Factors Influencing Liquidity in Leading Banks “A Comparative Study of Banks Operating in UK and Germany Listed on LSE”

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Abstract—This paper aims to examine factors influencing liquidity in leading banks operating in United Kingdom (market based economy) and Germany (bank based economy) and to compare findings of both these economies. Sample comprised of 8 leading banks of UK and 8 leading banks of Germany listed on London Stock Exchange. Data was collected from the internet, annual reports and some previous records of selected banks over the recent ten years period before, during and after the financial crisis from 2006-2015 having 80 number of observations from UK and 80 number of observations from Germany. Liquidity was taken as dependent variable while NIM, credit risk, bank size, profitability, income diversification and financial leverage were selected as independent variables. Panel data was analyzed by using pooled least square, fixed and random effects regression techniques, and Hausman specification test and redundant fixed effects tests were used to know most appropriate model. Pesaran’s test of cross sectional independence was performed and descriptive and correlation analysis of UK and German banks were also executed. Results revealed that net interest margin has significant negative impact on liquidity for both UK and Germany. Financial leverage have significant negative relationship with liquidity for Germany but this relationship is insignificant in case of UK. Bank size, credit risk, profitability and income diversification are insignificantly related with liquidity in case of both UK and German banks.

Keywords: Liquidity, Leading banks, London Stock Exchange, Financial Crisis, Net Interest Margin, Credit Risk, Bank Size, Profitability, Income Diversification, Financial Leverage, Panel Data

1. INTRODUCTION

1.1 Aims and Background of study

This research aims to investigate factors that affect liquidity position in commercial banks operating in UK and Germany. Commercial bank is a profit making institution, acts as an intermediary between lenders and borrowers, fetch deposits from individual customers and business and then grants loans to those persons who need financial support. The German banking system is quite unique as it contains three pillars of high importance: privately owned commercial banks, including large banks with extensive branch networks; smaller, privately owned and regionally focused credit cooperatives; and public banks (or banks with government involvement) comprising the small, regionally oriented savings banks and the larger Landesbanken. Banks and building societies operating in the United Kingdom collectively known as UK monetary financial institutions and they comprise the largest banking sector in Europe and the fourth largest in the world. Excessive liquidity indicates idle funds that don’t fetch any profits for the firm. In an advent of poor information of liquidity risk management from a bank, depositors of fund will choose to withdraw a greater portion or even all of their deposits, causing liquidity shortfall, which banks will be unable to generate sufficient financing to embark on profitable projects and consequently affect performance ratios such as assets turnover and return on equity.

Preferably, a well-managed financial institute should have a precise mechanism for the identification, monitoring, measurement and mitigation of liquidity risk. The Basel Committee of Banking supervision defined funding liquidity as “the ability of banks to meet their liabilities, unwind or settle their positions as they come due”. Liquidity risk management is a vital component of the global risk management agenda of the financial services sector, regarding all financial institutions. Liquidity risk’s measurement and management in banks did not receive adequate attention even though banks and regulators were required, by Basel II, an implementation of upgraded framework for dealing with this type of risk. Liquidity plays a crucial role to analysts (both internal and external) because liquidity has a close linkage with day to day business operations. When a financial institution fails to meet expected & unexpected cash flow needs as they arise, this is known as liquidity risk. Private Banks having less liquid assets in Germany increased liquidity by reducing lending to customers and it was found that banks preferred to rely on stable source of financing for example core deposits and high quality capital and they continued lending. Public banks with more assets tend to lend more and those banks with more core deposits most
effectively use their credit lines. Banks failed because of poor management of liquidity and over reliance on short-term wholesale funding in 2007 financial crisis, which quickened the failure of a number of banks. A struggle made by many banks to maintain sufficient liquidity during financial crisis period. In order to sustain the financial system, unprecedented levels of liquidity support were required from central banks. A number of banks failed, were required resolution or enforced into mergers even with such massive support. Liquidity risk management is defined as "the ability of bank to own sufficient liquidity or cash to meet up with unexpected demand from depositors so that bank can continue to perform its duties". The banks which proved illiquid in UK over the period 2005 to 2010 were Lloyds TSB, the Bank of Scotland, Standard Chartered and Natwest, on both a long term and short term basis, among which Natwest had poorest performance. Only the Barclays bank maintained a strong liquidity position on short term basis during 2005 to 2010. Liquidity positions of Santander plc seemed to be healthy on long term basis, although not in 2009. While in both normal and stress conditions, HSBC proved liquid in the short term, although not in 2008 and 2010. Royal Bank of Scotland, meanwhile, sustained healthy liquidity positions in long run since 2008 after getting capital support from government. The collapses of Northern Rock and Bear Stearns showed that profitability and adequate capital were no defense against liquidity risk. In the quarter before their disappearances, both made profits and were well capitalized businesses. However, their inability to deal with liquidity risk issues caused them to be swept away. Insufficient liquidity might deteriorate firm's credit standings and that might lead to forced liquidation of firm's assets. Literature, across different regions of the world, provides evidence that there are several factors which influence bank's liquidity position. The first studies on liquidity risk were mainly focused on bank runs and financial crisis (Diamond, Dybvig 1983). Credit risk, the right level of funding, the volatility of deposits and preference of cash were found to be major determinants of excess liquidity (Aikaeli, 2006). A significantly high negative impact of the interest margin rate on liquidity was showed by Agama in 2015 meaning that banks were encouraged by high interest rate to lend more. The IMF (2010) disclosed that global liquidity is positively correlated with equity investments. Advanced economies were influenced by liquidity problems more than that of emerging economies (Chudik and Fratzscher, 2011). Profitability was significantly and positively linked with liquidity (David and Samuel, 2012). The liquidity creation and performance of bank are negatively associated with large banks in China, while they are positively associated with small banks (Lei and Song, 2013). The bigger banks in Germany came very close to bankruptcy during the crisis, and had to be saved through publicly-overseen restructurings. Schweiger and Liebeg (2009) highlighted that, the benefits of lower cost of financial intermediation will only effectuate if banks price risks in a prudent manner. The layout of this paper is as follows. Section 2 presents review of literature on the topic. Third section provides study’s hypotheses, summarizes variables of the study, portrays conceptual framework, presents the source and type of employed data, introduces sample and population of the study, describes tools and techniques used for data analysis and provides operationalization of variables. Section 4 provides the results and discussion of the study and section 5 presents this paper’s main findings and conclusions, and provides practical implications followed by recommendations and future research.

1.2 Problem Statement

The banking systems of the European Union (EU) member states; the old and the new states, have faced significant challenges with regard to financial regulations (Casu et al., 2006). According to the research conducted by Mody and Wolff on 130 euro area banks in 2015, “banks are often superficially well capitalized but banks are vulnerable either because they have a high share of non-performing loans or they have insufficient resources to cover for possible losses on the non-performing loans”. Balance sheet analysis of Yan et al (2012), based on the work of Moody’s (2001) and BCBS (2010), has confirmed that, since 2005, the largest eight banks of United Kingdom have all suffered some liquidity pressures. Liquidity risk which is in the form of withdrawn loan obligations is appeared in Germany as borrowers drew on prior commitments in huge quantities (Syed et al, 2013). Over the period 2006 to 2012, German banking sector characterized by a relatively low liquidity buffer as measured by the ratio of liquid assets to deposits and short term funding and liquidity measured by the ratio of net loans to total assets showed high level of liquidity (Patora, p. 344, 2014). During the last two decades, financial institutions worldwide have witnessed a lot of stress in managing their margins in wake of the new risks, challenges and increase in the competition posed to them by the factors of liberalization and deregulation.

1.3 Research Questions

I. What factors determine liquidity in leading banks operating in UK and Germany?

II. How well did the leading banks operating in UK and Germany perform financially before, during and after the crisis period?

III. How do leading and competitive banks improve their liquidity position?

1.4 Objectives of the Study

I. To determine factors that have significant impact on liquidity position of leading banks operating in UK and in Germany.

II. To analyze the financial performance of leading banks operating in United Kingdom.
and Germany before, during and after financial crisis period.

III. To compare findings of both UK and Germany and to give valuable suggestions for soundness of leading banks of both UK and Germany examined in this research.

1.5 Significance of the study

Present research is beneficial for regulatory authorities and policymakers as this will help to assess the sufficiency of banks’ liquidity position and will help them to take quick action if the bank is deficient in this area in order to secure depositors and to limit damage in the system. The progress in banks’ liquidity performance tends to send positive signals to investors and shareholders regarding the future of the bank in which they invest, so this research is also helpful for investors in taking investment decisions. This research will help banks to decide best level of interest margins to win trust of their borrowers as well as their depositors. Also, if banks implement the financial intermediation function efficiently, they will encourage the economic growth of a country. This research is also helpful for future researchers to proceed further. This research is also helpful for banks’ customers in their interaction with the banks.

1.6 Limitations

I. The present research only focused 8 leading commercial banks operating in Germany and 8 leading commercial banks operating in United Kingdom. Future research can be carried out; by taking a larger sample from these two countries; by taking banks from whole Europe or by comparing other market based and bank based economies.

II. The obtained data covers a short time period, which is of 10 years (2006 to 2015), due to its unavailability and time constraint. The future researchers can take a large time frame to conduct further analysis.

III. This research preferred loan to asset ratio to denote liquidity position, future researchers can also preferred other financial indicators of liquidity and can also take in consideration some other variables representing financial performance of banks instead of liquidity.

IV. This research is based on secondary data.

V. Macroeconomic factors affecting banks liquidity have not been taken into account. The future researchers can also take in consideration these factors while studying and evaluating financial performance of banks.

VI. No comparison has been made between the different types of banks. Future researchers can also undertake comparative study e.g. public and private banks, national and international banks, large and small banks etc.

2 LITERATURE REVIEW

This section aims to discuss various research studies and different theoretical concepts regarding factors influencing bank’s liquidity and presents different methods adopted by different researchers in different countries.

Roman and Sargu (2014) evaluated the liquidity risk of the banks operating in Bulgaria and Romania in the context of the EU ascension process. Results underlined that capital adequacy ratio and ratio b/w impaired loans & gross loans had statistically significant effect on Romanian & Bulgarian banks’ liquidity risk. Also, Raeisi, Haghighat and Shirazi (2014) investigated the effect of internal and external factors on liquidity of banks. 18 Banks of Islamic Republic of Iran were evaluated during 2003 to 2012 by multiple regression analysis of panel data and their results showed assets quality and unemployment had negative effect on banks liquidity. According to Cucinelli, banks which had better assets quality were more probably to manage liquidity in short run (Cucinelli, 2013). Bank liquidity increased with higher nonperforming loans’ share & interbank transaction & interest rates on loans (Vodova, 2011; Vodova, 2013) and this was in line with another study conducted by Malik and Rafique in 2013. Malik and Rafique (2013) examined the macroeconomic & bank specific factors of commercial bank’s liquidity from Pakistan for period 2007-2011. Bank’s liquidity was measured in two ways; one was cash and cash equivalents to total assets (L1) and second was advances net of provisions to total assets (L2). Two models were estimated based on these measures of liquidity. Results indicated that nonperforming loan’s share on total volume of loans positively determined liquidity of bank (measured by cash and cash equivalents to total assets). Munteanu (2012) identified factors impacting liquidity of bank by multiple regression technique. A panel of twenty seven Romanian commercial banks was examined by him for period 2002 to 2010, highlighting the differences between the years of crisis (2008 to 2010) and the years before crisis (2002 to 2007). Liquidity was taken as dependent variable, measured by two ratios, liquid assets to deposits & short term funding and net loans to total assets. Independent variables of study were capital adequacy, assets quality, ratio of cost to income, funding cost, interbank funding, interest rate ROBOR, rate of inflation, credit risk rate, real growth rate of GDP and unemployment. The results reflected both different & common factors for the two liquidity rates examined and were similar to those of prior studies on this area. The years before crisis were monitored separately from the years of crisis (2008 to 2010). An essential indicator for stability of bank, Z-score, had a significant effect on liquidity of bank in the years of crisis. In the search of
designing efficient liquidity management tools, he constructed the empirical & conceptual framework for improving liquidity of bank, as a variable difficult to stress test. According to Munteanu, he intended to prolong the analysis to incorporate other economies of East Europe and more important indicators for the sake of establishing grounds of examining the influence of liquidity over profitability and the best model for profitability-liquidity tradeoff.

According to Vodova (2011), in his study on factors impacting Czech commercial banks' liquidity over time 2001 to 2009, relation between banks' size and their liquidity was ambiguous. In contrast, the link between market power of bank and liquidity risk was analyzed in a study of 47684 sample banks in one hundred and thirteen different economies (Nguyen et al., 2012), they showed that banks with big size, through cost efficiency and lesser capitalization, endured a lesser risk of liquidity. It was also found by them that non-listed banks normally hold less liquid assets than listed banks. While, bank liquidity decreased with bigger size of banks in another study conducted on Polish commercial banks for time 2001 to 2010 (Vodova, 2013). Similarly, in another study conducted by Vodova in 2013 on factors effecting Hungarian commercial banks' liquidity over time 2001 to 2010, bank liquidity was negatively related to size of the bank and the interest rate on interbank transactions. Bigger banks had a higher liquidity risk exposure (Cucinelli, 2015) and this was in line with another study undertaken by Dinger (2009) on ten banking systems from CEE (Estonia, Czech Republic, Bulgaria, Hungary, Poland, Lithuania, Latvia, Slovenia, Slovakia and Romania) in which he underlined that smaller banks have the tendency to be more liquid and according to him, foreign banks were less liquid than their domestic peers. Contrary to this, banks size and their liquidity was positively correlated (Chagwiza, 2014) and this was in line with Malik and Rafique (2013) where the bank size and monetary policy interest rate positively and significantly determined the bank liquidity. Also liquidity of Moroccan banking industry was positively correlated with bank's size (Meahi and Abderrassoul, 2014) meaning that, large banks were more liquid than small banks. But one study revealed that there was insignificant link between creation of liquidity and bank specific variables named performance & size (Rauch, Steffen, Hackethal, & Tyrrel, 2010). Also, Moussa (2015) analyzed determinants of banks liquidity in Tunisia over the period 2000-2010 by using Panel static and Panel Dynamic methods. It was found that size, total loans / total assets, financial costs/ total credits, total deposits / total assets had not a significant impact on bank liquidity. On the other hand, Vodova (2014) found if Czech commercial banks were liquid enough to meet sold loan commitments and if there were any significant differences depending on the size of the bank. The scenario analysis for three liquidity ratios in the period from 2007 to 2012 was used. The majority of Czech banks was able to finance the use of 50% of loan commitments. The most vulnerable banks belonged to the group of medium banks; they focused strongly on lending activity which they financed also from other sources of financing. Giannotti, Mattarocci and Gibilaro (2010) found that banks with large size had lesser liquidity exposure in a study on six hundred and seventy five sample banks from Italy. Authors sustained that this strategy could be confirmed subject to the theory that banks with larger size have a better repute and so are less exposed to the risk of liquidity (Giannotti et al., 2010). Lastly, it was highlighted by them that in the banking system of Italy there was no significant difference in terms of liquidity risk exposure between banks concentrating in real estate lending and other banks, while the former were significantly influenced by interbank market dynamics regarding liquidity exposure. Roman and Sargu (2015) analyzed major problem which needed to be undertaken when promoting financial stability, more precisely the factors of liquidity risk of sample banks functioning in a series of Central & Eastern European countries (Hungary, Bulgaria, Romania, Latvia, Poland, Czech Republic and Lithuania) over period 2004-2011, reviewed concurrently the progressions made in certain principal areas and ongoing challenges. Results showed that the loan portfolio’s depreciation had negative influence on analyzed banks’ overall liquidity. Size of bank had insignificant impact on bank credit risk (Zribi and Boujelbene, 2011).

Bunda and Desquilbet in 2008, on their study of 1107 commercial banks from thirty six emerging countries, discovered that capitalization (ratio of equity to total assets) was significantly and positively linked with all measures of liquidity preferred in their study and significantly linked with inflation and growth rates. Similarly, Vodova (2011) identified factors having influence on Czech commercial banks' liquidity over time 2001 to 2009. According to results bank liquidity and capital adequacy were positively associated with each other. Another study conducted by Vodova in 2013 identified factors having impact on Polish commercial banks' liquidity for period 2001 to 2010 using panel data regression technique. Results revealed that bank liquidity increased with higher capital adequacy. Bank liquidity was positively linked to capital adequacy of banks in another study conducted by Vodova in 2013 on Hungarian commercial banks over the period from 2001 to 2010. Similarly, Bonfim and Kim in 2011 underlined that lesser liquidity risk exposure was presented by banks having healthier capital adequacy. Also, Chagwiza (2014) identified factors having impact on liquidity of commercial banks from Zimbabwe over time 2010-2011 and bank liquidity was positively associated with total asset volumes, capital adequacy, gross domestic product and bank rate and this result was in line with the study of Raeesi, Haghhighat and Shirazi (2014). Capital adequacy had positive effect on liquidity of bank (Raeesi, Haghhighat and Shirazi,
2014) and this result was in line with (Cucinelli, 2013). More capitalized banks presented a healthier liquidity on long horizon (Cucinelli, 2013). Delechat et al. (2012), in their study over the period 2006 to 2010 by using a panel of approximately 100 commercial banks in countries of Central America, found that smaller lower capitalized banks tend to hold higher liquidity buffers. Karkowska (2015) focused on the investigation of banks’ liquidity determinants (local, global and financial markets determinants) in 42 countries (advanced and emerging/developing countries) over the period 2000-2011. Results showed the significance of the differences in global liquidity depending on the country’s level of development. They found support to the conjecture that globalization and global banks’ leverage might convey some useful information on global liquidity. Banks’ lending in advanced countries was shielded from the monetary policy because of their ability to freely access alternative sources of funds (Karkowska, 2015). Mehdi and Abderrassoul (2014) identified the determinants of Moroccan bank’s liquidity over the period 2001-2012 and showed that equity to total assets had no impact on Moroccan bank’s liquidity. Liquidity of Moroccan banking industry was positively correlated with share of own bank’s capital of the bank's total assets and external funding to total liabilities (Mehdi and Abderrassoul, 2014). Capital adequacy had negative influence on risk and this relation was statistically significant (Zribi and Boujelbene, 2011), indicating that under capitalized banks were more risk taker relative to over capitalized banks.

There is always a tradeoff between liquidity and profitability. An attempt to gain more in any of them means giving up some of the other. For a company to enhance its performance, it must pursue both liquidity and profitability. Vodova (2013), in his study on Polish commercial banks, showed through panel data regression that bank liquidity decreased with higher leverage. On contrary, he, in his study on Hungarian commercial banks in 2013, showed that bank liquidity was positively related to bank profitability. Vodova (2013), in his study on Polish commercial banks, showed through panel data regression that bank liquidity decreased with higher leverage. Most of the empirical papers on the relationship between banks’ performance and banks’ liquidity examined European and Asian banks. There was a positive association between liquidity and ROA (Saeed, 2014). It was investigated by Nurazi and Evans in 2005 that whether failure of bank could be predicted by using CAMELS ratios. The results suggested that liquidity was statistically significant to explain failure of bank. Lanberg and Valming (2009) conducted a study on companies listed on Shochholm Stock Exchange and found that liquidity strategies do not have significant impact on ROA. Dawood (2014) evaluated the profitability of the 23 commercial banks operating in Pakistan for the period of 2009 to 2012 and used OLS method for looking influence of some bank specific variables on profitability (ROA). According to his findings, liquidity was one of the variables that decide profitability. Hellhel (2014) investigated the influence of macroeconomic & bank specific determinants on fourteen commercial & private banks’ profitability from Georgia where banks tend to be largest part of financial system with free market system and liberalization policies as in other transition economies for period 2009-2013 by panel data analysis. The relationship of asset size and credit to deposit ratio with profitability of banks has been found to be statistically insignificant (Hellhel, 2014).

Online banking or internet banking helped customers to accomplish financial transactions through safe website functioned by any bank or other entity (Demoulin, 2013). Rauf, Qiang and Sajid (2014) investigated the effects of internet banking on the liquidity and asset quality of Pakistan banking sector overall, over the period 2004-2013, quarterly. Results showed that one percent increase in the transactions by means of internet banking would lead toward more than one percent increase in the strength of liquidity and asset quality of whole banking sector in Pakistan specifically and overall for all other countries generally.

Aspachs et al. (2005) observed for the nature of relationship between liquidity and set of banking variables, in order to test for the different theoretical relationships among them. This research took place on a quarterly basis in UK resident banks over the period Q1 1985 to Q4 2003. The results of their study showed that liquidity depends on a number of factors, such as: interest margin, likelihood of getting aid from last resort’s lender, loan growth, short term interest rate, GDP as an indicator of business cycle, bank size and bank profitability (Aspachs et al, 2005). Analysis of Valla & Sues-Escorbiac in 2006, over an English banks’ panel, stated an inverse correlation of GDP real growth and of net interest margin (seen as an opportunity cost for holding liquid assets) with liquidity. Vodova (2013), in his study on Polish commercial banks, showed through panel data regression that bank liquidity decreased with higher interest rate margin. Similarly, he, in his study on Hungarian commercial banks in 2013, showed again...
that bank liquidity was negatively related to interest margin. Contrary to this, Vodova (2011), identified factors of Czech commercial banks’ liquidity over time 2001 to 2009, using panel regression technique, and found that interest margin was insignificantly related to the Czech commercial banks’ liquidity. In contrast, Moussa (2015), in his study on 18 Tunisian banks over the period 2000-2010 through the method of static panel and method of panel dynamic, found that net interest margin have statistically significant negative impact on liquidity. Similarly, Marozva (2015), in his study on the relationship between liquidity and bank performance for South African banks during the period 1998-2014, employed the Autoregressive Distributed Lag (ARDL)-boundary testing approach and the Ordinary Least Squares (OLS) to examine the nexus between net interest margin and liquidity. Results revealed that net interest margin had significant negative influence on funding liquidity risk while, there was an insignificant co-integrating relationship between net interest margin and the two measures of liquidity. Agama (2015), determined factors that describe liquidity of commercial banks in Ethiopia over the period of 2000-2012. A balanced panel data incorporating five bank specific and three macroeconomic variables were considered. Fixed effect or random effect estimation techniques were employed based on the diagnosis tests made and nature of dependent variables. There was significantly high negative impact of the interest margin rate on liquidity, showed that banks are encouraged by high interest rate to lend more. The higher the lending, the lower level of liquidity for those banks (Agama, p. 77, 2015). This was similar to the findings of Moore (2010), Bunda and Desquilbet (2008) and Aspachs, et al., (2005). Angbazo (1997) found significant inverse association of net interest margin with liquidity risk by using liquid assets to total assets as liquidity risk measure. Beck and Hess (2009) found insignificant relationship between liquidity, net interest margin and spread. It was asserted that, the increase in opportunity cost of holding reserves in respect to increased liquid assets would drop net interest margins (Lopez-Espinosa et al., 2011). Some other studies revealed similar results as Maudos & de Guevara in 2004 and Chen & Liao in 2011. “A bank with higher liquidity faces lower liquidity risk hence is likely to be associated with lower spreads due to a lower liquidity premium charged on loans. Banks with high risk tend to borrow emergency funds at high costs and thus charge liquidity premium leading to higher spreads” (Ahokposis, 2013).

Rauch et al. (2010) studied liquidity risk’s determinants and tried to investigate the factors of liquidity creation. Macroeconomic factors and monetary policy were most significant determinants according to their findings and in another study, bank liquidity was inversely linked with monetary policy interest rate (Vodova, 2013). The relation between the growth rate of GDP and bank liquidity was ambiguous (Vodova, 2013). Contrary to this, financial turmoil, higher inflation rate and GDP growth rate were negatively related with liquidity of bank (Vodova, 2011), this result was in line with another study conducted by Chagwiza on commercial banks of Zimbabwe over the period 2010-2011. The adoption of multi-currency, inflation rate and business cycle had a negative impact on liquidity (Chagwiza, 2014). Contrary to this, bank liquidity increased with inflation (Vodova, 2013). Similarly, in one another study, Inflation rate had positive effect on liquidity of bank (Raesi, Haghighat and Shirazi, 2014). Contrary to this, according to Malik and Rafique in 2013, inflation had a negative impact on liquidity (measured by cash and cash equivalents to total assets). In another study, inflation rate and GDP growth rate along with delayed liquidity, financial performance, capital / total assets and operating costs/ total assets had significant impact on bank liquidity (Moussa, 2015). According to Cucinelli, the liquidity risk management changed only on the short term horizon during financial turmoil (Cucinelli, 2013). Kumbraili and Webb (2010) investigated the performance of South Africa’s commercial banking sector over the period 2005-2009. Financial ratios were used to measure the profitability, liquidity and credit quality performance of large South African based commercial banks. A sample of the top five commercial banks was selected based on the value of their total assets at the end of financial year 2009. A student’s t-test was employed to test the hypothesis that “the means of the two periods are the same on the seven variables” to examine whether the difference in performance of the banks in 2005-2006 was statistically different from that of 2008-2009. Results showed that overall bank performance increased considerably in the first two years of the analysis. A significant change in trend was observed at the beginning of the global financial crisis in 2007, reaching its peak during 2008-2009. This resulted in declining profitability, low liquidity and deteriorating credit quality in the South African Banking sector. Wuryandani (2012) investigated the liquidity determinants of banks by panel data of 110 famous banks during 2002 to 2011. He divided the banks liquidity into two groups: Precautionary liquidity (predicted) and involuntary liquidity. The study applied Generalized Method of Moment (GMM) and VAR (Vector Autoregression) test. It was shown that credits, savings and deposits were affected by Precautionary liquidity. Also, monetary policies only affected small banks by legal reserve rate for Precautionary liquidity. In addition, monetary policies were effective on banks liquidity via interest rate policy. According to Malik and Rafique, financial crisis significantly and positively influenced liquidity, measured by advances net of provisions to total assets, of commercial banks while bank liquidity, measured by cash and cash equivalents to total assets, was negatively and significantly affected by the financial crisis (Malik and Rafique, 2013). Mehdi and Abderrassoul (2014) identified the determinants of Moroccan bank’s liquidity over the period 2001-2012.
Results showed a decrease in liquidity during the period 2001-2012. This decline had increased since 2007 with the financial crisis. Liquidity of Moroccan banking industry was positively correlated with monetary aggregate M3, foreign assets and foreign direct investment and was negatively correlated with GDP growth rate, inflation rate, public deficit and financial crisis. Unemployment rate had no impact on Moroccan bank’s liquidity (Mehdi and Abderrassoul, 2014). Deep and Schafer (2004) investigated the liquidity changes of the banks as seasonal data during 1997 to 2001 among 200 USA banks. The results of the study showed that the calculated change amount by US commercial banks was low and deposit in insurance restricted the success and liquidity change of bank.

Research Gap

As seen in the existing empirical studies on evaluating liquidity risk that they lack in comparing financial performance of leading commercial banks operating in United Kingdom with leading commercial banks operating in Germany.

3 RESEARCH METHODOLOGIES

Based on the literature review made in last section and following the research considerations of Introduction section, this section will formulate the research structure of this paper.

3.1 Hypotheses

1. Null hypothesis (Ho): There is insignificant relationship between net interest margin and liquidity.
   Alternative hypothesis (H1): There is significant relationship between net interest margin and liquidity.

2. Null hypothesis (Ho): There is insignificant relationship between credit risk and liquidity.
   Alternative hypothesis (H1): There is significant relationship between credit risk and liquidity.

3. Null hypothesis (Ho): There is insignificant relationship between income diversification and liquidity.
   Alternative hypothesis (H1): There is significant relationship between income diversification and liquidity.

4. Null hypothesis (Ho): There is insignificant relationship between profitability and liquidity.
   Alternative hypothesis (H1): There is significant relationship between profitability and liquidity.

5. Null hypothesis (Ho): There is insignificant relationship between bank size and liquidity.
   Alternative hypothesis (H1): There is significant relationship between bank size and liquidity.

6. Null hypothesis (Ho): There is insignificant relationship between financial leverage and liquidity.
   Alternative hypothesis (H1): There is significant relationship between financial leverage and liquidity.

7. Null hypothesis (Ho): common effect model is appropriate
   Alternative hypothesis (H1): fixed effect model is appropriate

8. Null hypothesis (Ho): random effect model is appropriate
   Alternative hypothesis (H1): fixed effect model is appropriate

9. Null hypothesis (Ho): residuals across banks are not correlated
   Alternative hypothesis (H1): residuals across banks are correlated

Figure 3.1: Dependent and Independent variables, (Conceptual framework)

3.2 Econometric Models

For United Kingdom

\[ y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e \]

Here ‘y’ is dependent variable (LOANASSET)
‘a’ is called y-intercept or constant
“b1, b2, b3, b4, b5 and b6” are regression coefficients
“x1, x2, x3, x4, x5 and x6” are independent variables (ROA, CR, NIM, NIITI, DEBTEQUITY, and SIZE respectively)

‘e’ is error term or residual

For Germany

\[ y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e \]

Here ‘y’ is dependent variable (LOANASSET)

‘a’ is called y-intercept or constant

“b1, b2, b3, b4, b5 and b6” are regression coefficients

“x1, x2, x3, x4, x5 and x6” are independent variables (ROA, CR, NIM, NIITI, DEBTEQUITY, and SIZE respectively)

‘e’ is error term or residual

### TABLE 3.1: Summary of Variables used in the research

<table>
<thead>
<tr>
<th>Dependent Variable &amp; Notation</th>
<th>Variable description for UK and Germany</th>
<th>Some Previous Researches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit risk (CR)</td>
<td>[Loan loss provision / net interest income]*100</td>
<td>Munteanu (2012), Agama (2015) etc.</td>
</tr>
</tbody>
</table>

### Income Diversification (NIITI)


### Financial Leverage (DEBTEQUITY)


### Bank Size (SIZE)


### 3.3 Data Type and Sources

Instead of choosing huge number of banks, in this paper eight leading banks operating in Germany and eight leading banks operating in United Kingdom were selected and data was collected from secondary sources (the internet, annual reports and some previous records of selected banks). This paper employed quantitative data over the recent ten years period before, during and after the financial crisis from 2006-2015 for analysis having 80 number of observations from United Kingdom and 80 number of observations from Germany.

### 3.4 Population and Sample

The population of this research is all listed banks on London Stock Exchange. Sample selected for this research consists of 8 leading banks operating in UK and 8 leading banks operating in Germany. Sample banks from UK with their total assets (in millions GBP) and sample banks from Germany with their total assets (in billions of euros) are given below in table 3.2.

### Table 3.2: Sample banks operating in UK and Germany ranked by Assets

<table>
<thead>
<tr>
<th>Leading banks in UK ranked by total assets in million GBP (2014)</th>
<th>Leading banks in Germany ranked by total assets in billions of euros (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barclays Bank plc (1,345,833)</td>
<td>Deutsche bank AG (1,636.57)</td>
</tr>
<tr>
<td>RBS Group plc (1,019,934)</td>
<td>Commerzbank AG (574,263)</td>
</tr>
<tr>
<td>Lloyds Bank plc (862,004)</td>
<td>Deutsche Zentral-Genossenschaftbank (DZ bank AG)</td>
</tr>
</tbody>
</table>
management to perform their job efficiently is indicated by this ratio since it shows the ability to generate profit from bank’s assets.

- **Credit Risk**

This paper calculated credit risk as, loan loss provisions to net interest income ratio. This ratio shows the relationship between interest income and provisions in the income statement for same period and lower will be the better.

- **Net interest margin**

This research calculated net interest margin as, Net interest income to total assets ratio, where net interest income is the difference between gross interest income and expenses. The higher the ratio, the cheaper the funding or the higher the margin the bank is commanding. Higher margins are desirable as long as asset quality is maintained. This ratio helps bank to determine if or not it has been making wise investment decisions. From the manager point of view, how well he/she manages bank’s assets and liability also affected by the spread between the interest earned from its assets and costs from its liability, the spread here represents the net interest margin.

- **Income Diversification**

The ratio of non-interest income to total income was used by this research to indicate income diversification. Noninterest income is considered an important diversification source for the banks. Non-interest income represents other sources besides earnings from loans of the commercial banks. Vong et al (2009) captured the importance of fee-based services and other income resulting from diversification to commercial banks profitability by the non-interest income to gross income.

- **Financial Leverage**

This paper calculated financial leverage as the ratio of total debt to total shareholder’s equity. The degree of debt utilization for a bank is measured by this ratio. For its stability, debt leverage measures the degree of shareholders’ equity can cushion creditors’ claims with the financial shocks. The higher the ratio means the bank is more aggressive in financing its growth with debt and causes volatile earning from its extra interest expense. This volatile earning brings more risks for bank’s operation.

- **Bank Size**

This research calculated bank size by taking natural log of total assets. Demirguc-Kunt and Huizenga (2011), logarithmically measured the size of banks according to total assets called “absolute size” and liabilities over GDP called “systemic size”. They suggested, banks with a large absolute size were often much more profitable compared to banks with large

<table>
<thead>
<tr>
<th>Co-operative bank (43,396)</th>
<th>Deutsche Post bank AG (158,434)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBOS plc (377,874)</td>
<td>Nordeutsche Landesbank (Nord LB) (257.743)</td>
</tr>
<tr>
<td>Bank of Scotland Plc (381, 225)</td>
<td>Bayerische Landesbanken (Bayren LB) (285.000)</td>
</tr>
</tbody>
</table>
| Standard Chartered plc (499,100) | Landesbank Baden-Wurttemberg (LBBW) (2011), logarithmically measured the size of banks according to total assets called “absolute size” and liabilities over GDP called “systemic size”. They suggested, banks with a large absolute size were often much more profitable compared to banks with large

### Table 3.1. The variables under research are conceptualized and theories supporting this research as shown in table 3.1. The variables under research are conceptualized in figure 3.1.

#### Dependent Variable

Liquidity is dependent variable of this research.

- **Liquidity**

In this research, liquidity is calculated by dividing total net loans and advances of bank to its total assets. This ratio considered to be an important ratio which measures bank liquidity with respect to its total assets. It indicates the share of bank’s total assets which has invested for loans. Increase in this ratio will decrease bank liquidity and at the same time, higher potential profitability the bank can enjoy with exposure to liquidity risk.

#### Independent Variables

Profitability, credit risk, net interest margin, income diversification, financial leverage and bank size are independent variables of this research.

- **Profitability**

The present research used Return on assets ratio to indicate profitability which is calculated by dividing bank’s net profit after tax to its total assets. Return on assets ratios show how profitable the banks are relative to their total assets. The ability of

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#### Independent Variables

Profitability, credit risk, net interest margin, income diversification, financial leverage and bank size are independent variables of this research.

- **Profitability**

The present research used Return on assets ratio to indicate profitability which is calculated by dividing bank’s net profit after tax to its total assets. Return on assets ratios show how profitable the banks are relative to their total assets. The ability of...
systemic size which were profitless. The variable “size” is considered as a milestone for determining efficiency of bank.

4. DATA ANALYSIS, RESULTS AND DISCUSSION

This section discusses results regarding which factors have significant influence on liquidity for both UK and German banks.

4.1 Descriptive Analysis

Graphical representation of variables of sample banks of UK are given in Appendix A. All the figures collected from annual reports of sample banks of UK are in million pounds. All ratios were calculated in percentages except debt to equity ratio. Table 4.1 provides a summary of the descriptive statistics for the dependent and independent variables for the sample banks of United Kingdom.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
<th>Min</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Total net loans and advances / Total assets]*100</td>
<td>55.72</td>
<td>57.79</td>
<td>71.82</td>
<td>25.45</td>
<td>11.81</td>
</tr>
<tr>
<td>[Total debt/Total Shareholder's Equity]</td>
<td>33.19</td>
<td>26.94</td>
<td>106.47</td>
<td>11.22</td>
<td>19.92</td>
</tr>
<tr>
<td>[Loan loss provision / net interest income]*100</td>
<td>19.44</td>
<td>16.29</td>
<td>124.61</td>
<td>69.42</td>
<td>27.61</td>
</tr>
<tr>
<td>Natural log of total assets</td>
<td>12.66</td>
<td>12.50</td>
<td>56.98</td>
<td>-125.93</td>
<td>29.49</td>
</tr>
<tr>
<td>[Non-interest income / Total income]*100</td>
<td>20.90</td>
<td>25.10</td>
<td>56.98</td>
<td>-125.93</td>
<td>29.49</td>
</tr>
<tr>
<td>[(Interest income - Interest expenses)/Total assets]*100</td>
<td>0.02</td>
<td>0.07</td>
<td>2.18</td>
<td>-1.23</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Graphical representation of variables of sample banks of Germany are given in Appendix B. All the figures collected from annual reports of sample banks of Germany are in million euros. All ratios were calculated in percentages except debt to equity ratio. Table 4.2 provides a summary of the descriptive statistics for the dependent and independent variables for the sample banks of Germany.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
<th>Min</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
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</tr>
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<td>33.19</td>
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</tr>
<tr>
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<td>19.44</td>
<td>16.29</td>
<td>124.61</td>
<td>69.42</td>
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</tr>
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</tr>
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<td>20.90</td>
<td>25.10</td>
<td>56.98</td>
<td>-125.93</td>
<td>29.49</td>
</tr>
<tr>
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<td>0.02</td>
<td>0.07</td>
<td>2.18</td>
<td>-1.23</td>
<td>0.42</td>
</tr>
</tbody>
</table>

4.2 Estimation Results for UK Banks (Y = \text{LOANASSET})

Table 4.3: Redundant Fixed Effects Test for United Kingdom (Y = \text{LOANASSET})

Redundant Fixed Effects Tests

Pool: PANEL

Test cross-section fixed effects

<table>
<thead>
<tr>
<th>Effects Test</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section F</td>
<td>19.121092</td>
<td>(7.66)</td>
<td>0.0000</td>
</tr>
<tr>
<td>Cross-section Chi-square</td>
<td>88.632045</td>
<td>7</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table 4.4: Hausman Test for United Kingdom (Y = \text{LOANASSET})

Correlated Random Effects - Hausman Test

Pool: PANEL

Test cross-section random effects

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Chi-Sq. Statistic</th>
<th>d.f.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
According to redundant fixed effects tests, cross section F and cross section chi-square value is less than alpha of 0.05 as shown in table 4.3, also the Hausman test results can be seen to have p value less than 0.05 as shown in table 4.4. As both redundant fixed effects and Hausman tests indicating that fixed effect model is most appropriate model, thus the research accepts hypothesis that the fixed effect model is appropriate model to use.

Table 4.5: Fixed Effect Regression Model for United Kingdom (Y = LOANASSET_)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>52.51353</td>
<td>47.94718</td>
<td>1.095237</td>
<td>0.2774</td>
</tr>
<tr>
<td>NIM_?</td>
<td>8.654140</td>
<td>3.774260</td>
<td>2.292937</td>
<td>0.0250</td>
</tr>
<tr>
<td>DEBTEQUITY_?</td>
<td>0.082665</td>
<td>0.109742</td>
<td>0.753264</td>
<td>0.4540</td>
</tr>
<tr>
<td>SIZE_?</td>
<td>-0.665507</td>
<td>3.332244</td>
<td>-0.199717</td>
<td>0.8423</td>
</tr>
<tr>
<td>ID_?</td>
<td>0.080319</td>
<td>0.043600</td>
<td>1.842165</td>
<td>0.0699</td>
</tr>
<tr>
<td>ROA_?</td>
<td>-2.117473</td>
<td>1.775666</td>
<td>-1.192495</td>
<td>0.2373</td>
</tr>
<tr>
<td>CR_?</td>
<td>-0.004189</td>
<td>0.012911</td>
<td>-0.324446</td>
<td>0.7466</td>
</tr>
</tbody>
</table>

Fixed Effects (Cross)

| C     | 13.69229   |
| 2-C   | -23.87056  |
| 3-C   | 12.17214   |
| 4-C   | 7.804008   |
| 5-C   | 3.357058   |
| 6-C   | 2.790727   |
| 7-C   | -8.995601  |
| 8-C   | -6.950058  |

Effects Specification

Cross-section fixed (dummy variables)

| R-squared | 0.848773 | Mean dependent var | 59.50863 |
| Adjusted R-squared | 0.818986 | S.D. dependent var | 14.83693 |
| S.E. of regression | 6.312474 | Akaike info criterion | 6.680560 |

EXPLANATION

As in table 4.5, the results suggest that there is significant positive relationship between loan to asset ratio and net interest income to total asset ratio, as p-value is less than 0.05 and regression coefficient is positive as if there is one unit increase in explanatory variable net interest income to total asset ratio, there will be about 8.65 units increase in dependent variable loan to asset ratio which leads to reduce liquidity. So the research indicates that there is positive relationship between net interest margin and bank lending behavior or in other words, there is inverse relationship between liquidity and net interest margin in case of United Kingdom and accepts hypothesis that there is significant relationship between net interest margin and liquidity. Higher margins lead to higher lending activities thus reduced liquidity and lower margins lead to lower lending activities thus raise liquidity.

Results reveal that credit risk (loan loss provision to net interest income ratio), income diversification (non-interest income to total income ratio) and profitability (return on assets) are insignificantly related with loan to asset ratio as their p values are greater than 0.05, so this research reveals that, credit risk, income diversification and profitability have no significant impact on liquidity in case of UK and rejects hypotheses that, credit risk, income diversification and profitability are significantly related with liquidity. Insignificant relationship between credit risk and liquidity is due to the fact that, discretionary loan loss provisions particularly related to income smoothing behavior, not to cover expected future loan losses, thus have no impact on loan growth and liquidity. Insignificant relationship between income diversification and liquidity is due to the fact that, non-interest activities of large, systemically important and distressed banks have no impact on lending thus having no impact on risk of borrower’s default and on liquidity. Insignificant relationship between profitability and liquidity indicates that ROA tells only that how much return a bank earns on its total assets.

Results reveal that bank size (natural log of total assets) and financial leverage (debt to equity ratio) are insignificantly related with loan to asset ratio as their p-values are greater than 0.05, so this research indicates that insignificant relationship exist between liquidity and leverage in case of United Kingdom, also there is no relationship between bank size and bank lending behavior or in other words, there is no relationship between bank size and liquidity and rejects hypotheses that bank size and financial
leverage are significantly related with liquidity. Banks may keep large amount of deposits from customers as a reserve to meet demand of customers instead of lending, also from currently deposited amount, banks do not issue immediate loan. Insignificant relationship between bank size and liquidity is due to the fact that, it could be useful to divide banks into groups according to their size.

The overall model is found statistically significant (F=28.4972, p-value = 0.000000) as shown in table 4.5 and explanatory variables included in the model seem explained around 85 percent variance in the dependent variable (R² = 0.848773; R²adjusted = 0.818986) and remaining 15 percent is due to some other factors.

4.3 Pesaran CD Test

Research accepts null hypothesis that residuals across banks are not correlated because Pesaran CD test show insignificant p value (0.3540) as shown in table 4.6.

Table 4.6: UK banks

Pesaran's test of cross sectional independence = -1.236, Pr = 0.3540
Average absolute value of the off-diagonal elements = 0.423

4.4 Correlation Analysis

There is no multi collinearity in the independent variables as shown in the table 4.7.

Table 4.7: UK Banks

<table>
<thead>
<tr>
<th></th>
<th>LIQ</th>
<th>ID</th>
<th>LEV</th>
<th>SIZE</th>
<th>ROA</th>
<th>CR</th>
<th>NIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIQ</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>-0.3135</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEV</td>
<td>0.0826</td>
<td>-0.341</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.5988</td>
<td>0.336</td>
<td>0.129</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>-0.149</td>
<td>0.303</td>
<td>-0.248</td>
<td>0.03</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR</td>
<td>0.2826</td>
<td>0.025</td>
<td>0.180</td>
<td>0.06</td>
<td>-0.58</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NIM</td>
<td>0.5008</td>
<td>-0.298</td>
<td>0.164</td>
<td>-0.58</td>
<td>0.42</td>
<td>-0.26</td>
<td>1</td>
</tr>
</tbody>
</table>

4.5 Estimation Results for German Banks (Y = LOANASSET)

Table 4.8: Redundant Fixed Effects Test for Germany (Y = LOANASSET)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>84.42071</td>
<td>59.79697</td>
<td>1.411789</td>
<td>0.1627</td>
</tr>
<tr>
<td>NIM_?</td>
<td>19.59366</td>
<td>5.450963</td>
<td>3.594531</td>
<td>0.0006</td>
</tr>
<tr>
<td>DEBT_EQUITY_?</td>
<td>0.256354</td>
<td>0.080112</td>
<td>3.199950</td>
<td>0.0021</td>
</tr>
<tr>
<td>SIZE_?</td>
<td>-4.258727</td>
<td>4.602769</td>
<td>-0.925253</td>
<td>0.3582</td>
</tr>
<tr>
<td>ID_?</td>
<td>-0.007633</td>
<td>0.028120</td>
<td>-0.271457</td>
<td>0.7869</td>
</tr>
</tbody>
</table>

EXPLANATION

According to redundant fixed effects test, cross section F and cross section chi-square value is less than alpha of 0.05 as shown in table 4.8, also the Hausman test results can be seen to have p value less than 0.05 as shown in table 4.9. As both redundant fixed effects and Hausman tests indicating that fixed effect model is most appropriate model, thus the research accepts hypothesis that the fixed effect model is the right model to use.

Table 4.9: Hausman Test for Germany (Y = LOANASSET)

Correlated Random Effects - Hausman Test
Pool: PANEL
Test cross-section random effects

Table 4.10: Fixed Effect Regression Model for Germany (Y = LOANASSET)

Dependent Variable: LOANASSET_?
Method: Pooled Least Squares
Date: 01/05/17 Time: 14:45
Sample: 2006 2015
Included observations: 10
Cross-sections included: 8
Total pool (balanced) observations: 80
4.7 Correlation Analysis

There is no multi-collinearity in the independent variables as shown in Table 4.12.

As in Table 4.10, the results suggest that there is significant positive relationship between loan to asset ratio and net interest income to total asset ratio, as p-value is less than 0.05 and regression coefficient is positive as if there is one unit increase in explanatory variable loan to asset ratio which leads to reduce liquidity. Thus the research finds that there is negative relationship between liquidity and financial leverage in case of Germany and accepts hypothesis that there is significant relationship between financial leverage and liquidity. Low leverage leads to less lending activities thus increased liquidity while high leverage leads to high lending activities thus reduced liquidity.

Bank size (natural log of total assets), credit risk (loan loss provision to net interest income ratio), income diversification (non-interest income to total income ratio) and profitability (return on assets) are insignificantly related with loan to asset ratio as their p values are greater than 0.05, so this research reveals that, bank size, credit risk, income diversification and profitability have no significant impact on liquidity in case of Germany and rejects hypotheses that, bank size, credit risk, income diversification and profitability are significantly related with liquidity. Insignificant relationship between bank size and liquidity is due to the fact that, it could be useful to divide banks into groups according to their size. Insignificant relationship between credit risk and liquidity is due to the fact that, discretionary loan loss provisions particularly related to income smoothing behavior, not to cover expected future loan losses, thus have no impact on loan growth and liquidity. Insignificant relationship between income diversification and liquidity is due to the fact that, discretionary loan loss provisions particularly related to income smoothing behavior, not to cover expected future loan losses, thus have no impact on loan growth and liquidity. Insignificant relationship between profitability and liquidity indicates that ROA tells only that how much return a bank earns on its total assets.

The overall model is found statistically significant (F= 19.20770, p-value = 0.000000) as shown in Table 4.10 and explanatory variables included in the model seem explained around 79 percent variance in the dependent variable (R² = 0.790941 = R² adjusted = 0.749762) and remaining 21 percent is due to other factors.

4.6 Pesaran CD Test

Research accepts null hypothesis that residuals across banks are not correlated because Pesaran CD test show insignificant p value (0.2422) as shown in Table 4.11.

Table 4.11: German banks

| Pesaran's test of cross sectional independence = - 1.547, Pr = 0.2422 |
| Average absolute value of the off-diagonal elements = 0.534 |

4.7 Correlation Analysis

There is no multi-collinearity in the independent variables as shown in Table 4.12.
Table 4.12: German Banks

<table>
<thead>
<tr>
<th>ROA</th>
<th>CR</th>
<th>LEV</th>
<th>SIZE</th>
<th>ID</th>
<th>LIQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2873</td>
<td>0.0519</td>
<td>-0.09</td>
<td>0.272</td>
<td>0.01</td>
<td>0.33</td>
</tr>
<tr>
<td>0.0519</td>
<td>0.0519</td>
<td>-0.09</td>
<td>0.272</td>
<td>0.01</td>
<td>0.33</td>
</tr>
</tbody>
</table>

4.8 Discussion

These results are similar with some previous studies and some past studies had contradictory results as well. As in case of both United Kingdom and Germany, there is inverse relationship between liquidity and net interest margin, this is in line with Aspachs et al, 2005; Valla & Saes-Escorbiac, 2006; Bunda and Desquilbet, 2008; Moore, 2010; Vodova, 2013; Ahokposis, 2013; Moussa, 2015; Marozva, 2015; Agama, p. 77, 2015, etc. While Vodova, 2011 had opposing result, showed insignificant relationship between net interest margin and liquidity.

There is no relationship between bank size and liquidity in case of both United Kingdom and Germany, this result is in line with Rauch, Steffen, Hackethal and Tyrel, 2010; Vodova, 2011; Moussa, 2015. Contrary to this, those who found positive relationship between bank size and liquidity are Luchetta, 2007; Giannotti, Gibilaro and Mattarocci, 2010; Nguyen, Skully and Perera, 2012; Malik and Rafique, 2013; Chagwiza, 2014; Mehdi and Abderrassoul, 2014. According to these authors, bigger banks had lower liquidity risk exposures. While Kashyap et al, 2002; Dinger, 2009; Vodova, 2013; Vodova, 2014; Cucinelli, 2013; Roman and Sargu, 2015 supported “too big to fail” hypothesis, where it would seem that bigger banks were less motivated to hold liquidity, since they relied on government intervention in case of shortages.

As there is insignificant relationship between profitability and liquidity in case of both UK and Germany, this result is in line with Shen, Chen, Kao and Yeh, 2009 etc. While according to Delechat et al, 2012; Vodova, 2013 and Larney et al, 2013, profitability and liquidity were positively related to each other.

As there is negative relationship between liquidity and financial leverage in case of Germany, the finding is in line with Bunda and Desquilbet, 2008; Ahmed, Ahmed and Naqvi, 2011; Bonfim and Kim 2011; Vodova, 2011; Delechat et al, 2012; Vodova, 2013; Cucinelli, 2013; Chagwiza 2014; Raeisi, Haghgihat and Shirazi, 2014; Karkowska, 2015. While insignificant relationship exist between liquidity and leverage in case of United Kingdom and this result is consistent with Mc Carthy et al, 2010; Mehdi and Abderrassoul, 2014; Malede, 2014 etc.

As the relationship between income diversification and liquidity is not significant in case of both UK and Germany, this result is in line with Abedifar (2015), as he found that Non-interest activities of large (assets $1bn to $50bn), systemically important (assets greater than $50bn) and distressed banks have no impact on liquidity. Contrary to this, Cole, 1998; Lown et al, 2000 and Meier, 2011 in their study suggested that increased income diversification will increase the probability that credit (loans & advances) will be extended and emphasized the importance of information collection by banks.

As there is not significant relationship between credit risk and liquidity in case of both UK and Germany, this finding is consistent with Bouvatier and Lepetit (2008), who, in their study on 186 European banks over the period 1992-2004, found that loan loss provision made in order to cover expected future loan losses amplify credit fluctuations, meaning non-discretionary loan loss provisions intensify a procyclical effect because higher non-discretionary provisions decrease bank loan growth but they, in contrast, found that discretionary loan loss provisions have no significant impact on bank loan growth because these provisions particularly related to income smoothing behavior, thus having no effect on liquidity. Their findings were consistent with the call for the implementation of a dynamic provisioning system in Europe. They extended their study by incorporating a sample of banks from emerging markets and found that pro-cyclicality of non-discretionary loan loss provisions in banking is more pronounced in emerging markets.

5 CONCLUSIONS

Present research concludes that there is significant negative relationship between liquidity and net interest margin in case of both United Kingdom and Germany. Higher margins lead to higher lending activity of banks and thus reduce bank liquidity and lower margins lead to less lending activity of banks and thus increase liquidity. There is significant negative relationship between liquidity and financial leverage in case of Germany while insignificant relationship exists between liquidity and leverage in case of United Kingdom. Low leverage was the reason which made less lending possible in Germany after 2009 and lending position didn’t reach at previous levels till 2015 (levels before 2009) and thus increased liquidity. Decreasing debt to equity ratio indicates decreasing interest expenses thus bank will have good credit rating. While, financial leverage is not a significant factor in influencing lending activity in case of UK because most of the deposits, banks accept, are in demand form which are repayable to depositors on demand. Bank size is insignificantly related with liquidity in case of both UK and Germany because it could be useful to divide UK and German...
banks into groups according to their size and to estimate determinants of liquidity separately for small, medium and large banks. Profitability is not a significant factor in determining liquidity in case of both UK and Germany rather it tells how much return a bank earns on its total assets. Credit risk is not a significant factor in determining liquidity in case of both UK and Germany, as loan loss provision used for management objectives (discretionary loan loss provisions) did not affect credit fluctuations rather these provisions particularly related to income smoothing behavior. Income diversification is not a significant factor in determining liquidity in case of both UK and Germany as Non-interest activities of large (assets greater than $50bn), systemically important (assets $1bn to $50bn), systemically important and in 2013 etc., in this way future researchers will be able to underline if the determinants of banks’ liquidity and interest margins are common or country specific, thus having an overview of the possible implications that EU banking liquidity regulations may have in practice.

Future research can be carried out by taking a larger sample for larger time period from these two countries or by taking banks from whole Europe.

In future, it would be useful to examine other countries with bank-based and market-based economies to generalize the empirical results.

Also, it may be worth elaborating on the study of factors influencing liquidity by using different statistical tools.

Further research in this context would reveal the industry and macroeconomic factors that are also important in determining liquidity.

The future researchers can compare different types of banks operating in same country.

REFERENCES


APPENDIX

Appendix A Graphical Representation of Variables from United Kingdom

Appendix A.1 Total net loans and advances to total assets ratio

Appendix A.2 Net interest income to total assets ratio

Appendix A.3 Loan loss provision to net interest income ratio

Appendix A.4 Natural log of total assets

Appendix A.5 Non-interest income to total income ratio
Appendix A.6 Total debt to total shareholder’s equity ratio

Appendix A.7 Net profit to total assets ratio

Appendix B Graphical Representation of Variables from Germany

Appendix B.1 Total net loans and advances to total assets ratio

Appendix B.2 Net interest income to total assets ratio

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Appendix B.5 Non-interest income to total income ratio

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Appendix B.7 Net profit to total assets ratio