An Analysis of Determinants of Liquidity of Indian Commercial Banking Sector

Anurag Banerjee*

Abstract

Balance Sheet of a bank gives the real picture as regards to the financial position of the bank at any given point of time. Bank's Liquidity is said to be the capacity of a bank to fund increase in assets & meet both expected as well as unexpected cash & collateral obligations as they become due. On the contrary liquidity risk is the incapability of the bank in fulfilling its financial obligations with conservation of assets or incurring undesirable expenditures. It is clearly evident form the past studies that Indian Economy was affected by liquidity pressure because of extraction of investments made in the financial system of India. Literatures post global financial crisis (2007-08), suggested that mostly the developed economies were affected. Although the Indian Banking system has stringent rules, regulation & policies in tune to insulating & protecting the banking system during such crisis, yet the liquidity problems that are faced by the Indian banks might be were not due to the inefficiency of their performance or weaknesses in regulations, but might be due to insecurity of the customers. The present study seeks to fill the gap empirically by analyzing the relationships that bank liquidity shares with certain macroeconomic (GDP, Inflation & Economic Efficiency) and key bank specific (CRAR, Size, ROA, Diversification ratio, NNPA, Cost Efficiency ratio) variables. Also, the changes in efficiency of performance post financial crisis have also been analyzed herewith. To explore the association, OLS, Fixed Effect & Random Effect estimates has been intended to be performed on a sample of 60 Indian commercial banks over a period of 11 years (2005-06 to 2015-2016). Economic Efficiency, CRAR, CER, NNPA, OPDT, ROA and SIZE appeared to be the factors having statistically significant association with the bank liquidity, for the sample considered under the study period.

INTRODUCTION:

The Balance Sheet of every bank gives the real picture of the bank at any given point of time. The Indian Banking sector not only supports as regards to financial transactions but aids assistance in the transactions that are carried by an economic agent. A well-functioning facilitates the efficient intermediation of the financial resources & the optimum utilization & allocation of the same in the context of the economic growth of the country. The major goals of the financial sector policies lie in the maintenance of the financial stability & enhancement if accession to the financial services. Through the achievement of target financial goals of the country the policy makers are able to frame well-defined policies as regards to the protection of the savers, investors & other economic agents from the economic disruptions, that in turn helps in accession to the financial services specially to the underprivileged class. However, one of the major objectives

* *Ph.D. Scholar, St. Xavier's College, Kolkata (University of Calcutta), & Visiting Faculty (Department of Commerce) at St. Xavier's University, Kolkata. Email: abanerjee090@gmail.com, Alternative Mail: anuragbanerjee090@gmail.com*

of Indian banking sector reforms was to encourage operational self-sufficiency, flexibility and competition in the system and to increase the banking standards in India to the international best practices. As per Reserve Bank of India (2012) "liquidity is a bank's capacity to fund increase in assets & meet both expected & unexpected cash & collateral obligations as they become due", on the other hand the Liquidity risk is the incapacity on part of the bank in fulfilling its financial commitments without losing assets or incurring of undesirable expenditures. However, on part of the banks in order to safeguard themselves from such situation & maintaining financial stability an adequate liquidity buffer is expected to be maintained by them.

The Indian Banking System originated in a well mentionable stature with the establishment of the Presidency Banks leading to the formation of the Imperial Banks, 1921 to carry out the central banking functions. Later in the year 1934, the Reserve Bank of India (RBI) was established as per the RBI Act of 1934[1] and begun its operations from 1.4.1935. Later in the year 1949 the Reserve Bank of India was nationalized as per the Banking Regulation Act of 1949 making it an authoritative body to act as the apex in the banking structure of the country in the framing if the stringent rules for the smooth operations of the Indian Banking sector. In 1955 the RBI acquired the Imperial Bank & renamed it as State Bank of India. Seven subsidiaries of the State Bank of India were gradually nationalized in the year 1959. However, with the objective of a more resilient & robust banking structure the Government of India nationalized 14 commercial banks in 1969, followed by nationalization of another 6 commercial banks in the Indian subcontinent. Financial liberalization was initiated in 1991–92 for creating a more diversified, profitable, efficient and resilient banking system with the aim of making banking system more market-oriented and to that end, engendered a shift in the role of the RBI from micro-management of banks operations to macro governance Committee on Financial System, appointed by the government of India in 1991, identified direct investment and credit programs as the two main sources of declining efficiency, productivity and profitability among commercial banks, and particularly among nationalized banks. Consequently, subsequent liberalization policies have emphasized expansion of banking services, particularly in the private sector, and have relaxed the regulations and cut the red tape which hindered the banking sector, particularly its

foreign component. As a consequence, there has been a steady increase in the number of foreign banks operating in metropolitan centres, and these foreign banks have become leading players in several areas of business and have begun to set standards in the sector. The report of the Narasimham Committee of 1992 had recommended several reforms in act of strengthening the banking structure and stability, that prescribed some of the following mentionable significant reforms-

- Restructuring the monetary framework.

- Deregulation of Interest rates.

- Introduction of market-based interest rate system.

- Regulatory norms for Capital adequacy[2].

- Fresh norms of asset classifications & asset liability.

The second phase of reforms began in 1997 with aim to reorganization measures, human capital development, technological up-gradation, structural development which helped them for achieving universal benchmarks in terms of prudential norms and pre-eminent practices. Moreover, efficiency or productivity measures could act as leading indicators for evolving strengths or weaknesses of the banking system and could enable pre-emptive steps by the regulator when necessary.

The very recent global financial turmoil of 2007-08 can be one of the main causes behind the bank's illiquidity situation. Although the Basel Committee on Banking Supervision (2010)[3] have prescribed rules as regards to the solvency, liquidity creation & new capital rules to avoid such undesirable situation in the future. Before the occurrence of the global financial crisis the liquidity risk was considered as the secondary risk (Martz & Neu, 2007). Thus, after the occurrence of the global financial crisis the grave effects of the liquidity risk has been under much of the focus in the eyes of the researchers & the policy makers, although the literatures after the global financial crisis suggested that the crisis mainly affected the countries of the developed economies. Shukla (2014) opined that the extraction of the investments from the financial system of India resulted in increase in the liquidity pressure on the Indian economy. Although it has been believed that the Indian Banking sector is governed by stringent rules, regulations & policies acting

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1 Reserve Bank of India Act, 1934, As amended up to 27th June 2016. https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/ RBIA1934170510.PDF

2 BASEL I was introduced in April 1992 in India post introduction of the BASEL norms in 1988.

3 BASEL III Norms on the Capital Adequacy, though was expected to be implemented globally by the end of March 2018, but the deadline has been extended to January 2019. This norm requires the banks to maintain a projected of 10.5% (8% earlier + 2.5%) capital buffer in contrast with the risk-weighted assets.

as an insulator against such crisis, it might be noteworthy to say that the problems of liquidity faced by the banks were not due to the inefficiency in performance or laxity in the regulations, but might be due to the sentiment of the customers as regards to their insecurity. Although the Indian Banking Sectors have been able to adhere to the guidelines as prescribed by the RBI, but still there has been a scarcity of study as regards to the fact of the factors that affects liquidity of the Indian Banking Sector.

Moreover, "enhanced efficiency in banking can result in greater and more appropriate innovations, improved profitability as well as greater safety and soundness when the improvement in productivity is channeled towards strengthening capital buffers that absorb risk" (RBI, Report, 2008)[4]. Efficiency measures acts as leading indicators for evolving strengths or weaknesses of the banking system and could enable pre-emptive steps by the regulator when necessary at the right time. Hence investigation and measurement of efficiency in the banking sector have always been areas of interest for research study. Various factors have been found to be associated with efficiency of financial intermediaries. Specific factors may vary across countries, a policy environment facilitating tapping of economies of scale, diversification of activities and introduction of state-of-the-art technologies have generally been the driving force behind higher efficiency and productivity levels attracting the attention of the policymakers all over the world. The Indian banking system has been exposed to increased competition with the enhanced presence of foreign banks and entry of new private sector banks. Most of the public sector banks have accession to the capital market. This has changed their capital structure, besides subjecting them to market discipline. Interest rate structure has been almost deregulated. Statutory pre-emptions in the form of CRR and SLR have become more flexible significantly. Banks have also been allowed to diversify into non-traditional activities and are provided with operational flexibility and functional autonomy in their day-to-day decision-making process to enable them to respond to the evolving situation & have also been subjected to prudential norms in line with the international best practices. In the past few years, large number of banks' funds was locked in non-performing assets. Multi-pronged institutional arrangements along with the Cleaning Up mechanism of the Reserve Bank of India were put in place to enable banks to expeditiously recover their past dues. Advanced

information and communication technology have enabled banks to introduce new products, delivery channels, besides strengthening their internal control systems. All these changes have altered the ways the Indian Banking industry has been combining their inputs to deliver the financial services having a bearing on their efficiency.

Although the Indian Banking Sector has been able to adhere to the RBI guidelines as regards to liquidity management the factors that have affected the liquidity of the Banking sector has been focused upon this paper to bridge up the empirical gaps in its effect on the performance of the Banking sector & thereby the growth of the economy.

The present study seeks to find the association of certain macroeconomic & bank specific variables with the liquidity of the Indian Commercial Banking Sector.

LITERATURE REVIEW

This section deals with the Review of different literatures belonging to the fields of both descriptive & empirical studies done in the recent & in past as regards to the various aspects of efficiency, survey of the norms as regard to the Capital Adequacy Accords & the different Reposts on the Trend & Progress of the Banking Sector in India as published by the Reserve Bank of India: -

Francis & Osborne, (2010), examined the factors influencing the bank's choice of risk-based capital ratios based on the study of the risk-based capital of the UK banks & individual Capital requirements set by the UK FSA & bank of England as legacy supervisor. Some of the Key findings of the study reveals that: banks increase (decrease) ratios in response to higher (lower) capital requirements stating that the relationship is a bit stringent during the more favorable economic conditions and indicated that on average, banks raise capital ratios more in response to higher capital requirements; existence of a negative relationship between the capital ratios and the rate of GDP growth for all banks was also pointed in the United Kingdom; moreover, large banks have revealed statistically significant negative association between the risk-based capital ratios and economic conditions, supporting the countercyclical capital proposals requiring the banks to maintain higher buffers above the regulatory norms during stress periods; significant positive association also exists between the total risk-based capital ratios with the proportion of higher-quality, Tier 1 regulatory capital and also between capital ratios and exposures to market discipline pointing the fact that

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4 *Efficiency, Productivity and Soundness of The Banking Sector, 2008. https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/86736. pdf.*

banks that depends on the subordinated debts to support their capital ratios tend to keep more amount of Capital Base.

Saksonovaa, 2014, analyzed the stability of the banking sector against the background of growing diversity of financial instruments, technological progress and increasing interconnectedness of financial institutions. The paper studied the dynamics of the of net interest margin, as well as other banking sector indicators in the Baltic countries, Europe and the United States, revealing that, net interest margin can be an important complement to an overall profitability indicator such as return on assets showing that net interest margin tend to decline prior to the difficulties in the banking sector, while return on assets remained more stable during that time proving that net interest margin can serve as an important indicator of growing tensions or vulnerabilities in the banking sector; recognition of the fact that the tendency towards a declining net interest margin can be seen as a positive development as well since it suggests greater efficiency of the banking system in redistributing resources; and imperative suggestion as regards to the fact that can improve the Net Interest Margin and adjust the asset structure of the bank's optimally.

Gantiah Wuryandani, 2012, investigated the determinants of banks liquidity on the basis of longitudinal panel data modeling over a sample of 110 individual banks over a period from 2002 January to November 2011. The definition of liquidity had been segregated into precautionary (ratio of ratio of total cash, demand deposit at central bank, and demand deposit at other banks, to total asset) and involuntary liquidity (ratio of total traded securities of central bank, government, and others, to total asset). The key findings of the study revealed that, Credit, saving and deposit affect precautionary liquidity reflecting the operational bank activities influencing precautionary liquidity; financial system and macroeconomic conditions affects the involuntary liquidity along with the lag or historical liquidity of both liquidities, precautionary and involuntary, are strongly determined; financial system and macroeconomic condition significantly influence small banks liquidity in precautionary and involuntary, whereas the Monetary policy, by means of reserve requirement affects only small bank's precautionary liquidity. Also, the indirect monetary policy in terms of interest rate policy has no significant bearing on banks liquidity.

Syajarul et el., 2018, examined the effects of cost efficiency on the liquidity risk of Islamic Banks for 16 OIC countries over a period of 1999 to 2013. Findings revealed that the cost efficiency has significant positive bearing to liquidity risk. Among other significant factors of liquidity risk the mentionable are credit risk, profitability, size, GDP and inflation, whereas the market concentration proved to be insignificant as regards to liquidity risk. Findings also revealed that Islamic banks have higher level of liquidity risk than conventional banks, but there had been need to provide liquidity, probably through a well-functioning money market to mitigate the liquidity risk in banking.

Lastuvkova, 2016, showed the association between the bank liquidity and variables representing the size of banks as regards to total asset, gross volume of loans and client's deposits, through a robust panel model over a sample of banks of Czech, Slovak and Slovenia over a period of 2001-2013. The results of the said study revealed that the differences have been showed not only among different size groups but also among the same size groups in the different banking sectors.

Mazur and Szajt, 2015, analysed the determinants of the liquidity risk with respect to the banks operating in the Old & the New European Union respectively based on the determinants of the liquidity risk & the macroeconomic factors. Findings of the study revealed that a group of internal factors have affected the liquidity risk irrespective of the measure to check the liquidity risk that has been adopted. The results also had pointed the increase of the O/N interest rates in the New European countries that have no synonymity with the increase of the liquid assets.

Das and Ghosh, 2006, examined the interrelationships among credit risk, capital and productivity change in the Indian context with data on state-owned banks (SOBs) for the period 1995-96 through 2000-2001.Some of the key findings of the study revealed, profit maximization was taken as a surrogate for productivity, and suggested that higher productivity leads to a drop-in net NPAs, especially for mediums-sized banks; bank size and CRAR tend to be negatively related for the small banks, attesting to the limited scale effects emanating from bank operations & also, capitalization is driven positively by ROA; higher productivity leads to decrease in credit risk, and has a positive effect on bank capitalization as well & supports the fact that poor performers are more prone to risk taking than better-performing banking organizations, & the efficiency, capital and risk taking tend to be jointly determined, that are reinforcing and had been compensating each other.

As regards to the above background the present study seeks to empirically bridge up the gap in context to the identification of the bank specific & the macroeconomic variables that have significant bearing in explaining the variations in the liquidity of the Commercial Banks operating in the Indian Subcontinent.

OBJECTIVES

On the basis of the review of published literature & the existing works that have been reviewed for the purpose of the study the main two-fold objectives are as follows:

1. To examine the key bank specific and the macro economic variables that can have the best explanatory power to affecting the variation in the Liquidity of Indian Commercial Banks, and;

2. To analyze the performance efficiency, if any of those Commercial Banks operating in the Indian Subcontinent.

DATA & METHODOLOGY

Data & sample for the study:

The study has been conducted on a sample of 60 Indian Commercial Banks (including Public, Private & Foreign) having at least 5 operative branches in the Indian subcontinent over a period of 2005-2006 to 2015-2016, or for a period of 11 years or 660 bank years so as to capture the behavior of factors affecting liquidity variations covering the period of financial crisis, ranging 2007-09. The Banking Sector of every country plays pivotal role in the channelization of the idle fund, creation of deposits & in turn propels the economy of the country. Thus, the data has been segregated into the Macroeconomic Variables representing the external factors that can have significant bearing on the Liquidity of the Indian Commercial Banks and the Microeconomic or Bank Specific variables that accounts for the internal shocks that can affect the variation in the bank's Liquidity. The different variables considered for the study based on their extraction from the past literatures are explained as follows:

Bank Specific Variables:

i. Dependent Variable-Liquidity- Following the past study with reference to Delechat el. 2012, the bank liquidity has been taken as the sum total of Cash in hand, Balances with RBI, Balances with other Banks, Money at call or short notice as scaled by the Total Assets. More precisely it is the ratio of the Liquid Assets to Total Assets. Here, LIQ is the dependent variable & rest of the variables considered are explanatory.

ii. Independent Variables:

➤ Capital- The ratio that the Tier I & Tier II Capital in combined form bears with the total of risk weighted assets, given by the Capital to Risk Adjusted Ratio. The Banks are required to maintain 9%[5] of their Risk Weighted assets to safeguard from the future pressure on the banking operations, & have been expected to have bearing on the liquidity of the banks in meeting the unexpected crunch during the stress period.

➤ Bank Size- Taken as the log of Total Assets & is expected to have a negative impact on the Liquidity of the Indian Commercial Banking sector, as regards to the expansion of the scale of operations. However, this variable is expected to vary for either large & small banks.

➤ Profitability- Taken as a proxy for the Bank profitability, as the banks are required to invest at least 25% of their ploughed profits back into the institution[6] so as to create ample base for safeguarding the future liquidity crisis if any.

➤ DIVERSIFICATION- The banks with increasing in the scale of operations or increase in their size might undertake other non-traditional activities part from their normal course of business operations like third part products like assurance schemes & similar nature of activities, thereby generating non-interest incomes that can indirectly create pool for the protection of the Liquidity base.

➤ Cost Efficiency Ratio- The increase in the operating cost of the banks has intended them to increase the rate of deposits to have access to additional fund. Here, the ratio of Operating expenses to Total Income has been taken as a proxy for this measure.

➤ Net Non-Performing Assets- The quantum of the Non-performing assets that are unable to generate the inflows to the banks are expected to affect the Liquidity base of the Banks.

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5 At present prescribed by the RBI for the banks in the Indian subcontinent. This ratio is however expected to be scaled to 10.5% for the Indian continent as per the BASEL III by January 2019, but extended till 31st March 2019. Presently banks are keeping 9% of the risk weighted assets as prescribed by the RBI guidelines.

6 Banks are required to contribute 25% of the ploughed profits back into the institution U/s17 of the Banking Regulation Act of 1949.

Macroeconomic Variables:

➢ GDP- It refers to the final value of the goods & services produced in a country in a given period of time (quarterly or yearly) & can also be used as an indicator of the business cycle. Here the annual GDP growth rate has been taken.

➢ INFLATION- This variable gives the results as regards to the rise in the general price level of goods & services in the economy & thereby affecting the decrease in the purchasing power of the currency. Inflation rate at WPI[7] is taken the proxy for this variable.

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7 *Wholesale Price Index with Base Year 2004-05 has been considered here for the study.*

➢ Efficiency- The Economic efficiency has been considered to be a representative of the Industry specific factor in the regression exercise although it is macroeconomic in nature. In the said study the analysis of the efficiency scores has been kept limited to the Technical Efficiency scores of the banks i.e. the benefits that each of the banking institution enjoys as a result of the advanced technology available at their disposal on converting their available resources to produce output[8]

The summary of the variables, Notations and their sources are as follows:

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8 *Discussed more elaborately in the methodology of Data Envelopment Analysis under Assets Approach in the Intermediation variant.*

TABLE-1

VARIABLES	PROXY/ MEASUREMENT	NOTATION	SOURCE
Dependent Variable = Liquidity	Liquid Assets over Total Assets	LIQ	Reserve Bank of India (RBI, Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
INDEPENDENT VARIABLES (Bank Specific)			
Capital Adequacy	Capital (Tier I + Tier II) to Risk Adjusted Ratio.	CRAR	RBI Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
Bank Size	Log of Total Assets.	SIZE	RBI Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
Profitability	Return on Assets	ROA	RBI Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
Diversification activities	Ratio of Non-interest income to Total Income	DIVERSIFICATION	Calculated ratio as per data from RBI Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
Cost Efficiency Ratio	Total of Operating Expenses to Total Interest Income	CER	RBI Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
Net Non-Performing Assets	Gross NPA minus Provisions	NNPA	RBI Statistical Returns of Scheduled Commercial Banks in India 2008-09 to 2015-2016).
INDEPENDENT VARIABLES (Macroeconomic)			
Gross Domestic Product	Annual GDP Rate	GDP	Economic Outlook, Central Statistics Office (CSO) &RBI.
Inflation	Inflation at WPI with 2004-05 base.	INFLN.	Economic Outlook &RBI
Economic Efficiency	Computed value of Technical Efficiency Scores of Banks using DEA.	EFF.	Variables for input-output bundle collected from RBI Statistical Returns of Scheduled Commercial Banks in India 2005-06 to 2015-2016).

Methodology: The present study analyzes a balanced panel data of 60 Indian Commercial Banks over a period of 11 years (2005-06 to 2015-2016), in the backdrop of the OLS Regression model assumptions that are prevailing. The Constant Coefficient, Fixed & the Random effects Model have been applied on the dataset under consideration. In the usual sense the Fixed Effects Model is usually preferred over the Random Effects (as appropriated by the Hausman Test), as the former gives more consistent results& are more robust as compared to the later as the Fixed effects do not depend on the assumption of that the individual error term (ε_{it}) is not correlated with the regressors. The restricted F-test & the Hausman Test has also been applied for selection between the Fixed Effects or the CCM and the Fixed Effects or the Random Effects models respectively. The Lagrange Multiplier Test (with the BG-test) has also been employed to deal out with the serial correlation in the model making the model more robust for being used for future predictions. Further it is also assumed that the "ε" or the disturbance term is independent & identically distributed & none of the variables of the model are stochastic. ($\varepsilon_{it} \sim$ iid=0, δ^{2}). Thus, the specification of the Liquidity intended to be estimated is given by the following model:

$LIQR_{it} = \alpha_{it} + \beta_1 SIZE_{it} + \beta_2 CRAR_{it} + \beta_3 ROA_{it} + \beta_4 NNPA_{it} + \beta_5 CER_{it} + \beta_6 DIVERSIFICATION_{it} + \beta_7 GDP_{it} + \beta_8 INFLN_{it} + \beta_9 Eff_{it} + \varepsilon_{it.}$

Where, β_1 to β_9 are the coefficients of the independent variables & ε is the error term. The panel model has been constructed with the indices 'i' & 't' representing bank & year respectively.

On the grounds of estimating the efficiency in the performance, Data Envelopment Analysis (that gives the performance scores of a DMU[9]) has been used to estimate the efficient frontier in numerical terms through the efficiency scores by employing a desired bundle of Inputs & Outputs that the banks would have employed to produce a given level of desired Output through an available amount possible input bundle with them. As each definition of banking operations has associated with it a significant level of input & output bundles hence the selection of such input-output bundle is a vital decision in terms of the DMUs. The present study is confined only to the Constant-Return-to-Scale (CRS) assumption of DMUs. A firm's potential to achieve maximum output using a given input set and production technology is said to be the Technical Efficiency whereas the allocative

efficiency is the potential to utilize the inputs in optional proportions given the input prices. Thus, the Economic Efficiency (EE) of a DMU is given by EE = AE * TE. In the study the estimation has been restricted to the Input Oriented Technical Efficiency following the Constant Returns to Scale. The entire arrangement result of this methodology gives an efficiency frontier line, whereby the DMUs operating on the frontier line are considered as efficient compared to those operating below the efficiency frontier line.

The output-bundle of the firm may be treated as an assigned task and the efficiency of the firm is judged by the maximum equi-proportionate reduction in all of its inputs without compromising the feasibility of the target output. The input-oriented technical efficiency under CRS[10] of the firm is measured as:

$$\tau_x = \min \theta$$

$$\text{s.t.} \quad \sum_{j=1}^{N} \lambda_j y^j \ge y^0;$$

$$\sum_{j=1}^{N} \lambda_j x^j \le \theta x^0;$$

$$\sum_{j=1}^{N} \lambda_j = 1;$$

$$\lambda_j \ge 0; (j = 1, 2, ..., N).$$

A Graphical explanation of the Technical efficiency is given by the following figure[11]:

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9 Decision Making Units, here it is the Indian Commercial Banks, having a choice of different alternatives.

10 Refers to the fact that with optimum utilisation of available given level of inputs, a particular DMU is able to produce a given level of Output in the same way as the inputs are employed.

11 Source- Dutta et. al (2011).
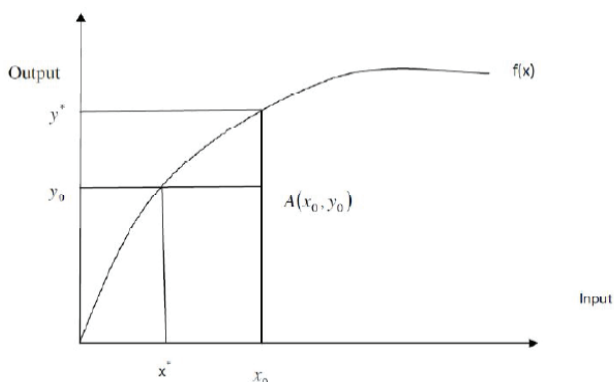
Let, y^* be the maximum level of producible output from input x_0. Let, firm A is at production point A with x_0 input, y_0 output. Therefore, output-oriented measure of technical efficiency of the firm A is = y_0/y^* I.e. the ratio between actual and maximum output. Similarly, in case of input-oriented measure for firm A can be defined as x^* / x_0 as the output y_0 could be reached by using only x^* amount of input. The score lies between 0 and 1 where 1 signifies efficiency.

According to the literature from literature by Sealey and Lindley(1977), the intermediation variant of the assets approach has been followed for the computation of the Technical Efficiency Scores, as per which the following has been considered as the input-output bundle:

- Inputs: Labour, Deposits, Fixed Assets & Borrowings.

- Outputs: Investment & Advances.

    The study has been performed by suing E-views 10 and that of the Efficiency Scores has been calculated by using the DEAP.

EMPIRICAL RESULTS AND DISCUSSION:

At the very outset of the study the analysis of the correlation matrix (Appendix-2) ensures that there is no multicollinearity present among the independent variables and the dependent variable that is Liquidity Ratio in this study bears a negative correlation with most of the independent variables under the study that can give an idea as regards to the predicted movement of the signs and their subsequent effects on the dependent variable. Post analysis of the Correlation matrix the study undertakes the regression exercise for the defined model as specified above. An analysis of the model results has been made in the summarized table below in order to draw formal conclusions of the regression exercise[12]:

As regards to the fact that it is important to say that the common intercept term "C" in the output table (TABLE-3-APPENDIX) as given in the appendix below, denotes the average of all the individual intercepts. However, step by step the results of the study have been performed firstly by analyzing the presence of the cross-section fixed effects (deviations from the common intercepts) in the context of the proposed model for the study. With this conformity of the presence of the cross-section fixed effects being non-zero, the presence of fixed effects in the model is confirmed. Hence the analysis has been started with the fixed effects model. In doing so, the presence of the serial correlation had been dealt with by running the Breusch–Godfrey test whereby the Chi-square & the Observed R-square were statistically insignificant at the second lag, hence a new variable in the name of LAGLIQ[13] has been generated (taken as the one-year lag of the dependent variable).

Variable name	Co-efficient	P-value
EFF (Economic Efficiency)	-0.032846**	0.0299
CRAR (Capital to Risk Adjusted Ratio)	0.000314**	0.0104
CER (Cost Efficiency ratio)	-0.034645**	0.0321
NNPA (Net Non-Performing Assets)	0.000000119*	0.0044
DIVERSIFICATION (Diversification ratio)	-0.000553**	0.0168
ROA (Return on Asset)	0.004575**	0.0333
SIZE	-0.010992*	0.0004
Accepted Model: FIXED EFFECTS MODEL. Hausman Test: 126.149 with p-value of 0.000. R-square- 65.58 F-stat: 112 with P-value of 0.000 DW-stat: 2.11 (close to 2).		

In order to confirm the superiority of the results as regards to the fixed effects model over the Constant Coefficient

summarized results are provided below and that of the original results of the analysis are shown in the Appendix section of the study.

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12 *Results has been segregated into 2 halves for the originally constructed model and for the Crisis Interaction Model. The*

13 *The inclusion of the lagged value of the Liquidity has reduced the sample size to 420 observations.*

Model the Redundant F-test has also been performed (TABLE-3-APPENDIX), that reveals that the computed F and the Chi-square values have been statistically significant at 1% level of significance or at 99% level of confidence confirming that the Fixed Effects Model is preferred more over the Constant Coefficient Model.

The accepted model for this study has been the Fixed Effects Model (TABLE-3), as appropriated by the Hausman Test (TABLE-5-APPENDIX), whereby the p-value is significant at less than 1% level of significance with a high Chi-square value confirming with more than 99% level of confidence the superiority and acceptance of the Fixed Effects Model over the Random Effects Model. At the very beginning of interpreting the results of the primary initial model the following can be deduced from the above results:

i. The R-Square of the model is 65.58, signifying that 65.58% of the variation in the liquidity is jointly explained by the dependent variables taken in the study. However, the goodness of fit of the model is also confirmed by the F-stat that has a value of 112 with a probability at less than 1% level of significance. The DW-stat[14] is 2.11 that confirms that the model is free from 1st order autocorrelation.

ii. In the said model the economic efficiency is negatively associated with the dependent variable (-0.032846) at 5 percent level of significance, that relates to the fact that might be with the increase in the scale of operation in order to maximize on the returns to scale or to maximize the outputs with a given level of inputs the banks are tend to lose the liquidity, with one unit increase in the economic efficiency over and above their normal operating level.

iii. It is a well-established fact that the capital cushion is required to provide for support to the banks at the times of dearth of funds & also to propel for the smooth operations of the banking sector. The increase in one unit of the CRAR results in 0.000314 units increase in the Liquidity of the banks. It is to be noted that this value is very small as regards to the effects of the financial crisis (2007-09), although the Reserve Bank of India had stringent rules in place to keep the economy less affected with the shocks during the said period.

iv. To meet up the operating expenses the banks are required to tap their funds so as to facilitate the smooth

operating activities in the competitive environment. However, the effect of the cost efficiency ratio is negative that refers to the fact that might be due to the increase in the operating costs the banks are finding it difficult to absorb them with the available inflow of funds resulting in fall of liquidity ratio.

v. The increase of size and the ability of the banks specially of the larger ones to mitigate their operating risk with the increase of their scale of operations calls for a decrease in the liquidity ratio that is supported by the results in the study.

vi. The result as regards to the Return on Asset, the result follows the normal nomenclature of the fact that with the increase in the returns the liquidity tends to get pushed upwards, hence the liquidity also increases that will lure the banks to maximize their returns.

In the context of the past literatures the effects of GDP (although insignificant in this study results) was found to have a positive impact on the bank liquidity in the study of Bunda and Desquilbet (2008), Bhati et el. (2015) and Moussa (2015). The effects of exchange rate regime and the business cycle in the Indian economy might be the cause this effect. Also, the credit model followed by the Central bank of India also ensures the propelling of the Indian economy even in context of the increasing unemployment of the youth sector.

However, the effects of the Bank Size on Liquidity holdings of the Indian Commercial Banks has statistically negatively significant (TABLE-3-APPENDIX) at 5% level of significance, thereby pointing to the fact that one of the major findings of the study is that the increase in the bank size pertains to less holdings of liquidity on part of the Indian Commercial banks. Here, it can be said that the large banks operating in the Indian banking sector can create more liquidity on grounds of diversification of their activities and also having the easy accession to the RBI facilities & would also be assisted with first priority from the safety net of the lender of last resort. Hence, the small bank managers should try to maintain higher funds for liquidity as they would not be in a position to raise funds in crisis period compared to Large Banks. This, finding of the present study is in tune to most of the past studies as regards to Bonner et el. (2013), Alger & Alger (1999), Dinger (2009), Vodova (2013), Kashyap et el. (2002).

In this paper the analysis of the efficiency in the performance of the Indian Commercial Banks post financial crises, has also been analyzed as regards to the DEA scores (TABLE-6-APPENDIX) in terms of Technical

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14 *The BG test in reference to Lagrange Multiplier test has been performed to make the model free from 1st order autocorrelation.*

Efficiency that suggests that, the efficiency of the foreign banks is more, signifying two things that as a need to safeguard their franchise value the foreign banks have been making fruitful utilization of the available amount of inputs to them thereby discharging a given level of output. However, it can also be deduced from the efficiency score analysis that most of the foreign banks operating in the Indian subcontinent are receiving support of the technologies from their parent body situated abroad enabling them in more optimal transformation of the available input bundles.

The technological change in the recent past has also become a deciding factor as regards to the predominance of the Foreign Banking Sector in the Indian Market as regards to higher efficiency as the updated technology has been used for the discharge of their services that the Indian Public and Private banks are still lacking behind. It can be said that the foreign banks & those banks that have been operating on or below the efficiency frontier as per the above table might be risk averse in relation to enhancing the economies of scale and hence are keeping more amount of Capital base to safeguard their future uncertainties.

CONCLUSION AND SUGGESTIONS

Summing up the study it can be said that the Reserve Bank of India in its own stature has been well equipped to face the crisis situation, if at all such situation arises as regards to the stringent rules and the policies in force. In the said study the Economic Efficiency, CRAR, CER, NNPA, OPDT, ROA and SIZE stood to be the significant factors that can have significant bearing on the prediction of the variations in the Liquidity ratio of the Indian Commercial Banking Sector so as to explain the variation in the Liquidity holdings of the Indian Commercial Banks, but the model is robust in its terms with an Adjusted R^{15}-square of 65.0014%, that is the proposed model is capable of explaining more than 50% of the variation in the liquidity holdings of the Indian Commercial Banks.

Also, the DW-stat[16] is at 2.11 signifying that there is no serial correlation present in our study. The present study has bene conducted for a period of 11 years (reduced by application of the lagged variable), whereby a more extensive dataset over a higher range of sample period can give more robust results. It can be concluded that with the better performance of the business cycle in the Indian subcontinent the Indian Commercial Banking sector tends to hold more liquidity. This, logic is also supported by the countercyclical buffer of the BASEL III norms that requires the banks to keep an additional of capital fund base from 0-2.5 in turn with the increase of credit faster than the GDP rate. The bank size being an important factor as regards to the setting if the standards on the liquidity holdings of the Indian Commercial Sector. A close analysis of the efficiency scores in conjunction with the CRAR of the Indian Commercial Banking Sectors for the sample under the study leads to the fact that mainly the foreign banks have been able to keep more amount of Capital buffers over and above the normal prescribed by the RBI. Also, they are operating at an optimal level on the frontier line under the scale of operation considered so they can be expected to be very less affected by the crisis period shocks. Here, in the said study the Economic Efficiency is one of the major outcome results for predicting the variations in the bank's Liquidity Ratio. Among the studies that are existing for studying the variations in the liquidity, this study has been able to point out at the effect of one of the major economic variables, that is the economic efficiency. In future studies, work can be extended in scope of ownership of the Private, Public & Foreign Banks in Indian context and also analysis can be done by implementing the super efficiency models of the DEA.

In the future work can also be carried on to analyze the behavior of the determinants of liquidity in response to the financial crisis in consideration of the dummy variables to create crisis interaction term and thereby the 'Crisis Interaction Model' to analyze the for the crisis period ranging from 2007-09.

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15 It gives by far the fairer estimation of the prediction power of the model after adjusting the loss for the degree of freedom on adding one additional explanatory variable in the model.

16 Value ranges from 2-4, however a value close to 1 or 2 signifies that the model is free from first order autocorrelation.

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APPENDIX:

TABLE-2 Correlation Matrix:

	liqr	size	cer	nnpa	roa	opdt	crar	eff	infln	gdp
liqr	1.0000									
size	-0.3969	1.0000								
cer	0.2017	-0.3125	1.0000							
nnpa	-0.0623	0.4784	-0.1506	1.0000						
roa	0.2474	-0.2716	0.2398	-0.2852	1.0000					
opdt	-0.1570	0.0684	0.0979	0.0174	0.3165	1.0000				
crar	0.3015	-0.3723	0.0461	-0.0979	0.1700	0.0976	1.0000			
eff	-0.0226	-0.2498	-0.1405	-0.1146	0.1503	-0.0996	0.0955	1.0000		
infln	-0.2636	0.3286	-0.2942	0.2948	-0.1634	0.4065	0.0165	0.0696	1.0000	
gdp	0.2143	-0.2234	0.2908	-0.1043	0.0189	-0.4286	-0.0275	-0.1569	-0.6833	1.0000

TABLE-3 Fixed Effects Model Selected based on Hausman Test Appropriation and Redundant F-Test:

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.698104	(59,530)	0.0000
Cross-section Chi-square	157.582382	59	0.0000

Cross-section fixed effects test equation:
Dependent Variable: LIQR
Method: Panel Least Squares
Date: 12/31/18   Time: 12:58
Sample (adjusted): 2 11
Periods included: 10
Cross-sections included: 60
Total panel (balanced) observations: 600

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.124626	0.034835	3.577595	0.0004
CER	-0.034645	0.016126	-2.148391	0.0321
CRAR	0.000314	0.000122	2.570891	0.0104
EFF	-0.032846	0.015094	-2.176075	0.0299
GDP	0.000824	0.001540	0.534915	0.5929
INFLN	-4.34E-05	8.33E-05	-0.520921	0.6026
NNPA	1.19E-07	4.17E-08	2.856128	0.0044
OPDT	-0.000553	0.000231	-2.397841	0.0168
ROA	0.004575	0.002144	2.133881	0.0333
SIZE	-0.010992	0.003072	-3.578578	0.0004
LAGLIQR	0.645351	0.025208	25.60082	0.0000

R-squared	0.655857	Mean dependent var	0.091738
Adjusted R-squared	0.650014	S.D. dependent var	0.061271
S.E. of regression	0.036248	Akaike info criterion	-3.778729
Sum squared resid	0.773876	Schwarz criterion	-3.698119
Log likelihood	1144.619	Hannan-Quinn criter.	-3.747349
F-statistic	112.2499	Durbin-Watson stat	2.113479
Prob(F-statistic)	0.000000		

TABLE-4 (Results of Random Effects Model):

Dependent Variable: LIQR
Method: Panel EGLS (Cross-section random effects)
Date: 12/31/18   Time: 12:58
Sample (adjusted): 2 11
Periods included: 10
Cross-sections included: 60
Total panel (balanced) observations: 600
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.124626	0.032204	3.869923	0.0001
CER	-0.034645	0.014908	-2.323938	0.0205
CRAR	0.000314	0.000113	2.780961	0.0056
EFF	-0.032846	0.013954	-2.353884	0.0189
GDP	0.000824	0.001424	0.578624	0.5631
INFLN	-4.34E-05	7.70E-05	-0.563486	0.5733
NNPA	1.19E-07	3.85E-08	3.089505	0.0021
OPDT	-0.000553	0.000213	-2.593771	0.0097
ROA	0.004575	0.001982	2.308243	0.0213
SIZE	-0.010992	0.002840	-3.870988	0.0001
LAGLIQR	0.645351	0.023304	27.69269	0.0000

Effects Specification

		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		0.033509	1.0000

Weighted Statistics

R-squared	0.655857	Mean dependent var	0.091738
Adjusted R-squared	0.650014	S.D. dependent var	0.061271
S.E. of regression	0.036248	Sum squared resid	0.773876
F-statistic	112.2499	Durbin-Watson stat	2.113479
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.655857	Mean dependent var	0.091738
Sum squared resid	0.773876	Durbin-Watson stat	2.113479

TABLE-5 - Appropriation through Hausman Test:

Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	126.149267	10	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CER	-0.008437	-0.034645	0.000599	0.2843
CRAR	0.000204	0.000314	0.000000	0.1009
EFF	-0.026404	-0.032846	0.000071	0.4435
GDP	0.000951	0.000824	0.000000	0.7886
INFLN	0.000127	-0.000043	0.000000	0.1785
NNPA	0.000000	0.000000	0.000000	0.9162
OPDT	-0.000577	-0.000553	0.000000	0.8270
ROA	0.002695	0.004575	0.000003	0.3089
SIZE	-0.054401	-0.010992	0.000266	0.0078
LAGLIQR	0.406860	0.645351	0.000525	0.0000

Cross-section random effects test equation:
Dependent Variable: LIQR
Method: Panel Least Squares
Date: 12/31/18   Time: 13:14
Sample (adjusted): 2 11
Periods included: 10
Cross-sections included: 60
Total panel (balanced) observations: 600

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.360430	0.084286	4.276296	0.0000
CER	-0.008437	0.028662	-0.294347	0.7686
CRAR	0.000204	0.000132	1.545787	0.1228
EFF	-0.026404	0.016290	-1.620822	0.1057
GDP	0.000951	0.001500	0.633695	0.5266
INFLN	0.000127	0.000148	0.856906	0.3919
NNPA	1.22E-07	4.95E-08	2.469480	0.0138
OPDT	-0.000577	0.000239	-2.409613	0.0163
ROA	0.002695	0.002710	0.994718	0.3203
SIZE	-0.054401	0.016558	-3.285397	0.0011
LAGLIQR	0.406860	0.032681	12.44950	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.735347	Mean dependent var	0.091738
Adjusted R-squared	0.700892	S.D. dependent var	0.061271
S.E. of regression	0.033509	Akaike info criterion	-3.844700
Sum squared resid	0.595127	Schwarz criterion	-3.331725
Log likelihood	1223.410	Hannan-Quinn criter.	-3.645009
F-statistic	21.34236	Durbin-Watson stat	2.115825
Prob(F-statistic)	0.000000		

TABLE-6 (Efficiency Scores):

Bank Name	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
ALLAHABAD BANK	1.000	0.906	0.896	0.932	0.790	0.772	0.875	0.944	0.821	0.842	0.885
ANDHRA BANK	0.955	0.933	1.000	0.966	0.649	0.983	1.000	1.000	0.961	0.857	0.912
BANK OF BARODA	0.777	0.877	0.905	0.924	0.629	0.670	0.960	1.000	0.868	0.879	0.810
BANK OF INDIA	0.781	0.916	0.824	0.902	0.562	0.717	0.842	0.904	0.865	0.809	0.791
BANK OF MAHARASHTRA	0.977	0.971	1.000	0.902	0.734	0.733	0.836	0.860	0.833	0.859	0.920
CANARA BANK	1.000	1.000	0.922	0.901	0.723	0.722	0.908	0.930	0.791	0.845	0.831
CENTRAL BANK OF INDIA	0.946	0.903	0.919	0.951	0.658	0.578	0.873	0.905	0.821	0.858	0.899
CORPORATION BANK	0.893	0.951	0.976	0.924	0.994	1.000	1.000	1.000	1.000	1.000	0.832
DENA BANK	1.000	0.895	0.911	0.900	0.751	0.894	0.918	0.897	0.841	0.902	0.862
IDBI BANK LIMITED	1.000	1.000	0.770	0.794	0.547	0.645	0.827	0.925	0.801	0.798	0.740
INDIAN BANK	0.814	0.912	0.922	1.000	0.797	0.849	0.937	1.000	0.848	0.940	0.947
INDIAN OVERSEAS BANK	0.939	0.916	0.880	0.863	0.628	0.574	0.785	0.862	0.798	0.836	0.798
ORIENTAL BANK OF COMMERCE	1.000	1.000	1.000	0.995	0.886	0.962	1.000	1.000	0.841	0.948	0.909
PUNJAB AND SIND BANK	1.000	1.000	0.704	0.861	0.768	0.763	0.916	0.984	0.905	0.918	0.902
PUNJAB NATIONAL BANK	0.752	0.948	0.858	0.930	0.606	0.609	0.842	0.903	0.808	1.000	0.824
SYNDICATE BANK	0.952	0.949	0.929	0.937	0.543	0.799	0.864	0.904	0.858	0.827	0.864
UCO BANK	0.854	0.898	0.866	0.893	0.860	0.876	0.847	0.931	0.852	0.871	0.821
UNION BANK OF INDIA	0.790	0.924	0.848	0.879	0.722	0.674	0.896	0.917	0.841	0.922	0.890
UNITED BANK OF INDIA	1.000	1.000	0.931	0.945	1.000	0.696	0.877	0.915	0.987	1.000	0.904
VIJAYA BANK	0.951	0.918	0.902	0.876	0.889	0.976	0.868	0.932	1.000	0.939	0.840
STATE BANK OF BIKANER & JAIPUR	0.890	0.945	1.000	0.977	0.740	0.921	1.000	0.975	1.000	0.942	0.969
STATE BANK OF HYDERABAD	1.000	1.000	1.000	0.938	0.848	0.861	0.940	1.000	0.985	0.947	0.977
STATE BANK OF INDIA	0.897	0.929	0.930	0.924	0.679	0.800	0.843	0.865	0.906	0.849	0.909
STATE BANK OF MYSORE	0.824	0.982	1.000	0.893	0.570	0.546	0.856	0.918	0.844	0.850	0.905
STATE BANK OF PATIALA	1.000	1.000	1.000	0.993	0.798	0.934	0.827	0.950	0.912	0.894	0.900
STATE BANK OF TRAVANCORE	1.000	1.000	1.000	1.000	0.812	0.931	0.930	0.967	0.961	0.933	0.911
AXIS BANK	1.000	0.790	1.000	0.833	0.759	0.629	0.811	0.915	1.000	0.825	0.841
CATHOLIC SYRIAN BANK LTD	1.000	1.000	1.000	0.880	0.791	0.744	0.869	0.924	0.924	1.000	1.000
CITY UNION BANK LIMITED	0.869	0.997	1.000	1.000	1.000	0.874	0.980	0.928	0.900	0.969	1.000
DCB BANK LIMITED	0.787	0.862	0.762	0.860	0.660	0.578	0.801	0.857	1.000	0.911	0.998
DHANLAXMI BANK	0.953	0.941	0.878	1.000	0.574	0.637	0.769	0.857	0.889	0.863	0.869
FEDERAL BANK	0.842	0.922	0.995	0.968	0.806	0.841	0.887	0.944	1.000	0.962	0.933
HDFC BANK	0.990	0.846	1.000	0.941	0.654	0.690	0.912	0.948	1.000	0.900	0.956
ICICI BANK	0.900	0.787	0.837	0.839	0.530	0.600	0.698	0.799	1.000	0.840	0.793
INDUSIND BANK	1.000	1.000	1.000	0.831	0.533	0.562	0.725	0.847	1.000	0.818	0.884
JAMMU & KASHMIR BANK LTD	1.000	0.981	0.884	0.887	0.964	1.000	1.000	1.000	1.000	1.000	0.919
KARNATAKA BANK LTD	1.000	0.906	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.987	0.912
KARUR VYSYA BANK	0.885	1.000	0.929	1.000	0.850	0.842	0.897	0.909	0.990	0.878	0.969

KOTAK MAHINDRA BANK LTD	0.657	0.909	0.885	0.939	0.613	0.656	0.748	0.854	1.000	0.904	0.894
LAKSHMI VILAS BANK	0.991	0.987	0.929	0.992	0.735	0.596	0.910	0.934	1.000	0.917	0.966
NAINITAL BANK	0.842	0.890	0.982	0.833	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SOUTH INDIAN BANK	1.000	1.000	1.000	0.927	0.867	0.896	1.000	0.933	1.000	0.904	0.902
TAMILNAD MERCANTILE BANK LTD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.990
YES BANK LTD.	0.892	0.828	0.891	0.826	0.751	1.000	0.969	1.000	1.000	0.809	0.784
BANK OF AMERICA N.A.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.947	1.000	1.000
BANK OF BAHRAIN & KUWAIT B.S.C.	0.808	0.699	0.836	0.907	0.785	0.690	0.810	0.990	1.000	1.000	1.000
BANK OF NOVA SCOTIA	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
BANK OF TOKYO-MITSUBISHI UFJ LTD	0.970	1.000	1.000	1.000	0.706	1.000	0.984	0.863	0.826	0.877	0.853
BARCLAYS BANK PLC	1.000	1.000	1.000	1.000	0.782	1.000	1.000	1.000	1.000	1.000	1.000
BNP PARIBAS	0.769	0.960	1.000	0.915	1.000	0.850	1.000	1.000	1.000	1.000	1.000
CITIBANK N.A.	0.860	0.773	0.916	0.753	0.787	0.612	0.741	0.793	0.777	1.000	1.000
CREDIT AGRICOLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DBS BANK LTD.	0.640	1.000	1.000	1.000	1.000	1.000	1.000	0.907	0.838	0.847	0.770
DEUTSCHE BANK AG	0.568	0.419	0.858	0.878	0.727	0.723	1.000	0.928	0.909	1.000	0.985
HONGKONG AND SHANGHAI BANKING CORPN.LTD.	0.834	0.782	0.749	0.988	1.000	1.000	1.000	1.000	0.796	0.890	0.852
MIZUHO BANK LTD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.988
ROYAL BANK OF SCOTLAND N.V.	0.757	0.964	0.947	0.934	0.404	0.806	0.767	0.845	1.000	0.989	1.000
SHINHAN BANK	0.748	1.000	0.980	1.000	1.000	0.854	1.000	1.000	1.000	1.000	1.000
SOCIETE GENERALE	0.847	1.000	1.000	1.000	1.000	1.000	1.000	0.983	1.000	1.000	0.876
STANDARD CHARTERED BANK	0.647	0.811	0.780	0.869	0.408	0.555	0.812	0.937	0.935	0.959	0.976