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Article

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GENERAL & APPLIED ECONOMICS | RESEARCH ARTICLE

Issues in liquidity management in banking system: An empirical evidence from Indian commercial banks

Raavinuthala Satya Krishna Sharma^{1*}, Kumar Bijoy² and Arunaditya Sahay¹

Abstract: Maintaining the optimal level of liquidity in the banking system has always been a challenge for banks globally. Liquidity deficit Indian Banks turned to liquidity surplus due to the demonetization of higher denomination currencies in November 2016. The liquidity deficit has the potential to trigger systemic risk whereas a surplus can weaken monetary transmission leading to the creation of asset bubbles. This study explores the impact of various interventions of policy-makers to maintain the optimal liquidity by simultaneously insulating the banks' profitability and overall economic growth from the policy's negative impact using Auto-Regressive Distributed Lag (ARDL) regression. The study records and analyses the impacts of "Fiscal Deficit", "Lending and Deposit Rates", and "Credit Growth Rate" on Liquidity Deficit, GDP growth and Banks' Profitability levels. It is found that Fiscal deficit is negatively related to Liquidity deficit and GDP growth but increases Banks' profit whereas Lending rates have an insignificant impact on Liquidity Deficit. Increasing Deposit rates have a positive impact on Liquidity deficit, negative on Banks' Profit, and immediate positive relationships with GDP growth which changes to negative at the third lag. Similarly, the Credit growth rate has a positive relationship with the Liquidity deficit, augments GDP growth, and reduces Banks' profit. It is also observed that the profit of Indian Scheduled Commercial banks has reduced after the demonetization. This study, apart from contributing to academic literature, will help the monetary authorities and the financial institutions in their policy decisions for managing the liquidity issues in the market.

Subjects: Economics; Macroeconomics; Econometrics; Development Economics

Keywords: Fiscal deficit; Joint optimization; Liquidity deficit; ARDL regression

JEL Codes: E52; E62; E63; G21

1. Introduction

Ever since the 2008 meltdown, Liquidity Risk and Systemic Risk have gained traction among the bankers, regarding their Asset Liability Management. Subsequently, the Bank for International Settlements for the first time in its history, introduced two measures that are supposed to indicate the liquidity health of a bank (Basel Committee on Banking Supervision, 2010). These measures are the Net Stable Funding Ratio (NSFR) and Liquidity Coverage Ratio (LCR). V. Acharya and Naqvi (2012) noticed how abundant liquidity in banks leads to the formation of asset bubbles that resulted in the 2008 crisis. International Monetary Fund (2020) discusses the vulnerability of banks on the liquidity front due to the emergence of COVID-19, especially in those nations that

are underdeveloped. Such global events do show the necessity for banks to manage their liquidity positions. In India, banks have faced a paradoxical situation from 2011 to 2021 in terms of funding liquidity. Reserve Banks of India (RBI), which was injecting an average of INR 28.365 trillion (US \$368.37 billion) every month into scheduled commercial banks from 2011 to 2016 on account of liquidity deficit, had to absorb post-November 2016 (after demonetization¹), an average of INR 95.07 trillion (US\$1.235 trillion) per month from them due to liquidity surplus with the banks (RBI Database on Indian Economy, 2021b). Both the liquidity deficit and surplus have a negative impact on the economy of a nation in their respective ways.

Concerning the impact of Liquidity Deficit, Chen et al. (2018) inferred that Liquidity Risk harms bank performance in market-driven financial systems. Acharya et al. (2015) explained the impact of Liquidity Risk on the banking system and the heterogeneity of market risk related to securities. They studied the relationships between market liquidity and funding liquidity and focused on the impact of Liquidity Risk on returns of the stock market and other securities. Considering the adverse impact of Liquidity Risk on a bank's performance and the stress it can generate on the financial system, the government and the lender of the last resort have to deal with the liquidity challenges² in the banking system. Abbas et al. (2019) observed a positive impact of liquidity available on the profitability among Asian banks after the Global Financial Crisis (GFC) of 2008.

With respect to problems arising from surplus liquidity, Saxegaard (2006) infers that in Sub-Saharan Africa excess banks' liquidity results in the weakening of monetary policy transmission. Saggarr (2006) notes that draining excess liquidity from the banking system can cost the central bank. Saggarr (2006) also notes that excess funding liquidity in the banking system can push the nominal interest rates toward zero leading to a liquidity trap. Zhang and Pang (2008) find that excess Funding liquidity in China has exacerbated the inflation in China. Keeping such a negative impact of excess liquidity there is a need to deal with it.

Therefore, banks must maintain optimal liquidity. Existing literature and repository of banking interventions show that there are five major approaches to address the issues: (1) Expand Fiscal Deficit and inject liquidity into the banking system. (2) Banks themselves can attract more funds by raising interest rates for a longer period-locking, thereby raising funding liquidity. (3) Joint optimization of monetary and fiscal interventions, (4) Liquidation of near-liquid assets like reducing their current asset holdings under Statutory Liquid Ratio (SLR) to increase liquidity. (5) Securitization of assets with low liquidity.

On the securitization front, Von Thadden (2000) discussed the rationale for securitization, while Cooper (2000) highlighted the challenges in securitization, especially when the asset pool contains low-quality assets. Wachter (2014) explained how such securitization led to the GFC in 2008. Therefore this work rules out securitization as a solution. In the Indian context to deal with the liquidity deficit, the Reserve bank of India reduced the mandatory holdings under SLR to 19.25 percent of Demand Term Liabilities (DTL; RBI, 2019). The average holdings of all scheduled commercial banks under SLR was around 22.37 percent of the demand-term liabilities (RBI, 2019). This 22.37 percent was against the mandated 19.25 percent (RBI, 2019), which shows that the holdings under SLR in scheduled commercial banks were 312.73 basis points more than the mandated requirement. If the banks choose to reduce their current holdings in SLR to increase liquidity, then High-Quality Liquid Assets (HQLA) will reduce, leading to the vulnerability of banks on the liquidity front. It is evidenced in the Indian market as well when RBI bought US\$5 billion by pumping liquidity to the tune of USD 4.48 billion into the banking system (RBI Rupee-Dollar Swap Notification, 2019). But such interventions might become unsustainable as the sellers of the dollar in the swap will have to square off their positions by the end of three years as per the agreement, resulting in a reversal of the process, leading to the sucking of Indian rupees from the market. To deal with excess liquidity in banks post-November –2016 RBI encouraged banks to engage in Long term reverse repo where the banks purchase the government securities for relatively long periods, Ramkumar (2021)

Table 1. Articles by intervention, strategy-wise

Mode of intervention	Count of works
Intervention through fiscal policy	11
Intervention through monetary policy	9
Intervention through Credit policies	10
Intervention through the combination of fiscal and monetary policies	7
Total	37

Source: As compiled from the literature review done by the authors

Nevertheless, literature and practice show that all these interventions are either unsustainable in long term or have side effects on the economic growth of the country or bank profitability. Keeping in view the various interventions, and their side effects, to deal with liquidity issues, as given in the literature, this work finds a way to deal with funding liquidity issues (deficit and surplus) of Indian Scheduled Commercial Banks using Fiscal Deficit, Interest Rates, and Credit Growth as instruments while minimizing the negative impact on GDP Growth and Bank Profits. This work applies Autoregressive Distributed Lag (ARDL) regression to study the impact of the interventions on Liquidity (deficit/surplus), GDP Growth Rate and Bank Profits. The work, on the whole, finds that if the objective is to reduce liquidity surplus, all interventions reduce Bank Profits. Bank lending rates do not have any impact on Liquidity Deficit, hence need not be considered as an intervention. When the objective is to reduce Liquidity Deficit, reducing Deposit Rates becomes the line of action as it augments GDP Growth Rate and improves Bank Profits while reducing Liquidity Deficit. Contrary to the popular belief that a hike in Deposit Rates reduces Liquidity Deficit, the work finds that a hike in Deposit Rate increases Liquidity Deficit. The reason is probably well explained by Bakoush et al. (2019) saying that the want of filling margin calls in interest rate derivatives due to movements in interest rates causes liquidity crises. Therefore, our work recommends a reduction in deposit rates to reduce the liquidity deficit.

2. Literature review

The existing body of literature shows how Liquidity Deficit in the banking system of an economy has been dealt with. The literature review here spans from the early 1970s, when Barro (1974) validates the Ricardian equivalence, to the post-demonetization era of the Indian economy. But a majority of them belong to the post-2008 crisis, indicating the increasing consciousness towards Liquidity Risk in the practicing as well as the academic world. Liquidity issues got international recognition for the first time in the Basel-III norms, which came into effect in 2010. Although authors, such as Amihud and Mendelson (1988) have made remarkable contributions on this front much before the crisis of 2008, it would not be an exaggeration to say that the regulation of Liquidity Risk of the banking system got recognition post the 2008 crisis. The literature that deals with strategies to cope with liquidity issues in banking system literature can be broadly classified into four categories a) Fiscal policy solutions to Liquidity Deficit, b) Monetary policy solutions to Liquidity Deficit c) Credit expansion policies and d) Joint solutions. Table 1 gives the count of works reviewed under each one of the four strategies.

2.1. The fiscal policy view

The fiscal policy view divides itself into two dichotomies. One that supports fiscal deficit to deal with liquidity crunch and the other that opposes it. Belonging to the school that advocates fiscal deficit are Keynes (1937), Wray (2009), Das (2010), Brunetti et al. (2011), Kollmann et al. (2013), Ott and Tatom (2016), Niemann and Pichler (2017), Kara and Sin (2018), and Lau and Yip (2019). On the opposite side of favoring fiscal deficit are Catao and Terrones (2005) and Reinhart and Rogoff (2010). The role of fiscal interventions to deal with liquidity crises had been highlighted by Keynes (1937). In the wake of the 2008 financial crisis, Wray (2009) and Das (2010) suggest that creating a Fiscal Deficit and Trade Deficit without crowding out investments will automatically muster savings in the economy, thereby creating a supply of money for the banking

system. Brunetti et al. (2011) show evidence that during a crisis, the central bank would be better off assuring guarantees in the interbank lending market and direct asset purchases instead of pumping capital into the banking system. The work, however, fails to consider the capital adequacy of the government to deal with contingent liabilities that can emerge from defaults on borrowings for which they stand guarantee. Kollmann et al. (2013) find that the government support to banks in the Euro area during the financial crisis has played a positive role in stabilizing economic output, investment, and consumption in the Eurozone. Niemann and Pichler (2017) talk about the role of public debt in tax smoothing and as an instrument to provide liquidity when needed, thereby reducing the friction in the economy. The work finds that moderate levels of debt have a positive impact on the welfare function, provided that government bonds are used as collateral for businesses with high returns on investment. This work refers to liquidity outside the banking system, whereas our focus is on funding liquidity in the banking system. In an economic environment where government bonds are liquid and private assets are partially liquid, Kara and Sin (2018) find evidence that bond-financed fiscal expansion leads to higher economic output because government bonds are more liquid than private assets. On the other hand, Ott and Tatom (2016) opine that where taxation is not high and in the case of high-income countries, taxation has a positive effect on the financial development of a nation. Supporting the policy of fiscal deficit expansion Lau and Yip (2019) observe that Fiscal Deficit improved GDP Growth in the ASEAN (Association of South East Nations) countries post the 2007–09 crisis. Discussing the negative impact of the expansion of the Fiscal Deficit, Catao and Terrones (2005) find that it leads to an increase in inflation. A rise in prices hinders economic growth via three routes, namely the Keynesian effect (increase in prices creates upward pressure on interest rates, leading to reduction of investments as the cost of money goes up), wealth effect (as prices go up, consumption is bound to come down), and trade effect (increase in prices encourages substitution by import). On the monetary front, a rise in interest rates also has a similar negative impact on national economic growth. Similarly, Reinhart and Rogoff (2010) observe that a Government Debt-to-GDP ratio beyond 90% harms economic growth.

2.2. The monetary policy view

With respect to the impact of interest rates on the liquidity of banks Lucchetta (2007) observes that in the European context, risk-free interest rates positively impact the liquidity retained by a bank. In support of Lucchetta (2007), Canzoneri et al. (2008) theorize through the Wicksellian framework that movements in interest rates translate into movements in money supply and liquidity in households and the banking system. Brei et al. (2020) also infer that banks move away from short-term-based market funding to deposit-based funding in a low-interest environment. On the other hand, Bakoush et al. (2019) say that “the want of filling margin calls in interest rate derivatives due to upward movements in interest rates causes liquidity crises”. Discussing the impacts of hiking interest rates, Song (2005) gives evidence that banking liquidity crises and currency crises can be exacerbated by a hike in interest rates as asset prices are bound to collapse due to this move. Manganelli and Wolswijk (2009) also observe that interest rates in the short term have a positive relationship with market liquidity risk in European Government Bonds. Demiralp et al. (2021) justified the negative interest rate policy in Europe during the excess liquidity-holding period. On other monetary interventions apart from interest rates, García-Cicco and Kawamura (2014) describe how Latin American banking systems dealt with liquidity problems during the 2008 financial crisis by resorting to other monetary policies apart from interest rates like reducing reserve requirements, the extension of the repayment period, etc. The work shows alternative ways to deal with liquidity crunch apart from the conventional interest rate mechanisms. However, Kuttner and Yetman (2016) observed that in Asia, raising reserve requirements to deal with excess liquidity can impact the smaller banks disproportionately. These banks have used credit growth, issuance of central bank bills, and acceptance of short-term deposits by central banks from banks as tools to manage surplus liquidity. Raising the reserve requirements has a side effect of reducing the credit multiplier.

2.3. Credit expansion policies

The literature that deals with credit expansion to deal with excess liquidity in banking shows the effectiveness of such expansion and also discusses the ramifications of such expansion. Belonging to the school that argues credit expansion reduces excess liquidity are, Ganga (2000), Cornett et al. (2011), V.V. Acharya and Mora (2015), and Tran and McMillan (2020). While discussing the ramification of such credit expansions, contributions are seen from Driscoll (2004), Ashcraft (2006), Capiello et al. (2010), Liu and Wray (2010), Dedeoglu et al. (2018), and Bawa et al. (2019).

With respect to credit policies in dealing with liquidity surplus, Ganga (2000) observes that open market operations alone were not sufficient to deal with the excess liquidity situation in Guyana and needed to be combined with credit growth. V.V. Acharya and Mora (2015), and Cornett et al. (2011) show how banks to manage Liquidity Deficit had to shrink their credit and fall back to liquid assets during the 2007–09 crisis. On the contrary, Tran and McMillan (2020) observes that lending had an inverse relation with funding liquidity just before the 2007–09 crisis and became insignificant in the post-crisis period. Concerning the impact of credit on the economic growth of an economy, Dedeoglu et al. (2018) find that increase in credit growth creates a positive impact on the money supply in Turkey. Similarly, Capiello et al. (2010) find that credit interventions positively affect economic output in the Eurozone. On the other hand, Driscoll (2004) and Ashcraft (2006) find that credit has an insignificant impact on economic output. Discussing the negative impact of credit expansion Bawa et al. (2019) alert against the blind expansion of credit that may bring down the profit levels of banks because of rising debt. Liu and Wray (2010) caution about asset bubble creation due to indiscrete credit expansion.

2.4. The joint intervention of fiscal and monetary policies

The optimal balance of fiscal and monetary policies has been discussed by Bi and Kumhof (2011) where such a trade-off had to be made when the liquidity of agents in the economic system was constrained. The objective of the work was to maximize the welfare of the given liquidity constraints by making interventions in fiscal and monetary policy. Interventions on Fiscal policy had a bigger effect as per the work. In an earlier but similar study by the same authors, Kumhof and Bi (2009) make borrowing a constraint instead of liquidity with the rest of all parameters being the same. Similar results have been obtained elsewhere as in the case of Bi and Kumhof (2011). Discussing the impact of liquidity on interest rates, Aruoba and Chugh (2010) state that when friction for liquidity raises the value of money, the Friedman rule, which advocates nominal interest rates to be zero for the economy to be socially optimal, is not optimal, indicating that interest rates have to be hiked for dealing with liquidity friction. Discussing the negative impact of public debt on state welfare Niemann (2011) observes, “For environments where a non-negative steady-state level of government debt (assets) emerges in the absence of conservatism and impatience, monetary conservatism induces accumulation of a higher stock of liabilities (assets) and has adverse (positive) welfare implications.” In this work, the objective of the optimization is welfare rather than economic growth. Cui (2016) uses a model with endogenous asset liquidity to understand the monetary and fiscal interactions with liquidity friction and find that the optimal Debt-to-GDP ratio is arrived at as an output. Since the objective of the study was the welfare function of the economy, the question of finding an interest rate for one component of the economy was not dealt with. Jarociński and Maćkowiak (2018) designed a model that captures features of monetary and fiscal policy with no default by the government, which gives higher simulated output than empirical data. Chowdhury et al. (2018) infer that market liquidity is impacted by both interest rates and government borrowing.

The entire literature survey does not find a work that deals with liquidity deficit and surplus of banks using Interest Rates, Fiscal Deficit, and Credit Growth simultaneously while trying to minimize their negative impact on the economic growth of a country and bank profitability. Our work addresses the liquidity management of Indian Scheduled Commercial Banks using Fiscal Deficit, Interest rates, and Credit Growth as instruments while minimizing the negative impact on Economic growth and profit levels of banks. The work follows the following scheme. Section 3

discusses the theoretical framework using which the study is carried out along with data collection and analysis methods. Section 4 presents the findings. Section 5 discusses the results and Section 6 concludes the work.

3. Research design and theoretical framework

3.1. Theoretical framework

From the previous research, three macroeconomic variables, namely Fiscal Deficit (Wray, 2009), Interest Rates (Canzoneri et al., 2008; Lucchetta, 2007) and Credit Growth (Cornett et al., 2011; Ganga, 2000; V.V. Acharya & Mora, 2015) have been identified as variables to control and manage liquidity in the banking system. The impact of the interventions of these three macroeconomic variables on GDP growth and Bank Profits are also observed based on the available literature.

The impact of Fiscal Deficit on GDP Growth is as per findings by Catao and Terrones (2005) and Lau and Yip (2019) whereas its impact on Bank Profits is based on the study of Obeng and Sakyi (2017). The impact of Interest Rates on GDP is observed in the same way as propounded by Keynes (1937) and on Bank Profits as observed by Song (2005). The impact of credit supply on GDP growth finds its theoretical ground in the works of Driscoll (2004), Ashcraft (2006), and Cappiello et al. (2010) while on Bank Profits as discussed by Ekpu and Paloni (2016), Kohlscheen et al. (2018), and Rossi et al. (2018).

Thus, this study proposes to build an intervention framework with Fiscal Deficit, Interest Rates, and Credit Growth as instruments to manage excess (deficit) of funding liquidity in Indian Scheduled Commercial Banks with a minimal negative impact on the profitability of banks and GDP growth of the country.

3.2. Methodology

Assi et al. (2020) use the ARDL method to explore the relations between Renewable Energy Consumption, Financial Development, Environmental Pollution, and Innovations in the ASEAN +3 group. Ozturk and Acaravci (2011) use the ARDL bounds test and Granger Causality to explore the relationship between Electricity Consumption and Real GDP growth in 11 MENA (the Middle East and North Africa) countries. Sunde (2017) uses ARDL to study mutual causality between Economic Growth and Foreign Direct Investment in South Africa. Toda and Phillips (1994) discuss the suitability of Vector Auto Regression (VAR) and Vector Error Correction Models (VECM) in causality studies. The literature thus shows the suitability of ARDL, VAR, and VECM to study the impact of regressors on the dependent variable.

ARDL by Pesaran et al. (1999) has been preferred in this work to study the impact of Fiscal Deficit, Interest Rates, and Credit on Liquidity Deficit (Surplus) on the GDP of the nation and profit levels of Indian Scheduled Commercial Banks. This is for two reasons. First, for unrestricted VAR, there should be no co-integration and all series should be of the order $I(0)$ of integration. For VECM, all series should be of the same order of integration. The second reason is that ARDL supports an asymmetric lag structure, which VAR or VECM do not. Equation-1 shows the general form of ARDL. In line with Assi et al. (2020), Ozturk and Acaravci (2011), and Sunde (2017), this work considers the ARDL approach with a dummy variable. The dummy variable “Demo” takes 0 for the period before demonetization and 1 for the period after demonetization.

$$Y_t = \alpha_0 + \sum_{j=0}^q \beta_j L^j X_t + \sum_{i=0}^p \gamma_i L^i Y_t + \epsilon_t \quad (\text{Equation 1})$$

where Y_t is dependent variable of term t and X_t is the regressor at the term t .

α_0 is the intercept, β_j and γ_i are the regression coefficients and ϵ_t is the error term.

L is the Lag Operator where $L^0X_t = X_t$, $L^1X_t = X_{t-1}$.

This work uses Equation 2 to find how these interventions impact funding liquidity, GDP, and profitability of the Indian banks, respectively. Interest rates on term deposits (1–3 years) and base rates in lending have been considered a proxy for interest rates in this work.

- (1) To study the impact of Fiscal Deficit, Lending Rates, Deposit Rates, and Credit Growth on Liquidity Deficit. On GDP growth and Bank profits

$$Y = \sum_{i=0}^n \beta_i FD_n + \sum_{j=0}^n \beta_j BMLR_n + \sum_{k=1}^n \beta_k CG_n + \sum_{k=1}^n \beta_k DR_n + C1 + Demo + e1 \quad (\text{Equation2})$$

where $Y \rightarrow$ LD when studying the impact of interventions on Liquidity Deficit

$Y \rightarrow$ GDP when studying the impact of interventions on GDP growth

$Y \rightarrow$ BP when studying the impact of interventions on Bank profits

GDP = Gross Domestic Product

LD = Liquidity Deficit

BMLR = Bench Mark Lending Rate

DR = Deposit Rates

CG = Credit Growth Rate

FD = Fiscal Deficit

BP = Profit level of Indian Scheduled Commercial Banks

Demo = Control Variable of Demonetization

3.3. Data

As per the computation from the database “Business of Scheduled banks in India” (RBI, 2021a), Indian Scheduled Commercial Banks owned 96.55 percent of the total assets of banks in India. Therefore, we take Indian Scheduled Commercial Banks as representative of the Indian banking system. The time range considered for data collection in this work is from November 2012 to June 2021. The frequency is quarterly for the Fiscal Deficit from November 2012 till June 2021 (adopted from RBI Database on Indian Economy, 2021a). The quarterly sum of daily liquidity injected by the Reserve Bank of India (adopted from RBI Database on Indian Economy, 2021b) has been taken as a proxy for Liquidity Deficit. For quarterly nominal GDP, the data has been taken from RBI Database on Indian Economy (2021c). Deposit rates on 1–3 year deposits (adopted from RBI Database on Indian Economy, 2021d) have been considered as a proxy for deposit rates because this category of deposits holds the maximum percentage of the source of funds in deposits. As per Maturity Profile Assets and Liabilities of RBI (RBI, 2021c), this category accounts for 25 percent of the total-term deposits mobilized and is the largest. Only term deposits have been explored, as demand liabilities are a volatile and unreliable source of money. For the lending rates, the base rate obtained from RBI Database on the Indian economy (2021d) is considered a proxy for the lending rate. To gauge the profit levels of Indian banks, the sum of the profits of the top 16 banks is considered. This is done because these banks’ financial assets sum up to more than

Table 2. List of banks considered for computing profit levels of Indian scheduled commercial banks

Name of the Bank	Ownership type	Online Source for-profits Data
State Bank of India	Public	https://sbi.co.in/web/investor-relations/reports
Punjab National Bank	Public	https://www.pnbindia.in/financials-archives.html
Bank of Baroda	Public	https://www.bankofbaroda.in/financial-reports.htm
Union Bank of India	Public	https://www.unionbankofindia.co.in/english/performance-archive.aspx
Canara Bank	Public	https://canarabank.com/User_page.aspx?othlink=379
Indian Bank	Public	https://www.indianbank.in/departments/financial-results/
Bank of India	Public	https://www.bankofindia.co.in/FinancialResult
Central Bank of India	Public	https://www.centralbankofindia.co.in/en/investor-relations
Bank of Maharashtra	Public	https://bankofmaharashtra.in/financial_results
Indian Overseas Bank	Public	https://www.iob.in/Financial_perf
ICICI Bank	Private	https://www.icicibank.com/aboutus/qfr.page?#toptitle
HDFC Bank	Private	https://www.hdfcbank.com/personal/about-us/investor-relations/financial-results
Axis Bank	Private	https://www.axisbank.com/shareholders-corner/financial-results-and-other-information/quarterly-results
YES Bank	Private	https://www.yesbank.in/about-us/investors-relation/financial-information/financialresults
Kotak Bank	Private	https://www.kotak.com/en/investor-relations/financial-results/quarterly-results.html
IDBI Bank	Private	https://apps.idbibank.in/idbiapp/idbi-bank-financial-result.aspx

Source: Compiled by Authors from the corresponding bank websites.

80 percent of the total financial assets of Indian Scheduled Commercial Banks as per RBI Database on Indian Economy (2021b). The data source of their profits is given in Table 2

3.3.1. Data description

The work considers the following variables: Liquidity Deficit (LD), Term Deposit Rate (DR), GDP, Bench Mark Lending Rate (BMLR), Fiscal Deficit (FD) Bank Profitability (BP) and Credit Delivered (CG). Table 3 shows the variables and proxies taken for these variables (in applicable cases only) along with their frequency and treatment to convert the high-frequency data to common frequency for analysis, count, mean, and standard deviation. A negative LD has been considered a liquidity surplus.

4. Findings

First, select macroeconomic variables, namely LD, FD, BMLR, CG, DR, and PB have been tested for stationarity using the Augmented Dicky–Fuller (ADF) test. It is found that LD, FD, BMLR, and CG are

Table 3. Data description

Variable	Proxy and Source	Available frequency before transformation	Transformed Frequency	Method of frequency transformation	Count after frequency transformation	Total Average	Standard Deviation in
LD	Liquidity injected by the Reserve bank of India. Negative Sign Means Surplus Liquidity absorbed by RBI	Daily	Quarterly	Summation	41	USD 264.415 Billion (Surplus)	USD 1649.37 Billion (Deficit)
DR	1–3 year Term deposit interest rate	Weekly	Quarterly	Average	41	8.40 percent	1.25 percent
Nominal GDP	Not applicable	Quarterly	Quarterly	Not applicable	41	USD 441.13 Billion	USD 120.19 Billion
BMLR	Base rate	Weekly	Quarterly	Average	41	9.81 percent	0.84 percent
FD	Fiscal Deficit	Quarterly	Quarterly	Not applicable	41	USD 23.32 Billion	USD 21.22 Billion
BP	Total Profit of 17 representative banks	Quarterly	Quarterly	Not applicable	41	USD 4,411 Billion	USD 1.19.41 Billion
CG	Credit Lent During the period	Quarterly	Quarterly	Not applicable	41	USD973.97 Billion	USD 269.22 Billion

Source: Compiled by Authors ³

stationary at the first difference while DR and PB are stationary at level. The chosen method of analysis, that is, ARDL, takes care of the difference in the level of stationarity as found with the data set. The findings are observed at a five percent significance level.

LD is regressed against FD, BMLR, CG, DR, and Demo as per equation 2. It is found that the FD of the current quarter and the previous four quarters reduce the LD. LR has no impact while DR exhibit mixed results. Credit Growth at lag 1 has a strong positive influence on LD. Interestingly, DR at lag 0 has a positive relationship with LD (see Table 4).

When the first difference of GDP (GDP growth) was regressed against D(GDP,-1), D(GDP,-2), FD, BMLR, DR, and Demo as per equation-2, it was found that D(GDP,-1), D(GDP,-2) and D(GDP,-3) had a negative impact on D(GDP), FD has a negative influence on GDP growth. The lending rate has a negative impact on GDP growth while DR exhibits both a positive (at lag 0) and a weak negative (at lag 3) impact on GDP growth. Credit Growth does show a positive influence on GDP growth. The results can be seen in Table 5.

When BP was regressed against BP(-1,-2), FD, BMLR, DR and Demo as per equation-2, it was found that lags of BP had no impact on BP. Fiscal Deficit was found to have positive association with Bank Profitability while lending rates had a positive influence on BP. Credit Growth and Deposit Rate showed a negative influence on BP. Demonetization has a negative impact on BP. When the first difference of GDP (GDP growth) is regressed against D(GDP,-1), D(GDP,-2), FD, BMLR, DR, and

Table 4. Impact of selected interventions on liquidity deficit

Variable	Lag Number	Coefficient	Standard Error
LD	1	0.02	0.20
	2	-0.24	0.21
	3	-0.96**	0.19
FD	0	-49.09**	13.07
	1	-59.67**	21.46
	2	-72.82**	22.42
	3	-63.25**	19.96
	4	-29.51**	11.16
BMLR	0	15,252,142.00	11,747,598.00
	1	-12,954,928.00	10,790,430.00
	2	-13,952,032.00	10,652,714.00
	3	1,973,046.00	12,855,636.00
	4	7,738,872.00	5,515,119.00
CG	0	11.42	7.07
	1	18.72**	6.87
	2	3.88	8.21
	3	15.57	8.96
	4	-9.77	7.57
DR	0	8,043,196.00**	3,013,324.00
	1	-454,365.00	3,467,386.00
	2	3,708,198.00	2,801,853.00
	3	-5,555,312.00	3,770,858.00
DEMO	0	889,372.00	1,632,700.00
C		-7,638,933	4,666,191

Note: * significant at 10 percent level. ** significance at five percent level.

Table 5. Impact of interventions on GDP growth and bank profits

Impact on GDP growth				Impact on Bank Profits			
Variables	Lag Number	Coefficient	Standard Error	Variables	Lag Number	Coefficient	Standard Error
D(GDP)	1	-0.44**	0.19	BP	1	0.05	0.19
	2	-0.45**	0.22		2	-	-
	3	-0.80**	0.29		3	-	-
FD	0	-1.97**	0.54	FD	0	0.07**	0.01
	1	-2.78**	0.80		1	0.11	0.02
	2	-2.61**	0.81		2	0.08	0.01
	3	-2.57**	0.76		3	-	-
BMLR	4	-1.78**	0.49	BMLR	4	-	-
	0	491,090.00	546,720.00		0	55,272.00**	21,898.00
	1	-357,896.00	464,699.00		1	-	-
	2	-1,015,583.00*	476,683.00		2	-	-
CG	0	0.01	0.27	CG	0	0.01	0.01
	1	0.54*	0.26		1	-0.01	0.01
	2	0.25	0.32		2	-0.05**	0.01
	3	0.03	0.36		3	-0.05**	0.01
DR	4	-0.46	0.36	DR	4	-	-
	0	314,347.00**	135,269.00		0	-7743.01**	3214.20
	1	-221,276.00	152,459.00		1	-16,533.00**	5612.00
	2	34,714.00	139,678.00		2	-	-
DEMO	3	-315,549.00*	160,765.00	DEMO	3	-	-
	0	135,394.00*	66,402.00		0	-10,559.00**	3377.00
	-	76,052.00	183,626.00		-	28,654.00**	8552.00

Note: * significant at the 10 percent level. ** significant at the five percent level.

Demo as per equation-2, it was found that $D(GDP, -1)$, $D(GDP, -2)$, and $D(GDP, -3)$ had a negative impact on $D(GDP)$, FD had a negative influence on GDP growth. The lending rate had a negative impact on GDP growth while DR exhibits both a positive (at lag 0) and a weak negative (at lag 3) impact on GDP growth. Credit Growth does show a positive influence on GDP growth (Table 5).

5. Discussions

The work, in agreement with Wray (2009), finds that FiscalDeficit of the current and past four quarters has a negative influence on the Liquidity Deficit. (Table 4). This indicates that the FD raised by the government contributes to the liquidity of banks. In disagreement with Lau and Yip (2019) and Kollmann et al. (2013) and in congruence with the findings of Catao and Terrones (2005), the work finds that the FD of the previous quarters has a negative impact on GDP growth (Table 5). This does indicate that the government expenditure is being channeled to unproductive venues. The work finds that FD has a positive relationship with bank profits in congruence with Obeng and Sakyi (2017). Lending rates seem to have an insignificant impact on LD, indicating movements in lending rates will not have any significant impact on borrowers' demand for credit in the Indian context (Table 4). This does show that a reduction in lending rates does not result in the suction of excess liquidity through the credit channel. Similarly, there is a strong significant positive relationship between lending rates with bank profits in disagreement with Song (2005) who observed a negative impact of interest rates on bank profits. A significant negative relationship between lending rate and GDP growth agrees with the postulates of Keynes (1937), where the negative relationship was highlighted between the two through the Keynesian effect. Similarly, there is a strong significant positive relationship between lending rates and BP in disagreement with Song (2005). This could be due to the increase in the spread between borrowing rates and lending rates of banks.

In concurrence with Ganga (2000), Cornett et al. (2011), and V.V. Acharya and Mora (2015), credit growth is found to have a positive relationship with Liquidity Deficit. However contrary to the findings of Ekpu and Paloni (2016), Kohlscheen et al. (2018), and Rossi et al. (2018), credit growth shows a negative impact on the profitability of banks. This may be due to increasing credit costs (fund and/or operational costs) or poor loan recovery rates. In congruence with Cappiello et al. (2010), the work shows a weaker positive influence (10 percent significance) of credit growth on the GDP growth rate while Driscoll (2004) and Ashcraft (2006) find the impact of credit supply to be insignificant on the economic output. This does suggest that Indian banks and policymakers need to have a relook at the avenues where credit is being allocated. Credit needs to be rechanneled to those venues that have a strong positive association with economic growth.

Interestingly, deposit rates at lags 0 shows a positive relationship with Liquidity Deficit, which disagrees with Lucchetta (2007). However, the positive relationship can be explained by Bakoush et al. (2019), who say that the want of filling margin calls in interest rate derivatives due to movements in interest rates causes liquidity crises. As expected, in accordance with Song (2005), deposit rates do show a negative impact on the profit levels of banks as they drive the cost of borrowing upwards. In agreement with Keynes (1937), Deposit rates at third lag show a negative relation with the GDP growth of the current quarter. However, deposit rates of the previous quarter have strong positive impact on GDP growth. The positive relation between the deposit rates of the previous quarter and GDP growth could be due to the control of inflation through a hike in interest rates as per Fama (1977). So, when inflation is controlled, economic growth does increase, which is as per Barro (2013). GDP growth, profit levels of the banking system and liquidity deficit were all found to be in a negative relationship with their lags, indicating a tendency to find a dynamic equilibrium.

Table 6 summarizes the impacts of various instruments used to control the liquidity of the banks over the Liquidity Deficit of the banking system, GDP growth of the country, and profit levels of banks.

Table 6. Impact of liquidity management interventions on liquidity deficit/surplus, GDP, and bank profit levels

Instrument to Control Liquidity Deficit	Impact on Liquidity Deficit	Impact on Nominal GDP	Impact on Bank Profit Level
Fiscal Deficit	The current quarter and all the previous quarters have a negative impact	Negative impact	Has a positive effect
Credit Growth	Positive Effect	Has a positive impact	Negative impact
Benchmark Lending Rates	Insignificant	Negative impact	Positive impact
Deposit Rates	Positive Impact on liquidity deficit	current lag has a positive impact while third lag has a negative impact	Negative impact

Overall, the work finds that there is no single intervention to deal with liquidity issues of Indian Scheduled Commercial Banks. If the issue is to deal with liquidity surplus, credit growth is effective in reducing it and has a weak positive impact on GDP growth. However, credit growth was found to reduce bank profits. If the fiscal deficit is reduced, the liquidity surplus reduces along with an increase in GDP. However, the reduction of fiscal deficit shows a negative impact on the banks' profits. Interestingly, a hike in deposit rates has been found to reduce liquidity surplus and increase economic growth (by reducing inflation) but reduce bank profits.

So, if the objective is to reduce liquidity surplus, all these options reduce bank profits. Bank lending rates do not have any impact on liquidity deficit, hence need not be considered as an intervention. When it comes to dealing with liquidity deficit, increasing fiscal deficit reduces liquidity deficit and improves bank profits but reduces economic growth. A decrease in deposit rates does reduce Liquidity Deficit, improves bank profit, and augments economic growth (by reducing costs). Reduction of credit does reduce liquidity deficit but comes with a reduction in the economic growth of the country. So, to deal with the liquidity deficit, a reduction in deposit rates comes as the first line of action, which is in accordance with the objective of this work.

6. Conclusion

From the study, it is evident that Fiscal Deficit emerges as a solution to Liquidity Deficit as its expansion quenches Liquidity Deficit, and it also augments banks' profit levels. Credit growth is good at handling surplus liquidity and improves GDP as well. If the banks can deal with the NPA situation. Then, the negative impact of credit growth on profit levels could be minimized as the literature suggests. Coming to deposit rates, they augment the Liquidity Deficit, indicating that hiking of deposit rate does reduce the Liquidity Deficit but serving the high borrowing cost is expanding the liquidity deficit in the current quarter. Deposit rates as expected harm profit levels of Indian Scheduled Commercial Banks, so, hiking deposit rates is the last option to deal with the Liquidity Deficit. Theory anyway tells that they do not reduce the excessive liquidity surplus. Coming to lending rates, they have an insignificant impact on liquidity deficit/surplus, a negative impact on GDP growth, and a positive one on bank profitability. This work concludes that quenching liquidity deficit in banks through a rise in the fiscal deficit comes at the cost of GDP growth reduction and an increase in bank" profits. Similarly, dealing with surplus liquidity through the credit channel comes at the cost of bank profit but augments GDP. Therefore, a trade-off between GDP growth and bank profitability seems to be inevitable in dealing with liquidity issues of Indian Scheduled Commercial Banks.

6.1. Limitations and further scope

This work does not address the scenario where there has been a sovereign default. The work provides a future scope on various modes government can infuse liquidity into the banking system, like equity, asset purchase, debt, various forms of debt like refinance, etc. The work is limited to taxation and borrowing as part of funding the Fiscal Deficit. It does not consider the sale of government assets, consumption of reserves, extraordinary income, or printing of money for the reasons discussed in Section 1. This work considers nominal GDP. How money supply to the banking system is affected by foreign capital flows can be dealt with separately using trade policy. Similar work can be done by considering other banking liquidity indicators like the Net Stable Funding Ratio (NSFR), Quick ratio, etc.

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Notes

1. Demonetization in India happened on 8 November 2016 in which, by the order of the Government, denominations of INR 500 and INR 1000 were declared to be invalid currency. Those who had these two denominations could only deposit the money into their respective bank accounts within a stipulated time. Banks were allowed to transact with the Government of India or the Central Bank with such denominations or they could use them to maintain the mandatory Cash Reserve Ratio.
2. Here liquidity means funding liquidity of the banking system and not market liquidity of the economy
3. INR was converted to its USD equivalent at the exchange rate of one USD equals to INR 77

References

- Abbas, F., Iqbal, S., Aziz, B., & Yang, Z. (2019). The impact of bank capital, bank liquidity and credit risk on profitability in post crisis period: A comparative study of US and Asia. *Cogent Economics & Finance*, 7(1), 1605683. <https://doi.org/10.1080/23322039.2019.1605683>
- Acharya, V. V., & Mora, N. (2015). A crisis of banks as liquidity providers. *The Journal of Finance*, 70(1), 1–43. <https://doi.org/10.1111/jofi.12182>
- Acharya, V., & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics*, 106(2), 349–366. <https://doi.org/10.1016/j.jfineco.2012.05.014>
- Acharya, V., Schaefer, S. M., & Zhang, Y. (2015). Liquidity risk and correlation risk: A clinical study of the general motors and ford downgrade of may 2005. *Quarterly Journal of Finance*, 5(2), 1–51. <https://doi.org/10.1142/S2010139215500068>
- Amihud, Y., & Mendelson, H. (1988). Liquidity and asset prices: Financial management implications. *Financial Management*, 17(1), 5–15. <https://doi.org/10.2307/3665910>
- Aruoba, S. B., & Chugh, S. K. (2010). Optimal fiscal and monetary policy when money is essential. *Journal of Economic Theory*, 145(5), 1618–1647. <https://doi.org/10.1016/j.jet.2010.03.009>
- Ashcraft, A. (2006). New evidence on the lending channel. *Journal of Money, Credit and Banking*, 38(3), 751–775. <https://doi.org/10.1353/mcb.2006.0037>
- Assi, A. F., Isiksal, A. Z., & Tursoy, T. (2020). Highlighting the connection between financial development and consumption of energy in countries with the highest economic freedom. *Energy Policy*, 1471, 689–700. <https://doi.org/10.1016/j.enpol.2020.111897>
- Bakoush, M., Gerding, E. H., & Wolfe, S. (2019). Margin requirements and systemic liquidity risk. *Journal of International Financial Markets, Institutions and Money*, 58(C), 78–95. <https://doi.org/10.1016/j.intfin.2018.09.007>
- Barro, R. J. (1974). Are government bonds net wealth?. *Journal of Political Economy*, 82(6), 1095–1117. <https://doi.org/10.1086/260266>
- Barro, R. J. (2013). Education and economic growth. *Annals of Economics and Finance*, 14(2), 301–328 <http://down.aefweb.net/AefArticles/aef140201Barro.pdf>
- Basel Committee on Banking Supervision. 2010. *An assessment of the long-term impact of stronger capital and liquidity requirements*. BCBS Report No. 173, Bank for International Settlement. <http://www.bis.org/publ/bcbs173.pdf>
- Bawa, J. K., Goyal, V., Mitra, S. K., & Basu, S. (2019). An analysis of NPAs of Indian banks: Using a comprehensive framework of 31 financial ratios. *IIMB Management Review*, 31(1), 51–62. <https://doi.org/10.1016/j.iimb.2018.08.004>
- Bi, H., & Kumhof, M. (2011). Jointly optimal monetary and fiscal policy rules under liquidity constraints. *Journal of Macroeconomics*, 33(3), 373–389. <https://doi.org/10.1016/j.jmacro.2011.02.002>
- Brei, M., Borio, C., & Gambacorta, L. (2020). Bank intermediation activity in a low interest rate environment. *Economic Notes*, 49(2), e12164. <https://doi.org/10.1111/ecn.12164>
- Brunetti, C., Di Filippo, M., & Harris, J. H. (2011). Effects of central bank intervention on the interbank market during the subprime crisis. *The Review of Financial Studies*, 24(6), 2053–2083. <https://doi.org/10.1093/rfs/hhq123>

- Canzoneri, M., Cumby, R., Diba, B., & López-Salido, D. (2008). Monetary aggregates and liquidity in a Neo-Wicksellian framework. *Journal of Money, Credit and Banking*, 40(8), 1667–1698. <https://doi.org/10.1111/j.1538-4616.2008.00178.x>
- Cappiello, L., Kadareja, A., Kok, C., & Prototapa, M., 2010. Do bank loans and credit standards have an effect on output? A panel approach for the euro area. (No. 1150). ECB Working Paper.
- Catao, L. A., & Terrones, M. E. (2005). Fiscal deficits and inflation. *Journal of Monetary Economics*, 52(3), 529–554. <https://doi.org/10.1016/j.jmoneco.2004.06.003>
- Chen, Y. K., Shen, C. H., Kao, L., & Yeh, C. Y. (2018). Bank liquidity risk and performance. *Review of Pacific Basin Financial Markets and Policies (RPFMP)*, 21(1), 1–40 doi:<https://doi.org/10.1142/S0219091518500078>.
- Chowdhury, A., Uddin, M., & Anderson, K. (2018). Liquidity and macroeconomic management in emerging markets. *Emerging Markets Review*, 34, 1–24. <https://doi.org/10.1016/j.ememar.2017.10.001>
- Cooper, I. (2000). Comments on the paper by Ernst-Ludwig von Thadden: Liquidity creation through banks and markets: A theoretical perspective on securitization. *Economic Notes*, 29(3), 393–397. <https://doi.org/10.1111/1468-0300.00039>
- Cornett, M. M., McNutt, J. J., Strahan, P. E., & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics*, 101(2), 297–312. <https://doi.org/10.1016/j.jfineco.2011.03.001>
- Cui, W. (2016). Monetary–fiscal interactions with endogenous liquidity frictions. *European Economic Review*, 87(C), 1–25. <https://doi.org/10.1016/j.eurocorev.2016.03.007>
- Das, S. (2010). On Financing the fiscal deficit and availability of loanable funds in India. *Economic & Political Weekly*, 45(15), 67.
- Dedeoglu, D., Ogut, K., & Andraz, J. M. L. G. (2018). Examination of money supply endogeneity in Turkey: Evidence from asymmetric causality test. *Cogent Economics & Finance*, 6(1), 1–18. <https://doi.org/10.1080/23322039.2018.1518956>
- Demiralp, S., Eisenschmidt, J., & Vlassopoulos, T. (2021). Negative interest rates, excess liquidity and retail deposits: Banks' reaction to unconventional monetary policy in the euro area. *European Economic Review*, 136(C), 103745. <https://doi.org/10.1016/j.eurocorev.2021.103745>
- Driscoll, J. C. (2004). Does bank lending affect output? Evidence from the US states. *Journal of Monetary Economics*, 51(3), 451–471. <https://doi.org/10.1016/j.jmoneco.2004.01.001>
- Ekpu, V., & Paloni, A. (2016). Business lending and bank profitability in the UK. *Studies in Economics and Finance*, 33(2), 302–319. <https://doi.org/10.1108/SEF-04-2015-0097>
- Fama, E. F. (1977). Interest rates and inflation: The message in the entrails. *The American Economic Review*, 67(3), 487–496 <https://www.jstor.org/stable/1831421>.
- Ganga, G. (2000). Credit, excess liquidity and monetary policy issues in Guyana. *Social and Economic Studies*, 49(2), 199–224.
- García-Cicco, J., & Kawamura, E. (2014). Central bank liquidity management and unconventional monetary policies. *Economía*, 15(1), 39–87 <https://repositorio.uca.edu.ar/bitstream/123456789/2224/1/central-bank-liquidity-management.pdf>.
- International Monetary Fund, 2020. *Global financial stability report: Markets in the time of COVID-19*. [Online] <https://www.imf.org/en/Publications/GFSR/Issues/2020/04/14/global-financial-stability-report-april-2020> [Accessed on 01-Jul-2021]
- Jarociński, M., & Maćkowiak, B. (2018). Monetary-fiscal interactions and the euro area's malaise. *Journal of International Economics*, 112(C), 251–266. <https://doi.org/10.1016/j.jinteco.2017.12.006>
- Kara, E., & Sin, J. (2018). The fiscal multiplier in a liquidity constrained new Keynesian economy. *The Scandinavian Journal of Economics*, 120(1), 93–123. <https://doi.org/10.1111/sjoe.12208>
- Keynes, J. M. (1937). The general theory of employment. *The Quarterly Journal of Economics*, 51(2), 209–223. <https://doi.org/10.2307/1882087>
- Kohlscheen, E., Murcia, A., & Contreras, J., 2018. *Determinants of bank profitability in emerging markets* (BIS Working Papers No. 686). Bank for International Settlements. <https://www.bis.org/publ/work686.htm> [Accessed on 01-Jul-2021]
- Kollmann, R., Ratto, M., Roeger, W., & In't Veld, J. (2013). Fiscal policy, banks and the financial crisis. *Journal of Economic Dynamics and Control*, 37(2), 387–403. <https://doi.org/10.1016/j.jedc.2012.09.007>
- Kumhof, M., & Bi, H. (2009). Jointly optimal monetary and fiscal policy rules under borrowing constraints. *Jointly Optimal Monetary and Fiscal Policy Rules under Borrowing Constraints*, 2009(286), 1–39 <https://doi.org/10.5089/9781451874310.001>.
- Kuttner, K., & Yetman, J., 2016. *A comparison of liquidity management tools in seven Asian economies* BIS Papers . https://www.bis.org/publ/bppdf/bispap88c_rh.pdf [accessed on 01-July-2021]
- Lau, W. Y., & Yip, T. M. (2019). The nexus between fiscal deficits and economic growth in ASEAN. *Journal of Southeast Asian Economies*, 36(1), 25–36. <https://doi.org/10.1355/ae36-1d>
- Liu, X., & Wray, L. R. (2010). Excessive liquidity and bank lending in China: A modern money perspective. *International Journal of Political Economy*, 39(3), 45–63. <https://doi.org/10.2753/IJP0891-1916390303>
- Lucchetta, M. (2007). What do data say about monetary policy, bank liquidity and bank risk taking? *Economic Notes*, 36(2), 189–203. <https://doi.org/10.1111/j.1468-0300.2007.00180.x>
- Manganelli, S., & Wolswijk, G. (2009). What drives spreads in the euro area government bond market? *Economic Policy*, 24(58), 191–240. <https://doi.org/10.1111/j.1468-0327.2009.00220.x>
- Niemann, S. (2011). Dynamic monetary–fiscal interactions and the role of monetary conservatism. *Journal of Monetary Economics*, 58(3), 234–247. <https://doi.org/10.1016/j.jmoneco.2011.03.008>
- Niemann, S., & Pichler, P. (2017). Collateral, liquidity and debt sustainability. *The Economic Journal*, 127(604), 2093–2126. <https://doi.org/10.1111/econj.12384>
- Obeng, S. K., & Sakyi, D. (2017). Macroeconomic determinants of interest rate spreads in Ghana. *African Journal of Economic and Management Studies*, 8(1), 76–88. <https://doi.org/10.1108/AJEMS-12-2015-0143>
- Ott, M., & Tatom, J. A. (2016). Government finance and the demand for money; The relation between taxation and the acceptability of fiat money. *Economic Notes: Review of Banking, Finance and Monetary Economics*, 45(1), 53–77. <https://doi.org/10.1111/ecn.12048>
- Ozturk, I., & Acaravci, A. (2011). Electricity consumption and real GDP causality nexus: Evidence from ARDL bounds testing approach for 11 MENA countries. *Applied Energy*, 88(8), 2885–2892. <https://doi.org/10.1016/j.apenergy.2011.01.065>
- Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels.

- Journal of the American Statistical Association*, 94 (446), 621–634. <https://doi.org/10.1080/01621459.1999.10474156>
- Ramkumar, 2021. RBI may deploy LTRR to mop-up excess liquidity with banks The Hindu BusinessLine . <https://www.thehindubusinessline.com/money-and-banking/rbi-may-deploy-ltrr-to-mop-up-excess-liquidity-with-banks/article35745765.ece> [Accessed on 8-June-2022]
- RBI, 2019. Weekly statistical supplement. <https://www.rbi.org.in/scripts/WSSViewDetail.aspx?TYPE=Section&PARAM1=4%0A> [Accessed: 1 May 2019]
- RBI, 2021a. Business of Scheduled banks in India. [Online] <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications> [Accessed: 1st July 2021]
- RBI, 2021b. Liabilities and assets of scheduled commercial banks of India. <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications> [Accessed: 1 July 2021]
- RBI, 2021c. Maturity profile of select items of liabilities and assets of scheduled commercial banks. <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications> [Accessed: 1 July 2021]
- RBI Database on Indian Economy, 2021a. Centre's gross fiscal deficit and its financing. <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications> [Accessed: 1 July 2021]
- RBI Database on Indian Economy. 2021b. Liquidity operations by RBI. <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications> [Accessed: 1 July 2021]
- RBI Database on Indian Economy, 2021c. Quarterly estimates of gross domestic product at market prices (At Current Prices). <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications> [Accessed: 1 July 2021]
- RBI Database on Indian Economy, (2021dJune). Ratios and Rates. RBI. [Accessed: 1 July] <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications>
- Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *American Economic Review*, 100(2), 573–578. <https://doi.org/10.1257/aer.100.2.573>
- Rossi, S., Borroni, M., Lippi, A., & Piva, M. (2018). Determinants of bank profitability in the Euro area: What has changed during the recent financial crisis? *International Business Research*, 11(5), 18–27. <https://doi.org/10.5539/ibr.v11n5p18>
- Rupee-Dollar Swap Notification, R. B. I. 2019. RBI to inject rupee liquidity through long term USD/INR buy/sell swap auction. <https://rbi docs.rbi.org.in/rdocs/PressRelease/PDFs/PR218426246F849AD94421979E5D84C418460D.PDF> [Accessed: 1 May 2019]
- Saggar, M. (2006). Monetary policy and operations in countries with surplus liquidity. *Economic and Political Weekly*, 41(11), 1041–1052.
- Saxegaard, M. (2006). excess liquidity and effectiveness of monetary policy: Evidence from Sub-Saharan Africa. *IMF Working Papers*, 2006((115), 1–52. <https://doi.org/10.5089/9781451863758.001>.
- Song, S. H. (2005). Liquidity and twin crises. *Economic Notes*, 34(3), 257–277. <https://doi.org/10.1111/j.0391-5026.2005.00151.x>
- Sunde, T. (2017). Foreign direct investment, exports and economic growth: ADRL and causality analysis for South Africa. *Research in International Business and Finance*, 41(c), 434–444. <https://doi.org/10.1016/j.ribaf.2017.04.035>
- Toda, H. Y., & Phillips, P. C. (1994). Vector autoregression and causality: A theoretical overview and simulation study. *Econometric Reviews*, 13(2), 259–285. <https://doi.org/10.1080/07474939408800286>
- Tran, D. V., & McMillan, D. (2020). Funding liquidity and bank lending. *Cogent Economics & Finance*, 8(1), 1–16. <https://doi.org/10.1080/23322039.2020.1734324>
- Von Thadden, E. L. (2000). Liquidity creation through banks and markets: A theoretical perspective on securitization. *Economic Notes*, 29(3), 375–391. <https://doi.org/10.1111/1468-0300.00038>
- Wachter, S. (2014). The market structure of securitisation and the US housing bubble. *National Institute Economic Review*, 230(1), R34–R44. <https://doi.org/10.1177/002795011423000104>
- Wray, L. R. (2009). An alternative view of finance, saving, deficits, and liquidity. *International Journal of Political Economy*, 38(4), 25–43. <https://doi.org/10.2753/IJP0891-1916380402>
- Zhang, C., & Pang, H. (2008). Excess liquidity and inflation dynamics in China: 1997–2007. *China & World Economy*, 16(4), 1–15. <https://doi.org/10.1111/j.1749-124X.2008.00118.x>



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