ASSET LIQUIDITY AND BANK PROFITABILITY IN SOUTH AFRICA

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Abstract

This paper empirically analyses the relationship between asset liquidity and bank profitability for South African banks for the period between 1994 and 2011. The study employs Ordinary Least Squares (OLS) and the Autoregressive Distributed Lag (ARDL)-bound testing approach to examine the linkage between return on assets (ROA) and liquidity, and the nexus between return on equity (ROE) and liquidity to capture the short-run and long-run dynamics. The study observes that there is neither a significant relationship between ROE and liquidity nor a relationship between ROE and liquidity. These observations hold for both the short-run and long-run. Banks are recommended to embrace the asset liability framework in their analysis and management of liquidity as the asset only approach is insufficient and misleading.

Keywords: South Africa, Liquidity, Bank Profitability, ARDL-Bounds Testing Approach, OLS.

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1. Introduction

During the last three decades the financial sector has experienced a significant change in its operational environment. Changes in both the internal and external factors have affected financial institutions structure and profitability. Banks are required to hold a considerable position in liquid assets while on the other hand it is required to be profitable for it be sustainable and to remain as a going concern. Despite the increased efficiency in many banks resulting from holding higher positions of liquid assets, profitability has severely suffered. Liquidity and profitability are inversely related, when liquidity increases profitability decreases and vice versa while on the other hand there is a direct relationship between higher risk and higher return, hence the dilemma in liquidity management is finding a balance between liquidity and profitability.

While it is generally agreed that the is a negative relationship between liquidity and bank profitability the is a counter evidence that shows a need to consider the trade off between resilience to liquidity shocks and cost of holding less profitable liquid assets as the later is assumed to impact bank's ability to take advantage of opportunities arising in the market that may result in increase in revenue, capital or ability to extend capital extend credit (Bordeleau and Graham 2010). Banks on the asset side hold low yielding securities such as treasury bills and highly rated short term corporate bonds in order to minimise a scramble for liquidity when credit use increases in time when money is tight (Holmstrom and Tirole 1998). Thus in essence a liquid financial institution has a smaller portion of its assets in long term loans and a greater proportion of its assets in short term securities that can be quickly liquidated into cash that can then be loaned out, however a highly liquid bank may mean lack of profitable projects to invest the money.

Given that liquid asset has a low liquidity premium and therefore a lower return relative to illiquid assets holding them imposes an opportunity cost on a bank. Liquidity management becomes a very important part in financial management decisions, where the liquidity management efficiency could be achieved by firms that manage a trade-off between liquidity and profitability (Bhunia and Khan 2011). The impact of bank asset liquidity on profitability has of late attracted the interest of academic research, financial market analysts, bank management and bank monitors. This paper investigates the effects of holding liquid assets on profitability. The evidence is based on the panel of South African banks from 1994 to the end of 2011. The Autoregressive Distributed Lag (ARDL) –bound test approach and Ordinary Least Squares (OLS) testing are utilised in an attempt to find if the is a long-run or short-run relationship between bank profits and their asset liquidity and results indicated that there is no significant relationship between the variables under consideration.

This study differs from other studies in three main respects. First, the article focuses mainly on the nature of relationship between asset liquidity and South Africa Banks profitability with the analysis including the cointergration relationship. Second, the paper consider all banks in South Africa as a representative sample over a more recent period, thus

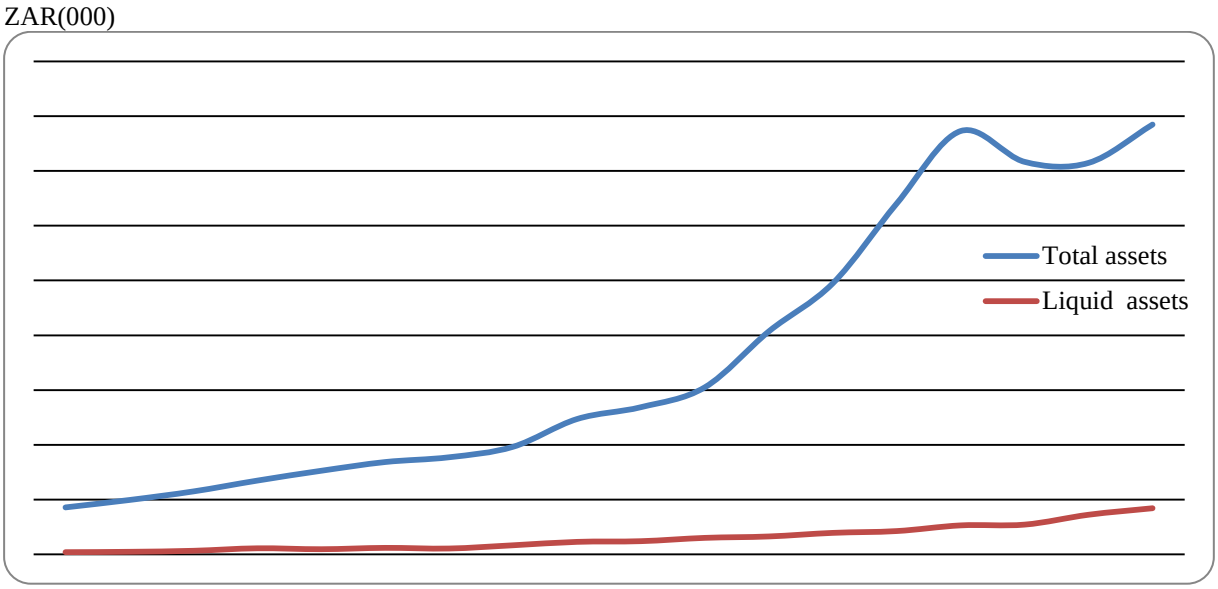
providing more appropriate and recent empirical evidence. Lastly, our empirical analysis does not only focus on the nature of relationship of variables in question but also looks at the implications of this interconnectedness in the context of Asset liability Management (ALM).

The paper is organised in the following manner. Section 2 discusses facts on South African banks liquidity (Liquidity in this context refers to liquid assets of the bank that are defined as cash, interbank deposits and short term government and corporate securities) and also a brief discussion on the banks' profitability. This is followed by section 3 that constitutes a brief discussion of literature and the empirical framework as applied in this article. Section 4 presents the estimation method and empirical results. Finally, conclusions and recommendations are presented and policy implications are drawn in section 5.

2. Asset liquidity and bank profitability in South Africa

As evidenced in fig 1, there has been an exponential growth in the balance sheet of South African Banks. Total assets increased undeterred until the financial crisis in 2008. The banks witnessed a slump during the crisis and after some corrective measures the trend began to be upward again. Liquid asset had a steady growth over the entire period, and this growth did not correspond with the growth and volatility in total assets. While the total assets sky rocketed, liquid assets maintained its growth rate presumably because the banks were investing in less liquid asset in a bid to maximise profits in times when financial markets were strong and calm.

Figure 1. Total assets and liquid assets

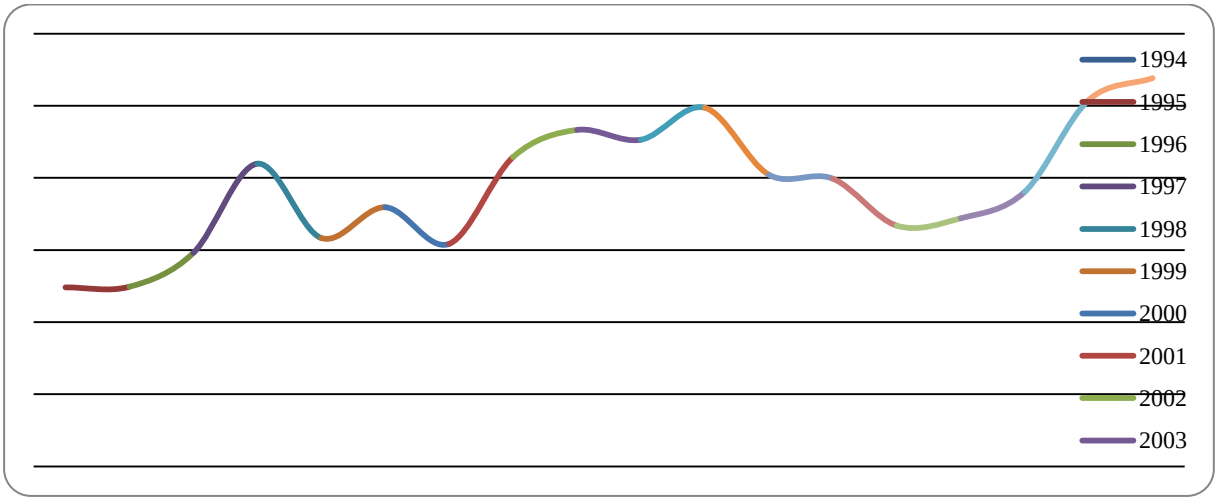


Source: McGregor BFA database

Total assets do not include intangible assets like good will, while liquid assets refer to Money Market Investment Assets (Money Market Investment Assets represents the short-term investment in financial assets by the bank as part of its banking operations) and Liquid Investment Assets (Liquid Investment Assets represents the cash on hand and the balances with other banks as per the notes to the annual financial statements in respect of the banking operations of the Company or Group).

Fig 2 represents the percentage of liquid assets as a percentage of total assets. The graph shows that the ratio has been increasing over time but with a very high degree of volatility.

Figure 2. Liquid assets as a percentage of total assets

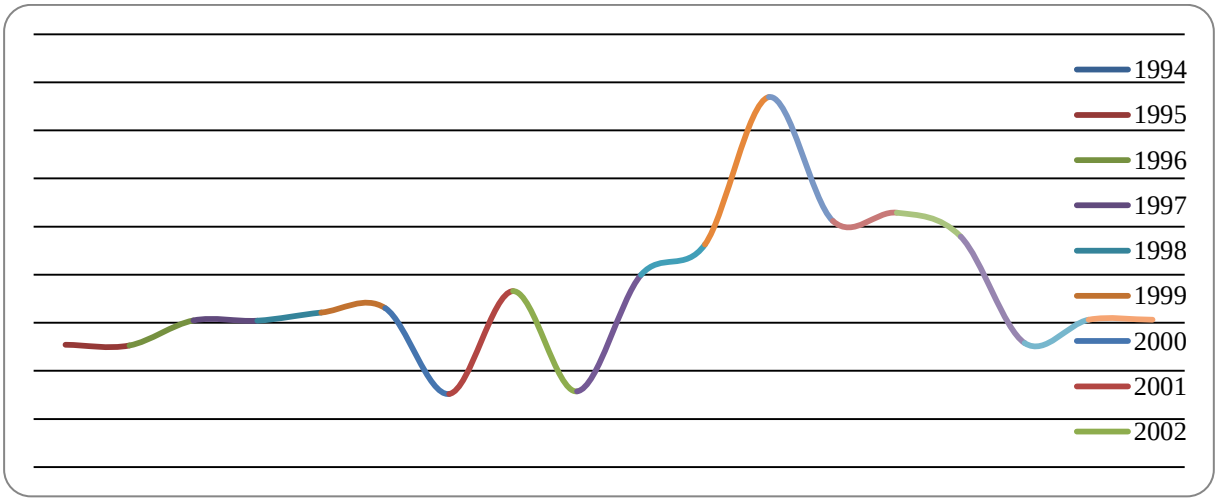


Source: McGregor BFA data base.

Since 2005 until the beginning of financial crisis in 2008, banks have been reducing their holding of liquid assets relative to total assets. In reaction to funding and liquidity pressures during global financial crisis banks in South Africa began to hold considerable liquid assets relative to total assets. It is during the crisis when the strength of a bank had to be measured in terms of how liquid the financial institution was rather than on the basis of the size of the balance sheet or profitability. Previously banks took advantage of mismatches between assets and liabilities; banks massively leveraged on these mismatches and were their key component of extremely profitable business model a phenomenon that changed after the recent financial crisis (Barua et all 2010). During the financial crisis, need for liquidity became fundamentally inherent to the financial sector. In fact, one of the key functions of the banking industry in a modern economic system is to allow the reallocation of financial resources from the liquid sectors to the illiquid ones. The Basel lll framework, released in December 2010 also calls for significant changes in liquidity requirements. The framework introduces more stringent liquidity requirements which are expected to be phased in over a number of years. Regardless of the fact that these changes has to be effected in over time many banks deems it prudent to maintain even higher than recommended liquidity levels in the interim.

The bank profitability variables are better represented by the return on equity (ROE) and return on assets (ROA). ROE shows the return that shareholders will get from their investment in the equity of the bank. ROA indicates ability of a bank to generate profits from utilising its assets, thus it measures the efficiency of management in using bank assets to generate earnings.

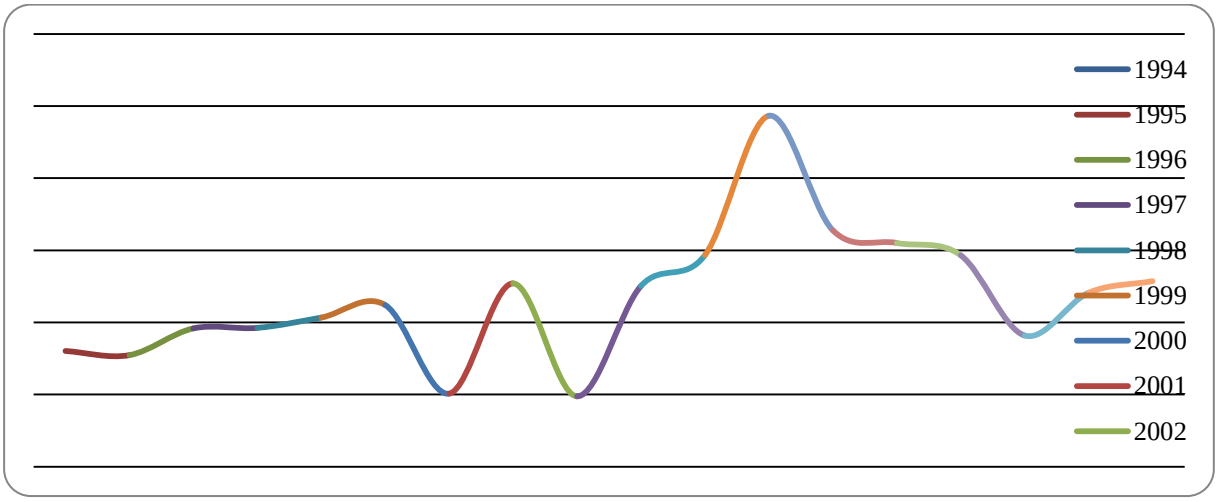
Figure 3. Return on Equity



Source: McGregor BFA data base.

A lot of developments on the global arena and South Africa's local arena in the past two decades resulted in a highly volatile ROE for South African banks. There was a steep increase in ROE from 2002 to 2005 that was followed by a steep fall in 2006 until 2009. The fall in ROE could have been a result of the country having gone through an economic recession coupled with a spillover effect of the global economic crisis in 2008/9 resulted in the people losing confidence in financial institutions. Since the business environment in general wasn't conducive this meant trading was theme on all spheres there by affecting consumer affordability, resulting in consumers being more reluctant to take on more debt, thereby negatively affecting the profitability of the banking sector. The fall in ROE was not disastrous because most of the financial institutions had very strong risk management systems in place as the South African Banks were amongst the first to implement Basel II recommendations. Though stiff regulations on financial institutions is blamed for stifling innovation and reducing growth 2008/9 global financial crisis meant otherwise.

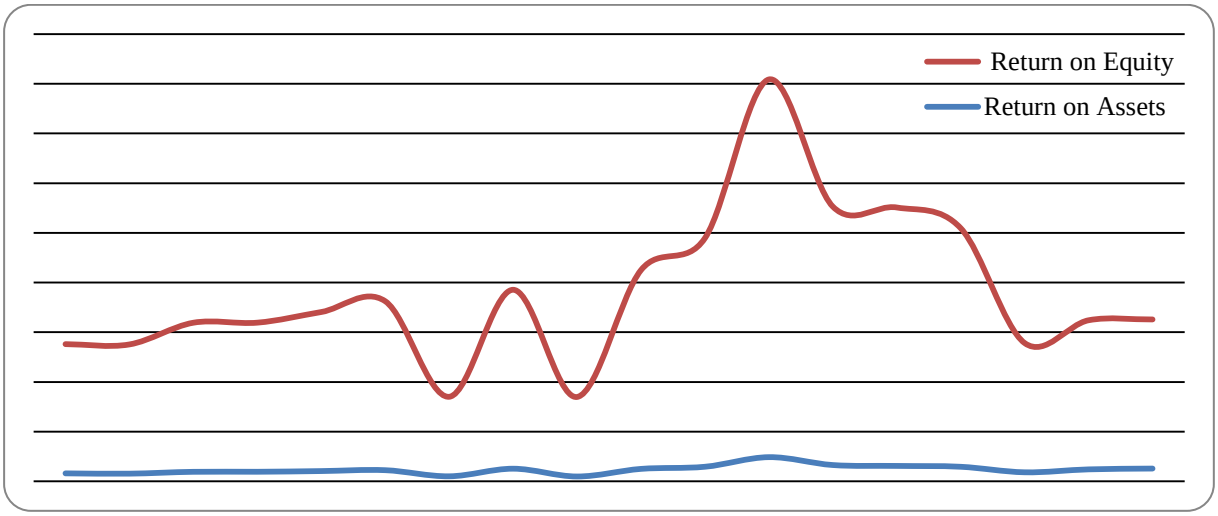
Figure 4. Return on assets



Source: McGregor BFA data base.

The return on assets also has not been stable over the past decade. ROA has the same trend as ROE the only major difference is that ROA is less than ROE due to the mathematics behind their calculations due to the differences of the composition of the denominators, where ROA has a larger denominator than ROE. The steep rise in ROA during the period of 2002 to 2006 was enhanced by the expansion of consumer credit, the South African economy experienced significant growth during this period. By the end of 2006 the economy began to slow down as the effects of global depression kicked in and we saw the reversal of the gains from previous years.

Figure 5. Return on Equity and Return on Assets



Source: McGregor BFA data base.

Fig 5 shows that South African banks some how relied heavily on liabilities to support assets and consequently they have higher ROEs and lower ROAs. This shows that the South African banks' equity base is too small relative to the total balance sheet as signified by total assets and thus can negatively impacts the banks' ability to borrow and can even be very disastrous if there is a run on deposits especially in an environment associated with dwindling confidence and a sudden increase in interest rates.

3. Literature review

Liquidity though not a new phenomenon in finance literature, there is no universally accepted definition of it. Adler (2012) asserts that the lack of agreed-upon definition emanates from the fact that the concept of liquidity arises from different economic perspectives. Liquidity can be defined in the context of how easy a security can be traded and in the context of how easy one can obtain funding to trade a security, the former being called market liquidity and the latter being funding liquidity. The focus of this paper will be on both the funding liquidity and market liquidity since the easier you can trade a security means the easier it is to get funds to trade securities, ideally market liquidity and funding liquidity are complementary. Most papers were written on the sources of liquidity risk and on how markets should be designed and regulated to cope with the effects of illiquidity. This literature review will attempt to summarise the impact of liquidity on bank profitability, hence need to look at liquidity as a cost, and as a risk and their impact on ROA and ROE. That is, investors need to be rewarded for holding illiquid assets and for the sensitivity of the security to liquidity shocks.

There are a very limited number of studies that were specifically carried out to investigate the impact of liquidity on bank profitability. Surprising most of these few studies were done on manufacturing companies. Therefore, most of the studies we draw the following conclusions were mainly focused in finding determinants of bank profitability with liquidity being one of the determinants and their empirical results were mixed. Some writers found a positive relationship; some found a negative relationship while others found both results and a few found no relationship at all. The debate is still rampant.

Bourke (1989) in his study on performance of banks in twelve countries in Europe, North America and Australia found evidence that there is a positive relationship between liquid assets and bank profitability. The results which seem counterintuitive, as we expect that illiquid assets have higher liquidity premium and hence higher return than liquid assets. Kosmidou and Pasiouras (2005) realised that the ratio of liquid assets to customer and short term funding is positively related to ROA and statistically significant. Also, they found a significant positive relationship between liquidity and bank profits. Kosmidou (2008) examine the determinants of performance of Greek banks during the period of EU financial integration (1990-2002) using an unbalanced pooled time series dataset of 23 banks found that less liquid banks have lower ROA. This is consistent with their previous findings like Bourke (1989) who found out that there is a positive relationship between liquidity risk and bank profitability. Recently, Olagunju, David and Samuel (2011) found out that there is a positive significant relationship between liquidity and profitability. They concluded that there is a bidirectional relationship between liquidity and profitability where the profitability in commercial banks is significantly influenced by liquidity and vice-versa.

On the contrary, Molyneux and Thornton (1992) recognized that there is inverse relationship between bank profitability and liquidity and they attributed this to the fact that banks hold liquid assets as an obligation to the requirements imposed by the authorities. However, if we are to view this relationship from the context that banks hold liquid assets as mandated by the central bank or any other authorities, then we may miss our argument as banks also hold liquid assets for other reasons. One to assume that banks only hold liquid assets as a requirement is in its self-perfidious or a deliberate ignorance of the knowledge of how banks functions, as Tobin (1958) way back suggested that liquidity is held for transaction purposes and for investments reasons. Tobin's proposal was a simplification of Keynes' liquidity preference theory. Keynes (1936) argued money is demanded for transaction purpose, speculative purpose and precaution purpose therefore we can firmly say without and prejudice say that liquid assets over and above mandatory requirements they are held for transaction, speculative and precautionary purpose.

Some authors found mixed results of both negative and positive relationship. Shen et al (2009) asserts that in market-based financial system liquidity risk is positively related to net interest margin an indication that banks with high levels of illiquid assets receives higher interests income. Conflicting to their earlier establishment on the relationship with net interest margin, they realised that liquidity risk is negatively related to return on average assets and also inversely related to return on average equity. They pointed out that banks incurred higher funding cost in the market if they have illiquid assets as they had to raise the money in the market to meet the funding gap. They also discovered that there is no relationship between liquidity risk and performance in a bank-based financial system as the banks play a major role in financing, therefore are not affected by liquidity risk. Demirguc-Kunt and Huizinga (1999) had inconclusive results; they found a positive relationship between loans to total assets and the net

interest margins. The also established an inverse relationship between the net interest margin and before tax profits. Naceur and Kandil (2009) in their analysis cost of intermediation in the post-capital regulation period which included; higher capital-to-assets ratios, an increase in management efficiency, an improvement of liquidity and a reduction in inflation found out that Banks' liquidity does not determine returns on assets or equity significantly.

Therefore conclusions about the impact of banks' liquidity on their profitability remain ambiguous and further research is required.

4. Data, empirical model specification and estimation techniques.

4.1 Data sources and definition of variables

This study uses annual time series data for the period between 1994 and 2011 all data used in this study were obtained from McGregor data base and the central bank of South Africa (SARB). Liquid assets were computed as a total of Money Market Investment Assets and Liquid Investment Assets. The ROE on the other hand was measured by the ratio of net income to total equity while the ROA measured as a ratio of net income to total assets. Initially the regression model was run to see the short run relationship of the profitability as measured by ROE/ROA and independent variable of Liquidity. Then, in an attempt to establish a long-run cointergration relationship between liquidity and profitability the auto regressive distributed lag (ARDL) - bounds testing approach by Perasan et al. (2001) model was adapted.

4.2 Regression Model

The regression model was run to investigate the short run relationship of the profitability as measured by ROE/ROA and independent variable of Liquidity. We can express the relationship between liquidity and profitability mathematically as follows:

$$\mathrm{ROA} = f(L) \quad (1)$$

$$ROA = \propto + \beta L + \varepsilon \quad (2)$$

$$\mathrm{ROE} = f(L) \quad (3)$$

$$ROA = \propto + \beta L + \varepsilon \quad (4)$$

Equations (1) and (3) shows return on asset and return on equity as functions of liquidity. The regression models are indicated by the equation (2) and equation (3). Profitability in this case is represented by ROA and ROE which are the dependent variables, Liquidity (L) is the explanatory/independent variable and α and β are coefficients. There is a plethora of empirical evidence (Bourke (1989), Kosmidou et al.(2005) Kosmidou (2008), Olaguju et al. (2011), and Molyneux et al. (1992)) that attest to the fact that there is statistically significant relationship between liquid assets and bank profitability. This evidence is conflicting and therefore, it is incumbent upon the researcher to contribute to the body of knowledge by further determining the nature of relationship between the variables in question. The first step was to find whether there is a deterministic or short run relationship between profitability and liquidity. The results of a simple LOS are as follows.

Dependent variable	Function	P-Value	F-Test statistic
ROA	ROA(Liquidity)	0.6830	0.1731
ROE	ROE(Liquidity)	0.5373	0.3975

**** Denotes 1% level of significance, ** Denotes 5% level of significance, and *Denotes 10% level of significance*

The results shown above reveal that there is no significant deterministic or short-run relationship between the profitability ratios (ROA & ROE) and liquidity (TL/TA). The F-Stats are well below the recommended figure of 4 and also the p-values are way above the threshold of 0.05.

4.3 Unit root tests

The data sets of three variables (liquid assets, ROE and ROA) were tested for stationarity using Phillip-Perron and Augmented Dickey Fuller tests before they were tested for cointergration – using ARDL-bounds approach. The results of the stationarity tests on differenced variables are presented in table 1.

Table 1. Stationarity tests of variables on first difference – Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test

Variable	No trend	Trend	Intercept
Stationary tests of variables on fist difference – **Augmented Dickey Fuller (ADF) test**			
DLiquidity (TL/TA)	-4.6347***	-4.7165***	-4.8941***
DROA	-5.0000***	-4.6731***	-4.8305***
DROE	-6.2459***	-5.9924***	-6.0370***
Stationary tests of variables on fist difference – **Phillips – Perron (PP) test**			
DLiquidity (TL/TA)	-4.6245***	-4.6999***	-4.8739***
DROA	-4.9740***	-4.6553***	-4.8085***
DROE	-6.1310***	-5.9025***	-5.9309***

**** Denotes 1% level of significance*

Given the result in the table above the hypothesis that first difference of ROA, ROE, and Liquidity has unit roots can be rejected.

4.4 Cointergration test- ARDL – bounds testing procedure

To establish a long-run cointergration relationship between liquidity and profitability the auto regressive distributed lag (ARDL) - bounds testing approach by Perasan et al. (2001) model was adapted. The ARDL approach is unique and superior in that it does not require all the variables under investigation to be integrated at the same order. Thus, the ARDL approach can be used in situation even if the regressors are integrated in any order that is order one (I (1)), order zero (I (0)) or partially integrated (Pesaran and Pesaran, 1997). Laurenceson (2003) argue that using the ARDL approach avoids problems resulting from non-stationary time series data.

The ARDL framework for equation 5, 6, 7 and 8 are as follows:

$$\Delta ROA_t = \mu_0 + \sum_{i=1}^{n} \gamma_{1i} \Delta ROA_{t-i} + \sum_{i=1}^{n} \gamma_{2i} \Delta Liquidity_{t-i} + \gamma_3 ROA_{t-1} + \gamma_4 Liquidity_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta Liquidity_t = \kappa_0 + \sum_{i=1}^{n} \phi_{1i} \Delta Liquidity_{t-i} + \sum_{i=1}^{n} \phi_{2i} \Delta ROA_{t-i} + \phi_3 Liquidity_{t-1} + \phi_4 ROA_{t-1} + \varepsilon_t \quad (6)$$

$$\Delta ROE_t = \alpha_0 + \sum_{i=1}^{n} \beta_{1i} \Delta ROE_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta Liquidity_{t-i} + \beta_3 ROE_{t-1} + \beta_4 Liquidity_{t-1} + \varepsilon_t \quad (7)$$

$$\Delta Liquidity_t = \varphi_0 + \sum_{i=1}^{n} \rho_{1i} \Delta Liquidity_{t-i} + \sum_{i=1}^{n} \rho_{2i} \Delta ROE_{t-i} + \rho_3 Liquidity_{t-1} + \rho_4 ROE_{t-1} + \varepsilon_t \quad (8)$$

Where Δ - first difference operator, ROA – Return on Assets, ROE- Return on Equity and Liquidity – Liquid Assets divided by Total Assets (TL/TA). In the above equations, the terms with the summation signs represent the error correction dynamics while the second part (terms with γ in equation (5), ϕ in equation (6), β in equation (7), and with ρ in equation (8)) correspond to the long run relationship. The null hypotheses in 5, 6, 7 and 8 are

$$\gamma_3 = \gamma_4 = 0, \quad \phi_3 = \phi_4 = 0, \quad \beta_3 = \beta_4 = 0, and \quad \rho_3 = \rho_4 = 0,$$

respectively, which indicate the non-existence of the long run relationship. The first step of the ARDL-bounds testing requires examining the order of lags on the first differenced variables in equation 5, 6, 7, and 8 using the Akaike information criterion (AIC) and the Schwartz-Bayesian criterion (SBC). The results of the AIC and the SBC suggest that optimal lag of ROA and liquidity is 3, while the optimal lag for ROE and liquidity is 3. The second step requires us to apply the bounds F-test to equation 5, 6, 7, and 8 in order to determine whether any long run relationship between South African Bank profitability and liquidity.

Dependent variable	Function	F-Test statistic
ROA	ROA(Liquidity)	1.6900
Liquidity	Liquidity(ROA)	1.1876
ROE	ROE(Liquidity)	2.5532
Liquidity	Liquidity(ROE)	5.1227**

*** Denotes 5% level of significance*

Our results show that there is no evidence of long run relationship between profitability and liquidity. All other things being equal ROA and ROE are not in influenced by liquidity in the long run. To determine whether liquidity is driven by ROE in the long run we used Table CI (v) on p.301 of Pesaran et al. (2001) to determine the asymptotic critical value bounds for the F-statistic since the models had unconstrained intercept and unrestricted trend. The lower and upper bounds for the F-test statistic at the 10%, 5%, and 1% significance levels are [5.59 , 6.26], [6.56 , 7.30], and [8.74 , 9.63] respectively. As the value of our F-statistic is blow the lower bound at the 5% significance level, we can also conclude that there is no evidence of a long-run relationship between the two time-series at this level of significance or greater.

5 Summary and Conclusion

In context of Basel lll framework, released in December 2010 that calls for significant changes in liquidity requirements as a mitigating dynamic to the damage that resulted from 2009/10 financial crisis this paper attempted to determine empirically the relationship between bank profitability and liquidity. This was done with the aim to establish the impact of changes in liquidity on the performance of banks. The results reported in this paper are consistent with the view that there is no significant relationship between profitability and liquidity. This could be an indication that performance of banks can be attributed to other macro-economic factors and other firm specific characteristics besides the composition of its assets. Our findings are consistent with the findings of Naceur et al. (2009) who found out that Banks' liquidity does not determine returns on assets or equity significantly.

These results came as a surprise especially for the banking system whose business and competitive edge is centred on the size and composition of their balance sheet. By nature of their business banks act as intermediaries between deficit units and surplus units, where the take mostly short term (highly liquid) money from surplus units and pass it on to the deficit unit at a price making a positive interest rate spread, consequently making the liquidity of bank assets a focal point of investigation. The liquidity issue outside capital adequacy is the most important fundamental assumed to be directly attributed to the performance of banks in the recent past, particularly during the global financial crises.

Finally, liquidity seems to be quite persistent all over the world, which probably signals need for new, efficient and effective management of assets and liabilities. An analysis of assets only without reference to liabilities could have been the major drawback of this study hence for future studies emphasis should be within a framework of asset liability management (ALM).

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