained earnings or issue new equity; they may reduce their overall level of assets or shift towards low risk asset portfolios. However, given the high cost of holding equity, bank managers often choose to hold the minimum capital required. However, if a larger proportion of their assets are high risky, capital must be increased to counter unexpected losses or else the high-risk assets must be decreased. The need for increased capital requirements in recent years has created a dilemma for bank managers when building the optimal required capital ratio to hold. On one hand, higher capital levels are necessary to safeguard the investment of owners by decreasing the potential for insolvency or a bank failure. On the other hand, holding more capital *ceteris paribus* implies a lower return on equity. For this reason, Mishkin (2013, p. 227) suggest an optimum trade-off between high capital sufficient to guarantee bank safety and a lower return that goes with high capital. Moreover, given that return on equity (ROE) is usually used as a performance indicator, maintaining high capital ratios pressurises management to maintain profit margins in some way. One such way may be an increase in the lending rate raising the cost of intermediation.

A closely related study done in South Africa was undertaken by Cumming and Nel (2005) who investigated the *expected* impact of risk based capital adequacy of Basel II on the lending behaviour of banks. Their paper utilized a simplified approach of analysing the trends of aggregate bank balance sheets for the period 1991 – 2003. They found that South African banks respond to capital requirements by raising additional capital rather than adjusting their risk-weighted assets. However they noted that while large banks find it relatively easier to raise capital, smaller banks opt to reduce lending. Their study recommended caution when implementing regulation in order to avoid possible adverse effects caused by rapidly imposed and excessive capital requirements (p.654). This present study is distinctive in that while we attempt to empirically determine the general effect of capital requirements during the period 2001 – 2012, we exploit the five year period after the implementation of the capital requirements of Basel II, to evaluate its *actual* effect on cost of intermediation.

Martin-Oliver et al (2013) argue that the costs of increased capital requirements arise due to the fact that instead of increasing the volume of equity, banks contract the volume of credit. Studying a sample of Spanish banks for

the period 1992 – 2007, their study showed that a 1 percentage point increase in the target equity capital ratio led to a 6.8 basis points increase in the interest rate. They also showed that the impact on economic growth that results from an increase in average interest rates due to higher equity capital is dependent on a number of factors. These factors included price elasticity of the demand for credit, comparative significance of bank credit in financing investment and the elasticity of output to capital services (Martin-Oliver et al, 2013, p. 38).

Analysing a panel of 48 low-income countries (LICs) and 67 emerging economies (EMS) for a period of 1996 -2010, Poghosyan (2012, p.3) found that lower bank capitalization has the effect of increasing cost of intermediation as margins tend to increase. However, Vanhoose (2007, p. 3686) states that the impact of capital requirements depends on the existing capitalization of an individual bank, arguing that only a minority of banks are constrained by minimum capital requirements at a given point in time. In agreement, Jensen-laerkholm (2013, p. 8) argues that most banks operate with substantial excess capital adequacy and such banks may upon facing increased capital requirements choose to reduce their capital levels and still remain within the legal stipulated minimum capital ratio. As a result, one would not expect such well-capitalized banks to experience significant changes in intermediation costs. In a more recent study to determine the effects of capital and liquidity requirements on the behaviour of banks and loan rates in the US, Corbae and D'erasmo (2014, p. 3) found that a 50 percent increase (from 4 percent – 6 percent) in capital requirements has the effect of reducing loan supply by 8.71 percent resulting in a rise in lending rates by 50 basis points.

Gudmundsson et al (2013, p. 4) maintain that strict capital requirements come at a cost. The authors argue that as a result of high capital requirements banks "tend to lend less, charge more for loans and pay less on deposits" to compensate themselves for maintaining a larger capital base. Hence there are economic-wide impacts on economic growth via the credit contraction channel. They further argue that stringent capital requirements has the potential to stifle competition acting as an entry barrier for new participants particularly small banks. On the contrary, Corbae and D'erasmo (2014, p. 3) empirically found that a 50 percent increase in capital requirements reduces the exit rates for small banks by 45 percent.

According to an IMF cross-country study by Cosimano and Hakura (2011, p. 5), implementation of Basel III would on average require the 100 world largest banks to increase their equity to asset ratios by 1.3 percentage points resulting in a 16 basis point increase in the lending rate causing a 1.3 percent decrease in loan growth in the long run. Their study also showed that a one percent increase in the equity to asset ratio was associated with a 0.12 percent increase in the loan rate for 100 largest banks worldwide. However, their study showed that for countries that did not experience the 2007 – 2009 crisis, the associated impact on the loan rate was an average increase of 0.13 percent while for affected countries the associated impact was an increase in the loan rate of 0.09 percent. However the authors noted that the response of an increase in regulatory capital requirements essentially depends on a bank's net cost of raising equity and the

elasticity of loan demand to changes in loan rates.

Studying a sample of 28 Egyptian banks covering the period 1989 – 2004, Naceur and Kandil (2008) employed the generalized method moments (GMM) approach to investigate the effect of bank capital regulations on cost of intermediation and bank profitability. Their results indicated that higher capital to assets ratio and higher bank liquidity contribute towards an increase in the cost of intermediation. On the contrary, Were and Wambua (2014, p. 80) find that bank liquidity requirements are associated with lower spreads or reduced cost of intermediation in Kenya. They argue that highly liquid banks do not need to incur additional costs of sourcing funds to meet increased demand for credit. In their study spanning the period 2002 – 2011, Were and Wambua (2014) showed that bank-specific factors as opposed to macroeconomic indicators played a comparatively more important role in the determination of interest rate spreads. In particular they found that interest spreads were not responsive to inflation rate and real GDP variables as these variables were found to be statistically insignificant in explaining interest spreads across banks. Moreover large banks were relatively associated with increased intermediation cost.

In the European Union (EU), Sutorova and Teply (2013) employed simultaneous equation models to assess the impact of Basel III on lending rates of 594 EU banks during 2006 – 2011. Their results indicated that the implementation of the capital requirements of Basel III reduces the level of loans from their initial levels by 2 percent. An increase in common equity capital was found to exert a significant and positive effect on the loan rate. The study showed that a 1 percentage point increase in the common equity ratio induced a 18.8 basis point increase in loan interest rates (Sutorova and Teply, 2013, p. 236). However, the interest rate elasticity of demand for loans was found to be low, that is, for every 1 percent increase in interest rate for loans by EU banks, demand for loans decreases by 0.156 percent.

In a study of three main OECD economies namely USA, Japan and the Euro area, using balance sheet data from 2004 – 2006, Slovik and Cournède (2011) estimated the medium term impact of Basel III capital requirements on economic growth. Their paper showed that a one percentage point increase in the ratio of capital to risk-weighted assets on average increased bank lending spreads by 14.4 basis points in the three economies. Their study further showed that to meet Basel III requirements effective in 2015 and 2019, banks would need to increase lending spreads by an average of 15 basis points and 50 basis points respectively. Furthermore, the 2015 Basel III requirements were estimated to lower GDP in these economies by an average of 0.23 percent after 5 years of implementation averaging a decline in growth of 0.05 percentage point annually. Similar results were also found by Macroeconomic Assessment Group (MAG, 2010) when they estimated the impact of bank capital ratios for member countries over an eight year period. For example, a 1 percentage point increase in the common equity to risk-weighted assets was found to induce a 15.5 basis points increase in interest spreads by the 35th quarter from the date of implementation and to decrease thereafter. The resultant effect of this increase in regulatory capital was estimated to be a reduction in lending by 1.4 percent

which would result in a contraction in GDP below its baseline by a 0.02 percent after 35 quarters. Another US study conducted by the Government Accounting Office (GAO, 2014, p. 26) to examine the impact of Basel III on the US banks, also found that increasing capital requirements has a modest effect on cost and availability of credit. In their economic analysis, they also showed that raising additional capital ratios both tier 1 capital and common equity tier 1 would lead to a modest decrease in lending and a modest increase in loan rates for borrowers.

As demonstrated by the empirical literature review, many of the studies on capital requirements and their associated economic impact are predominantly concentrated in developed economies. Since the South African banking sector is heavily concentrated with inter alia challenges of banking exclusion and inefficiency, many studies have taken a keen interest on investigating issues around bank competition, market concentration, bank efficiency and financial inclusion with few studies on bank regulation. As previously stated this present study takes advantage of the period that has elapsed since the implementation of Basel II capital requirements to assess its impact on the cost of intermediation for commercial banks in South Africa. The next section discusses data analysis and the methodology, model specification and justification of that model and description of variables and their expected impact on the cost of intermediation.

4 Data Analysis & Methodology

We used a panel of balanced data obtained from Bureau Van Dijk's Bankscope data base for a sample of 10 banks spanning the period 2001 – 2012. Industry specific and macroeconomic indicator data variables have been accessed from the quantec database. The sample size of banking institutions in this study is a fair representation of the entire banking sector as it comprises the major players in the country which together represent over 90% of retail and wholesale banking. Due to wide disparities in our panel data, the fixed effects model was employed to control for bank-specific heterogeneity. Panel data models are attractive for various reasons. The main benefit is their ability to model bank-specific characteristics that are unique to each bank. In addition, variables that vary over time but are constant across banks such as industry-specific and macroeconomic variables are better analysed by panel models. By combining times series and cross sections, Gujarati (2004, p. 637) states that the data becomes more informative and the degrees of freedom increases thereby improving the power and efficiency of statistical tests that are biased in small samples. The descriptive statistics shown in **Table 3.1 and Table 3.2** highlights the marked disparities between large and small banks bank particularly with regard to bank-specific variables.

The objective of this study is to empirically establish the effect of the recent Basel II capital requirements on the cost of intermediation. To accomplish this

an empirical model of the form below is estimated.

$$NIM_{i,t} = \alpha + \delta NIM_{i,t-1} + \sum_{b=1}^{B} \beta_b X_{it} + \sum_{m=1}^{M} \beta_m Z_t + \varepsilon_{it} \qquad (1)$$

Where $\mathbf{X}$ represents bank-specific characteristics with the subscript it while $\mathbf{Z}$ represents macroeconomic and financial structure factors with their respective subscript t. NIM_{t-1} is a one period lagged cost of intermediation persistence variable and ε_{it} is a disturbance term. Owing to the structure of our panel whose time dimension is larger than the cross section, the more preferred dynamic GMM model could not be employed. Dynamic panel data models are designed for panels whose time series structure is shorter and whose number of cross sections is larger (Arellano and Bond, 1991).

Two alternative cost of intermediation variables were chosen, NIM1 which represents net interest revenue to interest earning assets ratio while NIM2 is net interest revenue to average total assets ratio. We used two measures of capital requirements namely the equity to total assets (ER) ratio and a post-crisis dummy variable (REGU). In line with a related empirical study by Naceur and Kandil (2008), a dummy variable (REGU) was included to take the value one in 2008 and subsequent periods and zero before 2008. We selected the year 2008 since Basel II was implemented on the 1st of January 2008 by South African Reserve Bank (SARB). We expect the cost of intermediation to be higher during the post-crisis period of the implementation of Basel II capital regulation. Apart from capital requirements variables, a number of bank-specific (BS) and macroeconomic variables that are hypothesized to influence the basic functions of banks were incorporated into the model. In particular we employed the following variables as suggested by previous empirical studies

Bank Specific Factors:
Lagged dependent variable (NIM (−1))
In accordance with empirical literature on studies of financial intermediation, a lagged dependent variable is included to measure the degree of persistence in cost of intermediation.

Equity Ratio (ER)
To test the impact of bank capitalization on the cost of intermediation, the ratio of equity to total assets was included in the model. We interact this capital ratio variable with the regulation dummy period (REGU) to measure the effect of the Basel II capital requirements effected in 2008.

Liquidity (NLDST)
This is the ratio of net loans to deposit and short term funding. A higher figure implies lower liquidity Banks need adequate cash reserves and easily convertible assets for the purpose of satisfying customers cash demands and to boost the confidence of depositors. There is no consensus regarding the direction of its impact on intermediation. In one view, it is argued that high liquidity may induce a decrease in the cost of intermediation as banks seek to clear excess reserves to increase profitability. However, the other view argue that instead

higher liquidity induce an increase in the cost of intermediation to compensate for the excess liquidity.

Diversification (NRGR)

The ratio of non-interest revenue to gross revenue (NRGR) is employed to approximate a typical bank's non-traditional activities and hence diversification. Banks diversify in order to reduce their exposure to interest sensitive income and so decrease exposure to risk. However if diversification is associated with riskier activities intermediation costs may actually increase. Hence in principle the variable may exhibit either a positive or negative sign.

Financial Structure and Macroeconomic Factors:

Bank concentration (HHI)

Within a highly concentrated market, banks usually avoid to compete and so refrain from reducing their interest spreads resulting in intermediation inefficiency. An industry concentration variable measured by the Herfindahl index (H-index) is included in the model in line with previous studies. The general expectation is that high levels of concentration are negatively correlated with competition. In a competitive banking industry, banks are pushed to lower their lending rates in order to keep their respective market shares. It is generally acknowledged that banks in highly concentrated markets avoid competing among themselves and so refrain from reducing their interest spreads resulting in high intermediation costs. We therefore expect a positive relationship between the H-index and the cost of intermediation.

Inflation (INFL) & Economic Growth (GDPG)

In order to control for the effect of external macroeconomic factors on intermediation cost two macroeconomic variables are specified namely inflation and economic growth. We hypothesize that during inflationary times banks lower their cost of intermediation to stimulate credit demand. However in inflationary times banks may also consider a raise in their interest rates to keep their return on investment in line with inflation. Similarly in booming economic times demand for credit is generally high providing an incentive for banks to increase their cost of intermediation. However, depending on the elasticity of credit demand to changes in interest rates an economic boom may also induce the need to decrease the cost of intermediation in order to maximise profits.

5   Discussion of Results

After running the panel fixed effects models, the results in **Table 5** came to light. The central objective of this present study has been to establish the impact of increased bank capital requirements on the cost of intermediation. Empirical evidence in both models show that a 1 percent increase in the capital requirements lead on average to between 12 – 14 basis points increase in the cost of intermediation during the period 2001 – 2012. This is consistent with an earlier study by Cosimano and Hakura (2011) who found similar results of a 12 basis points increase in the interest-income ratio or loan rate following a 1 percent increase in the equity to assets ratio for the 100 world largest banks.

Similar results were also obtained by Slovik and Cournède (2011, p. 7) who found an average marginal effect of 14.4 basis points increase in bank lending spreads in the US, Japan and the Euro area following a one percentage point increase in the ratio of capital to risk-weighted assets. We also find significant persistence of high intermediation cost as shown by a positive and significant response of intermediation cost to its lag. We also found a positive and significant coefficient when the capital requirements variable (ER) was interacted with the regulation-period dummy. We then conclude that the Basel II capital requirements implemented during the regulation period 2008 – 2012 raised the cost of intermediation by an average 7 basis points as evidenced by both models.

The reported negative impact of the regulation-period dummy (REGU) runs contrary to our earlier expectation of a positive effect on the cost of intermediation. We postulate that this reflects the fact that South African banks have always maintained high capital adequacy ratios even prior to implementation of the Basel II accord capital requirements. Jensen-laerkholm (2013, p. 8) argue that banking institutions that maintain surplus capital adequacy ratios may choose to reduce their capital levels in the face of increased capital requirements. As a result, one would not expect such well-capitalized banks to increase their intermediation costs or experience significant changes during periods of financial regulation. Moreover, as early as 2001, the ratio of capital to risk-weighted assets for the entire banking system stood at 11.4 percent against the minimum required of 10 percent which was increased by the registrar of banks from the international ratio of 8 percent (Bank Supervision, 2001, p. 4).

Lower bank liquidity as indicated by higher ratios of net loans to deposit and short term funding had a positive and statistically significant association with the cost of intermediation. We maintain that during periods of high credit demand, banks with lower liquidity are inclined to raise emergency liquidity at a high cost and so pass on the cost to customers resulting in higher intermediation cost. A diversification variable exhibited a significant and negative effect on cost of intermediation as expected. Banks that diversify their business activities from traditional interest based business activities are less exposed to risk of high sensitive interest income. We however caution that in order to guarantee positive benefits banks need to guard against diversifying into riskier activities.

The industry concentration variable is statistically significant in explaining the cost of intermediation. However, in spite of being statistically significant, the H-index of industry concentration has a negative effect on the cost of intermediation contradicting our prior expectation. Our earlier hypothesis was that high concentration increases market power and dominance of banks enabling them to widen their spreads resulting in increased cost of intermediation. Perhaps, in the case of South Africa, despite the high market concentration, the nature of competition may be product specific justifying a reduction in the cost of intermediation. Claessens and Laeven (2003, p. 581) argues that contestability rather than structure is the most important for competition. In fact it is generally argued that the level of market concentration does not matter much because the nature of competition within banking is rather product specific. In agreement, Greenberg and Simbanegavi (2009, p. 13) found that with regard to

interest income, the South African banking sector was highly competitive and concluded that large banks operated under conditions consistent with perfect competition.

Despite carrying the expected sign, inflation does not seem to affect the cost of intermediation. This is consistent with the study by Were and Wambua (2013, p. 18) who found that in Kenya inflation had an insignificant effect on interest spreads. Our economic growth variables proved to exhibit a positive and statistically significant effect on the cost of intermediation in line with our earlier hypothesis that increased economic activity generally stimulate demand for loans leading to higher lending rates.

6   Conclusion

The primary objective of this paper has been to investigate the impact of increased capital requirements on the cost of intermediation in South African banking. In view of the second Basel Accord which was implemented in 2008 by SARB, we were also motivated to determine if there were significant changes to the cost of intermediation as a result of the capital requirements effected in 2008 and subsequent periods. Generally, this study has therefore cast light on the link between increased capital requirements as approximated by equity to total assets ratio and the cost of intermediation.

Empirical findings obtained from running fixed effects models showed that a 1 percent increase in the capital requirements on average results in 12 − 14 basis points increase in the cost of intermediation. We also found evidence that capital requirements effected in 2008 and afterwards raised the cost of intermediation by an average 7 basis points. In the light of our results, we caution that while maintaining adequate capital levels is crucial for obvious reasons, excessive regulation may have adverse effects. Maredza and Ikhide (2013, p. 14) cautions on the dangers of over regulation which usually follow after a crisis. Hence, there is need for capital regulation that is effective and well-balanced to guarantee safety and stability of the sector without endangering the ability of the banks to service the economy. While industry-specific and macroeconomic factors play a significant role in influencing intermediation process, we find that bank specific factors play an even greater role in influencing the cost of intermediation in South African banking.

7   References

References

[1] ARELLANO, M., and BOND, S., (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies*, Vol. 58, pp. 277 − 297.

[2] COMPETITION COMMISSION SOUTH AFRICA, (2008). *Banking Enquiry: Report to the Competition Commissioner by the Enquiry Panel.* Available [Online]: http://www.compcom.co.za/assets/Banking/Executive-overview.pdf [Accessed 7 March 2011].

[3] CORBAE, D., and D'ERASMO, P., (2014). *Capital Requirements in a Quantitative Model of Banking Industry Dynamics*, Federal Reserve Bank of Philadelphia, Working Paper No. 14 -13.

[4] COSIMANO, T.F., and HAKURA, D.S., (2011). *Bank Behavior in Response to Basel III: A Cross-Country Analysis,* IMF Working Paper WP/11/119, International Monetary Fund Institute.

[5] CUMMING, S., and NEL, H., (2005). Capital Controls and the Lending Behaviour of South African Banks: Preliminary Findings on the Expected Impact of Basel II. *South African Journal of Economics*, 73 (4), pp. 641 – 656.

[6] DELOITTE., (2004). *Banking the Unbanked in South Africa.* Global Regulation, Issue II.

[7] DIAS. D., (2011). *Advancing Financial Access for the World's Poor*, Consultative Group to Assist the Poor (CGAP). Available [Online]: http://www.cgap.org/48211411.pdf [Accessed 11 May 2013].

[8] GOVERNMENT ACCOUNTING OFFICE, (2014). *Bank Capita Reforms: Initial Effects of Basel III on Capital, Credit and International Competitiveness*, United States Government Accounting Office, GAO-15-67.

[9] GREENBERG, J.B., and SIMBANEGAVI, W., (2009). *Testing for Competition in the South African Banking Sector*, Faculty of Commerce University of Cape Town.

[10] GUDMUNDSSON, R., NGOKA-KISINGUH, K., ODONGO, M.T., (2013). *The Role of Capital Requirements on Bank Competition and Stability: The Case of Kenyan Banking Industry*, Kenya Bankers Association, Working Paper Series, WPS/02/13.

[11] GUJARATI, D., (2004). *Basic Econometrics.* 4th Edition. New York: McGraw-Hill.

[12] IKHIDE, S.I., (2008). Measuring the Operational Efficiency of Commercial Banks in Namibia, *South Africa Journal of Economics*, 76(4), pp. 586 ? 595.

[13] JENSEN-LAERKHOLM, T., (2013). *The Cost of Financial Stability: How increased Capital Requirements to Banks impact Firm Growth.* University of Copenhagen and Denmarks Nationalbank.

[14] MACROECONOMIC ASSESSMENT GROUP (MAG) (2010). *Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements.* Interim report, Bank for International Settlements.

[15] MAREDZA, A., and IKHIDE, S. (2013). The Impact of the Global Financial Crisis on Efficiency and Productivity of the Banking System in South Africa, *Economic Research Southern Africa*, ERSA Working Paper Series No 328.

[16] MARTIN-OLIVER, A., RUANO, S., and SALAS-FUMAS, V, (2013). Banks' Equity Capital Frictions, Capital Ratios, and Interest Rates: Evidence from Spanish Banks. *International Journal of Central Banking, 9(1),* pp. 183 – 225.

[17] MLAMBO, K., and NCUBE, M., (2011). Competition and Efficiency in the Banking Sector in South Africa, *African Development Review*, 23 (1), pp. 4 – 15.

[18] MISHKIN, F.S., (2013). *The Economics of Money, Banking and Financial Markets.* Global Edition, 10th Edition. Pearson Education Limited, Edinburgh Gate, Harlow Essex, England.

[19] NACEUR, S.B., and KANDIL, M., (2008). *The Impact of Capital Requirements on Banks' Cost of Intermediation and Performance: The Case of Egypt.* Economic Research Forum, Working Paper no. 430, pp. 1 – 26.

[20] POGHOSYAN, T., (2012). Financial Intermediation Costs in Low-Income Countries: The Role of Regulatory, Institutional and Macroeconomic Factors, International Monetary Fund, WP/12/140.

[21] SLOVIK, P., and COURNÈDE, B., (2011). Macroeconomic Impact of Basel III, OECD Economics Department Working Papers No 844: OECD Publishing. Available [Online] http://dx.doi.org/10.1787/5kghwnhkkjs8-en. [Accessed 7 March 2015].

[22] SOUTH AFRICAN RESERVE BANK (SARB), (2001). Annual Report 2001, *Bank Supervision Department*, pp. 1–113.

[23] SOUTH AFRICAN RESERVE BANK (SARB), (2010). Annual Report 2010, *Bank Supervision Department*, 90th Anniversary, pp. 1–173.

[24] SOUTH AFRICAN RESERVE BANK (SARB), (2013). Annual Report 2013, *Bank Supervision Department*, pp. 1–92.

[25] SOUTH AFRICAN RESERVE BANK (SARB). (2015). South Africa's Implementation of Basel II and Basel III. Available[Online]: https://www.resbank.co.za/[Accessed 02 April 2015].

[26] SOUTH AFRICAN RESERVE BANK, (2009). *Annual Report 2009*, Bank Supervision Department, Statistical Society, Series A (General), 120, pp. 253 –78. Available [Online]: http://www.reservebank.co.za/ [Accessed 24 February 2015].

[27] SOUTH AFRICAN RESERVE BANK, (2011). Annual Report 2011, *Bank Supervision Department*, Available [Online]: http://www.reservebank.co.za/ [Accessed 1 January 2015].

[28] SUTOROVA, B., and TEPLY, P., (2013). The Impact of Basel III on Lending Rates of EU Banks, *Journal of Economics and Finance,* 63 (3), pp. 226 – 243.

[29] VANHOOSE, D., (2007). Theories of Bank Behaviour under Capital Regulation. *Journal of Banking and Finance,* 31(12), pp. 3680 – 3697.

[30] VAN ROY, P., (2005). *The Impact of the 1988 Basel Accord on Banks capital ratios and credit risk-taking: An International Study*, European Centre for Advanced Research in Economics and Statistics (ECARES), Brussels: Belgium.

[31] WERE, M., and WAMBUA, J., (2013). *Assessing the Determinants of Interest Rate Spread of Commercial Banks in Kenya: An Empirical Investigation?* Kenya Bankers Association, Working Paper Series, WPS/01/13.

[32] WERE, M., and WAMBUA, J., (2014). What Factors Drive Interest Rate Spread of Commercial Banks? Empirical Evidence from Kenya, *Review of Development Finance,* 4(2014), pp. 73 – 82.

Table 1: South African Banking Sector: Number of entities registered

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Domestic Banks	41	30	22	20	19	19	19	19	18	17	17	17	17
Mutual banks	2	2	2	2	2	2	2	2	2	2	2	3	3
Branches of Foreign banks	15	14	15	15	15	14	14	14	13	13	12	14	14
Representative offices	56	52	44	43	47	43	46	43	42	41	43	41	43

Source: SARB Annual Report (2013) & SARB Annual Report (2014)

Table 2: Capital adequacy ratio – A comparison with Emerging Markets

	Capital Adequacy Ratio %		
	2007	*2008*	*2009*
SOUTH AFRICA	**12.8**	**13**	**14.1**
BRAZIL*	18.7	18.3	18.8
CHILE	12.2	12.5	14.3
CHINA*	8.4	12	11.4
CZECK REPLUBLIC	11.6	11.6	14
GREECE	11.2	9.4	11.7
HUNGARY	10.4	11.2	12.9
INDIA*	12.3	13	13.2
KOREA	12.3	12.3	14.4
LITHUANIA	10.9	12.9	14.2
PAKISTAN	12.3	12.3	14.1
PERU	12.1	11.9	13.5
POLAND	12	11.2	13.3
RUSSIA*	15.5	16.8	20.9
Red shading indicates higher capital ratio relative to South Africa. *Emerging BRICS countries are highlighted by an asterisk.			

Source: IMF Global Financial Stability Report (2010)

Table 3.1: Descriptive Statistics by Cross-section (Bank)

	NIM1									
	ABSA	**FNB**	**NED**	**STAN**	**INVE**	**CAP**	**SAS**	**TEBA**	**AFRI**	**BIDV**
MEAN	3.43	2.79	2.94	2.99	1.56	91.61	7.88	10.67	23.33	6.06
STD.DEV.	0.21	0.46	0.39	0.53	0.26	72.53	1.40	3.80	7.67	2.22
MIN	2.96	2.24	2.31	2.47	1.13	22.66	5.67	6.21	14.53	3.08
MAX	3.76	3.36	3.46	4.13	1.97	197.30	9.76	17.63	36.98	9.39
	NIM2									
	ABSA	**FNB**	**NED**	**STAN**	**INVE**	**CAP**	**SAS**	**TEBA**	**AFRI**	**BIDV**
MEAN	3.24	2.54	2.72	2.86	1.49	46.82	5.73	8.68	20.83	3.20
STD.DEV.	0.22	0.42	0.33	0.50	0.25	29.25	1.11	2.23	7.91	1.53
MIN	2.83	2.00	2.19	2.38	1.08	17.20	3.77	5.90	11.56	0.59
MAX	3.52	3.06	3.13	3.95	1.88	83.65	7.31	12.94	32.23	5.05
	ER									
	ABSA	**FNB**	**NED**	**STAN**	**INVE**	**CAP**	**SAS**	**TEBA**	**AFRI**	**BIDV**
MEAN	6.34	6.61	6.84	5.32	7.31	46.20	22.55	20.03	23.77	44.94
STD.DEV.	1.10	1.25	1.33	0.80	1.88	28.08	6.51	3.39	5.70	12.07
MIN	4.62	5.37	3.94	4.30	5.28	16.58	13.99	15.10	14.22	27.58
MAX	7.97	8.64	8.45	7.13	11.44	91.02	30.43	25.06	32.59	62.00
	NLDST									
	ABSA	**FNB**	**NED**	**STAN**	**INVE**	**CAP**	**SAS**	**TEBA**	**AFRI**	**BIDV**
MEAN	95.35	86.73	89.76	80.66	78.43	167.62	192.57	64.12	110.01	79.82
STD.DEV.	10.66	3.31	2.56	4.52	9.83	125.75	56.43	53.24	9.11	53.80
MIN	81.73	82.93	85.50	76.97	61.07	73.52	97.72	11.43	95.29	11.14
MAX	121.95	92.14	93.40	91.67	90.17	448.84	318.19	129.34	126.27	191.81
	NRGR									
	ABSA	**FNB**	**NED**	**STAN**	**INVE**	**CAP**	**SAS**	**TEBA**	**AFRI**	**BIDV**
MEAN	44.19	55.92	45.49	46.93	37.15	23.92	69.23	47.44	23.67	92.45
STD DEV.	2.19	6.13	3.90	4.14	7.46	22.91	4.21	10.68	10.97	4.03
MIN	40.79	47.21	38.54	40.41	23.84	0.06	64.36	32.58	11.30	86.06
MAX	47.70	70.39	52.78	54.51	47.79	52.37	77.74	67.80	37.26	97.56

Source: Own computation using Bankscope and Quantec data

Table 3.2: Descriptive Statistics by Time Period (Year)

	YEAR	MEAN	STD. DEV	MIN	MAX
	2001	25.47	60.64	1.97	197.30
	2002	24.43	59.34	1.49	192.61
	2003	24.02	55.44	1.42	180.62
	2004	20.78	43.35	1.90	141.64
	2005	19.45	40.16	1.13	130.62
NIM1	**2006**	14.21	26.69	1.32	89.17
	2007	9.92	10.35	1.68	35.58
	2008	9.91	10.34	1.87	34.70
	2009	9.16	8.69	1.60	28.05
	2010	8.35	7.96	1.50	23.40
	2011	9.41	11.61	1.43	36.98
	2012	8.81	9.59	1.38	29.30
	YEAR	MEAN	STD. DEV	MIN	MAX
	2001	13.09	23.28	1.85	77.46
	2002	12.40	23.15	1.40	76.60
	2003	13.81	25.40	1.39	83.65
	2004	14.18	24.72	1.88	80.20
	2005	13.09	22.80	1.08	72.44
NIM2	**2006**	9.26	15.44	1.27	52.24
	2007	7.35	7.26	1.60	25.51
	2008	7.25	7.03	1.84	23.89
	2009	6.59	5.74	1.53	17.62
	2010	6.10	5.97	1.43	17.20
	2011	7.21	9.05	0.59	28.87
	2012	7.43	9.22	1.08	29.46
	YEAR	MEAN	STD. DEV	MIN	MAX
	2001	21.12	26.07	4.62	91.02
	2002	22.17	26.32	4.94	88.84
	2003	23.77	26.40	3.94	83.86
	2004	21.82	21.00	4.73	59.27
	2005	21.19	18.59	4.75	56.28
ER	**2006**	20.70	19.56	4.75	62.00
	2007	19.66	17.67	4.73	58.41
	2008	17.08	12.53	4.30	38.97
	2009	15.27	11.27	5.58	38.43
	2010	14.22	8.23	5.82	27.58
	2011	14.87	9.25	5.95	34.14
	2012	16.02	10.81	6.37	39.40
	YEAR	MEAN	STD. DEV	MIN	MAX
	2001	121.17	94.79	11.14	362.30
	2002	140.17	117.53	52.50	448.84
	2003	128.39	77.35	53.64	275.67
NLDST	**2004**	116.55	72.05	74.07	318.19
	2005	102.88	28.03	76.42	168.57
	2006	98.55	46.47	11.43	194.61
	2007	108.05	47.64	16.93	191.81
	2008	94.93	41.22	20.71	189.39

	YEAR	MEAN	STD. DEV	MIN	MAX
	2009	89.16	43.47	23.08	197.42
	2010	84.55	45.95	16.49	182.85
	2011	81.52	34.79	27.09	144.62
	2012	88.16	37.88	33.75	148.03
	YEAR	**MEAN**	**STD. DEV**	**MIN**	**MAX**
	2001	49.37	26.82	0.37	89.28
	2002	47.66	25.94	0.06	95.99
	2003	45.70	25.17	1.08	94.14
	2004	46.43	25.62	1.68	94.05
	2005	50.06	28.59	2.22	96.49
NRGR	*2006*	47.44	24.30	11.06	94.85
	2007	47.70	19.00	19.93	89.95
	2008	48.15	17.96	30.65	86.06
	2009	50.03	16.74	34.61	86.67
	2010	52.12	16.45	36.34	88.84
	2011	50.34	19.69	26.85	97.56
	2012	48.69	20.92	23.84	95.48

Source: Own computation using Bankscope and Quantec data

Table 4: The Number and classification of banks in the sample

LARGE BANKS	Total Assets	SMALL BANKS	Total Assets
STANDARD	889 250	AFRICAN BANK	49 236
ABSA	725 679	CAPITEC	22 230
FNB	665 525	UBANK	3 586
NEDBANK	585 033	SASFIN	2 767
INVESTEC	253 514	BIDVEST	4 062

Source: SARB Supervision Department, Annual Report, 2011

Table 5: Determinants of the Cost of Intermediation

	NIM1	NIM2
Intercept	2.907	7.713***
	(*0.110*)	(*0.0010*)
NIM$_{t-1}$	0.812***	0.715***
	(*0.0000*)	(*0.0000*)
ER	0.121**	0.140***
	(*0.0111*)	(*0.0001*)
ER*REGU	0.067***	0.071***
	(*0.0040*)	(*0.0001*)
REGU	− 0.643***	− 0.948***
	(*0.0084*)	(*0.0000*)
NLDST	0.011**	0.002
	(*0.0395*)	(*0.3736*)
NRGR	− 0.0595***	− 0.106***
	(*0.0044*)	(*0.0001*)
HHI	− 0.119**	− 0.172**
	(*0.0108*)	(*0.0186*)
INFL	− 0.008	− 0.016
	(*0.440*)	(*0.162*)
GDPG	0.026***	0.025***
	(*0.0093*)	(*0.1398*)
Adj. R^2	0.948	0.94
D-Watson	1.90	1.58

P-values are reported in parentheses:
* / [**]/ (***) denotes significance at 10%, / [5%] / (1%) level of significance respectively

Figure 1: Capital Adequacy Ratios (CARs): South Africa`s Banking Sector
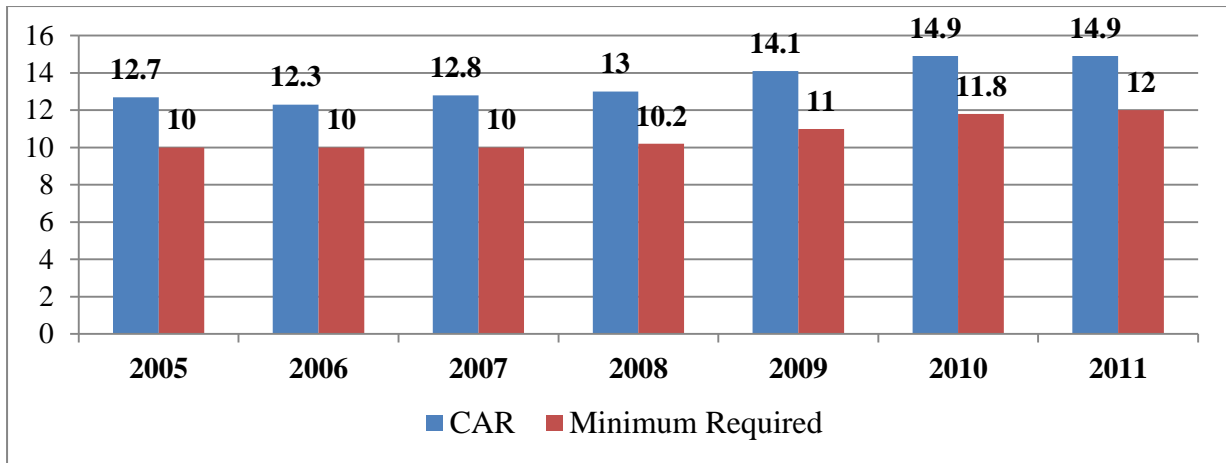
Source: Bank Supervision Annual Report (2011) & various Quarterly Bulletins SARB