Estimation of liquidity created by banks in India

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Abstract

Risk transformation and liquidity creation are the two key functions of a bank. Liquidity Creation plays a very important role in the economy, but there is no comprehensive measure of liquidity creation that exists in our country. This study estimates the notional value of liquidity created by Scheduled commercial banks in India during the period 2005 to 2018. We have developed four measures of liquidity creation by Indian Banks, following Berger and Bouwman (2009). We have estimated Liquidity created by Banks in India is Rs.41524096 million in FY 17-18, which is 27.2 percent of total assets of all Scheduled Commercial Banks (excluding Regional Rural Banks), as per broad measure. We found off-balance sheet activities play a significant role in liquidity creation, 25 percent of the total liquidity creation as per broad measure is found to be determined by the off-balance sheet activities. Recently, there have been discussions to privatize the nationalized banks, but our study found that for FY17-18, nationalized banks contributed around 68.2 percent of total liquidity creation whereas private banks and foreign banks contributed 29.7 percent and 2.0 percent, respectively. Nationalized banks are performing quite well in liquidity creation. Though the total number of foreign banks has increased from 31 in 2005 to 45 in 2018, we found a declining trend in creating liquidity by the foreign banks.

We have also estimated liquidity creation based on size. The study finds that large banks are contributing significantly towards the liquidity creation, which constitutes 94% of total liquidity creation as per broad measure.

Keywords-Risk transformation, liquidity creation, Scheduled commercial banks, Off-balance sheet activities

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1. Introduction

Banks are considered to be an engine that drives the economy. They channelize funds from savers to borrowers. There are two pre-eminent functions of banks risk transformation and liquidity creation. The term Liquidity creation was first defined by Diamond and Dybvig (1983) in which it was defined as a process through which banks finance liquid liabilities from illiquid assets. Liquidity is also created through off-balance sheet items like guarantees and loan commitments (Holmstrom and Tirole, 1998, Kashyap, Rajan, and Stein, 2002).

When banks accept deposits and give loans to a borrower, it gives liquid monetary items to depositors as well as borrowers i.e. depositors are offered with the ready availability of their deposits and on the other hand, borrowers are provided with long term availability of cash through loans. In this way, they also transform the maturities of balance sheet items. Maturity transformations are inherent in liquidity creation.

Extensive theoretical studies have been done on Liquidity creation. But there is a dearth of an empirical one. Many studies in banking have focused on quantification of what banks do. In order to measure the output of a bank, they have used conventional measures like gross total assets, loans etc. It was Berger and Bouwman (2009) who developed an empirical measure of liquidity creation which is considered to be a better measure of bank output.

The key role of banks is liquidity creation (Diamond and Rajan 2001, Greenbaum and Thakor 2007).Berger and Sedunov (2017) found liquidity creation is positively related with GDP but there are caveats to this relationship, a high level of liquidity creation might be detrimental for banks and the economy as excess liquidity creation can result in increased probability of financial crisis, asset bubbles etc.(e.g., Acharya, Shin, and Yorulmazer, 2011; Berger and Bouwman, 2017;Acharya and

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Naqvi, 2012).An example of this could be when a bank is pursuing more lending policies, it is creating liquidity but at the same time it is also becoming more fragile and exposing itself to various kinds of risks like liquidity, withdrawals, mismatch of liabilities and assets etc. At the macro level, this process may result in asset bubble which happened in the financial crisis. During that period there was an increase in subprime mortgage lending which increased the prices of real estate, which later on declined and resulted in crisis.

2. Literature Review

Historically liquidity has been gauged by loan to asset ratio, the ratio of cash to total asset or liquid assets to total assets. Not much attention was paid to liquidity creation which is different from liquidity. The first attempt was made by Deep and Schaefer (2004) in which they introduced liquidity transformation (LT) gap which was expressed as (Liquid liabilities -Liquid assets)/total assets. They considered maturity to define liquidity of both assets as well as liabilities. Assets and liabilities within one year were considered to be liquid and off-balance sheet activities were excluded as they are contingent. There measure wasn't comprehensive enough as they did not consider off-balance sheet activities which play an important role in creating liquidity, secondly more than the time period, it's the nature that matters more as there may be some assets which are of longer duration but they are liquid. The second attempt to measure liquidity was by Berger and Bouwman(2009) where they created four different measures of liquidity creation. The estimated liquidity creation from period 1993 to 2003 for U. S banks.They included off-balance sheet items which weren't included in the earlier measure. They classified loans by category as well as maturity as compared to earlier measure which considered the only maturity. Since it's a comprehensive

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measure it has been widely used by various researchers to estimate liquidity creation by banks and understanding it's a relationship with macroeconomic and firm-specific variables.

Steffen,Hackethal, and Tyrell (2010) measured liquidity creation by German Banks and also determined the factors affecting liquidity creation by using multivariate dynamic panel regression and differentiated between macroeconomic factors and firms' specific factors.

Fungáčová and Laurent Weill (2012) estimated liquidity created by banks in Russia by developing three measures. Estimation was done in general, on the basis of ownership, and size. They found state-owned and large banks contributed the most towards liquidity creation.

Sabahat (2017) estimated liquidity created by banks in Pakistan in which four measures of liquidity creation were created. Liquidity created based on size was also estimated. They used a quarterly dataset of balance sheet ranging from June 2007 to June 2016.They estimated Rs.2.55 trillion of liquidity created at the end of June 2016.

Umar, Sun and Majeed (2017) took the data of 136 Indian banks from 2000 to 2014 and found a narrow measure of bank liquidity creation and capital are negatively related (Financial fragility hypothesis) and a broad measure of liquidity creation and capital are not related except in the case of listed banks and banks during pre-crisis. Risk absorption hypothesis held in these two cases

3. Objectives of our Study

Our study endeavours to construct a comprehensive measure of liquidity created by the Indian Banking Industry and estimate the same on the basis of ownership, size and in general. This concept of estimating liquidity creation is relatively new. Most of the studies are confined to developed economies like the US, European countries. There is no study that estimates liquidity created by

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Indian banks in general and also based on ownership and size in particular. The present study addresses the questions like what is the magnitude of the liquidity created by the Indian banking industry, how it has varied over time.

4. Rationale of the Study

Presently, the Indian banking industry is grappling with the Non-performing assets, stressed loans, reduced credit, in the economy. All these factors play a major role in liquidity creation by Banks. In order to know the exact implications of these factors, one should know the liquidity created by Indian Banks. This study focuses on the estimation of liquidity created by the Indian Banking Industry. We have focused on Public, Private, Small finance Banks and Foreign Banks. The amount of liquidity created by each group of above banks is still unanswered. One needs to know which bank group creates maximum liquidity and which destroys the most. In addition to this, we have also estimated liquidity created based on size by dividing banks into large, medium and small banks to study the implications of size in liquidity creation.

5. Methodology

5.1 Indian construct of liquidity creation

Our first objective is to create a comprehensive measure of Liquidity created by Indian Banking industry. There has been abundant theoretical research done on banks central role as liquidity creator but not much work has been done empirically. We have computed four measures of liquidity creation following Berger and Bouwman (2009). There are three steps for estimating liquidity creation. It begins with the classification of all the bank's liabilities, equity, assets and off-balance sheet activities into liquid, semi-liquid, or illiquid depending on how easily they are

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converted into cash. In the next step, depending upon the category the weights are assigned, for example liquid liabilities and illiquid assets are multiplied by 0.5; liquid assets and illiquid liabilities (including equity) by -0.5, and semi-liquid liabilities and assets are multiplied by 0 as we cannot distinctly categorize them. Liquidity creation theory states a bank is said to have created liquidity when illiquid assets are converted into liquid liabilities or vice versa so when a bank takes savings deposits (liquid liabilities) to fund a loan (illiquid assets), it creates liquidity on both asset as well as liability side. Similarly, if a bank holds liquid assets such as cash, it extracts liquidity from the market because cash cannot be used by economic agents, hence negative sign is given. We use weights of 0.5, 0, -0.5 so that maximum liquidity created or destroyed is unity. In the final step, all the activities are combined which were classified in the first step and weighted in the second step as shown in equation (1)

Liquidity Creation = (0.5 * illiquid assets + 0 ∗semi-liquid assets -0.5 * liquid assets) + (0.5 ∗ liquid liabilities +0 ∗semi-liquid liabilities −0.5 ∗ illiquid liabilities) − 0.5 ∗ equity + (0.5 * illiquid guarantees +−0.5 ∗ liquid guarantees) (1)

The right-hand side of the above equation differs depending on the measure used. Four measures of liquidity creation were developed based on the loan classification and inclusion/exclusion of off-balance sheet items. They were known as “Catfat”, “Catnonfat”, “Matfat” and “Matnonfat”. All bank activities other than loan were classified based on category as well as maturity. But when it comes to loans, two categories were created; in the first category i.e. “Cat”, loans were classified by product category and in the second i.e. “Mat”, loans were classified by maturity. The reason for doing this was it is very difficult to get information on both maturity as well as category simultaneously in the case of loans. Hence loans greater than one year were considered illiquid

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loans and less than one year as semi-liquid loans. Activities other than loan were classified based on both products as well as maturity in both the category. When off-balance sheet activities were included “fat” was added as a suffix and when they were excluded it was called "nonfat”. Table 1 gives a snapshot of the above four measures. Catfat is the preferred measure as it includes both on balance sheet as well as off-balance sheet activities. It is also called a broad measure of liquidity creation whereas Catnonfat is called a narrow measure.

For the Catfat measure of liquidity creation we have divided balance sheet activities as follows;

Liabilities and Equity

Capital is considered to be illiquid because funds cannot be demanded by investors from the bank. Although they can sell their shares in the secondary market when we consider from the banks point of view funds cannot be retrieved from banks. Hence liquidity is created by financial markets rather than a bank. As a result, they are considered as **illiquid liabilities.** Similarly, Reserves and Surplus are also considered **illiquid liabilities**.

Demand Deposits and savings deposits are repayable on demand. They are classified under **liquid liabilities.** Term deposits are classified as **semi-liquid liabilities** as there are penalties involved when one wants to withdraw funds. There is no differentiation done between short term and long-term deposits because the penalty is imposed irrespective of maturity.

Borrowings in the form of capital instruments like innovative perpetual Debt Instruments and Subordinated Debt instruments are considered to be **illiquid liabilities** because these are long term liabilities which cannot be withdrawn quickly. Borrowings from Reserve Bank of India and Other banks are considered to be **semi-liquid liabilities.**

Borrowing from outside India is in the form of capital instruments like innovative perpetual debt, bonds and notes which are of illiquid nature. Hence, they are treated as **illiquid liabilities.**

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Bills payable includes items like drafts, pay slip, travellers' cheque, electronic mail transfer, and drafts etc. which are relatively of liquid in nature. Bills payable are treated as **liquid liabilities.** Other liabilities and provisions which include items like deferred tax liabilities, provisions are treated as **illiquid Liabilities.**

Assets

Cash and balances with Reserve Bank of India are treated as **liquid assets** as it comprises of cash in hand, gold, foreign currencies and balances with RBI in the form of current account.

Balances with banks and money at call and short notices are treated as **semi-liquid assets**. It includes funds which banks provide to other financial institution at interbank rates. Parties involved in transactions are large and transparent.

As per RBI Guidelines, Investments are categorized into three groups which are held to Maturity, available for sale, and held for trading as per RBI Guidelines. They are also categorized as (a) government securities, (b) other approved securities, (c) shares, (d) bonds and debentures, (e) investments in subsidiaries (f) others (Units of Mutual Funds, Commercial Papers etc.).

Investments in subsidiaries, joint venture and associates are classified as Held to Maturity. They are treated as **illiquid Assets**. All investments other than Investments in subsidiaries, joint venture and associates are treated as **liquid assets.**

Our approach is slightly different from that of Berger and Bouwman (2009) when we talk about Loans and advances. They treated business loans as illiquid assets and residential loans as semi-liquid assets because residential loans are easier to securitize as compared to business loans. We have treated both types of loans as illiquid assets because there are differences in levels of capital

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market development of developed and developing countries which make it easier or harder to securitize bank assets (Berger, Boubakri, Guedhami, & Li (2017)). They did their study in the U.S which is a developed nation where there is more acceptance and usage of securitization as compared to developing nation like India. Hence, we have treated all the loans and advances as illiquid except Loans and advances are given to bank and public sector. They are treated as **semi-liquid assets** as counterparties are large and informationally transparent and very less likely to default. Other than these we have treated all the loans as **illiquid asset**s which includes items like Loans and advances to Priority Sector, Other loans etc.

Fixed Assets are considered to be **illiquid assets.** Other assets include items like deferred tax assets, interest accrued etc. are also treated as **illiquid assets.**

Off-balance Sheet activities

Acceptances, endorsements and other obligations and Guarantees have been treated as illiquid Guarantees as they function similarly to loans i.e. banks must provide funds to the customer when an obligation arises and they cannot be sold or participated easily. Guarantees are irrevocable. Hence similar to **illiquid assets** they are given the weight of ½.

Liabilities for partly paid investments/ Venture Funds are treated as **liquid assets**.

Other items for which the Bank is contingently liable includes items like claims against the bank not acknowledged as debts which contain demand against the bank on legal and tax matters, are treated as **illiquid**.

We have excluded derivatives in off-balance activities. There are also no seminal papers that talk about the role of derivatives in liquidity creation function of banks. Table 2 summarizes our construct used for estimating liquidity created.

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Indian Banking industry is administered by the Banking Regulation Act of India, 1949. Banks are generally categorized into two groups, Scheduled banks and Non-scheduled banks.

Scheduled Commercial Banks are further divided into five categories which are Public sector Banks, Private Sector Banks, Foreign Banks, Small finance banks and Regional Rural Banks. They have been formed according to the pattern of nature of operation and ownership.

6. Data source and methodology

This study exclusively focuses on secondary data. Our sample includes annual data from 2005 to 2018 of Public, SBI and its associates, Private, Foreign Banks and Small Finance Banks. We have excluded Regional Rural Banks due to data availability issues. Data related to liabilities and assets of banks have been extracted data from RBI's database on Indian economy. Off-balance sheet activities have been taken from Capitaline and ProwessIQ. Our dataset includes 119 banks and 1213 bank-year observations. We have estimated liquidity created based on the group of banks mentioned above. We have also divided our sample based on total assets i.e. top 30 percent (70th percentile) were categorized as large banks, the bottom 30 percent (30th percentile) were small banks and rest40percentwere put into medium banks category. In this way, we estimated liquidity creation by large, small and medium banks.

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7. Results

This section is divided into three parts. The first part is devoted to general results of all the banks, in the second section we will be discussing our results based on ownership and in the last section, the estimation will be based on group size.

7.1 General results

This section will measure how much liquidity is created by Indian Banks in the observation period and how it has varied. We have divided liquidity creation (in Rs.) by total assets and total equity. By normalizing the data, it helps in comparing the liquidity creation of various banks and avoids giving excessive weights to large banks.

Panel F of Table 3 gives the summary of liquidity created in total by Scheduled Commercial Banks from 2005 to 2018 for all the four measure of liquidity creation. According to the Catfat measure liquidity created has increased from Rs.5349636 million as on 31st March 2005 to Rs.41524096 million as on 31st March 2018.According to Catnonfat measure i.e. when we exclude off-balance sheet activities, liquidity created as on 31stMarch 2005 is Rs.2173709million and Rs.31247709 million as on 31st March 2018.Initially, in 2005, off-balance sheet activities contributed around 60 percent of total liquidity creation and now their share has decreased to 25 percent. Moving towards Matfat liquidity creation measure, it is less than Catfat liquidity creation measure in contrary to the results of Berger and Bouwman (2009), in their case liquidity creation was highest using Matfat measure. The reason for the same is they took residential mortgage as semi-liquid assets and we haven't taken that classification, we have treated the majority of our loans and advances as illiquid which carry positive weight of ½, this increases our liquidity creation measure as per Catfat in comparison to Matfat where loans and advances less than a year are treated as semi-liquid where 0

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weightage is given. Otherwise, Matfat and Catfat shows similar patterns. Matnonfat also resembles the pattern of Catnonfat measure of liquidity creation.

We can further observe that liquidity creation as per Catfat measure increased considerably in the year 2008 whereas Catnonfat increased in a smaller quantity which indicates there was an increase in off-balance sheet liquidity creation which constituted 72 percent of total liquidity creation (Source-Author). As on 31st March 2018 liquidity creation is equal to 27.2 percent of total assets and Rs. 3.5 liquidity is created per Rs 1 of total equity as per the Catfat liquidity creation measure.

6.1 Results by Ownership

We have discussed the overall liquidity created by banks. It's very important to analyze group wise estimation of liquidity created and their components. Based on data provided by RBI we have formed five groups i.e. Foreign Banks, Private Banks, Nationalized Banks, SBI and its associates and Small Finance Banks. It will give us more insights into liquidity creation and how the characteristics affect it.

If we look at a graph of nationalized banks in panel A of Table 3, we will see that both Catnonfat and Catfat have been increasing over time. As on 31st March 2018, liquidity created by nationalized banks as per Catfat measure is 29.2 percent of total assets and 23.2 percent of total assets as per Catnonfat measure. If we have a look at table 4 and 5, we will see the composition of Catfat and Catnonfat measure of liquidity creation by each group. From table 5, we can see they contribute 46.3 percent to total liquidity creation as on 31st March 2018 which has increased in comparison to 38.3 percent in 2005.

From table 5 we can see SBI and its associates were contributing around 23.6 percent to total liquidity creation in the year 2017 as per Catfat measure but after merger, their share has declined to

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21.9 percent in the year 2018.There has been a slight decrease in off-balance sheet activities during the process of merger and post-merger as well. It will be interesting to see the impact of the merger on Liquidity creation in long run. Both Nationalized banks and SBI contributes more through on balance sheet activities as compared to off-balance sheet activities which can be seen from table 4 it is 48.9 percent and 23.1 percent as per Catnonfat measure and 46.3 percent and 21.9 percent as per Catfat measure as on 31st March 2018 in table 5.

Panel C in table 3 shows Private banks are contributing 28.7 percent and 20.9 percent as per Catfat and Catnonfat respectively as on 31st March 2018 but if you compare these ratios with the year 2005 it was 37.4 percent and 9.6 percent respectively which shows the exposure of Private Banks in off-balance sheet activities was very high initially. But now it has decreased which can be validated from table 4and 5, Private banks are contributing around 29.7 percent and 28.7 percent to liquidity creation as per Catfat and Catnonfat measure respectively which was earlier 29.9 percent and 18.8 percent in the year 2005.

Panel D in table 5, shows the liquidity creation by Foreign Banks. As on 31stMarch 2018 liquidity created by foreign Banks as per Catfat measure is Rs. 842579 million which is 9.7 percent of total assets and Rs 0.5 per Rs.1 of total equity. But if we consider Catnonfat measure, foreign banks are creating liquidity negatively i.e. Rs. (272695) million. As per Berger and Bouwman (2009) Catfat is the best measure of liquidity creation but in this case, looking at Catfat measure can be misleading. As on 31st March 2018, the amount of total assets of foreign banks is Rs.8675740 million, total equity is Rs.1561877 million and total contingent liabilities are Rs.86889246 million (STRBI, 2018). Contingent liabilities are 10 times of total assets and 55.6 times of total equity. Foreign banks have a disproportionate amount of contingent liability. It is almost 50 percent of the total contingent liability of all scheduled banks as on 31st March 2018.Usually, foreign banks have a

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small share in total deposits and advances, as a result, they earn from guarantees, letter of credit etc. Foreign banks are creating liquidity through off-balance sheet activities but the proportion is too high as we can see from the difference between Catfat and Catnonfat measure of liquidity creation. Theoretically, if all contingent liabilities crystallized into an actual liability, total assets of foreign banks won't be sufficient to meet the liabilities. In 2005, according to Catnonfat measure, foreign banks were creating liquidity positively but it started declining from the year 2008 and in the year 2009 liquidity creation was negative and it has continued to be so .In the year 2008, liquidity created as per Catfat increased by a huge amount , the reason behind this was an increase in Off-balance sheet activities as they rose by 101.98% (STRBI,2018).In the year 2009, both Catfat and catnon fat declined which suggest foreign banks were affected by financial crisis, there liquidity creation pattern was quite volatile especially through off-balance sheet activities.

From Panel E in table 3 we can see in the year 2017, Small finance banks were negatively creating liquidity as per all the measure. With an increase in a number of banks from two to six they have started creating liquidity positively which is 6 percent of total assets and Rs.0.4 per Rs.1 of total equity. They are relatively new, we can't comment much on them but it will be interesting to see how they will perform in the future. The share of nationalized banks has been the largest as per both the measure of liquidity creation and after the merger of SBI and its associates, RBI has clubbed SBI into the Nationalized bank category which has increased the share of nationalized banks to 68.2 percent and 72 percent as per Catfat and Catnonfat respectively.

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6.2 Results by size

We have estimated liquidity created by small, medium and large banks. We have divided them based on total assets. Top 30 percent (70^{th} percentile), the bottom 30 percent (30^{th} percentile) and middle 40 percent. Such classification helps to find whether liquidity creation varies with size.

Panel A, B, C of table 6 show us the liquidity created by small banks, medium banks and large banks respectively. As on 31st March 2018, we can see small banks are negatively creating liquidity as per all the measures. Table 7 and 8 shows us the composition of liquidity created based on size as per Catnonfat and Catfat respectively. As far as Catnonfat measure is concerned 94.6 percent of on-balance sheet liquidity is created by large banks, 5.7 percent by medium banks and -0.2 percent by small banks. If we have a look at the graphs in panel A, liquidity created by large banks as per all the measures is increasing this can be substantiated from table 8 as well, liquidity created by large banks was 78.1 percent in the year 2005 and presently it has increased to 93.5 percent as per catfat measure whereas the share of medium and small bank has declined to 6.7 percent and -0.10 percent respectively which was 21.1 percent and 0.8 percent in the year 2005.From table 6 we can see large banks are creating 28.4 percent liquidity as a percentage of total assets, whereas medium banks are creating 18.1 percent as on 31st March 2018 but if we compare these ratios with the ones in 2005 it was 20.9 percent for large banks and 32.5 percent for medium banks .

Berger and Bouwman (2009) found large banks contributed around 81 percent towards total liquidity creation in U.S. Size has implications for liquidity creation as there are significant differences seen among the group. Balance sheet size of top banks is very huge, for example as on 31st March 2018; the total assets of HDFC (Rs.10639343 million) are greater than of total foreign banks (Rs.8675740 million).

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8. Conclusion

Risk transformation and liquidity creation are the two main functions of the bank. Considering an important role liquidity creation plays in an economy, there is no comprehensive measure of liquidity creation that exists in our country. This paper attempts to estimate liquidity creation by banks in India. We have estimated liquidity created using four different measures following Berger and Bouwman (2009) from the year 2005 to 2018.We have estimated as on 31st March 2018, Rs. 41524096 million liquidity is created which is 27.2 percent of total assets as per Catfat measure. We also divided banks based on ownership and size.

Recently, there have been discussions to privatize the nationalized banks, but our study found that for FY17-18, nationalized banks contributed around 68.2 percent of total liquidity creation whereas private banks and foreign banks contributed 29.7 percent and 2.0 percent, respectively. Nationalized banks are performing quite well in liquidity creation. Though the total number of foreign banks has increased from 31 in 2005 to 45 in 2018, we found a declining trend in creating liquidity by the foreign banks.

Other interesting insight we got from our study was about the position of banks in contingent liabilities. Though there has been a decline in the share of contingent liabilities in Nationalized and Private Banks, but it is quite high in the case of foreign banks. Foreign banks hold a considerable amount of positions in contingent liabilities. Recent frauds have resulted in crystallizing of contingent liabilities which has affected the corpus and valuations of banks negatively. Berger and Bouwman (2015) also found that excessive liquidity creation by U.S banks was associated with the financial crisis, where off-balance sheet activities had played a major role. A comprehensive liquidity creation measure as developed in our study will help

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policy makers and various banks executives to predict the likelihood of bank failure and financial crisis.

We also noticed that the size of bank affects the liquidity creation. Large banks contributed the most towards liquidity creation whereas small banks had a slightly negative contribution towards liquidity creation.

We did not find any significant change in the liquidity creation patterns of nationalized and private banks during the period of financial crisis whereas foreign banks were quite volatile during that period.

9. Implications for policy makers

While monitoring various financial firms and anticipating their risk of failure, factors like adequacy of capital, asset quality, leverage ratio, earnings etc. are considered. We propose liquidity creation measure developed in this study should also be considered while evaluating firms. For example, if a bank is creating liquidity in excess as compared to its counterparts, it is becoming riskier. Thus, it becomes imperative to monitor liquidity creation of a bank. At the macro level, in situations like overheating of the economy, it will be prudent for banks to cut back on liquidity creation as it might be aggravating the situation. Hence, monitoring the liquidity creation will help policy makers to predict risk taking ability of a bank and to suggest the optimal level of liquidity the bank should create. It will also act as a benchmarking exercise for individual banks against own past liquidity creation.

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10. Scope for future research

Since we have estimated liquidity created by banks, it will now be possible to explore different factors affecting liquidity creation like GDP, Inflation, exchange rates etc. The Indian banking industry is currently burdened with stressed assets; NPAs. It will also be interesting to see how all these factors affect liquidity creation. One can estimate the optimal amount of liquidity an individual bank should create considering various types of risks and economic condition.Both of the scenarios i.e. excess liquidity creation and creation of less liquidity have repercussions for the economy. Thus, it is imperative to measure liquidity created by the banks

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Further reading

"Statistical tables relating to banks in India", available at:
https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!4

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Table 1**. Types of measures of liquidity creation**

Loans classification	Off-balance sheet activities included	Off-balance sheet activities excluded
By Category	Catfat	Catnonfat
By Maturity	Matfat	Matnonfat

Table 2. Bank liquidity Creation Construct

Step 1 Classification of banks activities based on liquidity **Step 2 Assigning weights (0, 1/2, -1/2) according to their contribution in liquidity creation process**		
Assets		
Illiquid assets (weight = 1/2)	Semi liquid assets (weight = 0)	Liquid assets (weight = -1/2)
Premises Other Fixed assets Capital work in progress Other assets Investments in subsidiaries/associate companies Loans to Priority Sector Other loans	Interbank assets Loans and Advances to public sector Loans and Advances to bank	Cash in hand Balance with RBI All investments excluding Investment in subsidiaries /Associate companies

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Liabilities and equity		
Liquid liabilities (weight = 1/2)	Semi liquid liabilities (weight=0)	Illiquid Liabilities (weight = -1/2)
Demand Deposits Savings Bank Deposits Bills Payable	Term Deposits Borrowings from RBI Borrowings from other banks	Subordinated Debt Perpetual Debt instruments Borrowings from other institution and agencies Other Borrowings Other liabilities and Provisions Equity Reserves and Surplus
Off-Balance Sheet Activities		
Illiquid guarantees (weight = 1/2)	Semi Liquid guarantees (weight=0)	Liquid guarantees (weight = -1/2)
Guarantees on behalf of Constituents Acceptances, Endorsements and other obligations Claims not acknowledged as debt Other contingent liabilities		Liability for partly paid investments
Step 3 Combining of activities by using step 1 and 2 according to the liquidity creation measure.		

Source-Authors

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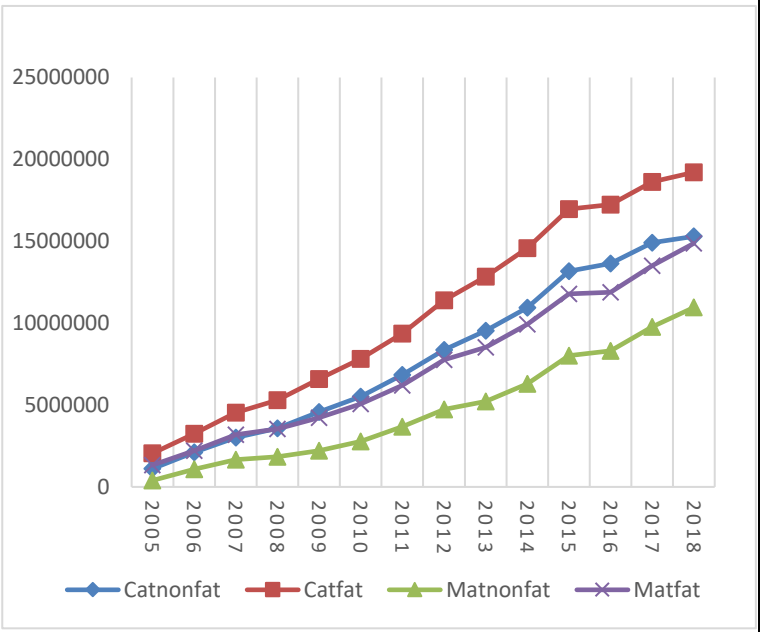
Table 3. Estimation of liquidity created based on ownership and in total

NATIONALIZED BANKS

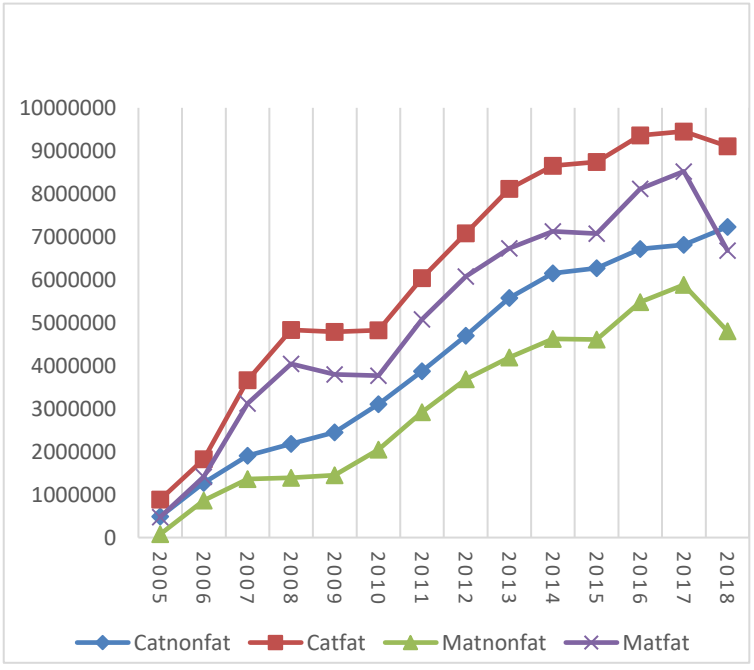
Year	2005	2018
N	20	20
Catnonfat	1111630	15296839
Catfat	2048302	19211306
Matnonfat	394412.4	10958031
Matfat	1331085	14872498
Catnonfat/TA	9.7%	23.2%
Catfat/TA	17.9%	29.2%
Matnonfat/TA	3.4%	16.7%
Matfat/TA	11.6%	22.6%
Catnonfat/TE	1.7	4.1
Catfat/TE	3.1	5.2
Matnonfat/TE	0.6	3.0
Matfat/TE	2.0	4.0



Panel A

STATE BANK AND ITS ASSOCIATES

Year	2005	2018
N	8	1
Catnonfat	487302	7229548
Catfat	886278	9107173
Matnonfat	79012	4803145
Matfat	477988	6680769
Catnonfat/TA	7.8%	20.9%
Catfat/TA	14.1%	26.4%
Matnonfat/TA	1.3%	13.9%
Matfat/TA	7.6%	19.3%
Catnonfat/TE	1.5	3.3
Catfat/TE	2.7	4.2
Matnonfat/TE	0.2	2.2
Matfat/TE	1.5	3.0



Panel B

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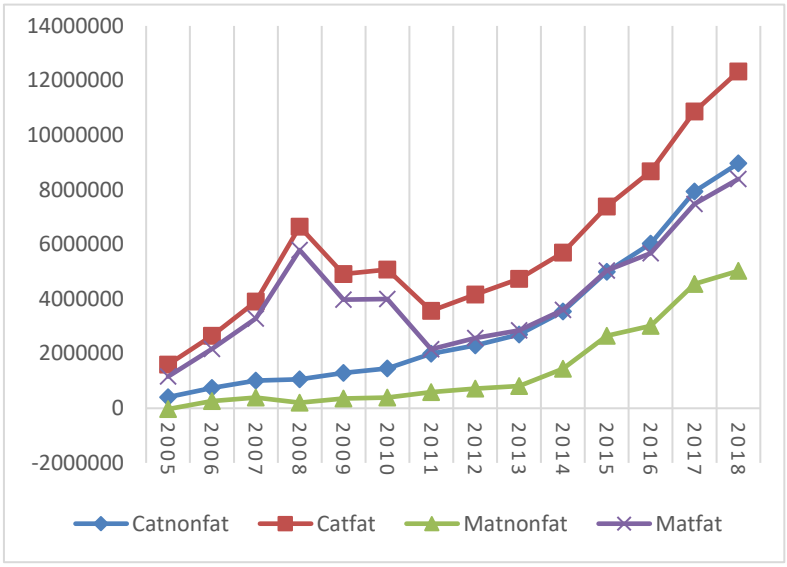
Table 3 continued

PRIVATE SECTOR BANK

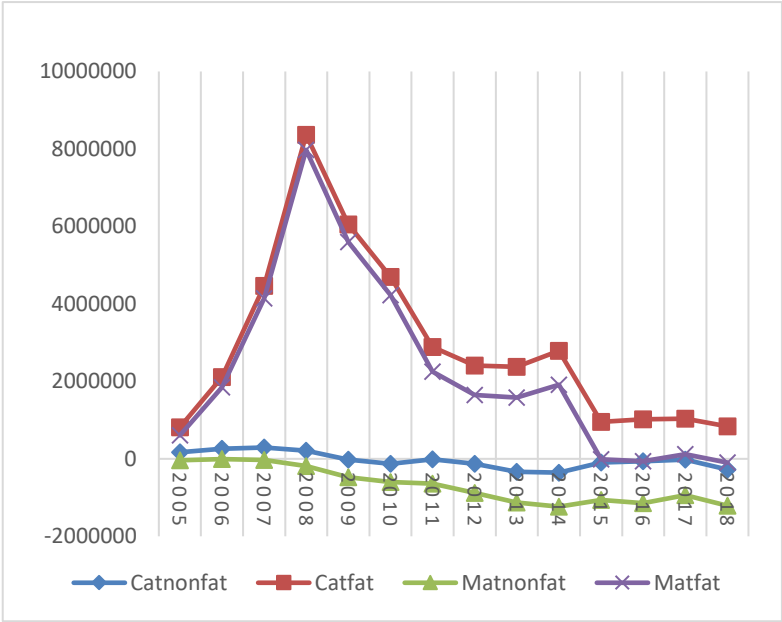
Year	2005	2018
number	29	21
Catnonfat	408964	8966542
Catfat	1599010	12332064
Matnonfat	-30198	5029233
Matfat	1159848	8394755
Catnonfat/TA	9.6%	20.9%
Catfat/TA	37.4%	28.7%
Matnonfat/TA	-0.7%	11.7%
Matfat/TA	27.1%	19.5%
Catnonfat/TE	1.3	2.0
Catfat/TE	5.2	2.8
Matnonfat/TE	-0.1	1.1
Matfat/TE	3.8	1.9



Panel C

FOREIGN BANKS

Year	**2005**	**2018**
N	31	45
Catnonfat	165813	-272695
Catfat	816046	842579
Matnonfat	-38951	-1212741
Matfat	611282	-97468
Catnonfat/TA	10.8%	-3.1%
Catfat/TA	53.1%	9.7%
Matnonfat/TA	-2.5%	-14.0%
Matfat/TA	39.8%	-1.1%
Catnonfat/TE	0.9	-0.2
Catfat/TE	4.3	0.5
Matnonfat/TE	-0.2	-0.8
Matfat/TE	3.2	-0.1



Panel D

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Table 3 Continued

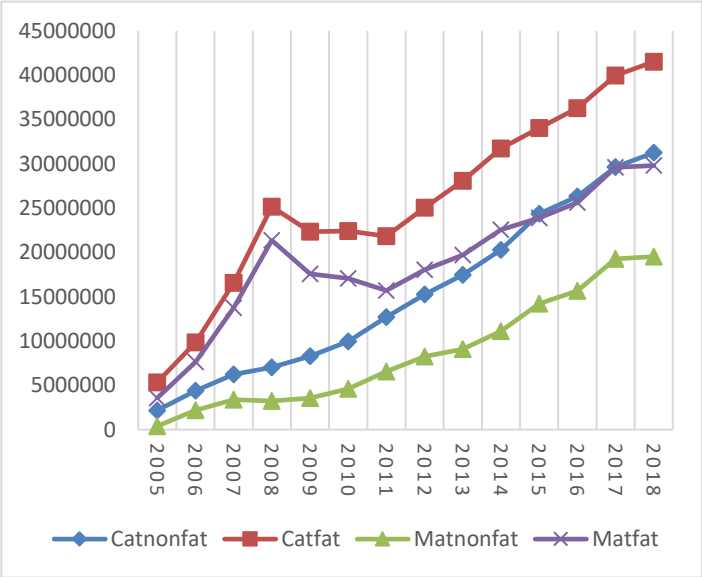
SMALL FINANCE BANKS

Year	2017	2018
N	2	6
Catnonfat	-4452	27473
Catfat	-4094	30974
Matnonfat	-21098	-46699
Matfat	-20740	-43199
Catnonfat/TA	-3.7%	5.3%
Catfat/TA	-3.4%	6.0%
Matnonfat/TA	-17.6%	-9.0%
Matfat/TA	-17.3%	-8.4%
Catnonfat/TE	-0.2	0.4
Catfat/TE	-0.2	0.4
Matnonfat/TE	-1.0	-0.7
Matfat/TE	-0.9	-0.6

Panel E

TOTAL SCHEDULED BANKS

Year	2005	2018
N	88	93
Catnonfat	2173709	31247709
Catfat	5349636	41524096
Matnonfat	404275	19530969
Matfat	3580203	29807357
Catnonfat/TA	9.2%	20.5%
Catfat/TA	22.7%	27.2%
Matnonfat/TA	1.7%	12.8%
Matfat/TA	15.2%	19.5%
Catnonfat/TE	1.5	2.6
Catfat/TE	3.6	3.5
Matnonfat/TE	0.3	1.6
Matfat/TE	2.4	2.5



Panel F

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Table 4. Composition of Catnonfat measure of liquidity creation based on ownership

Year	Nationalized Banks	SBI and its associates	Private Banks	Foreign Banks	Small Finance Banks
2005	51.14	22.42	18.81	7.63	
2006	48.35	28.93	16.84	5.89	
2007	48.45	30.61	16.24	4.70	
2008	51.00	31.02	14.99	2.99	
2009	55.15	29.43	15.62	-0.20	
2010	55.43	31.18	14.71	-1.32	
2011	53.83	30.51	15.73	-0.07	
2012	54.92	30.80	15.13	-0.84	
2013	54.58	31.90	15.46	-1.93	
2014	53.98	30.30	17.48	-1.75	
2015	54.12	25.75	20.53	-0.39	
2016	51.83	25.52	22.89	-0.24	
2017	50.31	22.98	26.78	-0.06	-0.02
2018	48.95	23.14	28.70	-0.87	0.09

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Table 5. Composition of Catfat measure of liquidity creation based on ownership

Year	Nationalized Banks	SBI and its associates	Private Banks	Foreign Banks	Small Finance Banks
2005	38.29	16.57	29.89	15.25	
2006	33.04	18.52	26.99	21.45	
2007	27.41	22.09	23.59	26.91	
2008	21.08	19.21	26.43	33.28	
2009	29.48	21.44	22.00	27.08	
2010	34.88	21.52	22.65	20.94	
2011	42.84	27.62	16.33	13.21	
2012	45.50	28.27	16.63	9.60	
2013	45.74	28.91	16.89	8.46	
2014	45.97	27.27	17.98	8.78	
2015	49.82	25.67	21.70	2.81	
2016	47.50	25.79	23.92	2.80	
2017	46.59	23.64	27.17	2.60	-0.01
2018	46.27	21.93	29.70	2.03	0.07

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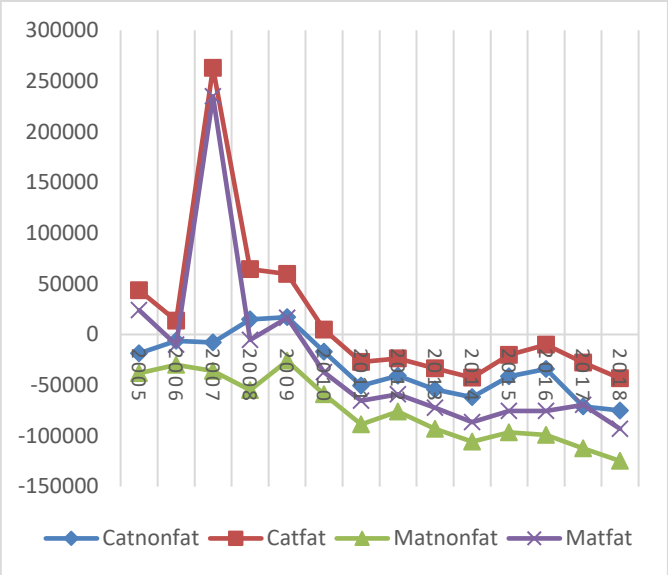
Table 6. Estimation of liquidity created based on size

SMALL BANKS

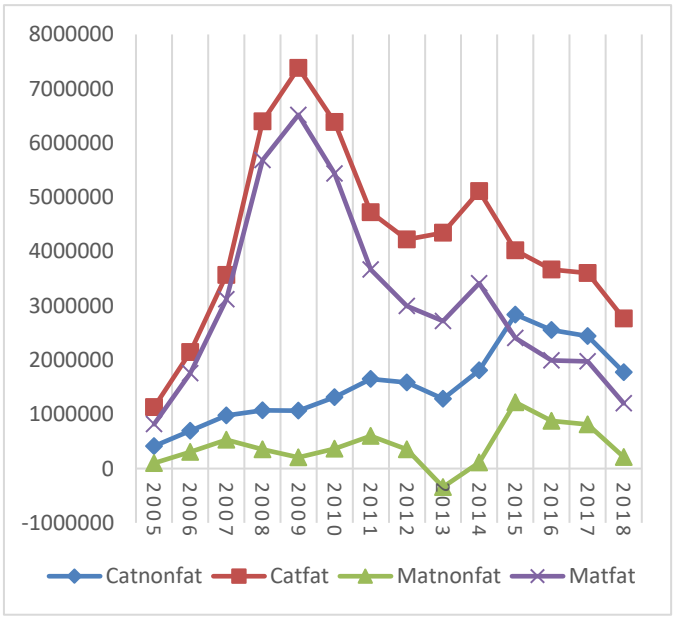
Year	2005	2018
Catnonfat	-18477	-74982
Catfat	43623	-43349
Matnonfat	-38149	-124719
Matfat	23951	-93086
Catnonfat/TA	-10.5%	-17.7%
Catfat/TA	24.7%	-10.2%
Matnonfat/TA	-21.6%	-29.4%
Matfat/TA	13.5%	-21.9%
Catnonfat/TE	-0.42	-0.54
Catfat/TE	0.99	-0.31
Matnonfat/TE	-0.87	-0.90
Matfat/TE	0.55	-0.67



Panel A

MEDIUM BANKS

Year	2005	2018
Catnonfat	413087	1776760
Catfat	1130731	2764461
Matnonfat	99803	214354
Matfat	817447	1202056
Catnonfat/TA	11.9%	11.6%
Catfat/TA	32.5%	18.1%
Matnonfat/TA	2.9%	1.4%
Matfat/TA	23.5%	7.9%
Catnonfat/TE	1.70	1.01
Catfat/TE	4.67	1.57
Matnonfat/TE	0.41	0.12
Matfat/TE	3.37	0.68



Panel B

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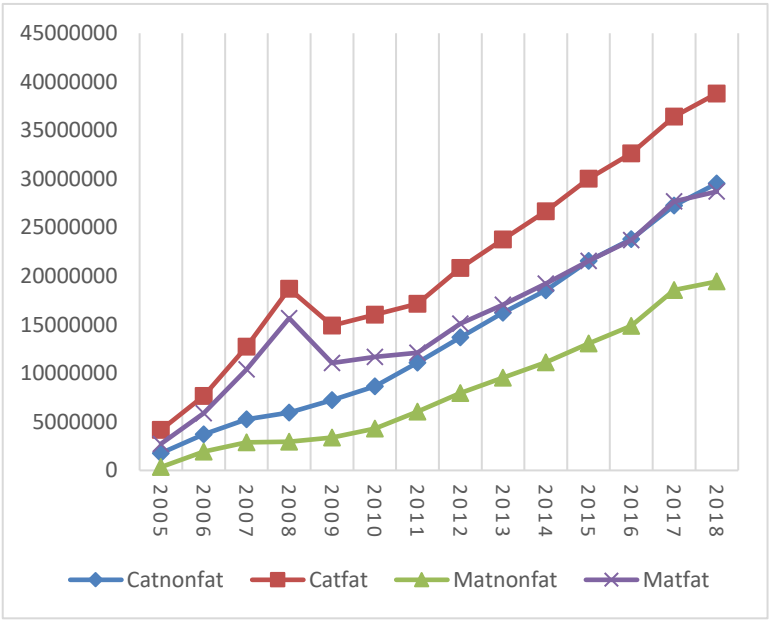
Table 6 Continued

LARGE BANKS

Year	2005	2018
Catnonfat	1779099	29545931
Catfat	4175282	38802985
Matnonfat	342621	19441333
Matfat	2738805	28698387
Catnonfat/TA	8.9%	21.6%
Catfat/TA	20.9%	28.4%
Matnonfat/TA	1.7%	14.2%
Matfat/TA	13.8%	20.9%
Catnonfat/TE	1.47	2.94
Catfat/TE	3.45	3.86
Matnonfat/TE	0.28	1.93
Matfat/TE	2.26	2.85



Panel C

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Table 7. Composition of Catnonfat measure of liquidity creation based on size

Year	Small	Medium	large
2005	-0.85	19.00	81.85
2006	-0.15	15.85	84.30
2007	-0.13	15.74	84.39
2008	0.21	15.21	84.59
2009	0.21	12.86	86.93
2010	-0.17	13.21	86.96
2011	-0.40	13.02	87.38
2012	-0.27	10.41	89.86
2013	-0.31	7.36	92.95
2014	-0.31	8.91	91.40
2015	-0.17	11.65	88.52
2016	-0.13	9.70	90.43
2017	-0.24	8.24	92.00
2018	-0.24	5.69	94.55

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Table 8. Composition of Catnonfat measure of liquidity creation based on size

Year	Small	Medium	Large
2005	0.82	21.14	78.05
2006	0.14	21.82	78.04
2007	1.59	21.51	76.90
2008	0.26	25.44	74.31
2009	0.27	33.05	66.69
2010	0.02	28.50	71.48
2011	-0.12	21.60	78.53
2012	-0.09	16.86	83.23
2013	-0.12	15.47	84.64
2014	-0.13	16.11	84.03
2015	-0.06	11.82	88.24
2016	-0.03	10.11	89.92
2017	-0.07	9.01	91.06
2018	-0.10	6.66	93.45