

**Macro Research Report submitted to
Indian Institute of Banking & Finance for the Year 2017-18
Titled:**

Shadow banking in India: Do bank run Asset Management Companies (AMCs) perform liquidity transformation through exposure to Non-Banking Finance Companies (NBFC) in their debt oriented schemes and will this increase the systemic risk of a bank due to a possible joint exposure to NBFCs?

Principal Investigator: Jaslene Bawa¹.

Co-Investigator: Sankarshan Basu²

Co-Investigator: Asish Saha³.

¹ Assistant Professor, Finance and Accounting, FLAME University, Pune. E-mail: Jaslene.bawa@flame.edu.in, Mobile: 8349501141

² Professor, Finance and Accounting, Indian Institute of Management, Bangalore, E-mail: sankarshan.basu@iimb.ac.in

³ Professor, Finance and Accounting, FLAME University, Pune, E-mail: asish.saha@flame.edu.in

Research Report Abstract:

This research studies the joint exposure that Indian banks face through their balance sheet i.e. direct lending, investment and their off-balance sheet i.e. stand by letter of credit (SBLC) issued on behalf of Indian Non-banking finance companies (NBFC) for their commercial paper and an indirect exposure to the same NBFC through its asset management arms. Using data from Reserve Bank of India, Micro Finance Institutions Network, monthly portfolio disclosure of asset management companies' and annual reports of NBFCs and banks during the period 2012 to 2018, Ministry of Corporate Affairs (MCA) index charges, company shelf prospectus the paper tries to address three questions: first, whether a joint exposure exists to a particular NBFC at a bank level and at the banks' mutual fund arm level; second, whether asset management arms of these banks function as shadow banks and undertake liquidity transformation through investing in NBFC floated debentures and commercial paper and how this adds to the joint exposure of the Indian banks; and third whether the banks financial interdependency with these financial institutions such as NBFCs and mutual funds affects the overall systemic risk. The paper uses the Bai – Perron (1998) model with multiple structural breaks for assessing the liquidity transformation in debt schemes and the Diebold – Yilmaz (2009, 2012 and 2014) models to estimate the return spill-over effect (financial interdependency)⁴.

⁴ We thank Mr. Rohit Goel, Research Officer in the International Monetary Fund (IMF) Monetary and Capital Markets Department for his help with the financial interdependency portion of this report. e-mail: rgoel@imf.org

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1. Introduction:

This study begins with describing how the global financial markets suffered due to the sub-prime crisis in 2007-08 as a number of financial institutions (such as mutual funds) had an exposure to debt instruments that were backed by poor quality mortgage assets. These financial institutions had undertaken maturity and liquidity transformation similar to a traditional bank. These institutions were suggested to have functioned like a “shadow bank”. These shadow banking activities went undetected under the regulatory framework that generated a fall out. This created a very high systemic risk for the whole financial system. Although shadow banking is highly pervasive in the developed countries such as U.S. and Europe, also it is extremely prevalent in the emerging economies since these economies have a large population that has no access to traditional banking. In an emerging economy like India shadow banks function in the form of Non-banking Finance Companies (NBFCs) and they lend to corporate and retail borrowers with a reasonable credit history function (Acharya et.al, 2013).

These NBFCs act as a complement to the traditional banking system. However, they aren't regulated as closely as Indian banks. Over the recent past, the loan book growth of these NBFCs has outperformed the Indian banks loan book growth. This NBFC loan book growth is mostly funded through bank loans and asset management companies (AMC). Owing to the slowdown in the banking sector due to high levels of non-performing assets, the banks' loan disbursement to NBFCs had reduced and the NBFC funding reliance shifted to increased borrowing from AMC (through investment in NBFC floated commercial papers and debentures) mostly through commercial paper.

More than 50% of the Net Asset Value (NAV) of AMCs debt oriented schemes have an exposure to NBFC floated securities (commercial paper, securitization and debentures). A striking feature of the top most AMCs that contribute nearly 50% of the assets under management in the industry is that a large part of them are bank run or financial institution run. This brings us to the point where banks

undertake a dual exposure to NBFCs through 1) Direct lending and investment 2) Investment through AMC held portfolio.

The Reserve bank of India (RBI) duly monitors the NBFC exposure limit at the bank and the AMC level separately. However, consolidated risk monitoring is still far from reality. Basel III pillar disclosures deliberate on the consolidated risk for the bank and the AMC (as these AMCs are majority owned subsidiaries of banks) on a group level. But this is yet to be implemented across Indian banks.

AMCs may resort to undertake the function of liquidity transformation on behalf of their parent banks as they fund NBFC floated securities using investor money. NBFCs have a heavy funding dependency on commercial paper in which bank and financial institution run AMCs are the largest investors. Owing to the short-term maturity of commercial paper (CP) that NBFCs use to fund loans of longer maturity to NBFC customers. When an NBFC raises a large portion of its total funding through CPs this situation generates a high roll-over risk and may lead to funding drying up in case the AMC does not roll over the CP.

Typically, it has generated an asset liability mismatch (ALM) for majority of the NBFCs barring a few such as HDFC. The occurrence of recent events in the market such as default on the part of Infrastructure Leasing and Financial Services (IL&FS) on its debt securities worth INR. 37.61 billion i.e. 22.84% of the debt on its books and IL&FS having a consolidated debt level worth INR. 9,100 billion⁵. With this default event, the entire NBFC segment faced a temporary upheaval in the form of liquidity drying up and the Reserve Bank of India (RBI) and the Government had to step in and introduce a slew of measures to curb the panic in the market. We will discuss this event, its impact on the fund schemes

⁵ Bloomberg Quint, Finance Ministry's Reading of How Big the IL&FS Crisis is?, 08 October 2018, available on the internet at, <https://www.bloomberqqint.com/business/finance-ministrys-reading-of-how-big-is-the-ilfs-crisis#gs.vpIH6Dw>, accessed on 01 December 2018

NAV that had an exposure to IL&FS and the measures undertaken on behalf of the RBI to calm the nerves of investors and market participants later in this report.

The occurrence of these events over the past two to three months have re-affirmed that NBFCs can pose a systemic risk to the entire financial system as a joint exposure exists between financial institutions and banks. This report has primarily attempted to answer three questions and to establish the extent of fallout a NBFC can have on its peers and other financial institutions and banks:

- a) Does joint/dual exposure to NBFCs exist in the present Indian financial system?
- b) Do bank run AMCs through their open-ended debt-oriented schemes indulge in liquidity transformation?
- c) Does the banks systemic risk increase due to the joint/dual exposure to NBFCs?

These three propositions are later presented in this study in a diagrammatic format in Diagram No. 6. Each subsequent proposition is based on proving the previous proposition true.

This research report is categorized into eight sections. The first section provides a backdrop that covers the United States Financial crisis, NBFCs in India, their dependency on AMC funding, how an NBFC default can affect the financial system, and how an AMC investor is different from a bank depositor, the second section covers the overview of shadow banking in the global and Indian market, the third section covers the overview of non-banking finance companies (NBFC) in India, the fourth section covers the NBFC loan growth, the fifth section covers how the NBFCs have been funding their loan growth and the sixth section describes the financial interdependency among banks and asset management companies, the seventh section gives a brief about the data sources, the possible methodology that was employed for this research and the section eight provides the concluding remarks.

1.A. Backdrop:

The global financial markets suffered due to the sub-prime crisis in 2007 – 2008 as a number of financial institutions (such as mutual funds) had an exposure to debt instruments that were backed by poor quality mortgage assets. These financial institutions had undertaken maturity⁶ and liquidity transformation⁷ similar to a traditional bank. These institutions were suggested to have functioned like a “shadow bank”. These shadow banking activities went undetected under the regulatory framework and subsequently generated a fall out in terms of a very high systemic risk for the whole financial system. This meant that the systemic risk generated under shadow banking was transmitted across a number of financial institutions and markets and adversely impacted the normal-functioning of the financial system. Shadow banking is highly pervasive in the developed economies such as the U.S. and Europe and the 2008 crisis brought to the fore the after-effects of how interconnected the financial institutions were and the high-level of systemic risk these interconnected financial institutions generated for the whole system due to the collapse of one of the peers. Shadow banking exists in emerging economies such as India and China and is more prevalent in the Chinese financial markets than Indian markets. However, shadow banking is catching up in India. The level of interconnectedness that exists among these financial institutions in these countries and the level of systemic risk generated through this interconnectedness is still largely unexplored. Unlike developed economies, these economies have a large population that has limited or no access to traditional banking services. This gives rise to the establishment of financial institutions that serve as complements to the traditional banks.

⁶ Maturity transformation is where the financial institutions borrow money from the market and depositors for a short duration, however they lend for a short or longer duration.

⁷ Liquidity transformation is where the financial institution funds the illiquid assets (long term loans) with liquid liabilities (short-term deposits)

For example, an emerging economy like India has outfits in the form of Non – Banking Finance Companies (NBFCs) that serve as a complement to the traditional banking system (See Appendix: Exhibit No. A). Indian banks provide 58.7% of the Indian households (India has 246.74 million households: Census data 2011⁸) with banking facilities. However, banking penetration in urban areas is 67.76% of total Indian households and 54.4% of Indian households in the rural area. In comparison to developed nations banking penetration in India remains on the lower side i.e. 53% in 2014 (i.e. 468.81 million account holders). However, 43% of these 468.81 million accounts remain dormant⁹ (See: Global Findex data¹⁰). To fill the gap of this low banking penetration, NBFCs undertake market liquidity, maturity transformation and risk sharing (Ghosh et al., 2012) and tend to function as shadow banks.

NBFC setups lack regulation at a par with traditional Indian banks and at times have different norms altogether. For example, the non-performing assets (NPA) recognition at Indian banks occurs when a borrower defaults on repayment of the principal loan amount or interest payment on the loan for a period of 90 days. However, in the case of a NBFCs the NPA recognition occurs at 180 days. The time frame for banking NPA recognition and NBFC NPA recognition is gradually moving towards convergence. However, this NPA norm recognition convergence is yet to be fully implemented. This is an example indicating how NBFCs and Indian banks have divergent norms.

Another example of divergent norms is in the context of Asset Liability Management (ALM). Unlike a traditional bank that accept deposits (current, savings and term deposits) to fund their loan books,

⁸ Census India 2011, Number of Households availing banking services and number of households having each of the specified assets, available on the internet at, <http://www.censusindia.gov.in/2011census/Hlo-series/HH12.html>, accessed on 20 Jun 2018

⁹ The Indian Express, 10 Nov 2015, In India bank account penetration surges, but 43% dormant, available on the internet at, <http://indianexpress.com/article/india/india-news-india/in-india-bank-account-penetration-surges-but-43-dormant/>, accessed on 20 Jun 2018

¹⁰ World Bank Global Financial Inclusion Index 2014, South Asia, Key Indicators, available on the internet at, <http://datatopics.worldbank.org/financialinclusion/country/india>, accessed on 20 Jun 2018

these NBFCs fund their loan book through borrowing from the markets (i.e. issuing commercial paper (CP) and debentures) and banks.

Banks and asset management companies (AMC) fund these NBFCs through subscribing to the debt market issuances such as commercial paper and debentures. The NBFCs proportion of funding composition decision i.e. to borrow from banks or through CPs and debenture issuances depends on the interest rate cycle in the economy. Lately, NBFCs reliance on bank funding has reduced whereas dependence on AMC funding (through investment in NBFC floated commercial papers and debentures) has increased as the interest rates in the economy were favourable. Many NBFCs fund their customer loans with long-term maturity with commercial papers (CPs) that have short-term maturity. This has generated an Asset Liability Mismatch and majority of the NBFCs are not subject to Asset Liability Management guidelines. At present, ALM guidelines are applicable to non-deposit-taking NBFCs with asset size of INR.1 billion and above and to those deposit-taking companies which have a deposit base of INR. 200 million and more¹¹.

AMCs finance these NBFCs through their scheme portfolio under the open-ended liquid, money market and short-term debt schemes. We observe that these scheme (liquid, money market and short-term debt) portfolios consist of more than 50% of the Net Asset Value (NAV) exposure towards NBFC floated debt securities. On an aggregate level, the 42 Indian AMCs have a total Assets Under Management (AuM) worth INR. 25 trillion of which debt forms 58.6% i.e. INR. 14.75 trillion (31 August

¹¹ EconomicTimes Website, Soon, bank type asset liability management norms for NBFCs, available on the internet at, <https://economictimes.indiatimes.com/industry/banking/finance/soon-bank-type-asset-liability-management-norms-for-nbfc/articleshow/67295625.cms>, accessed on 2 January 2019

2018)¹². Of this amount raised through debt schemes, approximately INR. 2.49 trillion is invested in NBFC commercial paper (58% of INR. 2.49 trillion) and debentures (42% of INR. 2.49 trillion).

In case an AMC has a portfolio exposure to a NBFC floated debt security which defaults it can have a ripple effect on the entire financial system. In the following sub-section we shall elaborate how an NBFC default affects various stakeholders in the financial system.

¹² SEBI website, Deployment of Debt Funds, available on the internet at, <https://www.sebi.gov.in/statistics/mutual-fund/deployment-of-funds-by-all-mutual-funds.html>, accessed on 03 October 2018.

1.B. How does a NBFC default affect the entire financial system?

Out of the 42 Indian AMC's, eleven are bank sponsored and contribute to 47% of the total mutual fund industry Assets Under Management (AuM). Now, if a bank sponsored NBFC has portfolio exposure to a NBFC debt paper that has a default status. The AMC will have to mark down the exposure by 50% with immediate effect. The parent bank may also have an exposure to the same NBFC through a bank loan, the parent bank may have issued Letters of Undertaking (LoU) on behalf of the NBFC. Hence, the very same NBFC may have borrowed both from banks and the debt market i.e. AMC exposure to NBFC floated debt securities. Default on the NBFC's part may affect the financial system in four ways

- a) the liquidity at the AMC/s on account of redemptions,
- b) will lead to recognition of a non-performing asset (NPA) at a bank level,
- c) reduction in the liquidity in the debt market
- d) reduction in share price of peer NBFCs and Banks

Let us explain how the entire financial system is adversely affected through a live example of Infrastructure Leasing and Financing Services limited (IL&FS)¹³, a government-owned NBFC based in India. IL&FS has the following subsidiaries: IL&FS Transportation and Network Limited (ITNL), IL&FS Financial Services, IL&FS Energy Development Centre, IL&FS Wind Energy Limited etc.

In June 2018, the IL&FS subsidiary IL&FS Transportation Networks Limited (ITNL) had delayed redemption on its commercial paper worth INR.1 billion. However, by evening of the due date they

¹³ IL&FS Limited was incorporated in 1987 with the objective of promoting infrastructure projects in the country. IL&FS was promoted by the Central Bank of India (CBI), Housing Development Finance Corporation Limited (HDFC) and Unit Trust of India (now, Specified Undertaking of Unit Trust of India - SUUTI). While SUUTI has largely exited (stake of 0.82% as on March 31, 2018), the shareholding has broadened over the years with the participation of many institutional shareholders. As on March 31, 2018, Life Insurance Corporation of India (LIC) and ORIX Corporation Japan were the largest shareholders in IL&FS with their stake holding at 25.34% and 23.54% respectively, while Abu Dhabi Investment Authority (ADIA), HDFC, CBI and SBI stake holding are at 12.56%, 9.02%, 7.67% and 6.42% respectively

had redeemed the commercial paper and paid in full. In late September 2018, IL&FS Financial Services, an Indian based government-owned NBFC defaulted on its commercial paper redemption for the third time in a row. *What was the issue at hand?* On 08 September 2018, IL&FS Financial Services commercial paper worth INR. 40 billion was downgraded to a credit rating of “D” carrying a default status. Subsequently, on 17 September 2018, the parent IL&FSs’ commercial paper worth INR. 25 billion received a rating downgrade to “D” accompanied by a rating downgrade in other debt instruments such as non-convertible debentures worth INR. 52.25 billion and long-term loans worth INR. 3.5 billion. The reason behind the downgrade was the inability of the ITNL to meet the redemption obligations due on 14 September 2018 and on 15 September 2018, ITNL received notices on delays and defaults in servicing some inter-corporate deposits accepted by IL&FS¹⁴. To provide a sense of the magnitude of commercial paper outstanding for IL&FS and its subsidiaries - ITNL had commercial paper outstanding worth INR. 20 billion, IL&FS Financial Services had commercial paper outstanding worth INR. 40 billion and IL&FS alone had commercial paper outstanding worth INR. 25 billion in the market. This made the ball park figure of IL&FS commercial paper outstanding at INR. 85 billion.

Typically, debt mutual fund schemes had invested in the commercial paper of IL&FS and its subsidiaries worth INR. 29 billion¹⁵. This is approximately 34% of the total commercial paper outstanding for both IL&FS and its subsidiaries. AMCs such as Bank Of India AXA had an exposure¹⁶ worth INR. 1.04 billion, Union Mutual Fund INR. 990 million, Principal Mutual Fund INR. 11.4 billion,

¹⁴ ICRA, Infrastructure Leasing and Financial Services Limited, 17 September 2018, available on the internet at, <http://www.ilfsindia.com/media/2051/changes-in-revised-credit-rating-17092018.pdf>, accessed on 05 October 2018.

¹⁵ EconomicTimes, Bond credit rating downgrades: How safe are the ‘safer’ debt mutual fund categories?, available on the internet at, <https://economictimes.indiatimes.com/wealth/invest/bond-credit-rating-downgrades-how-safe-are-the-safer-debt-mutual-fund-categories/articleshow/65910015.cms>, accessed on 24 September 2018

¹⁶ MoneyControl, 25 mutual funds with INR.2700 crore of IL&FS bonds take a hit, available on the internet at, <https://www.moneycontrol.com/news/business/mutual-funds/25-mutual-funds-with-rs-2700-crore-of-ilfs-bonds-take-a-hit-2950281.html>, accessed on 24 September 2018

Kotak MF INR. 7.98 billion and a few others such as (Motilal Oswal, DSP Mutual Fund, Invesco etc) to IL&FS debt securities. As a result of the downgrade, the market value of the IL&FS debt securities on the books of the AMCs was reduced by 50% and this adversely affected the Net Asset Value (NAV) of these schemes as they witnessed a dip between the range of 1.63% - 8.24% (See: Table No. 19 and Diagram No. 20). As a measure to protect mutual fund investor unit holders interest, Principal mutual fund house had temporarily suspended new investments into its debt plans (Principal Cash Management Fund, Principal Ultra Short Term Fund, Principal Low Duration Fund, and Principal Arbitrage Fund) with effect from 10 September 2018¹⁷. However, the problem at hand was not only faced by the mutual funds, Indian banks such as Union Bank of India, Punjab National Bank (PNB) and others also had a large exposure to IL&FS loans worth INR. 570 billion. Now, in this case both PNB and Union bank had a dual exposure to IL&FS in the form of:

1. On-balance sheet exposure - direct lending and investment and off-balance sheet exposure - standby letter of credit (SBLC) – *[explained later in Diagram No. 2]*
2. Investment - bank sponsored AMC portfolio.

So, this IL&FS downgrade didn't only affect the banks or the mutual fund who had an exposure to it but also the peers that didn't have exposure to it. Following the credit rating downgrade of IL&FS, the Indian financial system that covers debt and equity market and its participants were affected in seven ways:

- a) Peer NBFCs witnessed a drop in their share price
- b) Peer NBFCs debt paper was sold at a discount to generate liquidity

¹⁷ Principal India Webiste, Notice cum addendum to the scheme information document (SID) and key information memorandum (KIM) of schemes of Principal mutual fund (No. 41/2018), 09 September 2018, available on the internet at, https://www.principalindia.com/media/uploads/notice_ad_-_suspension_of_subscription_-090918.pdf, accessed on 03 October 2018.

- c) Debenture spread for AAA rated debt securities widened indicating liquidity risk increase
- d) Mutual Fund schemes that had an exposure to IL&FS debt securities witnessed a drastic drop in their Net Asset Values (NAV)
- e) Mutual Fund houses borrowed heavily in the Collateralized Borrowing and Lending Obligations (CBLO) market
- f) Commercial Paper issuances dropped
- g) Banks witnessed a drop in their share price

a) Peer NBFCs witnessed a drop in their share price

There were rumours that Dewan Housing Finance Limited (DHFL), another large NBFC had also defaulted on their commercial paper interest and principal repayment and DSP Investment Managers sold-off their exposure to DHFL debt securities at a steep discount. This rumour led to a 43% drop in the share price of DHFL on 21 Sep 2018¹⁸. A similar share price drop was witnessed across peer NBFCs such as India bulls Housing Finance and LIC Housing Finance in the range of 15% - 20%.

b) Peer NBFCs debt paper was sold at a discount to generate liquidity

DSP mutual funds initiative to sell DHFL debt securities was partly attributed to the corporate advance tax payment redemption demand and partly to maintain liquidity as the IL&FS papers were fully illiquid. DSP credit risk fund had an exposure of 3.26% stake in IL&FS Energy Development Corporation, a subsidiary of IL&FS Ltd. The value of this exposure was marked

¹⁸ MoneyControl, 24 Sep 2018, available on the internet at, <https://www.moneycontrol.com/news/business/explained-why-dhfl-and-other-nbfc-stocks-took-a-beating-on-friday-2979741.html>, accessed on 24 Sep 2018

down by 50% due to the credit rating downgrade to “D” i.e. default status¹⁹. To generate liquidity in the mutual fund scheme, the fund managers sold a peer NBFC debt paper.

c) Debenture spread for AAA rated debt securities widened indicating liquidity risk increase

Due to the IL&FS rating downgrade an after effect was witnessed in the debt market as corporate debenture spreads increased for the AAA rated bonds issued for various time period maturity buckets ranging from 1 year to 7 years. Over a period of three weeks, the bond spreads for five out of the six buckets increased in the range of 20 – 80%. The highest increase in spreads was witnessed for the AAA 3- 5 year debentures. However, long-term debentures with maturity greater than seven years didn’t witness an increase as the markets factored in the short-term liquidity crunch that might be resolved in the future. The increase can be witnessed for the various maturity buckets in Table No. 1.

Table No. 1: Bond spread change over a Three week period when a NBFC debt i.e. IL&FS was downgraded to “D”

Debenture Maturity	Spread (bps)		Percentage Increase/Decrease
	31 Aug 2018	28 Sep 2018	
Less than 1 year	106.01	143.27	35.15%
1 year to Less than 2 year	102.55	123.58	20.51%
2 year to Less than 3 year	87.1	105.69	21.34%
3 year to Less than 5 year	51.19	92.02	79.76%
5 year to Less than 7 year	56.65	69	21.80%
Greater than 7 year	54.38	29.9	-45.02%

Source: Created by authors, available from market update CCIL website

¹⁹ EconomicTimes, 22 Sep 2018, DHFL paper sale by DSP triggered panic, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/dhfl-paper-sale-by-dsp-triggered-panic/articleshow/65908110.cms>, accessed on 30 Sep 2018

d) Mutual Fund schemes that had an exposure to IL&FS debt securities witnessed a drastic drop in their Net Asset Values (NAV)

18 open-ended mutual fund schemes had an exposure to IL&FS debt securities²⁰. The top 8 schemes that had the highest percentage exposure to IL&FS debt securities were Motilal Oswal Ultra Short Term, Principal Cash Management Fund, Principal Ultra Short Term Fund, Invesco India Credit Risk Fund, DSP Credit Risk Fund, BOI AXA Credit Risk Fund, Tata Corporate Bond Fund and Union Liquid Fund (See Table No. 19) in the range of 3.99% to 9.87% of their Assets Under Management as on 31 August 2018. Owing to the IL&FS rating downgrade the NAV of these schemes has decreased in the range of 1.63% to 8.24% over the period 31 Aug 2018 to 28 Sep 2018.

e) Commercial Paper issuances dropped

The commercial paper issuance during the fortnight 15 Sep 2018 to INR.1124.06 billion, a 28% decrease from INR. 1,561.20 billion on 31 Aug 2018 (Source: RBI database). This also suggested that the money market reacted to the IL&FS rating downgrade with a decrease in raising and rolling over Commercial Paper.

f) Mutual Fund houses borrowed heavily in the Collateralized Borrowing and Lending Obligations (CBLO) market

The sixth indicator was the Mutual fund borrowing in the CBLO segment increased from INR.313.26 billion to INR. 1175.99 billion, up 275% over a period of three weeks. Collateralised Borrowing and Lending Obligations (CBLO) - a repo window run by Clearing Corporation of India Limited (CCIL) is an alternative to the inter-bank market where financial institutions and

²⁰ EconomicTimes, How the IL&FS Fiasco wiped out an entire years' gain in liquid funds, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/how-the-ilfs-fiasco-wiped-out-an-entire-years-gains-in-liquid-funds/articleshow/66027283.cms>, accessed on 02 October 2018.

banks lend and borrow against government securities. However, this market is smaller compared to the inter-bank market. Mutual funds began borrowing in the CBLO market in order to maintain liquidity to meet corporate advance tax redemptions and retail investor redemptions in case there were any further rating downgrades of debt instruments and debenture spreads continued to increase. This example of a NBFC debt paper rating downgrade and the subsequent effect on peer NBFCs in the financial system suggests that AMCs perform the function of converting illiquid debt securities into liquid assets to meet investor redemptions.

h) Banks share prices witnessed a drop

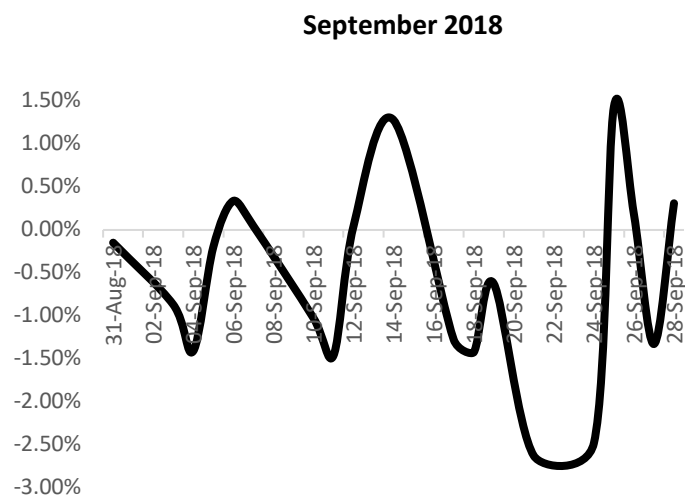
The NIFTY Bank index²¹ also witnessed a dip of around 11% over the period 31 August 2018 to 28 September 2018 with the largest drop in the range of 2-3% witnessed during the period September 21 – 24, 2018. One would argue that the NIFTY Bank index drop could also be attributed to the issues faced at Yes Bank with respect to the tussle regarding the extension of the term of their CEO Rana Kapur and the proposed merger between Bank of Baroda, Dena and Vijaya Bank. Yes Bank is a part of the NIFTY Bank Index and forms ~3% of the index weightage. During the same period, HDFC Bank share price dipped 2.71%, ICICI Bank dipped 11.45%, Kotak Mahindra Bank dipped 12.01%, Axis Bank dipped 5.70%, State Bank of India dipped 15.37%, Indusind Bank dipped 12.06%, Yes Bank dipped 62.63%, RBL dipped 20.32%, Federal Bank dipped 13.72% and Bank of Baroda dipped 43.00%. Bank of Baroda (BoB) dipped over the news of a possible merger between the public sector banks Dena, Vijaya and BoB.

²¹ NIFTY Bank Index is formed of 12 Indian banks such as HDFC bank (37.04) , ICICI Bank (16.93), Kotak Mahindra (13.12), Axis (9.36), State Bank of India (SBI) (8.57), Indusind Bank (7.43), Yes Bank (2.92), RBL (1.66), Federal bank (1.21) and Bank of Baroda (0.82). The weights that these banks form of the index are mentioned in the brackets. The index is based on the free float market capitalization method. The details are available on the NSE website, https://nseindia.com/content/indices/ind_nifty_bank.pdf, accessed on 04 October 2018.

Yes bank contributed to 18% of the total fall in the NIFTY Bank Index and BoB contributed to 3.5% of the NIFTY Bank index fall.

However, one can suggest that the bank index fell over worries of liquidity in the debt segment, financial markets and the possible impact that the IL&FS debt default would have on the bank financial statements.

Diagram No. 1: NIFTY Bank Index falls ~11% over the period 31 August 2018 to 28



Source: Created by authors

To calm the financial market and restore liquidity in the system, the Reserve Bank of India (RBI) introduced liquidity in the system through allowing an additional 2% of the Net Demand and Time Liabilities (NDTL) to be considered under the Facility to Avail Liquidity for Liquidity Coverage Ratio (FALLCR).

Liquidity Coverage Ratio (LCR)²² is maintained to ensure that sufficient liquid assets (at least 90% of the total cash outflows) are available at a bank to meet financial obligations in a 30-day liquidity stress

²² The liquidity coverage ratio (LCR) refers to high quality liquid assets (HQLA) held by financial institutions to meet short-term obligations in case of an idiosyncratic and market-wide shock. The LCR is a ratio that enables a generic stress test to anticipate market-wide shocks. LCR is formed of two components: a) Value of High Quality Liquid Assets in stressed conditions and b) Total net cash

scenario. In India, banks maintain a portion of their net demand and time liabilities (NDTL) under a reserve requirement - statutory liquidity ratio (SLR) where banks hold SLR in the form of liquid securities (such as cash, government securities and SDL). These government securities are highly liquid and can be sold easily to raise money. Under the present regulatory requirement, SLR is maintained at 19.5% of NDTL. Let us explain this concept of LCR and FALLCR with an example, Bank A has INR. 100 in NDTL and it maintains INR. 19.5 in SLR.

In 2015, Indian banks implemented the Basel III norms of LCR²³ under which these banks had to maintain sufficient liquid assets to meet financial obligations in a 30 day liquidity stress scenario. Now, these banks already maintained INR. 19.5 out of the INR. 100 NDTL as SLR which comprised of high quality liquid assets such as government securities. But the RBI recommended that in order to compute the LCR, the Indian banks could only use a part of the securities held under SLR (56% of the government securities from SLR – INR. 19.5 i.e. INR. 11²⁴) as of 21 Jul 2016. This meant that the Indian banks had to keep aside more than the INR. 19.5 in high quality liquid assets (HQLA)²⁵ to meet their LCR requirements. This technically reduced the amount available for lending at the banks. In September 2018, RBI allowed Indian banks to consider INR. 13 out of the INR. 19.5 for computation of LCR. Hence, in this way the RBI reduced the pressure on banks to hold more liquid assets to

outflows. The LCR assures that financial institutions have the necessary assets on hand to ride out any short-term liquidity disruptions. HQLA refers to assets that can be easily and immediately be converted into cash in a private market to meet the banks' liquidity requirements for a 30 calendar day liquidity stress scenario. Basel Committee on Banking Supervision, Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools, January 2013, available on the internet at, <https://www.bis.org/publ/bcbs238.pdf>, accessed on 04 October 2018.

²³ Basel Committee on Banking Supervision, Regulatory Consistency Assessment Programme: Assessment of Basel III LCR Regulations - India, June 2015, available on the internet at, <https://www.bis.org/bcbs/publ/d321.pdf>, accessed on 03 October 2018

²⁴ RBI Notifications, Basel III Framework on Liquidity Standards – Liquidity Coverage Ratio (LCR), Liquidity Risk Monitoring Tools and LCR Disclosure Standards, 21 July 2016, available on the internet at, https://rbi.org.in/scripts/FS_Notification.aspx?id=10522&fn=2&Mode=0, accessed on 03 October 2018

²⁵ Assets allowed as the Level 1 High Quality Liquid Assets (HQLAs) for the purpose of computing the LCR of banks, inter alia, include (a) Government securities in excess of the minimum SLR requirement and, (b) within the mandatory SLR requirement, (i) Government securities to the extent allowed by RBI under Marginal Standing Facility (MSF) [presently 2 per cent of the bank's NDTL] and (ii) under Facility to Avail Liquidity for Liquidity Coverage Ratio (FALLCR) [presently 11 per cent of the bank's NDTL].

compute the LCR and increased liquidity by allowing them to hold INR. 2 less than before. This figure of INR. 13 is the FALLCR²⁶ that a bank can consider to compute LCR.

Typically, Indian banks hold 28% in SLR, this implies that they hold INR.8.5 more than the SLR requirement i.e. INR.19.5. This INR.8.5 is used to compute the LCR under Basel III norms. In addition to this now these banks can use INR.13 out of the INR.19.5 under SLR. So LCR numerator is calculated as INR.13 (from SLR) + INR.8.5 (excess above INR.19.5 held as government securities) = INR.21.5. Now, the banks have $INR.100 - INR.19.5 - INR.8.5 = INR.72$ for lending.

Earlier this was $INR.11$ (from SLR i.e. INR.19.5) + INR. 8.5 (excess above INR.19.5 held as government securities) = INR.19.5 for LCR calculation. Here, the bank would have to provide another INR.2 to make sure that the LCR requirements are met i.e. INR.21.5. So earlier, the bank was left with $INR. 100 - INR.19.5 - INR.8.5 - INR.2 = INR.70$ for lending. By increasing the FALLCR, the RBI has increased the funds available at banks for lending and indirectly increased liquidity in the financial system. Typically, banks have to maintain an ascertained Cash Reserve Ratio (CRR) in addition to the Statutory Liquidity Ratio (SLR) requirement. So, if a bank has deposits worth INR.100 and it maintains a 5% CRR and a 19.5% SLR on the deposits; the total amount available to the bank for lending is $100 - 5\% * 100 - 19.5\%$ of 100 = $INR.100 - INR.5 - INR.19.5 = INR.75.5$. In addition to this the banks have a priority sector lending requirement. This PSL requirement earmarks 40% of the available funds from INR.75.5 to be lent to the priority sector such as agriculture, micro enterprises, advances to the weaker sections education, housing, social infrastructure etc. This implies that out of the INR.75.5 - $40\% * INR.75.5$ should be advanced to the priority sector i.e. INR.30.5. After all these requirements are met, the bank

²⁶ RBI website, Basel III Framework on Liquidity Standards – Liquidity Coverage Ratio (LCR), Liquidity Risk Monitoring Tools and LCR Disclosure Standards, 27 September 2018, available on the internet at, https://www.rbi.org.in/scripts/BS_CircularIndexDisplay.aspx?id=11380, accessed on 03 October 2018.

is left with INR.45.5 to lend to other categories and industries²⁷. When these PSL targets are met the bank gets a PSL certificate. The banks with a PSL certificate can sell it to the banks that haven't met the PSL targets. Hence, the bank that has met PSL targets can earn an extra non-interest income through sale of the PSL certificates. In this sale of PSL certificates, the credit risk of the original Priority sector loan will remain with the originator²⁸. The SLR and CRR requirement in India is the highest among other nations, this additional priority sector lending (PSL) target further restrains their capacity to lend compared with other nations²⁹.

Although, the Reserve bank of India (RBI) duly monitors the NBFC exposure limit at the bank and the AMC level separately and banks may attempt to consolidate the risk level under the Basel III pillar. These AMCs may undertake liquidity transformation on behalf of their parent banks. Using investor money, the fund managers at the respective AMCs subscribe to NBFC floated debt securities that may not be very liquid as indicated in the case of IL&FS. Since AMC investors can redeem their investments from an open-ended scheme at any point in time, the AMC may undertake the function of converting illiquid into liquid assets to meet investor redemption demands similar to a bank meeting the depositor withdrawal demands. Hence, the fund manager may require to hold a certain cash balance to meet the investor redemptions (There are no regulatory cash balance requirements to be maintained by Indian AMCs).

²⁷ RBI website, 01 Aug 2018, Priority Sector Lending – Targets and Classifications, available on the internet at, <https://m.rbi.org.in/Scripts/FAQView.aspx?Id=87>, accessed on 01 December 2018

²⁸ NDTV, 11 April 2016, Priority Sector Lending Certificate Guidelines to benefit Banks: Moodys, available on the internet at, <https://www.ndtv.com/business/banks-to-benefit-from-rbis-priority-sector-lending-guidelines-moodys-1392733>, accessed on 01 December 2018.

²⁹ The Financial Express, 27 April 2015, Monetary Policy Transmission and banking regulations, available on the internet at, <https://www.financialexpress.com/opinion/monetary-policy-transmission-and-banking-regulations/67086/>, accessed on 01 December 2018.

As we place forward the argument that AMCs convert illiquid into liquid assets through investor redemption; one may raise the point that there is a fundamental difference between an AMC investor and a bank depositor:

1. A bank depositor deposits money in the bank with an objective of earning a fixed amount of interest on his/her deposit and assumes that the deposit will be paid on demand when desired and a certain portion is guaranteed under the deposit insurance scheme.
2. An AMC investor invests money in an open-ended AMC scheme with an objective of earning a return based on a certain risk undertaken and assumes that the investment can be redeemed at any point in time. However, here the investor bears in mind that the AMC scheme returns can also be negative (where the investor may lose his capital invested in the scheme) and there is no guarantee of the invested capital.

Given this scenario, there is a possibility that at an AMC – an investors entire capital can be wiped off unlike a bank deposit that carries a deposit insurance and capital buffers. However, this scenario where an AMC investor loses the entire capital is rare. Example, in case an investor wishes to redeem INR.1 million from a debt scheme of a mutual fund. This mutual fund scheme is formed of individual debt securities floated by various financial institutions and corporates. The mutual fund may use their cash buffer i.e. hypothetically INR. 10 million maintained to meet the investor redemption. However, the mutual fund manager will have to still replenish the cash buffer to the previous level i.e. 10 million in anticipation of future redemptions. So, the fund manager can replenish his cash buffer either – a) by selling off a portion of the debt securities portfolio held or b) by borrowing in the Collateralised Borrowing and Lending Obligations (CBLO) market c) approaching the parent bank for extending a credit line d) rely on other peer schemes in the mutual fund house and borrow cash to replenish the cash buffer. In this manner, the fund manager replenishes the cash buffer to the original level of INR. 10 million.

Now, in case a debt security such as IL&FS been downgraded to default status, the mutual fund has 5% exposure to this IL&FS debt paper. So what happens is, the debt scheme has to mark down the value of this exposure by 50% effectively. This affects the Net Asset Value (NAV) of the scheme. Thereafter, an investor approaches the scheme for redemption of INR. 1 million. The fund manager may rely on his cash buffer of INR. 10 million to pay for the investor redemption. However, in this scenario, the fund manager may face difficulty to replenish the cash buffer to the original INR. 10 million as there is a rating downgrade, which affects the debt market. If the fund manager approaches the debt market to sell-off another debt security, he will have to do so at a discount which is what happened with DHFL debt paper. Second, if there is a further redemption demand of INR. 1 million. The fund manager may rely on selling off other debt securities in the portfolio but at steep discounts, as the market is shaken with a debt paper downgrade. Another option would be to approach the CBLO market if the scheme holds enough government securities on the basis of which they can borrow the INR.1 million, or they can approach other schemes in the fund house for replenishing the cash buffer to the position of INR. 10 million. This default situation of a debt security in the portfolio of the mutual fund scheme gives rise to a liquidity risk that may not only be limited to an investor redemption or an AMC but may also spread to other participants in the financial system. In this example, we have considered a single mutual fund house as a standalone situation. In realistic terms, a number of mutual fund houses may have exposure to the debt security that has defaulted. These mutual fund houses may have various exposure limits to the debt security. Now, if an investor redemption occurs simultaneously at these mutual fund houses. The mutual fund houses would want to replenish their cash buffer to the original position. However, since the sale of the defaulted asset may not be possible as it has become illiquid, the debt market may witness a simultaneous sale of peer debt securities or

borrowing from other schemes or in the CBLO market to sustain their cash buffers. This may generate a temporary liquidity problem in the financial system.

This situation may get complicated if not only the debt issuer defaults (NBFC such as IL&FS) on the debt securities (commercial paper and debentures) but also on bank loan taken. In this scenario, both AMCs and banks will be affected this extends to the systemic risk definition. Systemic risk comprises a financial system, a pool of interconnected institutions that have a mutually favourable business relationship through which illiquidity, insolvency, and losses can quickly propagate during periods of financial distress (Billio et al., 2012).

Let us explain this in detail, the systemic risk that arises when a scheme or a fund house has exposure to a particular NBFC that defaults on honouring their debt security payment and bank loan repayment. In case an NBFC fails to service the debt i.e. repay interest or principal amount on maturity (debenture or commercial paper or bank loan). This would make the debt instrument illiquid. However, debt instruments such as commercial paper may have a Standby Letter of Credit (SBLC) which guarantees repayment in case of default and shifts the onus on the SBLC issuing bank.

Now, the above situation generates exposure not only for the bank which may directly lend or invest in a NBFC, but also through the off-balance sheet SBLC issued in favour of the NBFC and the exposure of the bank sponsored AMC to NBFC issued debt securities. Failure of the NBFC will lead to a NPA recognition at the bank level, registration of mark to market losses at the write-off of defaulted debt securities and invoking of SBLC. AMCs will be affected to the extent that there might be a dip in the NAV. This creates a moral hazard issue for the banks and the financial system on the whole leading us to three unanswered questions. The questions have been developed in a sequential manner and only

when the predecessor question is true we have proceeded to the subsequent questions testing in this report.

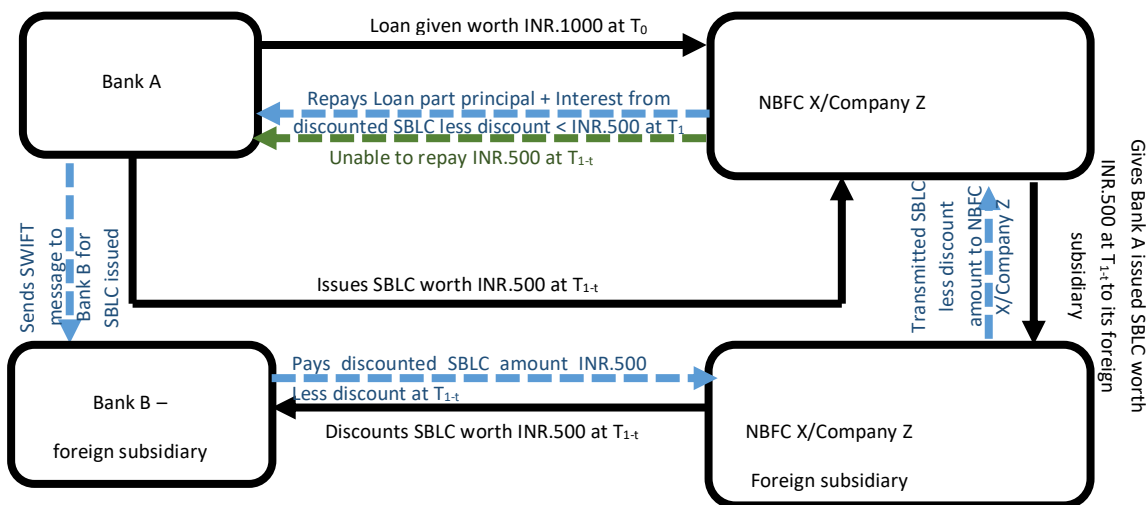
- a) Does joint/dual exposure to NBFCs exist in the present Indian financial system?
- b) Do bank run AMCs through their open-ended debt-oriented schemes indulge in liquidity transformation?
- c) Does the banks systemic risk increase due to the joint/dual exposure to NBFCs?

The issue with SBLC is explained with an example, a Bank A based in India that has a loan exposure worth INR. 1,000 to a company Z or a NBFC X at T_0 . The principal and interest is due on the loan after a year at T_1 is INR.500. Both the lender and borrower at T_{1-t} know that the borrower will be unable to service the loan. In this scenario, Bank A issues an SBLC to the borrower – NBFC X and Company Z. This SBLC issuance and discounting functions as a platform to delay the recognition of the loan as a non-performing asset (NPA). How is this done?, the lender (Bank A) issues a SBLC on behalf of the borrower (Company Z/NBFC X) promising to pay another bank (Bank B) in case the borrower fails to repay. Unlike usual Letters of Credit (LOC) the SBLC may not be linked to a trade or is not contingent upon the borrower performing an obligation. The borrower may use its wholly-owned offshore subsidiary (NBFC X/Company Z foreign subsidiary) to discount the SBLC from a bank abroad (Bank B – foreign subsidiary). The local lender bank (Bank A) – which issues the SBLC – communicates through a SWIFT system to inform Bank B – foreign subsidiary and authenticates the instruments' veracity. The funds obtained through the discounting are remitted by NBFC X/Company Zs foreign subsidiary to NBFC X/Company Zs domestic account. Thereafter, NBFC X/ Company Z uses this SBLC discounted

money to repay the original lender (Bank A)³⁰. Through this mechanism, the borrower avoids a situation of default and downgrade of the debt undertaken.

In case the borrower would not have opted for the SBLC discounting route, Bank A would recognize the Company Z / NBFC X account as a non-performing asset (NPA) immediately. Through the SBLC issuing route the bank delays the issue faced by the borrower.

Diagram No. 2: Standby Letter of Credit (SBLC) usage to evergreen bad loans at domestic bank



Source: Created by authors

In this study, we have considered 42 Indian scheduled commercial banks and their eleven Asset Management Companies (AMCs). These 42 banks comprise of 21 Public and 21 Indian Private Sector Banks that extend 96% of the loans and advances in the organized Indian banking system (See Appendix: Exhibit No. B for list of banks included in this study). The sample of Public sector banks consists of the merged entity of State Bank of India. Post April 2017, State Bank of India and its five

³⁰ EconomicTimes, Banks and Companies are using standby letter of credit to avert loan default, downgrade, 11 Feb 2014, available on the internet at, <https://economictimes.indiatimes.com/industry/banking/finance/banking/banks-and-companies-are-using-standby-letter-of-credit-to-avert-loan-default-downgrade/articleshow/30180192.cms>, accessed on 30 Sep 2018

subsidiaries (State Bank of Hyderabad, State Bank of Bikaner and Jaipur, State Bank of Mysore, State Bank of Patiala and State Bank of Travancore) and Bhartiya Mahila Bank³¹ were merged into one bank now referred to as State Bank of India (SBI). In September 2018, three public sector banks Bank of Baroda, Vijaya Bank and Dena Bank were proposed to be merged into one entity³². This will bring the number of public sector banks to 19 in the near future. Life Insurance Corporation (LIC), a government owned insurance company has acquired a 51% stake in public sector bank - IDBI Bank³³. We have excluded foreign banks³⁴ and small finance banks (SFB)³⁵ from this study as they contribute a minor portion to the total bank lending business.

Of these 42 banks, we have eleven bank sponsored AMC's that contribute to 47% of the total assets under management (equity and debt schemes). Of these eleven AMC's, private sector bank sponsored AMC's form 35% of the total AUM in the mutual fund industry and public – sector bank sponsored AMC's form the remainder 12% (See Appendix: Exhibit No. C for list of Asset Management Companies included in this study). Among the public sector bank sponsored AMC's, Principal bought out the entire stake of Punjab National Bank in Principal PNB Asset Management Company (AMC)³⁶. So, from August

³¹ NDTV, 01 April 2017, Five Associate Banks, Bhartiya Mahila Bank merge with SBI, available on the internet at, <https://www.ndtv.com/business/five-associate-banks-bharatiya-mahila-bank-merge-with-sbi-1676064>, accessed on 03 October 2018.

³² The Hindu Business Line, 17 September 2018, Vijaya Bank, Dena Bank and Bank of Baroda to merge: Govt, available on the internet at, <https://www.thehindubusinessline.com/money-and-banking/vijaya-bank-dena-bank-bob-to-merge-govt/article24968935.ece>, accessed on 03 October 2018

³³ Business Today, 01 April 2018, LIC-IDBI deal: Cabinet approves LIC's acquisition of 51% stake in IDBI Bank, available on the internet at, <https://www.businesstoday.in/current/economy-politics/lic-idbi-deal-cabinet-approves-lic-proposal-to-buy-51pc-stake-in-idbi-bank/story/280874.html>, accessed on 03 October 2018.

³⁴ Foreign banks operate in India through branches or wholly-owned subsidiaries. They operate in either mode but not both. The domestic banking regulations apply to these foreign banks. These banks are set up by non-resident Indians (NRI) who hold a majority stake in the branch or the wholly owned subsidiary (WOS). For more details information on Foreign banks are available on the Reserve Bank of India (RBI) website at, https://rbidocs.rbi.org.in/rdocs/content/pdfs/CF06072017_AN.pdf, accessed on 11 Aug 2018.

³⁵ Small Finance Banks (SFB) are regulated and license to operate under the RBI guidelines and perform basic banking functions of accepting deposits and lending to unserved and underserved sections such as small business units, small and marginal farmers, micro and small industries and unorganized sector entities. These are scheduled commercial banks that have to open at least 25% of their branches in the rural unbanked areas and have to extend 75% of their adjusted net banking credit (ANBC) to the priority sector. Priority sector includes: Agriculture, Micro, Small, Medium Enterprises (MSME), Export credit, Education, Housing, Social Infrastructure, Renewable energy and others. More details please refer to the RBI Compendium of Guidelines for Small Finance Banks – Financial Inclusion and Development, available at the RBI website, https://rbidocs.rbi.org.in/rdocs/content/pdfs/CF06072017_AN.pdf, accessed on 11 Aug 2018

³⁶ MoneyControl, 29 August 2018, Principal buys out entire stake of PNB in Principal PnB Asset Management Company (AMC), available on the internet at, <https://www.moneycontrol.com/news/business/mutual-funds/principal-buys-out-entire-stake-of-pnb-in-principal-pnb-asset-management-company-2893791.html>, accessed on 03 October 2018.

2018, there are 10 bank sponsored AMCs. The study period considered is from Jan 2012 to Jan 2018 extended to May 2018 wherever data is available.

2. Shadow Banking Overview:

Shadow banking has been an area of interest post the 2007 – 2008 US financial crisis. In the developed economies such as US and Europe, money market mutual funds (MMMF) and debt mutual fund schemes were considered as shadow banks who undertook the function of credit intermediation without having access to central bank liquidity facilities and deposit insurance guarantee facilities (See: Chernenko and Sunderam (2014); Duygan – Bump et.al. (2013)). These mutual fund schemes also fell prey to the sub-prime mortgage default crisis that occurred in the US during 2007 – 2008. A number of these mutual fund schemes had an exposure to debt instruments that were backed by poor quality assets such as residential and commercial mortgages. When the crisis occurred the mutual fund schemes were faced with heavy investor redemption demands and were unable to liquidate the underlying sub-prime mortgage assets backed by securities (commercial paper, asset backed securities, bonds). The redemptions subjected mutual fund schemes to a fire sale or suspension of investor redemptions till a suitable action plan was ascertained.

An example of a MMMF is the Reserve Primary Fund that held US\$785 million in Lehmann issued securities and became illiquid when the fund was unable to meet investor redemption demand³⁷. Three European debt mutual fund schemes³⁸ such as BNP Paribas ABS Eonia³⁹, BNP Paribas Euribor (French domiciled) and Parvest Dynamic ABS (Luxembourg domiciled) had an exposure of 35% of their assets to US sub-prime Asset Backed Securities (ABS) in July 2007. BNP Paribas

³⁷ Securities Exchange Commission website, Reserve Primary Fund Distributes Assets to Investors, 29 Jan 2010, available on the internet at, <https://www.sec.gov/news/press/2010/2010-16.htm>, accessed on 20 Jun 2018

³⁸ Asset Back Securities (ABS) Fund by definition must invest at least 80% of their assets in securitized assets such as asset backed securities.

³⁹ BNP Paribas Documents, Background Information on suspension and reopening of ABS funds in August, available on the internet at, <https://invest.bnpparibas.com/sites/default/files/documents/5761.pdf>, accessed on 20 Jan 2018.

suspended redemptions for 20 days from August 8, 2007 to August 28, 2007 to contain the downfall. The concept of shadow banking has gradually evolved where, credit intermediation takes place outside the conventional banking system. In this system, a non-banking financial institution engages in liquidity, credit and maturity transformation. However, unlike a bank these non-banking financial institutions don't have access to the central bank liquidity facilities and deposit insurance guarantee facilities like a bank.

These U.S and European based non-banking financial institutions (such as money market mutual funds) faced systemic risks which surfaced during the 2008 financial crisis and went undetected under the regulatory framework. To resolve this issue the US and European financial markets introduced a number of reforms in the industry such as increasing disclosures of monthly portfolio holdings, introducing floating net asset value (NAV) for institutional floated funds, enhancing diversification and setting single institution exposure limit to 10% - 15%, imposing a 2% redemption fees on liquidation in case the weekly liquid assets dips below 30% of its total assets etc⁴⁰. Similarly, the Financial Stability board (FSB) has actively undertaken efforts to monitor and measure shadow banking so that the unforeseen systemic risks are minimized, and opportunities created through shadow banking benefit the overall financial system.

Shadow banking is more prominent in the US system and less pervasive in the European region. However, in emerging economies such as India; non-banking financial institutions such as NBFCs (shadow banks) serve as complements to the existing banking institutions due to skewed banking penetration levels across the country. In India these NBFCs that fill the banking gap are the form of Non-Banking Financial Companies (NBFC). NBFCs in India operate as shadow banks and undertake liquidity, maturity transformation and leverage activities similar to banks (See: Acharya

⁴⁰ SEC adopts Money market Fund reform rules, 2014, available on the internet at, <https://www.sec.gov/news/press-release/2014-143>, accessed on 20 Jun 2018

et. al. (2013)). Shadow banking in India is estimated at USD190 billion which is the 15th largest in the world. Among BRICS, India is the third largest shadow banking sector. However, in terms of growth India's OFI sector has grown at an annualized rate of 15.5% over the last five years, second only to China's staggering 47% CAGR within the BRICS. Furthermore, bank funding from OFIs is growing at a pace of 18.7% CAGR which compares with a median of 9.5% and is the fastest amongst BRIS countries.

Shadow banking was coined by McCulley⁴¹ and subsequently, Adrian and Shin (2009) suggested what functions a financial institution should perform to be termed as a shadow bank. Primarily, a financial institution should undertake liquidity transformation, maturity transformation and credit transformation. These activities are conducted by unregulated institutions or under unregulated conditions. In India, however each financial institution may be regulated in some form or the other but there may be liquidity transformation and maturity transformation which may not occur in the sense of a traditional bank. Earlier studies have considered mutual funds and shadow banking i.e. mutual funds undertake liquidity and maturity transformation in open-ended mutual fund schemes. This is a function similar to a traditional bank. However, these mutual funds do not provide an insurance for the investor funds in case of a run on the fund house and these funds don't have a capital buffer to offset losses. Typically, large funds absorb the losses of heavy redemptions internally and at some point, the Net Asset Value (NAV) is subject to volatility. In both cases, the mutual fund houses may witness erosion of their fund base. Sunderam and Cherenko (2014), Duygan – Bump et. al. (2013), Sunderam and Cherenko (2016), Shek, Shim and Shin (2017), Morris, Shim and Shin (2017) and Jiang et. al. (2017) have studied mutual fund and shadow banking in the above context.

⁴¹ Federal Reserve Bank of Atlanta, Shadow Banking Interview of Paul McCulley, available on the internet at, <https://www.frbatlanta.org/news/conferences-and-events/conferences/2012/120409-fmc/media/mcculley-interview.aspx>, accessed on 11 Aug 2018

A few academicians have studied shadow banking and financial stability (Bengtsson, 2013). Academicians such as Goldstein et. al. (2015), Hanouna et. al. (2015), SEC (2015), Feroli et. al. (2014) and Chen et. al. (2010) have examined liquidity transformation and financial stability problems. The occurrence of an event that threatens the stability of or public confidence in the financial system (De Bandt and Hartmann, 2000) is defined as a 'Systemic risk'. Systemic risk comprises a financial system, a pool of interconnected institutions that have a mutually favourable business relationship through which illiquidity, insolvency, and losses can quickly propagate during periods of financial distress (Billio et al., 2012). This implies that the systemic risk affects a number of financial institutions or markets in a strong sense thereby severely impacting the general well-functioning of the financial system.

While, banks play a major role in the traditional definition of systemic risk where a single bank is vulnerable to depositor runs, we emphasize that the definition of systemic risk goes beyond the traditional definition where failure is transmitted from one institution, market, system to another. This is similar to a contagion-effect where a single institution faced with failure is connected to other financial institutions and markets and the failure risk faced by this single institution spreads across to other institutions and markets. Acharya et. al. (2017), Song (2017) have examined systemic risk in the financial system for banks'. *However, they have failed to consider that banks and other financial institutions such as asset management companies and other non-bank financial institutions may have a mutually beneficial business relationship with each other. Hence, considering systemic risk among the same category of institutions – banks, may not capture the systemic risk at the level of the financial system.*

Reinhart and Rogoff (2009) considered four “L”s – Leverage, Liquidity, Losses and Linkages. Literature has already covered the first three Ls extensively and measures are well established for the same. A common theme across systemic events is that they involve the financial system i.e. connections and interactions between financial institutions and mutual beneficiary parties. Therefore, to gain a comprehensive perspective of the systemic risk faced at the financial system it is important to capture the degree of connectivity of market participants.

For example, in China; shadow banking is in the form of bank floated wealth management products (WMPs) that give an opportunity to a bank depositor to invest their excess deposit funds in their bank accounts in money market instruments and bonds with short -term maturity. However, these WMPs tend to invest funds in risky assets and people are under the belief that these WMPs to some extent are bank guaranteed (Acharya et. al. (2017)). In case, these WMPs fail, this situation might lead to loss of deposit funds for bank depositors of the bank that may later on lead to a bank run. Hence, this gives rise to an interconnectedness between the money market funds, debt funds and bank deposits. Hence, to assess the systemic risk in Chinas’ financial system it would be important to study the degree of connectivity between these two institutions.

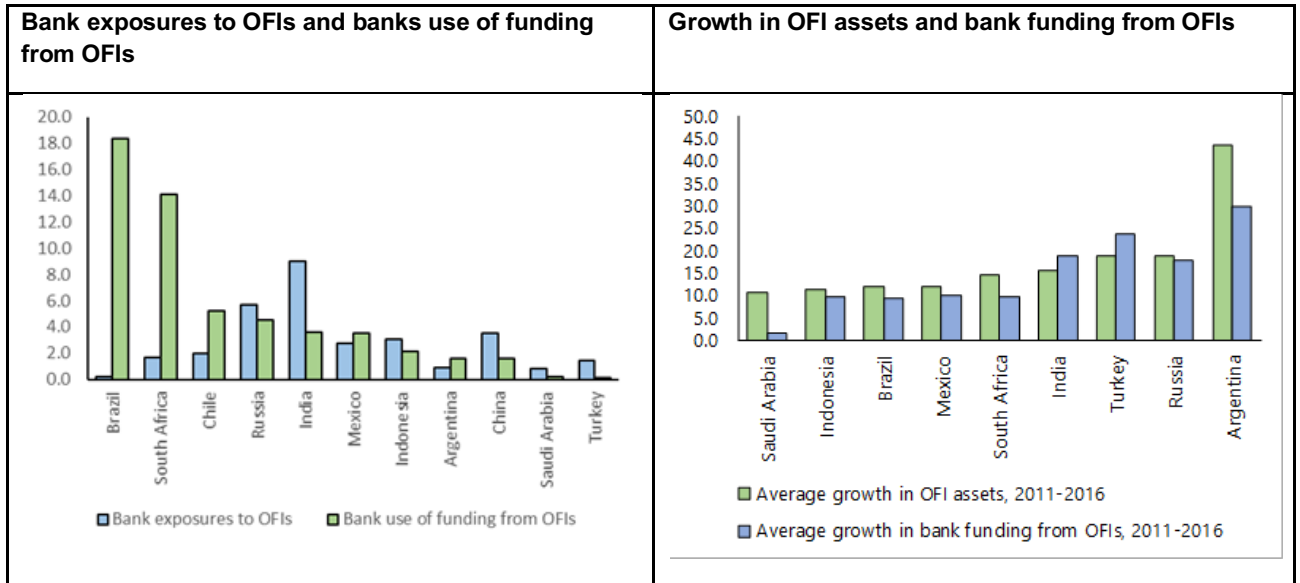
In India, the NBFCs function as a complement to the Indian banking system and cater to the unbanked segments. These NBFCs serve as shadow banks with many of these NBFCs being bank sponsored. While not directly comparable, these can pose similar risks especially under a risk aversion situation given the significant liquidity, maturity and leverage transformations undertaken by these institutions. NBFCs typically raise funds from Banks (through term-loans, working capital loans), Asset Management Companies, Insurance and other financial institutions (through commercial paper and debentures) for lending to their end borrowers. Many a times, the NBFC, AMC and Bank may have an exposure to the same borrower/s. This common borrower may have taken a bank loan, raised money in the market through commercial paper and

debentures and may have also a loan exposure to the NBFC. In case, this borrower/s defaults and is unable to service the debt and interest payment for the respective bank loan or debt instrument such as commercial paper and debentures and loan repayment for the NBFC. It would generate a systemic risk for the whole Indian financial system. This borrower holds exposure to the NBFC, Bank and AMC. Hence, a default on this borrower's part may impact all the three in varied degrees.

Furthermore, a detailed analysis of the shadow banking system in India is also important given the higher interconnectedness within the financial system. In India, bank claims on the Other Financial Intermediaries (OFI) stand at 11.0% of the overall bank assets. This compares with a median of 3.6% (3.5% for China) and is the third highest within the Financial Stability Board universe (behind Belgium and Ireland), reflecting the high scope of spillovers from a potential credit shock (spillovers are analysed in detail in Proposition III). Interconnectedness from the funding side is in-line with peers with banks' liabilities to the OFIs standing at 3.5% of bank assets (compared with 1.6% for China, and 3.7% median)⁴². India's non-bank sector is also significantly exposed to global shocks with OFI claims on the rest of the world constituting 44% of the OFI assets which is the highest amongst the biggest nations and compares with a median of 7.7%.

⁴² Global Shadow Banking Monitor, Financial Stability Board, 2017 <http://www.fsb.org/wp-content/uploads/P050318-1.pdf>

Diagram No. 3: Bank exposure to OFIs using bank funding and growth



Source: Created by authors

Hence, it is important to study the degree of connectivity between the banks, NBFCs and the AMCs in question in order to understand the totality of the systemic risk faced by the Indian Financial system in case such a default event occurs. OFIs refer to those financial corporations that are primarily engaged in financial intermediation—that is, corporations that channel funds from lenders to borrowers through their own account or in auxiliary financial activities that are closely related to financial intermediation—but are not classified as deposit takers (IMF 2004a). OFIs include insurance corporations; pension funds; securities dealers; investment funds; finance, leasing, and factoring companies; and asset management companies. In the case of India, we can consider NBFCs as OFIs.

3. Overview of Non-Banking Finance Companies (NBFC) in India

NBFCs are registered under The Companies Act, 1956 and engage in the business of loans and advances, leasing, hire-purchase, insurance business, chit funds, trading, acquisition of securities such as shares, bonds, debentures and others⁴³. In March 2018, there are 11,402 NBFCs of which 249 are NBFC Non-deposit taking Systematically Important (NBFC ND SI). These 249 NBFC ND SI form 86% of the total assets of the NBFC sector⁴⁴. Table No. 2, displays the asset size and the number of NBFC ND-SI from 2014 till 2018. We observe in Table No. 2 that the number of NBFC ND SI have more than halved from 493 in 2014 to 229 in 2018. This reduction was attributed to a revision in the regulatory guideline that increased the threshold asset size requirement of these NBFC ND SI from INR 1 billion to INR 5 billion (See Table No. 2) thereby disqualifying a number of the NBFCs with the prior granted status of NBFC ND SI.

Public limited companies' form 47.7% of the total NBFC ND SI whereas private limited companies contribute for the remainder 45.45%. The asset size for private limited companies reduced from INR. 6,856 billion to INR. 2,810 billion and the asset size increased for the public listed companies from INR.1,705 to INR.9,806 billion. The reason behind an increase in the asset base of public listed firms can be attributed to the initial public offerings (IPO)⁴⁵ launched by MAS Financial Services, Ujjivan Financial Services, IndoStar Capital Finance, ICICI Securities and a few others and the capital raised through debentures and commercial paper borrowings.

⁴³ Reserve Bank of India website, Frequently Asked Questions, Definition of NBFC, 10 Jan 2017, available on the internet at, <https://www.rbi.org.in/Scripts/FAQView.aspx?Id=92>, accessed on 26 Jan 2018.

⁴⁴ FSB 2017 report, available on the internet at, <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/7CHA7201709E69A4012B24EE590B260B1F151BB97.PDF>, accessed on 15 Jan 2017.

⁴⁵ MoneyControl, NBFCs laugh their way to the bank as rich investors try to cash in on IPOs, available on the internet at, <http://www.moneycontrol.com/news/business/ipo/nbfc-laugh-their-way-to-the-bank-as-rich-investors-try-to-cash-in-on-ipo-mania-2328453.html>, accessed on 15 Jan 2017.

Table No. 2: Number and Asset size of NBFC ND-SI

Ownership	March 2014		March 2015		March 2016		March 2017		March 2018	
	No.	Asset Size (In INR bn)	No.	Asset Size (In INR bn)	No.	Asset Size (In INR bn)	No.	Asset Size (In INR bn)	No.	Asset Size (In INR bn)
Total	493	12742	471	15232	220	14833	220	16917	249	20,064
Government	15	4181	15	5337	15	5765	15	6280	15	7448
Non- government	478	8561	456	9895	205	9068	205	10637	234	12616
Public Ltd. (1)	252	1705	243	2120	105	2026	105	8268	105	9806
Private Ltd. (2)	226	6856	213	7775	100	7041	100	2369	129	2810

Source: Created by authors, Reserve Bank of India, Financial Stability Report, Report on Trend and

Progress of Banking in India 2016-17 and 2017-18, Page 142 and Page 40

Despite a reduction in the number of NBFCs due to the asset threshold limits the NBFC has witnessed a double – digit loan growth over a period. The Indian NBFC sector has witnessed loan growth from INR. 7,233.52 billion in March 2012 to INR. 17,993.35 billion in March 2018, a 16.40% compounded annual growth (CAGR) rate over the six – year period. This complementary financing system has been outperforming the loan growth of scheduled commercial banks (SCB)⁴⁶. (For more details on NBFC loan growth please refer to Section No. 4).

A few reasons attributable to the growth in the NBFC loan outstanding are:

1. *The inability of SCBs to undertake higher lending activities due to the huge pile of non-performing assets (NPA) that have been accumulated since the financial crisis in 2007-08 in the banking system. 11 Public sector banks are under Prompt Corrective Action (PCA)⁴⁷ where a few of them have been restricted from undertaking lending activities since they*

⁴⁶ RBI website, SCB definition: All banks included in the second schedule to the Reserve Bank of India Act, 1934. They are categorized into five different categories: 1) State Bank and its associates, 2) Nationalised banks, 3) Private sector banks, 4) Foreign banks and 5) Regional Rural Banks.; available on the internet at, <https://www.rbi.org.in/scripts/PublicationsView.aspx?id=14655>, accessed on 28 Jan 2018.

⁴⁷ Reserve Bank of India (RBI), Revised Prompt Corrective Action (PCA) Framework for Banks, available on the internet at, <https://rbi.org.in/scripts/NotificationUser.aspx?Mode=0&Id=10921>, accessed on 25 July 2018

are at Threshold 3. Although this situation has improved over the months and banks have begun lending as capital has been infused into the banks by the government.

- 2. The growth in NBFC loan may be attributed to the revised norms, where Reserve Bank of India increased the borrowing limit for individual borrowers from INR. 50,000 to INR. 100,000 in April 2015.*

Unlike a traditional bank that accepts deposits to support the business of lending. NBFCs borrow from the financial market to fund their lending activities. Debentures, bank borrowing (term-loans, working capital loans), commercial paper and borrowing from other financial institutions forms roughly 60% - 70% of a NBFCs total borrowing and more than 50% of their balance sheet (For more details please refer to Section No. 5).

Bank granted term-loans and working capital loans to NBFCs are worth INR 2.06 trillion and INR 668 billion and forms 18% of the NBFC lending book as on 31 March 2017. Banks have an exposure to NBFC floated commercial paper (INR. 631 billion), NBFC issued debentures (INR. 1381 billion) and this forms 13.12% of the NBFC lending book. Overall bank exposure to NBFCs amounts to INR. 4.9 trillion⁴⁸.

⁴⁸ Bank exposure includes scheduled commercial banks such as private sector banks and public sector banks and foreign banks.

Banks are not the only ones who hold an exposure to NBFCs. Asset Management Companies (AMCs) subscribe to NBFC floated securities such as debentures and commercial paper. The net exposure⁴⁹ that AMCs have to NBFCs has steadily increased year on year from INR. 83 billion in March 2012 to INR. 3,818 billion in March 2018⁵⁰. A number of these AMCs are bank sponsored and hence this introduces dual exposure at the bank level.

Banks may face a twin exposure to a particular NBFC through:

- 1) Direct exposure: Loans and investments on their bank balance sheet
- 2) Indirect exposure: Portfolio investment in debentures and commercial paper of a NBFC through the bank sponsored mutual fund arm.
- 3) Indirect exposure: Issue of Stand by letter of credit for issuance of commercial paper and debentures

However, the indirect exposure through the bank run AMC to the same NBFC is not fully accounted for in the banking system. RBI sets limits on the exposure taken by banks⁵¹ and AMCs⁵² independently to NBFCs. However, the RBI doesn't provide any guidelines that cover joint exposure to a particular NBFC undertaken by a bank and the same bank run AMC especially on the off-balance sheet side and the with respect to the structured obligations (that may have exposure AMCs).

⁴⁹ The AMCs included here are Bank run, Financial Institutions run and Corporate run AMCs

⁵⁰ Reserve Bank of India, Financial Stability Report, 2013, 2014, 2015, available on the internet at, <https://rbi.org.in/Scripts/FsReports.aspx>, accessed on 23 Jan 2018

⁵¹ Banks have a direct exposure limit for the NBFC lending activities and investment activities capped at 10% to 15% (of the banks' capital funds as per the last audited financial statements) for a single NBFC/NBFC Asset Financing Company/ NBFC Infrastructure Finance Company. RBI exposure limit to a single NBFC, available on the internet at, https://www.rbi.org.in/scripts/BS_ViewMasCirculardetails.aspx?id=9875, accessed on 19 Jan 2018.

⁵² AMCs have an exposure limit of 25-30% to the NBFC sector and a single issuer limit of 10-15% of the net asset value (NAV). Live Mint, SEBI relaxes debt fund exposure limit for housing finance companies, 11 Aug 2016, available on the internet at, <http://www.livemint.com/Money/kJdEWM3z3hecPWSwKMvZtK/Sebi-relaxes-debt-fund-exposure-limit-for-housing-finance-co.html>, accessed on 23 Jan 2018.

With this background we arrive at our first proposition for this research “Does Joint exposure among financial institutions exist?” and we sequentially develop the remainder two propositions based on the positive outcome from proposition I. We elaborate more about the first proposition in section 5.

4. NBFCs loan growth higher than Scheduled Commercial Banks

The Indian NBFC sector has witnessed loan growth from INR. 7,233.52 billion in March 2012 to INR. 17,993.35 billion in March 2018, a 16.40% compounded annual growth (CAGR) rate over the past six year period. This complementary financing system has been outperforming the loan growth of scheduled commercial banks (SCB)⁵³. These SCBs cater to 95% of the banking population. However, over the past few years since 2012 onwards the quarter on quarter loan growth of the NBFC sector has outperformed that of the SCBs.

Diagram No. 5 displays the loan outstanding growth rates for both NBFC sector and Scheduled Commercial Banks (SCBs) for the period March 2012 to September 2017 on a quarterly basis. SCB loan growth on a quarter to quarter basis has been on the lower side of 1-5%, whereas NBFC loans and advances portfolio growth has moved in the range of -2% to 14%. Eleven of the eighteen quarters over the period March 2012 to September 2017, NBFC loan outstanding growth rate was higher than the SCB loan outstanding growth rate.

A few reasons attributable to the growth in the NBFC loan outstanding are:

1) The inability of SCBs to undertake higher lending activities due to the huge pile of non-performing assets (NPA) that have been accumulated since the financial crisis in 2007-08 in the banking system. 11 Public sector banks are under Prompt Corrective Action (PCA)⁵⁴ where a few of them have been restricted from undertaking lending activities since they are at Threshold 3

⁵³ RBI website, SCB definition: All banks included in the second schedule to the Reserve Bank of India Act, 1934. They are categorized into five different categories: 1) State Bank and its associates, 2) Nationalised banks, 3) Private sector banks, 4) Foreign banks and 5) Regional Rural Banks.; available on the internet at, <https://www.rbi.org.in/scripts/PublicationsView.aspx?id=14655>, accessed on 28 Jan 2018.

⁵⁴ Reserve Bank of India (RBI), Revised Prompt Corrective Action (PCA) Framework for Banks, available on the internet at, <https://rbi.org.in/scripts/NotificationUser.aspx?Mode=0&Id=10921>, accessed on 25 July 2018

In March 2018, the banking NPAs of scheduled commercial banks were around INR. 9899.84 billion (i.e. 11.60%⁵⁵ of the total advances at INR. 85343.50 billion⁵⁶). Table no. 3 presents the sector-wise fund based exposure of 20 banks (16 Public sector banks and 4 Private sector banks) to three sectors such as Iron and Steel, Textile and Infrastructure (Power, Road, Rail, Port, Telecom and others). These three sectors form 30.15% of the total INR. 9899.84 billion gross NPAs. These top 20 banks in Table no. 3 form 84% of the total banking loans and advances and contribute to 98.27% of the total NPAs in the banking system⁵⁷. These 16 Public sector banks contribute to 87.74% of the total NPAs in the banking system followed by Public sector banks contributing 10.54% of the total NPAs. Dena, UCO, IDBI and Canara bank have the highest exposure to the Iron and Steel sector. Canara bank has the highest exposure to the Textile sector. IDBI has the highest exposure to Infrastructure that includes power, road, rail, port, telecom and others. IDBI reports highest Gross NPAs followed by Punjab National Bank (PNB). Banks such as IDBI, Oriental Bank of Commerce, Central Bank of India, Allahabad Bank, UCO Bank, Corporation Bank, Bank of India, Indian Overseas Bank, Dena Bank, Bank of Maharashtra are all under Prompt Corrective Action (PCA) whereas PNB, Canara bank and Union bank are on the watchlist to be put under PCA if their profit turns negative for two consecutive years.

⁵⁵ Chapter II: Financial Institutions: Soundness and Resiliencem Reserve Bank of India Publications, 26 June 2018, available on the internet at, <https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=902>, accessed on 14 July 2018.

⁵⁶ RBI Bulletin, Business in India: All Scheduled Banks and All Scheduled Commercial Banks, 11 June 2018, available on the internet at, https://rbi.org.in/Scripts/BS_ViewBulletin.aspx?Id=17609, accessed on 14 July 2018

⁵⁷ Reserve Bank of India, Statistical Tables Relating to Banks in India, available on the internet at, <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#14>, accessed on 14 July 2018.

Table No. 3: Sector-wise fund exposure of 20 Scheduled Commercial Banks and Gross NPAs as on 31 March 2018

The table presents the funded exposure of 20 scheduled commercial banks of which 16 are public sector and 4 are private sector banks. Column number 2 to 4 mention the contribution of Iron and steel, Textile and Infrastructure sector to the total funded exposure mentioned in INR billion. Column 5 presents the total funded exposure of the respective bank which includes both domestic and international fund based credit exposure. Column no. 6 presents the gross NPA of each bank and column no. 7 to 9 presents the contribution of each of the three sectors to NPAs. Column no. 10 is a ratio that indicates the asset quality of each bank which is computed by dividing the gross NPA by fund based exposure i.e. column no.6 divided by column no.5.

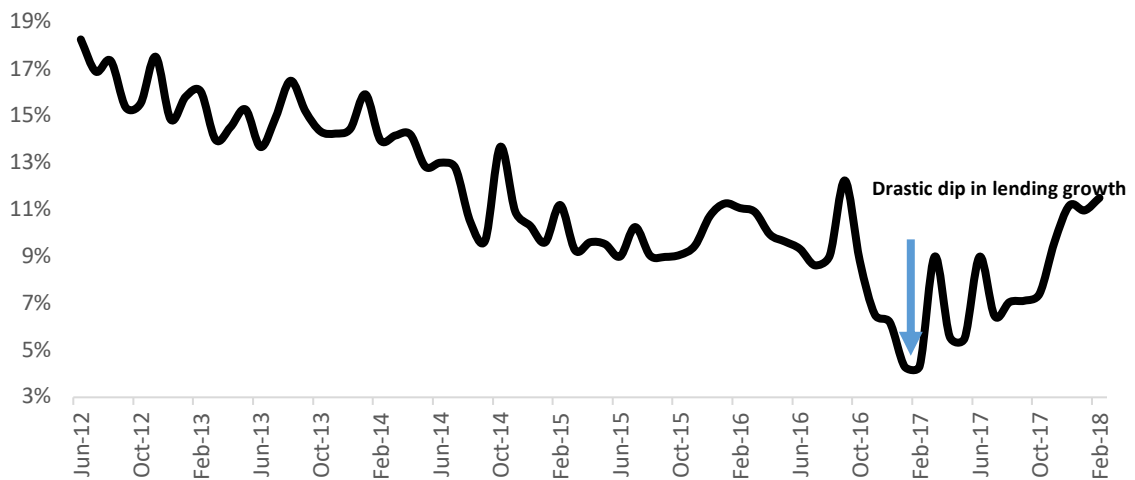
Bank Name	Iron and Steel	Textile	Infrastructure	Fund based exposure (in INR bn)	Gross NPA (in INR bn)	Iron and Steel	Textile	Infrastructure	Gross NPA to Funded Exposure
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Public Sector Banks									
SBI	3.43%	1.84%	10.71%	20744.63	2251.05	24%	7%	26%	10.85%
IDBI	6.25%	3.36%	21.01%	2508.72	1088.49		32%		43.39%
PNB	5.10%	2.14%	9.68%	4783.96	895.44	NA	NA	NA	18.72%
Canara	6.16%	5.13%	17.11%	4014.74	476.99	24.59%	4.13%	21.55%	11.88%
Oriental Bank of Commerce	4.09%	2.97%	5.92%	2461.37	261.34	2.96%	NA	NA	10.62%
BoB	4.35%	3.83%	8.20%	5353.01	570.60	17.09%	5.84%	16.50%	10.66%
Indian Bank	2.15%	2.17%	11.29%	2256.88	119.90	31.64%	4.59%	26.83%	5.31%
Central Bank of India	3.08%	2.25%	14.88%	2881.56	381.31	NA	NA	NA	13.23%
Allahabad Bank	4.69%	2.88%	11.24%	2029.44	265.63	21.69%	5.96%	10.68%	13.09%
UCO Bank	6.40%	1.73%	14.46%	1074.70	305.50	18.45%	3.62%	19.71%	28.43%
Corporation Bank	4.22%	4.40%	15.42%	1280.05	222.13	NA	NA	NA	17.35%
Union Bank	3.50%	2.86%	12.55%	4251.33	493.70	1.65%	0.44%	2.25%	11.61%
Bank of India	2.90%	2.22%	10.96%	4020.80	623.93	11.01%	4.56%	17.82%	15.52%
Indian Overseas Bank	4.53%	1.90%	10.01%	2201.23	381.80	NA	NA	NA	17.34%
Dena Bank	6.45%	4.84%	15.66%	742.39	163.61	17.35%	8.62%	15.00%	22.04%
Bank of Maharashtra	2.59%	2.41%	8.65%	1092.05	184.33	19.67%	3.55%	10.16%	16.88%
Private Sector Banks									
HDFC	1.55%	2.04%	7.82%	7841.86	93.00	2.55%	2.30%	4.28%	1.19%
ICICI	1.95%	0.45%	6.34%	8811.59	567.04		20%		6.44%
Axis	1.50%	1.15%	6.25%	6441.09	342.49	10.15%		39.12%	5.32%
Indusind									
Kotak Bank	2.17%	2.14%	3.18%	2352.98	40.71		13.87%		1.73%

Source: Compiled by authors from Pillar 3 disclosures of scheduled commercial banks (SCB).

This exposure is considered at a point in time and not on a longitudinal basis, since more or less the securities held have remained similar, secondly, we are not conducting a longitudinal analysis of how the exposure is changing.

The GNPA has been steadily rising owing the RBI withdrawing the restructured assets scheme. With the withdrawal of the restructured asset window, banks NPAs have almost doubled. This has led to low lending as the banks didn't have enough funds to lend (as the previous funds were not repaid by defaulting borrowers and these banks had to provide for the NPAs). Sensing the rising NPA issue, the RBI announced the PCA mechanism under which 11 banks were placed and these PCA norms led to curtailment of standard banking operations. In Graph No. we observe that during early 2017 the credit growth dipped drastically with some recovery witnessed around June 2017 to early 2018. However, the growth hasn't reached the 2012 levels.

Diagram No. 4: SCB non-food bank credit growth (y-o-y)



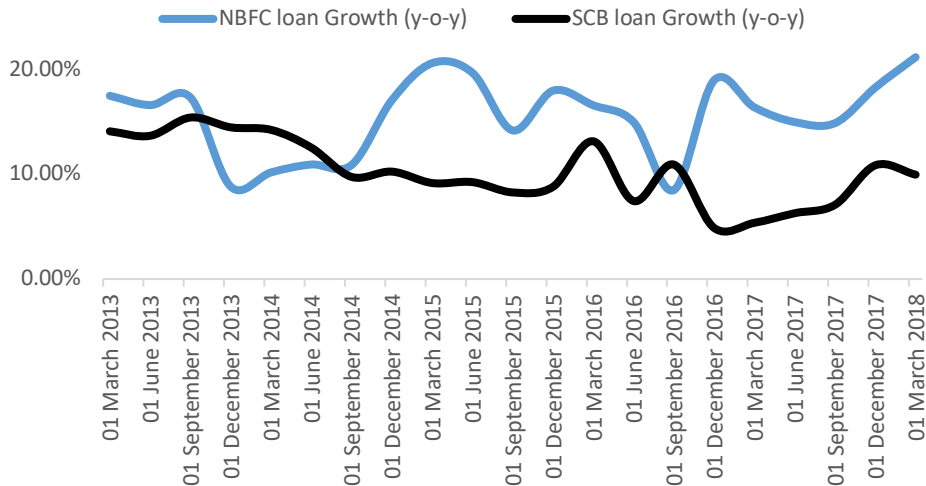
Source: RBI Bulletin, Scheduled Commercial Banks Business in India

To fill the lacuna created by the banking sector, NBFC lending witnessed an increase.

2) The growth in NBFC loan may be attributed to the revised norms, where Reserve Bank of India increased the borrowing limit for individual borrowers from INR. 50,000 to INR. 100,000 in April 2015⁵⁸. Hence, these two reasons have mostly contributed the NBFCs growth as they have partially substituted for the SCBs; since the SCB credit offtake has reached an all-time low.

Diagram no. 5 presents the comparison between loan growth of both SCBs and NBFCs over a period March 2013 to March 2018. NBFC loan growth outstrips the growth of SCBs. The loan books served as a complement to Indian banks. NBFI loan book increased to INR. 18,585 billion, up 156.93% over the past six years since 2012. NBFC loan growth outstripped bank loan growth in 17 out of the 21 quarters under study.

Diagram No. 5: NBFC loan growth Vis a Vis SCB loan growth



Source: Created by the authors, Reserve Bank of India, Financial Stability report

⁵⁸CARE Ratings, NBFC-Microfinance Institutions- Update on Regulatory Changes, April 2015, available on the internet at, <http://www.careratings.com/upload/NewsFiles/SplAnalysis/Microfinance%20Sector%20-%20Update%20on%20Regulatory%20Changes%20docx.pdf>, accessed on 22 Jan 2018

NBFCs loan growth has been in double digits owing to the banks facing NPA problems. 11 state run banks are under PCA where their lending and expansion activities have been curbed. RBI has put restrictions on Dena bank⁵⁹, Allahabad bank⁶⁰ for fresh lending. For IDBI, not only is the lending restricted but a LIC has been approached to acquire 51% stake in IDBI to ensure inflow of capital⁶¹. In Dec 2016 quarter, the NBFC loan growth was the least (8.5% y-o-y) compared to the previous quarters. The reason behind it was the demonetization that occurred in Nov 2016 where INR. 500 and INR. 1000 currency notes were withdrawn.⁶² Majority of the borrowers in NBFCs belong to medium to small means of income. Maximum business of these NBFCs conducted via cash was affected drastically and during demonetization loan delinquency rates increased drastically as borrowers were unable to honor their instalment payments. NBFCs in the form of Micro-Finance Institutions (MFIs) faced high delinquency rates in the range of 11-37%⁶³. Most of the NBFCs after the demonetization period rolled over the loans of the borrowers especially such as Janalakshmi financial services, Ujjivan Financial services, Bandhan, Fincare etc. This helped improve the aesthetics of their financial statements as their loan amounts were shown repaid and delinquency rates came down. However, Janalakshmi has not been able to handle the rollover of loans successfully and have been facing higher delinquency rates. First Half 2018 Gross NPA was reported at 29.9%. Even their pass through certificates (PTC) were downgraded to a 'D' rating⁶⁴.

⁵⁹ The Hindu, 11 May 2018, RBI bars Dena bank from lending, hiring, available on the internet at, <https://www.thehindu.com/business/rbi-bars-dena-bank-from-lending-hiring/article23856962.ece>, accessed on 25 July 2018

⁶⁰ The Times of India, 14 May 2018, RBI puts deposit, lending restrictions on Allahabad Bank, available on the internet at, <https://timesofindia.indiatimes.com/business/india-business/rbi-puts-deposit-lending-restrictions-on-allahabad-bank/articleshow/64163095.cms>, accessed on 25 July 2018

⁶¹ The Hindu Business Line, 17 July 2018, LIC may an open offer to buy IDBI bank shares, available on the internet at, <https://www.thehindubusinessline.com/money-and-banking/lic-may-make-an-open-offer-to-buy-idbi-shares/article24445703.ece>, accessed on 25 July 2018

⁶² The Hindu, 08 November 2016, Demonetisation of Rs.500 and Rs.1000 notes: RBI explains, available on the internet at, <https://www.thehindu.com/news/national/Demonetisation-of-Rs.-500-and-Rs.-1000-notes-RBI-explains/article16440296.ece>, accessed on 25 July 2018

⁶³ Micro Finance Institutions Micrometer reports, available on the internet at, <http://mfinindia.org/resource-center/mfin-publications/>, accessed on 25 July 2018

⁶⁴ ICRA reports, 18 January 2018, Janalakshmi Financial Services, available on the internet at, <https://www.icra.in/Rationale/GetRationaleFile/66568~Janalakshmi%20Financial-R-18012018.pdf>, accessed on 25 July 2018

5. How are these NBFCs funding their loan growth?

A NBFC funds its lending activities through 70% borrowing on its balance sheet. The funding composition of a NBFC typically forms debentures, bank borrowing, commercial paper, borrowing from other financial institutions etc. Table No. 4 presents' the funding composition of Indian NBFCs over the period 2013 to 2018. The funding composition of NBFCs is based on the interest rate cycle, typically when the interest rates go up the NBFCs depend on the banks for borrowing as Marginal Cost of funds based Lending Rate (MCLR)⁶⁵ is sticky; when the interest rates come down the NBFCs depend on the market debt securities such as commercial paper, debentures etc. Debentures and banks (47% of total NBFC total assets) have been a major source of funding for NBFCs. A decline is witnessed in the bank borrowing as a percentage of total NBFC assets from 19% to 15% of the NBFC balance sheet (INR. 19,671 billion) in March 2017. This is in light of the slowing banking system that is laden with non-performing assets as a result of which banks are unable to make new loans. However, in 2018 the bank borrowing has increased and returned to the previous levels.⁶⁶ Market interest rates were on a decline from November 2013 to January 2018. The base rate of a leading public sector lender suggests that in November 2013 the rate was 10% which consistently declined to 8.65% till January 2018⁶⁷.

⁶⁵ Definition of MCLR available on the Reserve Bank of India (RBI) website, <https://m.rbi.org.in/scripts/FAQView.aspx?Id=111>, accessed on 11 August 2018. MCLR is the lowest interest rate that a lender can offer. MCLR is closely linked with the repo rate and fund costs of the banks. Thus, if there is a change in the repo rate, it will have an impact on the bank loan rate offered to a borrower.

⁶⁶ The Economic Times, NBFCs lower exposure to banks rely on commercial papers and bonds, available on the internet at, <https://economictimes.indiatimes.com/industry/banking/finance/nbfc-lower-exposure-to-bank-loans-rely-on-commercial-papers-and-bonds/articleshow/45697536.cms>, accessed on 23 Jun 2018

⁶⁷ State Bank of India base rate (historical) available on the website at, <https://www.sbi.co.in/portal/web/interest-rates/base-rate-historical-data>, accessed on 11 August 2018

Table No.4: NBFC funding composition as a percentage of total NBFC assets and borrowings

	Mar-13	Mar-14	Mar-15	Mar-16	Mar-17	Mar-18P
Debentures	31.47%	32.22%	33.46%	31.30%	32.85%	32.26%
Bank Borrowings	19.88%	19.83%	18.78%	19.59%	15.94%	20.66%
Borrowings from FIs	1.38%	1.08%	0.94%	1.06%	1.49%	1.19%
Commercial Paper	3.67%	3.51%	3.87%	4.96%	6.52%	5.56%
Other Borrowings	8.64%	9.09%	9.68%	9.76%	8.69%	9.17%
As a % of Total Assets	65.04%	65.74%	66.73%	66.67%	65.49%	68.84%
	Mar-13	Mar-14	Mar-15	Mar-16	Mar-17	Mar-18P
Debentures	44%	45%	45%	43%	46%	42%
Bank Borrowings	28%	27%	25%	27%	22%	27%
Borrowings from FIs	2%	1%	1%	1%	2%	2%
Commercial Paper	5%	5%	5%	7%	9%	7%
Other Borrowings	12%	13%	13%	13%	12%	12%
As a % of Total Borrowings	91.92%	90.94%	90.26%	91.09%	91.01%	90.21%
Total NBFC assets (Bn)	12,852.39	14,111.13	14,767.30	17,231.10	19,671.79	22100
Total NBFC Borrowings (Bn)	9,093.25	10,201.10	10,918.76	12,612.79	14,156.03	16,865.34

Source: Created by authors, Reserve Bank of India, Financial Stability Report, Report on Trend and

Progress of Banking in India 2016-17, Page 144

NBFC floated commercial paper outstanding as a percentage of total commercial paper outstanding was around ~32% in March 2017⁶⁸. NBFC floated commercial papers formed roughly 49% of the total commercial papers outstanding in March 2014. During this year, NBFCs with a

⁶⁸ Zee Business, 22 Aug 2016, Why are companies flocking to 'unsecured' commercial papers?, available on the internet at, <http://www.zeebiz.com/india/news-why-are-companies-flocking-to-unsecured-commercial-papers-5238>, accessed on 24 Jan 2018.

high credit rating could raise funds through CPs at a rate that was 150 basis points lower than the average bank base rates⁶⁹. Again around 2016 – 2017, the NBFC floated CP share in the total CP outstanding increased from 24% to a steady 32% owing to increased demand from AMCs and a funding rate lower than the average bank base rates⁷⁰. Hence, NBFC floated CP funding has witnessed a phenomenal increase as a portion of NBFC funding during the period 2012 to 2018.

These NBFC floated commercial papers have investor participation from asset management companies (AMCs), banks and insurance companies. AMCs are major participants of these commercial papers⁷¹. The net exposure⁷² that AMCs have to NBFCs has steadily increased year on year from INR. 83 billion in March 2012 to INR 4056 billion in March 2018⁷³.

Indian banks direct exposure to the NBFC sector is INR. 4.9 trillion⁷⁴ of which NBFC floated commercial paper and debentures forms 40% (of the total INR. 4,996 billion) as on March 2017. Bank loans in the form of term loans and working capital loans still form the bulk of the exposure (55% of INR 4,996 billion). The 2017, Consolidated NBFC balance sheet break indicates that share capital and reserves form roughly 14 – 15% of the total NBFC D assets and 23% for the NBFC NDSI assets. The bank borrowing as reported in the gross deployment of RBI data is INR. 4,964 billion. However, taking an average of reporting as 92% of the gross bank deployment to NBFCs the figure is calculated at INR.4566 billion i.e. 92% of INR.4964 billion. The rest of the figures are estimated

⁶⁹ The Economic Times, NBFCs lower exposure to bank loans, rely on commercial papers and bonds, 31 Dec 2014, available on the internet at, <https://economictimes.indiatimes.com/industry/banking/finance/nbfc-lower-exposure-to-bank-loans-rely-on-commercial-papers-and-bonds/articleshow/45697536.cms>, accessed on 26 Jan 2018.

⁷⁰ India Infoline, Issuance of commercial paper rises, 03 Mar 2017, available on the internet at, https://www.indiainfoline.com/article/news-top-story/issuance-of-commercial-paper-rises-117030300249_1.html, accessed on 26 Jan 2018.

⁷¹ The Financial Express, Yields on NBFC commercial papers rise ahead of IPOs, 8 Sep 2017, available on the internet at, <http://www.financialexpress.com/market/yields-on-nbfc-commercial-papers-rise-ahead-of-ipos/846066/>, accessed on 26 Jan 2018

⁷² The AMCs included here are Bank run, Financial Institutions run and Corporate run AMCs

⁷³ Reserve Bank of India, Financial Stability Report, 2013, 2014, 2015, available on the internet at, <https://rbi.org.in/Scripts/FsReports.aspx>, accessed on 23 Jan 2018

⁷⁴ Bank exposure includes scheduled commercial banks such as private sector banks and public sector banks and foreign banks.

using the following assumptions for March 2018. Debentures is taken as an average of past 5 years ratio to the total assets i.e. 32.26% of INR.22,100 billion, borrowings from FI at 1.19% of INR.22,100 billion, Inter-Corporate Borrowings at 2% of total assets, Public deposits at 1.4% of total assets, commercial paper for NBFCs is 33% of the total CP issuances over a period of 3 years. CP outstanding in March 2018 were INR. 3,725 billion⁷⁵.

This higher dependence on the commercial paper funding due to lower bank lending to NBFCs and in order to keep the marginal cost of funds on the lower side has led to asset liability mismatch problems among NBFCs.

⁷⁵ CP outstanding published in RBI weekly statistical supplement. RBI website, available on the internet at, <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications>, accessed on 15 January 2019.

5. A How did the commercial paper funding lead to asset liability mismatch problems?

Asset Liability Mismatch (ALM) is considered to be a comprehensive and dynamic framework for measurement, monitoring and managing the market risk for NBFCs. When does a asset liability mismatch occur?

1. The primary source of funds for a NBFC is commercial paper (CP), debentures and bank loans. These funds raised through the CP need to be repaid to the investor or lender within a period of 1- 5 years.
2. The NBFCs usually provide loans for a longer period of time such as more than 5 years in case of a home loan or any other kind of infrastructure loan.
3. So when an NBFC provides a long term loan from funds with a shorter maturity, this situation is called an asset liability mismatch. This gives rise to two cases which are explained subsequently.

One would ask, why is it such an issue with an NBFC and not a bank. In case of a bank, the bank relies on depositor funds to lend. However, in case of NBFC these NBFCs can't accept demand deposits. NBFCs can accept public deposits only if the NBFC is an investment grade institution and to an extent of 1.5 times its net owned funds (NOF). In addition to this, the NBFC can accept deposits between a period of 12 months to 60 months and can pay a maximum interest of 12.5%⁷⁶. Hence, unlike a bank the NBFC faces more challenges to raise funds for its asset base of loans. The second issue is that in case a NBFC issues long-term debentures – this type of investment brings along with it the liability of a higher interest rate compared to the interest rate

⁷⁶ RBI website, All you wanted to know about NBFCs, 10 January 2017, available on the internet at, <https://www.rbi.org.in/Scripts/FAQView.aspx?id=92>, accessed on 01 December 2018.

charged on the commercial paper. Hence, to take the benefit of the lower interest rate of the commercial paper, NBFCs resorted to higher level of CP borrowing in the money market.

Case 1 for an asset liability mismatch: Shorter duration liability funding long-term loan

An NBFC may finance a loan granted worth INR. 5,000 for a duration of five years backed by commercial paper worth INR. 5000 issued with a maturity period of 91 days. Now post 91 days, the commercial paper has matures and the NBFC will have to either repay the amount to the commercial paper investor or roll over the commercial paper for another 91 days. In this case, the NBFC will have to ascertain that the CP is rolled over every 91 days otherwise, they will have to arrange for the INR.5000 from another source.

Case 2 for an asset liability mismatch: mix of shorter duration liability funding long-term loan

An NBFC may finance a loan granted worth INR. 5,000 for a duration of five years backed by commercial paper worth INR. 3,000 issued with a maturity period of 91 days, debenture worth INR. 1,000 issued with a maturity period of 182 days and a bank loan worth INR. 1,000 that has to be repaid monthly through instalments with interest. Now post 91 days, the commercial paper has matures and the NBFC will have to either repay the amount to the commercial paper investor or roll over the commercial paper for another 91 days. In this case, the NBFC will have to ascertain that the CP is rolled over every 91 days otherwise, they will have to arrange for the INR. 5,000 from another source.

The total commercial paper outstanding in the market was worth INR. 5,876.9 billion as on 31 October 2018 of which INR. 1,200 billion (i.e. 20% of the commercial paper market) belonging to NBFCs was due for a roll-over between the months' October to December 2018⁷⁷. In November

⁷⁷ The Financial Express, 23 October 2018, Indian NBFCs need to repay about Rs.1.2 lakh crore of commercial paper debt in October-December, available on the internet at, <https://www.financialexpress.com/industry/banking-finance/indian-nbfc-need-to-repay-about-rs-1-2-lakh-crore-of-commercial-paper-debt-in-october-december/1358391/>, accessed on 01 December 2018

alone, INR. 700 billion of the INR. 950 billion was due for redemption due to maturity of the instruments for top 50 NBFCs. These CPs function by rolling over for the coming period instead of repayment. However, the roll-over rate for top 50 NBFCs was at 40% of the average monthly issuances between June and August 2018 i.e. INR. 1,802 billion.

Table No. 5 displays the total commercial paper outstanding in the financial market at different time periods during April to mid-November. The Table in the first column indicates the amount of commercial paper outstanding, followed by the amount issued in column no. 2 and the range of the interest rate at which these commercial papers are issued in column no. 3 and finally in column no. 4 is the percentage of issuances in comparison to the total amount of commercial paper outstanding. The fourth column gives us a sense of the magnitude of the issuances in comparison to the outstanding. Typically, these paper become due for maturity every 90 days or so, in this situation every quarter, the same paper may be redeemed or may be rolled over. If the paper is redeemed the outstanding commercial paper reduces. However, when the paper is rolled over, the issuances may increase – but the net effect on the outstanding will remain unchanged. When new paper is issued the amount is added to the outstanding.

Hence the total outstanding commercial paper $_{(t)}$ = Previous balance of outstanding commercial paper $_{(t-1)}$ + New issuances $_{(t)}$ – Redemptions $_{(t)}$

In case of roll over;

Total outstanding commercial paper $_{(t)}$ = Previous balance $_{(t-1)}$ + (new issuances $_{(t)}$ + roll over $_{(t)}$) – redemptions $_{(t)}$. This new issuance also includes a portion from the roll overs.

Table No. 5: Commercial Paper Issuances between 30 April 2018 to 15 November 2018 and rate of interest

Fortnight Ended	Amount Outstanding (₹ Billion)	During the Fortnight		Amount issued as a % of Amount Outstanding
		Amount Issued (₹ Billion)	Rate of Interest (Per cent)	
	1	2	3	4
Apr. 30, 2018	4,476.90	567.70	6.35 - 12.31	12.7%
May 15, 2018	4,777.00	874.40	6.61 - 9.55	18.3%
May 31, 2018	4,668.90	850.20	6.89 - 9.84	18.2%
Jun. 15, 2018	5,076.10	1,341.60	6.25 - 15.86	26.4%
Jun. 30, 2018	4,918.30	1,267.30	6.16 - 11.19	25.8%
July 15, 2018	5,630.90	995.5	6.03 - 10.71	17.7%
July 31, 2018	6,395.30	1,677.10	6.19 - 12.47	26.2%
August 15, 2018	5,978.40	1,478.50	6.53 - 15.79	24.7%
August 31, 2018	6,323.00	1,561.20	6.44 - 10.40	24.7%
September 15, 2018	6,408.10	1,112.60	6.56 - 15.79	17.4%
September 30, 2018	5,562.00	1,125.20	6.84 - 11.18	20.2%
October 15, 2018	5,944.90	799.1	6.72 - 17.49	13.4%
October 31, 2018	5,876.90	949.3	6.87 - 10.38	16.2%
November 15, 2018	5,847.20	1,066.20	6.69 - 11.73	18.2%

Source: Created by authors, compiled from Reserve Bank of India Weekly Supplement, available on the internet at, <https://m.rbi.org.in/scripts/WSSView.aspx?Id=22288>, accessed on 01 December 2018.

We observe in Table No. 5 that the issuances as a percentage of the total outstanding witnessed a decline in mid-October with a simultaneous increase in the upper bound of the interest rate i.e. 17.49%. This suggests that there was a slight pressure in the commercial paper market for a brief while and gradually this pressure eased with interest rates coming to previous month levels. The roll-over rates for the subsequent months have resumed to 68 – 78%.

To off-set the dilemma of the thinning commercial paper market, the NBFCs have actively considered other options such as retail bonds⁷⁸. However, this option does not come for free. This

⁷⁸ LiveMint, 09 November 2018, 50 NBFCs need Rs70,000 crore in November to redeem commercial papers: CRISIL, available on the internet at, <https://www.livemint.com/Industry/uMYryUnPrtw9vocd00kh8L/50-top-NBFCs-need-70000-crore-in-November-to-redeem-commer.html>, accessed on 01 December 2018

option brings along with it a higher interest rate element. NBFCs have raised INR. 270 billion between April and September 2018. However, this was not sufficient to offset the slow- down in the commercial paper market. Keeping in mind the growing concerns over the IL&FS default and thinning liquidity in the market. The RBI provided funds through a special window for banks with Open Market Operations purchase worth INR. 360 billion in October and INR. 400 billion in November, which has brought some level of liquidity in the financial system. However, this special window was not provided to NBFCs.

During the period 20 September to 23 November 2018, the RBI undertook OMO purchases worth INR. 880.02 billion to introduce liquidity into the financial system (See: Appendix, Exhibit No. G).

However, these liquidity infusion steps cannot help rectify the Asset Liability mismatch for the NBFCs in the near term. To resolve this situation, the RBI introduced in early October the suggestion to revise the NBFC ALM norms so that the risk of constant roll-overs of loans and debt instruments is reduced⁷⁹.

To gain an insight into the NBFC ALM maturity, Table No. 6 on the next page provides the ALM for select five leading NBFCs in India.

⁷⁹ Business Standard, 06 October 2018, RBI to revise NBFC Asset-Liability norms over borrowing, lending mismatch, available on the internet at, https://www.business-standard.com/article/economy-policy/rbi-to-revise-nbfc-asset-liability-norms-over-borrowing-lending-mismatch-118100501175_1.html, accessed on 01 December 2018

Table No. 6: Select NBFC Asset Liability maturity

NBFC Name	Upto 1 year		1-3 year		3-5 year		Over 5 year	
	Asset	Liability	Asset	Liability	Asset	Liability	Asset	Liability
PNB Housing Finance (INR bn) Jun 2018	191.41	242.18	183.63	234.64	110.45	95.67	220.19	133.19
DHFL (US\$ bn)	5.1	3.1	4.4	4.3	4.4	2.8	2.4	5.2
Indiabulls Housing Finance (INR. bn)	389	343	646	632			379	438
HDFC (INR. bn)	870	757	2118	2360	-	-	1029	900
Bajaj Finance (INR. Crore) – Mar 2018	49136	25035	24738	29355	6205	8630	8322	25381

Source: Created by authors

We observe in Table No. 6 that the NBFCs such as PNB Housing Finance, HDFC and Bajaj Finance have a ALM mismatch in the period 1-3 years. However, the NBFCs such as DHFL, Bajaj Finance and India-bulls have a ALM mismatch over the 5 year period. This again reinforces that these NBFCs reliance of funding composition is higher on the short-term compared to the long-term borrowings. This introduces a roll-over risk which can destabilize the financial market.

A major investor in the NBFC issued commercial paper are mutual funds that have an exposure of around 60% of these NBFC CPs. As discussed earlier, eleven of the 42 AMCs are bank sponsored and have an exposure to the NBFC CPs, this makes banks face a twin exposure to a particular NBFC through:

- 1) Direct exposure: Loans and investments on their bank balance sheet
- 2) Indirect exposure: Portfolio investment in debentures and commercial paper of a NBFC through the bank run mutual fund arm.

However, the indirect exposure through the bank run AMC to the same NBFC is not fully accounted for in the banking system. RBI sets limits on the exposure taken by banks⁸⁰ and AMCs⁸¹ independently to NBFCs. However, the RBI doesn't provide any guidelines that cover joint exposure to a particular NBFC undertaken by a bank and the same bank run AMC.

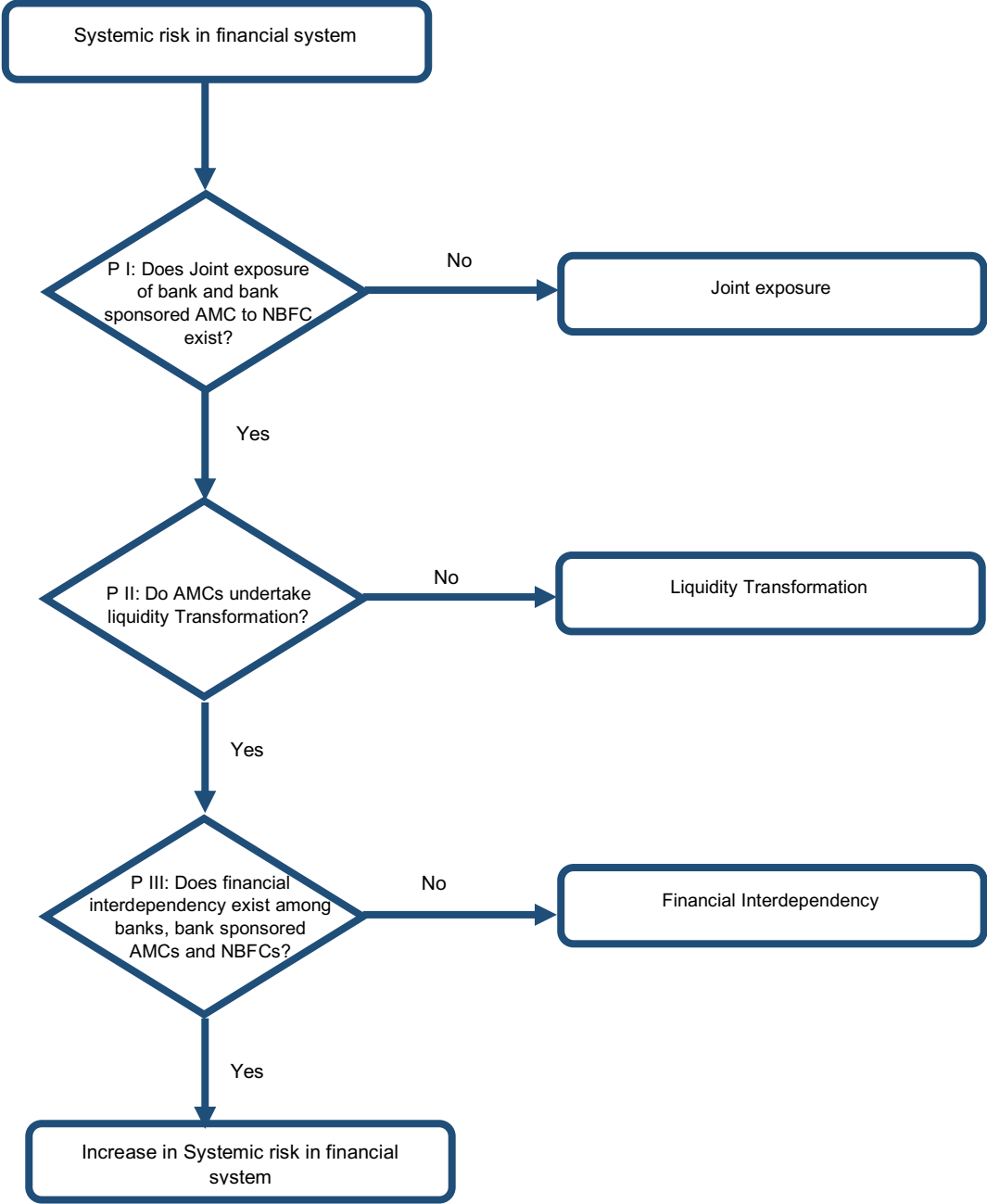
Although Basel III disclosure considers the bank risk at the consolidated level for both the parent bank and the bank-run AMC. However, the business norms for NBFC lending are divergent from banks, where a bank reports a non-performing asset (NPA) after 90 days and a NBFC reports it after 180 days. Hence, a bank may register the NBFC loan as NPA earlier than a NBFC may report it. In such a scenario, the bank may provide for the NBFC loan default, however at the AMC level that subscribes to the NBFC commercial paper and debentures. There may be limited reflection on their asset quality. In this setup, the banks overall systemic risk would tend to increase manifold. The direct and indirect exposure to a particular NBFC may be well within the RBI prescribed individual limits for a bank and AMC. However, the risk generated through this total exposure (direct and indirect) may be well beyond the banks' capacity to sustain the impact of default on the part of an NBFC. Authorities may wish to consider both direct and indirect exposure to a particular NBFC and what impact it might probably have on the parent bank using various

⁸⁰ Banks have a direct exposure limit for the NBFC lending activities and investment activities capped at 10% to 15% (of the banks' capital funds as per the last audited financial statements) for a single NBFC/NBFC Asset Financing Company/ NBFC Infrastructure Finance Company. RBI exposure limit to a single NBFC, available on the internet at, https://www.rbi.org.in/scripts/BS_ViewMasCirculardetails.aspx?id=9875, accessed on 19 Jan 2018.

⁸¹ AMCs have an exposure limit of 25-30% to the NBFC sector and a single issuer limit of 10-15% of the net asset value (NAV). Live Mint, SEBI relaxes debt fund exposure limit for housing finance companies, 11 Aug 2016, available on the internet at, <http://www.livemint.com/Money/kJdEWM3z3hecPWSwKMvZtK/Sebi-relaxes-debt-fund-exposure-limit-for-housing-finance-co.html>, accessed on 23 Jan 2018.

stress testing scenarios. With this background we arrive at our first proposition for this research and we sequentially develop the remainder two propositions based on the positive outcome from proposition I.

Diagram No. 6: Sequential development of propositions and testing



Source: Created by authors

Proposition I: Does joint exposure exist for a bank and its bank run AMC to NBFC/s?

- **To test whether a bank has direct and indirect exposure to a particular NBFC or multiple NBFCs.**
- **To test whether the indirect exposure is near RBI limits or below RBI limits of 10-15% of NAV.**

One of the reasons behind considering this line of argument is that parent banks own a majority stake in their sponsored AMCs. These parent banks also hold a majority stake in other NBFCs to which these bank sponsored AMCs may hold an exposure. (For details please refer to Table No. 11). Typically, a bank has to meet the lending restriction norms laid out by the central bank i.e. not to extend a loan to a particular NBFC beyond 10 – 15% of their net demand and time liabilities (NDTL). However, through their AMC they may extend short-term loans or long-term loans to NBFCs by subscribing to their commercial paper and debentures. Typically, an AMC is expected to function as a pass through that serves as a platform between an investor and a borrower; where an investor is enabled to withdraw his/her invested funds at any point in time. However, an AMC may indulge in the function of liquidity transformation where the fund manager may hold cash in excess of their requirements (investment and redemption) as the NBFC issued commercial papers and debentures that the AMC holds in its portfolio may be more illiquid than expected. This implies that AMCs might undertake liquidity transformation on behalf of the parent bank. This may lead to AMCs functioning as shadow banks.

Although Acharya et. al., (2013) has considered NBFCs as shadow banks he has not addressed that asset management companies (AMCs) might undertake liquidity transformation especially in an open-ended scheme.

5. B. Joint exposure of AMC to banks and NBFCs

At the first level, we try to establish if an indirect exposure exists to a particular NBFC or multiple NBFCs. We observe in Table No. 8 that the bank run AMCs have a direct exposure to NBFC or multiple NBFCs. Table No. 11 suggests that banks have cross-holdings in these mutual funds and hence tend to have an indirect exposure to NBFCs and other financial institutions. A glance at the individual bank or NBFC exposure as a percentage of AuM suggests that these mutual funds have remained in the limits set under RBI guidelines – 10-15%.

Of these 42 banks, we have eleven bank sponsored AMCs that contribute to 47% of the total assets under management (equity and debt schemes). Of these eleven AMCs, private sector bank sponsored AMCs form 35% of the total AUM in the mutual fund industry and public – sector bank sponsored AMCs form the remainder 12% (See Appendix: Exhibit No. C for list of Asset Management Companies included in this study). Among the public sector bank sponsored AMCs, Principal bought out the entire stake of Punjab National Bank in Principal PNB Asset Management Company (AMC)⁸². So, from August 2018, there are 10 bank sponsored AMCs. The study period considered is from Jan 2012 to Jan 2018 extended to May 2018 wherever data is available.

The three cases of mutual fund portfolios serve as an example to present the point that joint exposure exists between bank run mutual fund houses, banks and NBFCs. This is for a month whereas joint exposure has evolved over a period of time. Portfolio was compiled for ICICI, Axis and HDFC for the month of March 2018. This presents the aggregate of all the schemes offered under debt to an investor – liquid fund, money market fund, income funds, hybrid funds, corporate debt fund, short-term to medium term income funds and fixed maturity plans⁸³. We

⁸² MoneyControl, 29 August 2018, Principal buys out entire stake of PNB in Principal PNB Asset Management Company (AMC), available on the internet at, <https://www.moneycontrol.com/news/business/mutual-funds/principal-buys-out-entire-stake-of-pnb-in-principal-pnb-asset-management-company-2893791.html>, accessed on 03 October 2018.

⁸³ ICICI Prudential AMC, Types of Debt Funds, available on the internet at, <https://www.icicipruamc.com/InvestCorrectly/Basics-of-Mutual-Funds/Understanding-Debt-Mutal-Funds/Different-types-of-Debt-Funds.aspx>, accessed on 25 July 2018

have excluded the treasury securities under the portfolio and the AuM has been adjusted to reflect only cash, CBLO and other debt securities. It indicates how much exposure to each fund house have in terms of debt (commercial paper, debentures, zero-coupon bonds, certificate of deposits, pass through certificates) to a particular bank, non-banking finance company (NBFC) and small finance banks. We have included Housing Finance Companies (HFC) as well under the NBFC for the presentation of the table.

5. C. Results for Proposition I:

Sector-wise debt allocation for the entire mutual fund industry

The sector-wise portfolio allocation of the debt schemes (aggregate level) is presented in Table no. 7 on the next page. We observe in the table that allocation to the NBFC sector issued commercial paper has gradually to INR. 1,061.61 billion in March 2019 from INR. 475.16 billion in March 2015, a 22 percent compounded annual growth rate over the past five years. For the corporate debt, again the same story continues where investments in NBFC issued corporate debentures increased to INR. 1,104.77 billion in March 2019 from INR. 530.59 billion in March 2015, a 20 percent compounded annual growth rate over the past five years. This suggests that the dependency of NBFCs to borrow from the AMCs through instruments such as commercial paper and debentures is growing in double digits. However, this creates an issue when the NBFC depends on short-term CPs for funding compared to medium to long-term borrowing through debentures. The NBFCs indulge in funding their long term loans via short-term issued CPs. This may generate a liquidity risk at the NBFC in case the roll-over of the CP is not possible.

**Table No. 7: Sector-wise (NBFC, Real Estate and others) allocation of debt schemes from
March 2015 to March 2019**

Sector	March 2015	March 2016	March 2017	March 2018	March 2019
Government Securities	13.14%	13.98%	10.6%	6.78%	3.98%
Money Market Instruments	47.68%	41.92%	38.67%	41.21%	44.74%
Commercial Paper	16.35%	20.55%	22.94%	24.12%	23.68%
Real Estate	0.17%	0.27%	0.20%	0.26%	0.06%
NBFC	6.6%	5.96%	6.94%	8.28%	8.13%
Others	9.58%	14.32%	15.80%	15.58%	15.49%
Bank Certificates	27.41%	18.21%	8.06%	11.79%	15.49%
Treasury Bills	0.46%	0.55%	1.23%	0.51%	0.83%
CBLO/Tri-Partite Agreement	3%	1.81%	4.02%	3.55%	3.59%
Others MMI	0.46%	0.8%	2.42%	1.24%	1.15%
Corporate Debt	27.98%	30.76%	36.67%	38.07%	33.28%
Real Estate	0.62%	0.36%	0.45%	0.51%	0.51%
NBFC	7.37%	8.55%	8.92%	9.34%	8.46%
Others	19.99%	21.85%	27.30%	28.22%	24.31%
PSU Bond Debt	7.51%	10.28%	11.74%	11.03%	11.85%
Securitised Debt	0.01%	0.01%	0.25%	0.19%	1.06%
Bank Fixed Deposit	4.86%	3.77%	2.17%	3.27%	1.78%
Others	-1.19%	-0.72%	0.45%	-0.55%	-0.17%
Assets Under Management (INR. Billion)	7199.39	8283.53	12590.90	12692.24	13058.78

Source: Deployment of debt

Going further, we attempt to establish the joint exposure at the bank-run scheme levels for top 3 mutual fund houses ICICI, HDFC and Axis. We have not considered the longitudinal exposure of the AMCs to these NBFC floated debt instruments for the joint exposure hypothesis since the broad trend of security holdings across the years has been more or less similar.

With this background we arrive at our first proposition for this research and we sequentially develop the remainder two propositions based on testing and after ascertaining a positive outcome from hypothesis I.

Hypothesis I: To determine joint exposure between banks, NBFCs and other financial institutions

Null Hypothesis (Ho): Banks and Financial Institutions do not have a joint exposure

- i) Parent bank sponsored AMCs do not have exposure to a Parent bank – sponsored NBFC
- ii) Parent bank sponsored AMCs do not have exposure to other Banks
- iii) Parent bank sponsored AMCs do not have exposure to other Bank sponsored NBFC
- iv) The AMC does not have exposure to individual banks and NBFCs within RBI limits

Alternate Hypothesis (Ha): Banks and Financial Institutions have a joint exposure

- i) Parent bank sponsored AMCs have exposure to a Parent bank – sponsored NBFC
- ii) Parent bank sponsored AMCs have exposure to other Banks
- iii) Parent bank sponsored AMCs have exposure to other Bank sponsored NBFC
- iv) The AMC has exposure to individual banks and NBFCs within RBI limits

After we fail to accept the null hypothesis I, we proceed to formulating hypothesis II (mentioned in detail on Page No. 92),

Bank run debt mutual funds and their exposure to other banks and NBFCs (Non-Banking Finance Companies)

In March 2018, ICICI Prudential debt (open – ended) schemes had Assets under Management (AuM) of INR. 1,187.76 billion.

ICICI debt mutual funds:

On the whole banking and NBFC sector (including exposure to ICICI Bank and ICICI Home Finance) forms 60% of the debt schemes exposure. The ICICI debt (open-ended) schemes have other bank exposure of 27% to the total AuM as on March 2018. Other NBFCs form 33% of the total exposure of these debt schemes. Single entity exposure is within the regulatory norms of RBI i.e. 10% of the total AuM. The scheme portfolio includes public sector banks such as Union Bank, UCO bank, Bank of Baroda, Allahabad bank that have received a downgrade in their credit rating over the past one year due to the ongoing non-performing assets (NPA) dilemma.

On the private sector banks front, the scheme has the highest exposure to Axis bank that has been on the RBI radar for divergence reporting and increasing NPAs.

On the NBFC front, the ICICI debt mutual fund schemes have highest exposure to a bank affiliated institution i.e. HDFC.

Axis mutual fund

In March 2018, Axis Mutual fund has a debt exposure worth INR.366.6 billion of which, 68% forms exposure to (Public and Private sector) banks, Small Finance Banks (SFBs) and NBFCs. The overall banking sector forms 19.24% of the total debt AuM. Axis bank along with its owned subsidiaries form 1.56% of the exposure. Other private sector banks form 13.2% exposure. Public sector banks form 4.22% exposure. There is an overlap in the Banks across both ICICI and Axis schemes. Among

NBFCs, apart from EXIM, NABARD and SIDBI, the rest form 44.63% of the total debt AuM. Among NBFCs as well, there is an overlap between both Axis and ICICI mutual fund exposure to the same NBFCs. HDFC, PFC, Indiabulls and LIC Housing form the top exposure in these schemes. The schemes under Axis cover the debt under open-ended and close ended in addition to equity schemes that invest a portion in debt securities. Among ICICI and Axis debt mutual funds, the exposure to the banking sector is at a par levels.

HDFC Mutual Fund

HDFC mutual fund has AuM worth INR.1268.42 billion in March 2018. Of this amount around 8.48% exposure lies with HDFC, HDFC bank and its subsidiaries that are also NBFCs. HDFC has a presence in the housing industry in terms of lending. The HDFC mutual fund has an exposure of 44.04% of the total debt AuM to NBFCs. The highest exposure is to HDFC its own parent company, followed by Power Finance, LIC Housing, Indiabulls, Mahindra and Mahindra Financial Services and Aditya Birla Finance. The mutual fund has an exposure to 22.86% of the banks (both Public and Private sector banks).

Across bank sponsored mutual fund schemes, the top NBFC exposure remains with HDFC, Power Finance Corporation, Indiabulls Housing Finance, LIC Housing Finance.

Table No. 8: Joint exposure of Parent bank through NBFC – mutual fund arm to other banks and NBFCs

Sector	Percentage (% of total Debt AuM)	Total Amount (INR. Billion)	Percentage (% of total Debt AuM)	Total Amount (INR. Billion)	Percentage (% of total Debt AuM)	Total Amount (INR. Billion)
Fund wise						
	ICICI		Axis		HDFC	
Parent Bank and its NBFC subsidiaries	1.8%	21.90	1.56%	5.73	8.48%	107.56
Other Banks (PSB + Pvt SB – Parent Bank and its subsidiaries)	18%	216.31	17.68%	64.80	20.73%	262.92
Other Private Sector Banks	14%	171.69	13.2%	48.39	8.32%	123.81
Top 5 bank exposure						
Axis Bank	5.1%	60.91			2.32%	29.43
Indusind Bank	2.3%	26.76	NA	NA	0.69%	8.78
IDFC Bank	2.2%	26.18	3.41%	12.48	NA	NA
HDFC Bank	1.8%	21.17	1.36%	5.00		
South Indian Bank	1%	9.24	1.53%	5.59	0.57%	7.24
ICICI Bank			1.43%	5.24	3.07%	38.93
RBL	NA	NA	2.55%	9.36	NA	NA
Kotak Bank	NA	NA	NA	NA	0.43%	5.48
Other Public Sector Banks	4%	44.61	4.22%	15.47	11.96%	151.67
Top 5 bank exposure						
Bank of Baroda	1.6%	18.5	0.21%	0.75	1.69%	21.41
Union Bank of India	0.8%	9.89	0.6%	2.23	1.29%	16.40
Vijaya Bank	0.5%	6.01	2.78%	10.19		
SBI	0.3%	3.64	0.19%	0.69	2.17%	27.47
UCO Bank	0.27%	3.17				
Punjab National Bank	NA	NA	0.20%	0.74	1.37%	17.37
Andhra Bank	NA	NA	NA	NA	1.85%	23.47
Other Small Finance Banks (SFB)	0.78%	9.21	0.26%	0.93	0.45%	5.70
Ujjivan SFB	0.3%	3.95	0.24%	0.88	NA	NA
Equitas SFB	0.2%	2.76	0.01%	0.05	NA	NA
AU SFB	0.2%	2.49	NA	NA	0.45%	5.7
NABARD	5.3%	62.65	3.34%	12.25	5.26%	66.71
SIDBI	0.5%	5.32	0.92%	3.37	1.92%	24.32
EXIM	0.4%	4.84	0.75%	2.75	1.93%	24.53
Other NBFC	33%	397.13	44.63%	163.61	28.58%	362.42
Top 5 NBFCs						
HDFC	5.5%	65.22	5.05%	18.49		
Power Finance Corporation	2.9%	35.05	5.10%	18.67	4.27%	54.10
Indiabulls Housing Finance	2.6%	30.46	4.83%	17.70	3.18%	40.27
LIC Housing Finance	2.2%	25.64	2.30%	8.43	2.83%	35.91
India Infoline Finance Ltd	1.5%	17.91	NA	NA	NA	NA
Aditya Birla Finance	1.2%	13.77	NA	NA	1.78%	22.59
Dewan Housing Finance Ltd	NA	NA	4.49%	16.44	NA	NA
Edelweiss Commodities	NA	NA	2.30%	8.43	NA	NA
Mahindra & Mahindra Financial Services	NA	NA	NA	NA	2.21%	28.06
L&T Finance	NA	NA	NA	NA	1.72%	21.87

Source: Compiled by authors from monthly portfolio disclosure of mutual fund schemes for March 2018.

6. Financial institutions interdependency

Dwelling further on the joint/dual exposure we consider the interdependency between these financial institutions. Further in this section, Table No. 9 displays the net exposure of Banks, AMCs and Insurance companies to NBFCs. These NBFCs also include Housing Finance Companies (HFCs). One can observe that the net exposure of banks has increased annually 21.67% over the period 2012 to 2018. However, a striking observation is the phenomenal (~ 89%) annual increase in the net exposure of AMCs to NBFCs during the same period. This increased exposure was attributed to higher NBFC floated commercial paper (CP) and bond issuances during the period 2012 to 2018. Increased demand from AMCs side for the NBFC floated securities (debentures and commercial paper) has gradually shifted their portfolio composition exposure in their liquid and debt funds' portfolio from bank certificate of deposits. Earlier, AMCs portfolio composition for money market and liquid funds included more than 50% bank issued certificate of deposits⁸⁴. In late 2008, the bank run mutual funds were faced with redemptions to the scale of INR. 540 billion in the money market mutual funds. To enable the bank run mutual funds to honor their redemption claim commitments, the RBI provided a repo-facility to the parent banks worth INR. 600 billion for a fortnight.⁸⁵

Around late 2009, SEBI abolished the entry load or upfront commission for mutual fund distributors. Majority of the mutual fund distributors were banks. Distributors, who earned a commission from asset management companies for selling mutual funds to investors, no longer had an incentive to do so. Second, RBI was concerned that there could be regulatory arbitrage in the form that mutual funds could be lending to companies that banks could not directly lend to⁸⁶. A look at Diagram No. 7 that presents the investment composition of scheduled commercial banks (SCB) to the total other

⁸⁴ ACE Mutual Fund database, Analysis of Top 5 money market funds and liquid funds' portfolio composition

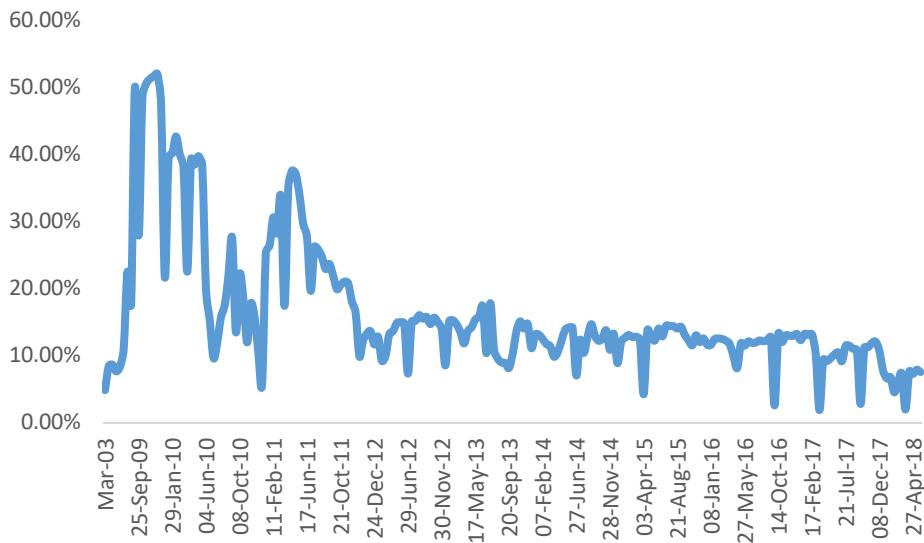
⁸⁵ Mutual Funds and Market Development in India, 07 Jul 2011, available on the internet at, https://www.rbi.org.in/scripts/BS_SpeechesView.aspx?id=584, accessed on 23 Jan 2018.

⁸⁶ LiveMint, Banks close liquidity tap for mutual funds, 18 May 2010, available on the internet at, <https://www.livemint.com/Home-Page/tP7lQImEp7HDp7kzN2vojO/Banks-close-liquidity-tap-for-mutual-funds.html>, accessed on 14 July 2018

investments. Typically, the investment of scheduled commercial banks comprises of Statutory Liquidity Reserves (SLR), commercial paper, shares and bonds or debentures issued by (PSUs, Private corporate and others), instruments issued by mutual funds and financial institutions. The SLR typically forms 80% of the banks' investment and the remainder 20% is invested in other securities such as commercial paper, shares, bonds, mutual funds and financial institutions. From 2003 onwards, SCB investment exposure to mutual fund instruments was on the rise and from Sep 2009 to Dec 2009. The SCBs investment in mutual funds was an average 40 – 50% of the total other investments figure INR. 3,018 billion (average of other investments between September to December 2009).

Diagram No. 7: Scheduled commercial banks investment in mutual funds during the period 2003 to 2018

The diagram presents mutual fund investments as a percentage of other bank investments.



Source: RBI Bulletin, Scheduled Commercial banks Investments, period March 2003 to May 2018

To curb this interdependency among banks and mutual funds RBI imposed a limit on bank investment in debt oriented mutual funds at 10% of the banks' net worth in May 2011⁸⁷. Post this, the SCB investment in mutual funds continued to reduce. A look at the investment percentage of the total other investments shows a declining trend. We conducted a structural break test to see whether the data series witnessed a break point when an event occurred. Post the regulation that imposed limit on bank investment, a structural break occurred in December 2011 (Using Bai-Perron). Again in Jan 2017, the banks' investment in mutual fund schemes witnessed a structural break. This may be attributed to the effect of demonetization in November 2016.

Owing to banks sitting on liquidity due to demonetization, banks converting funds raised via special dollar swap window and overseas borrowing in Indian rupees. RBI in its press statement suggested that swap windows for Foreign Currency Non-resident (Banks) – FCNR⁸⁸ and banks overseas borrowings had mobilized USD 34 billion. Increased liquidity in terms of cash balances at the banks reduced the banks' need to borrow in the money market through certificate of deposits (CDs). Banks were trying to be conservative in terms of extending new loans to borrowers as the NPAs were gradually on the rise and the restructured asset recognition window was closing. Bank issued certificate of deposits (CD) outstanding have more than halved to INR. 1,286.2 billion (October 2017) from INR. 3,410.54 billion (Mar 2010⁸⁹). Typically, AMCs used to invest 50% - 70% of their portfolio under the liquid and money market fund schemes in bank issued certificate of deposits⁹⁰. During the transition period, the mutual funds to fill up the lacuna created from the receding CD issuances started

⁸⁷ RBI Speeches, Mutual Funds and Market Development in India, Jul 2011, available on the internet at, https://www.rbi.org.in/scripts/BS_SpeechesView.aspx?id=584, accessed on 24 Jan 2018

⁸⁸ Business-Standard, 04, December 2013, Fund houses resort to deploying in CBLO, available on the internet at, https://www.business-standard.com/article/markets/funds-houses-resort-to-deploying-in-cblo-113120400826_1.html, accessed on 25 July 2018

⁸⁹ RBI Bulletin, Issue of Certificate of Deposits by Scheduled Commercial Banks, Feb 2011, available on the internet at, https://www.rbi.org.in/Scripts/BS_ViewBulletin.aspx?ld=11959, accessed on 23 Jan 2018.

⁹⁰ ACE Mutual Fund database, Average portfolio composition of top 5 liquid and MMMF schemes from 2011 to 2017

investing heavily in CBLOs⁹¹. This gave them access to CBLO – a money market instrument where mutual funds could lend their excess money for short periods on in lieu of a collateral such as Treasury bills, central government securities etc. with a maturity left of six months. Non-banks were not allowed participation in this market and this market operated through the Clearing Corporation of India Limited (CCIL).

Around June and July 2011, the CBLO trade value increased 28.36% and 34.29% year on year respectively to INR. 10,741 billion and INR. 10,661 billion respectively. The increase in CBLO was due to the excess supply from mutual funds as short-term liquid funds matured⁹². Again between August 2012 to March 2014, the CBLO trade value witnessed a steady year on year increase due to inflows from mutual fund houses into the money market system and the Foreign Currency Non-Resident (FCNR) swaps⁹³. In September 2015, Amtek Autos' debt instruments rating status was downgraded to default as it was unable to make a payment on its coupons. During the year FY 2015-16, the debt instruments of Jaiprakash Associates, Monnet Ispat, Punj Lloyd, Electrosteel Steels, Shree Rama Newsprint, Uttam Sugar Mills, Hindustan Construction, Mukesh Steels, Sanghvi Forging and Yash Papers were downgraded to default rating⁹⁴. In all 100 companies (20 listed and 76 unlisted) have been assigned the downgraded status. Around early 2017, the CBLO segment witnessed a phenomenal increase (i.e. average 53.23% year- on – year) to average INR. 22,536 billion during the period Jan 2017 to Apr 2017. A part of the increase in the CBLO activity was attributed to mutual funds

⁹¹ Business Standard, 4 December 2013, Funds houses resort to deploying in CBLO, available on the internet at, https://www.business-standard.com/article/markets/funds-houses-resort-to-deploying-in-cblo-113120400826_1.html, accessed on 14 July 2018

⁹² NDTV, 23 Nov 2011, CBLO falls as mutual funds flush with cash on liquid plans maturity, available on the internet at, <https://www.ndtv.com/business/cblo-falls-as-mutual-funds-flush-with-cash-on-liquid-plans-maturity-13361>, accessed on 25 July 2018.

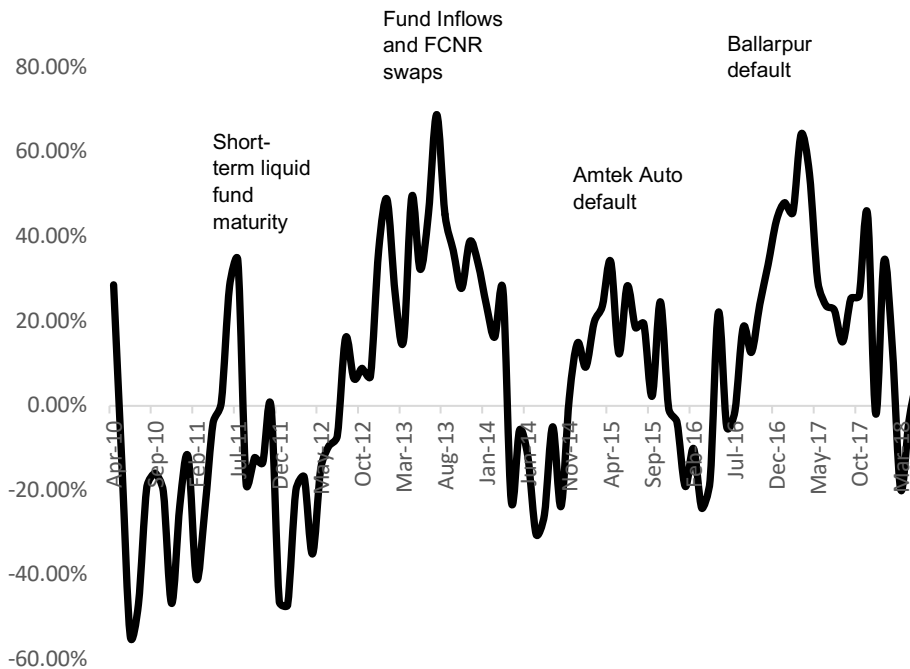
⁹³ Times of India, 30 September 2013, FCNR swap deal: What it means for NRIs, available on the internet at, http://timesofindia.indiatimes.com/articleshow/23309748.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cpst, accessed on 03 May 2019

⁹⁴ Financial Express, A hundred firms downgraded to 'default' status since April, available on the internet at, <https://www.financialexpress.com/industry/a-hundred-firms-downgraded-to-default-status-since-april/142973/>, accessed on 14 July 2018.

parking INR. 1,146.70 billion in CBLO due to a downgrade in the company Ballarpur Industries Limited (BILT) rating to default.

We also conducted the Bai-Perron multiple breakpoint⁹⁵ test on the CBLO trade growth data from the period dated 2010 to May 2018 and found that multiple breaks were found at August 2012, April 2014, November 2014, Feb and August 2016 and April 2017. These breaks were consistent with the events that occurred during the period as enumerated above in the paragraph.

Diagram No. 8: CBLO trade value growth (y-o-y) during period Apr 2010 to May 2018

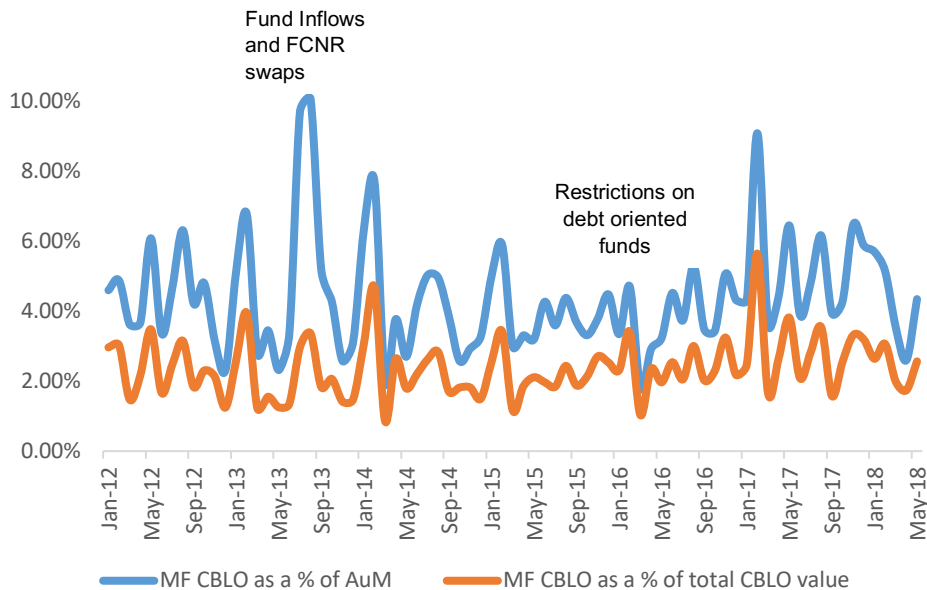


Source: CCIL website Rakshitra Archives, available on the internet at, <https://www.ccilindia.com/Research/CCILPublications/Pages/RakshitraArchive.aspx>, accessed on 14 July 2018

⁹⁵ Bai Perron Multiple breakpoint, available on the internet at, http://www.eviews.com/help/helpintro.html#page/content%2Fmultibreak-Working_with_Breakpoint_Equations.html%23, accessed on 25 July 2018

From Diagram No. 8, we understand that when there is a stress event there is an increase in the CBLO activity. However, when the stress event subsides the CBLO activity reverses to the normal⁹⁶. In continuation with the stress event, mutual fund exposure to CBLO increases during the period of a stress event. For example, when in early 2017 Ballarpur Industries debt instruments received a downgrade to 'D'. Mutual fund houses increased their exposure to more CBLO to keep a buffer in case investors redeemed their units.

Diagram No. 9: MF CBLO exposure from Jan 2012 to May 2018



Source: SEBI website, deployment of funds by all mutual funds – debt funds, available on the internet at, <https://www.sebi.gov.in/statistics/mutual-fund/deployment-of-funds-by-all-mutual-funds.html>, accessed on 14 July 2018

During the same period the CBLO exposure of mutual funds as a percentage of AuM was as high as 10% in Jul 2013 and Aug 2013 i.e. INR. 584 billion to INR. 587 billion. Around Feb 2014, the exposure

⁹⁶ Stress is defined as a prolonged decline in the real market growth. Duprey, Klaus and Peltonen (2016), use markov switching models to ascertain periods of financial stress. The short summary is available on the internet at, <https://voxeu.org/article/dating-financial-stress-events-new-approach>, accessed on 25 July 2018

of MFs to AuM was 7.74% i.e. INR. 547.28 billion and 5% of total CBLO market value of INR. 11,653.44 billion. In Feb 2017, this percentage was very high i.e. 5.7% of the total CBLO value and the reason behind it was the rising defaults in the company issued debt instruments and mutual funds trying to maintain a cushion to meet the investor redemptions and being cautious while fund allocation.

Gradually, AMCs' shifted their portfolio composition from certificate of deposits to commercial paper in the debt oriented funds such as liquid and money market funds. Commercial paper used to form roughly ~30% of Net asset value (NAV) of a AMCs portfolio composition in 2011 that has increased to 70-80% of NAV in 2018. Similarly, the percentage holdings of bank issued certificate of deposits has decreased from 50-70% to roughly ~10% or less of the Net Asset Value (NAV) of a scheme. Increased investment in commercial paper led to a more than six times increase in commercial paper issuances to INR. 4,668.90 billion (May 2018) from INR. 760.56 billion (March 2010)⁹⁷. A major portion of this commercial paper that these AMC floated liquid and money market funds invest into belongs to NBFCs.

⁹⁷ RBI Bulletin, Issue of Commercial Paper by Companies, 2011, available on the internet at, https://www.rbi.org.in/Scripts/BS_ViewBulletin.aspx?Id=11960, accessed on 23 Jan 2018.

A similar trend was also observed in, bond issuances with a major participation from NBFC companies.

Table No. 9: Direct net exposure of Banks, AMCs and Insurance Companies to NBFCs

INR. Billion	March	March	March	September	March	March	March	March
	2012	2013	2014	2014	2015	2016	2017	2018
Banks (Net)	1513	1453	2919	1495	1595	2029	3739	4909
AMCs (Net)	83	624	756	312	1008	1489	3208	3818
Insurance								
Companies	780	880	965	1023	1760	1038	1898	2917
(Net)								

Source: Created by authors, Reserve Bank of India, Financial Stability Report, 2013, 2014, 2015, 2016, 2017, 2018, available on the internet at, <https://rbi.org.in/Scripts/FsReports.aspx>, accessed on 15 July 2018

We observe in Table No. 9 that the net exposure of AMCs to NBFCs has increased manifold to INR. 3,818 billion i.e. 46 times over the past six years whereas the bank exposure to NBFCs has increased 3.2 times over the six year period. The gap between bank and AMC exposure to NBFCs is narrowing down. This suggests that the AMCs are undertaking lending at a par to banks when it comes to NBFCs. Thereby indicating that they may be exposed to higher risks given they don't have a capital cushion like banks.

In Table No. 10, we present a few select banks' exposure to NBFCs as an example to indicate the percentage of exposure they have in terms of their fund base. Data for Top three private banks and the largest state owned bank - SBI is presented. These four banks form a 40% of the total advances in the banking system. ICICI exposure to NBFC has increased marginally from 6.54% in June 2015 to 7.40% in March 2018. Whereas, the bank and financial institution exposure has increased from 6.17%

of the total fund based exposure to 9.06%. HDFC has witnessed a reverse situation in the exposure to banks i.e. fund based exposure has reduced to 3.91%. This may also be attributed to the uncertainty in the banking sector due to the bad loans problem. However, aggregate NBFC and HFC exposure has increased during the same period from 6.07% to 7.32% in March 2018. Axis bank fund based exposure to Banks and Financial Institutions has remained more or less stable in the range of 7-8%. However, NBFC exposure has increased to 1.51% from 0.94% in June 2015. State Bank of India (SBI) fund based exposure to NBFC is on the higher side because these NBFCs many a times lend to priority sectors such as agriculture and allied activities, micro and small enterprises, housing, education, and other low income segments. As a public sector bank (PSB) the onus of priority sector lending largely lies on PSBs. Private sector banks have a presence in housing segment, however, they keep away from segments which might have social costs compared to profit generation options. Till 2011, banks were allowed to achieve the PSL targets⁹⁸ through NBFC refinancing. However, post 2011⁹⁹ the bank lending was treated as PSL only if the NBFCs lending rate was not more than 8% of the banks' rate. This demotivated a number of banks from engaging in lending to NBFCs.

⁹⁸ Reserve Bank of India, 18 April 2018, Priority Sector Lending –Targets and Classifications, available on the internet at, <https://rbi.org.in/scripts/FAQView.aspx?Id=87>, accessed on 25 July 2018

⁹⁹ Business Today, 24 February 2015, Review Priority sector lending norms open refinance window for NBFCs, says Equitas Holdings MD, available on the internet at, <https://www.businesstoday.in/union-budget-2015-16/executive-wish-list/union-budget-2015-16-p-n-vasudevan-equitas-holdings-nbfc/story/215836.html>, accessed on 25 July 2018

Table No 10: Select banks' exposure to NBFCs

Bank name	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar
	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018
ICICI NBFC	6.54%	6.79%	6.72%	6.48%	6.56%	6.70%	6.92%	6.95%	7.09%	6.80%	7.49%	7.40%
ICICI Bk and FI	6.17%	5.75%	6.57%	8.08%	5.98%	7.14%	5.91%	6.82%	6.34%	7.19%	7.18%	9.06%
ICICI	12.71%	12.54%	13.30%	14.56%	12.53%	13.84%	12.83%	13.77%	13.43%	14.00%	14.67%	16.45%
HDFC NBFC	4.12%	3.81%	3.97%	4.22%	3.96%	4.13%	4.98%	5.35%	2.80%	5.10%	4.42%	5.22%
HDFC HFC	1.95%	1.94%	2.07%	1.99%	2.20%	2.19%	1.96%	2.20%	2.19%	2.32%	2.27%	2.10%
HDFC Banking	6.16%	5.42%	4.66%	4.47%	4.50%	4.31%	3.28%	3.82%	4.90%	3.47%	2.78%	3.91%
HDFC	12.23%	11.16%	10.70%	10.69%	10.66%	10.63%	10.22%	11.36%	9.90%	10.89%	9.47%	11.24%
Axis NBFC	0.94%	0.95%	1.03%	1.13%	1.09%	1.37%	1.09%	1.51%	1.88%	1.81%	1.80%	1.51%
Axis Bk and FI	8.53%	8.21%	8.86%	6.76%	6.03%	9.04%	6.03%	8.51%	7.79%	7.35%	8.24%	8.55%
Axis	9.47%	9.16%	9.89%	7.90%	7.13%	10.41%	7.13%	10.01%	9.67%	9.16%	10.05%	10.06%
SBI NBFC	11.05%	9.54%	10.52%	10.71%	10.64%	9.86%	12.03%	10.39%	10.11%	11.56%	12.76%	12.51%

Source: Created by authors, Banks Pillar 3 disclosure norms, SBI data is available from 2015

onwards. Hence, the other banks data is presented from the SBI date till latest March 2018.

RBI has laid out norms that curtail their exposure at 10-15% of the banks net owned funds to a single NBFC¹⁰⁰. Earlier we discussed about how a parent bank may have exposure to a particular NBFC and its AMC may also have an exposure to that NBFC. This amounts to dual exposure. For example, ICICI bank, HDFC bank and Axis bank have a fund based exposure to Indiabulls Housing Finance. Similarly, Axis bank, ICICI bank and HDFC bank also have a fund based exposure to Dewan Housing Finance Limited (DHFL).

¹⁰⁰ RBI, 01 July 2013, Master Circular- Bank finance to NBFCs, available on the internet at, https://rbi.org.in/scripts/BS_ViewMasCirculardetails.aspx?id=8115#2, accessed on 14 July 2018

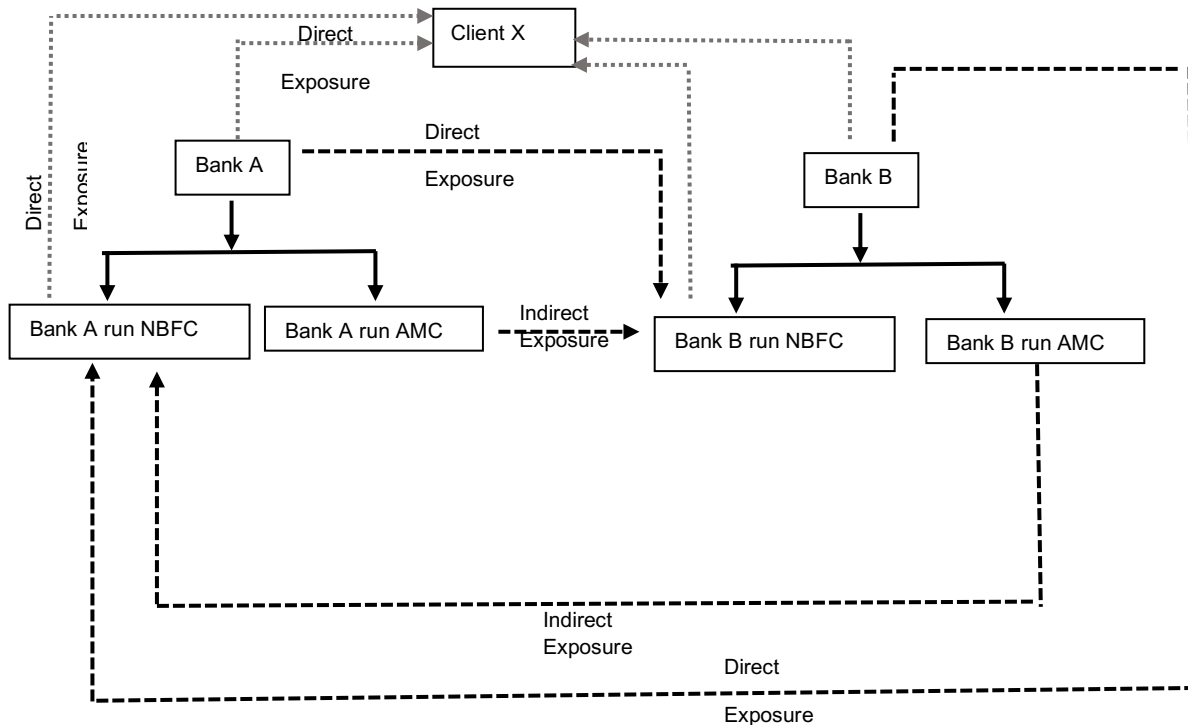
Existing banks, corporate houses and financial institutions (other than banks) may set up NBFCs. The NBFCs in our proposal are institutions that lend to retail and corporate clients. Now we discuss how a parent bank and its AMC that have exposure to another bank run NBFC or a corporate run NBFC may create a further web of interdependency in case of bank-run NBFCs. A bank-run AMC may invest in the securities floated by another bank-run NBFC or a corporate run NBFC. For example, Axis liquid fund may have an exposure to Aditya Birla Housing Finance and HDB Financial Services floated commercial paper or debentures. This situation adds to the interdependency among financial institutions such as banks, AMCs and NBFCs among each other. In case of a corporate-run NBFC, the same may have an exposure to multiple banks in terms of bank borrowing and multiple AMC exposure. If a parent bank and its AMC has exposure to such a corporate run NBFC and this NBFC faces issues. This situation will not only impact the parent bank, but also its AMC, the other banks that have lent to the NBFC and other bank run AMCs that have exposure to this particular AMC.

For example, Bank "A" has exposure to corporate run NBFC "I"; Bank "A" also has a AMC "M". This AMC "M" has also exposure to NBFC "I". The exposure of Bank "A" and AMC "M" to NBFC "I" account for the joint exposure. Now this NBFC "I" may also have exposure to other bank "B" which may also have its AMC "N". This makes the joint exposure of bank "B" and AMC "N" to NBFC "I" in the system. In case NBFC "I" witnesses a default in its loans. The Bank "A", AMC "M", Bank "B" and AMC "N" may end up having a joint exposure to NBFC "I". Although the exposure limits of Bank "A" and Bank "B" and AMC "M" and "N" may be within the individual RBI limits. On the whole, it may create a systemic risk for the whole financial system.

This is only one form of interdependency that is explained here. The other form of interdependency may be created when a bank and its AMC have an exposure to another bank run NBFC. This adds manifold to the systemic risk of the financial eco-system. For example, Axis Liquid Fund may have an exposure to ICICI Home Finance. In case ICICI promoted ICICI Home Finance faces NPA, this will not

only impact the ICICI Home Finance Promoter, other AMC's that may have an exposure to it, Axis Liquid Fund that may have an exposure to ICICI Home Finance and the parent bank Axis Bank. Hence, the interdependency in case of bank-run NBFC's the systemic risk increases slightly more than a corporate run NBFC. Diagram No. 10 presents how financial interdependency exists between financial institutions. In this diagram no. 10, Bank A, Bank B, Bank A run NBFC and Bank B run NBFC have an on-balance sheet loan exposure to Client X. Now, Bank A has a loan exposure to Bank B run NBFC and Bank A run AMC also has investment exposure to Bank B run NBFC. Similarly, Bank B has a loan exposure to Bank A run NBFC and Bank B run AMC also has investment exposure to Bank A run NBFC. In case the client "X" defaults it affects Bank A, Bank A run NBFC, Bank B, Bank B run NBFC, Bank A run AMC and Bank B run AMC directly. This is indicative of the interconnectedness that exists among financial institutions. The level of interconnectedness becomes more complex in reality.

Diagram No. 10: Financial Interdependency among financial institutions and banks

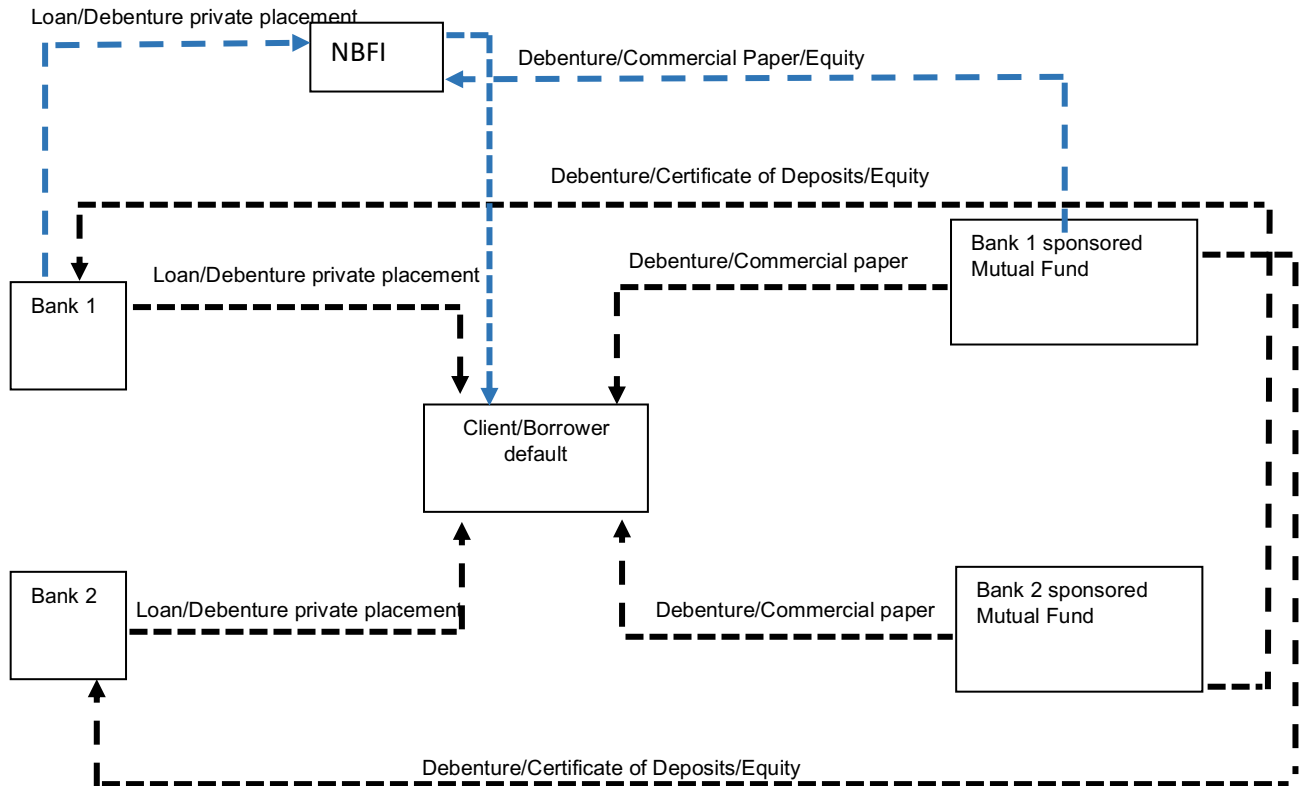


Source: Created by authors

6. A. Scenarios:

- Scenario A and B presented on the subsequent pages are a graphical representation of:
 - *Transmission of funds* between banks and financial institutions to a borrower:
 - **Fund flow from:**
 - Bank 1 to NBF
 - Bank 1 mutual fund arm to NBF
 - Bank 1 , Bank 1 mutual fund arm and NBF may have an exposure to a common client
 - Bank 2 and Bank 2 mutual fund arm has exposure to Client
 - Bank 1 sponsored mutual fund arm has exposure to Bank 2
 - Bank 2 sponsored mutual fund arm has exposure to Bank 1
 - “Risk” origination and how it will impact Bank 1 and Bank 2 and their mutual fund arm:
 - **Client defaults**
 - NBF is affected – Direct exposure to client
 - Bank 1 and Bank 1 mutual fund arm is affected – Direct exposure and Indirect exposure (Portfolio investment in NBF) to client
 - Bank 2 and Bank 2 mutual fund arm is affected – Direct exposure to client
 - Bank 1 mutual fund arm is also exposed to Bank 2 – Indirect exposure to client
- Difference between Scenario A and B:
 - Scenario A: Transmission of funds (without bank guarantee)
 - Scenario B: Transmission of funds (with bank guarantee)

Diagram No. 11: Scenario A - Transmission of funds (without bank guarantee)



Source: Created by authors

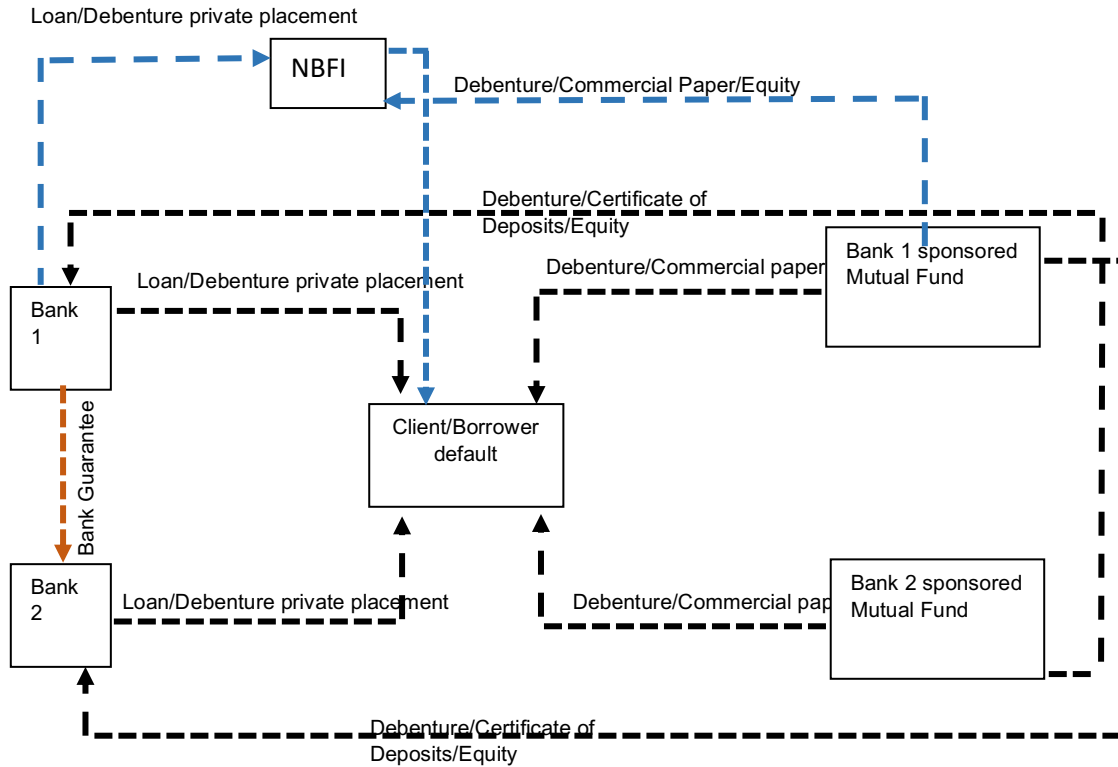
Non-banking Finance exposure, Bank 1 exposure to a) Borrower default, b) Bank 1 sponsored Mutual Fund exposure to borrower default, c) other banks floated debt or equity, d) NBFC and e) Bank 1 mutual fund exposure to NBFC floated debt or equity

- Bank 1 has exposure to Borrower through loans/debenture private placement
- Bank 1 sponsored Mutual fund has exposure to debenture/commercial paper issued by borrower
- Bank 2 has exposure to Borrower through loans/debenture private placement
- Bank 2 sponsored mutual fund has exposure to debenture/commercial paper issued by borrower

- Bank 1 sponsored mutual fund arm has exposure to Bank 2 issued debentures/ Certificate of Deposits/Equity
- Bank 1 has exposure to NBFC that undertakes direct lending to borrower
- Bank 1 sponsored mutual fund has exposure to NBFC that invests in borrower debentures/commercial paper/equity

Total exposure of Bank 1 to the borrower default = Direct lending exposure to borrower + Bank 1 sponsored Mutual fund exposure + Indirect Exposure through investment in Bank 2 + Investment in Bank 2 sponsored mutual fund + Indirect exposure of Bank 1 sponsored mutual fund arm to Bank 2 + Bank 1 direct lending exposure to NBFC which lends to borrower + Bank 1 sponsored mutual fund has exposure to borrower debentures/commercial paper/equity.

Diagram No. 12: Scenario B - Transmission of funds (with bank guarantee)



Source: Created by authors

Non-banking Finance exposure, Bank 1 exposure to a) Borrower default, b) Bank 1 sponsored Mutual Fund exposure to borrower default, c) other banks floated debt or equity, d) NBFC, e) Bank 1 mutual fund exposure to NBFC floated debt or equity and f) bank guarantee

- Bank 1 has exposure to Borrower through loans/debenture private placement
- Bank 1 sponsored Mutual fund has exposure to debenture/commercial paper issued by borrower
- Bank 1 exposure to bank guarantees issued on behalf of borrower
- Bank 2 has exposure to Borrower through loans/debenture private placement
- Bank 2 sponsored mutual fund has exposure to debenture/commercial paper issued by borrower

- Bank 1 sponsored mutual fund arm has exposure to Bank 2 issued debentures/ Certificate of Deposits/Equity
- Bank 1 has exposure to NBFC that undertakes direct lending to borrower
- Bank 1 sponsored mutual fund has exposure to NBFC that invests in borrower debentures/commercial paper/equity

Total exposure of Bank 1 to the borrower default = Direct lending exposure to borrower + Bank 1 sponsored Mutual fund exposure + Bank guarantee issued to Bank 2 on behalf of borrower + Indirect Exposure through investment in Bank 2 + Investment in Bank 2 sponsored mutual fund + Indirect exposure of Bank 1 sponsored mutual fund arm to Bank 2 + Bank 1 direct lending exposure to NBFC which lends to borrower + Bank 1 sponsored mutual fund has exposure to borrower debentures/commercial paper/equity.

This leads to a fundamental question, whether AMCs play the role of liquidity transformation in addition to the banks and NBFCs in India. The banks and NBFCs undertake the business of direct lending, whereas AMCs of these banks may be involved in an indirect route of lending through subscription of NBFC commercial papers and debentures. Although Acharya et.al, (2013) has only considered NBFCs as shadow banks and has not addressed asset management companies (AMCs) that might undertake liquidity transformation especially in an open-ended scheme. Here, the AMC may not function as a pass-through but may indulge in the function of liquidity transformation where the scheme may tend to hold cash in excess of their redemption requirements. This may lead to AMCs functioning as shadow banks.

6. B. Parent banks' exposure to its own subsidiary NBFCs: Indian banking system connectedness with other Financial Institutions

The Indian banking system is interlinked with a majority stake in a number of financial institutions. These subsidiaries are in the form of other non-banking financial institutions such as housing finance companies, asset management companies, securities arm, life and general insurance institutions. As we observe in the Table no. 11 that present financial institutions and their subsidiaries have cross-holdings in each other. This interlinking creates a possibility of systemic risk that may not only affect the individual institutions but also the holding institution. Another issue is that most of these Financial institutions are not listed which does curtail the risk on the front of the public but does generate a tremendous risk at the front of the investor in the company at the holding company level. A look at HDFC subsidiaries suggests that out of seven institutions only three are listed on the stock exchange. Under the ICICI wing, two out of five are listed on the exchange. With ICICI securities it was recently brought to notice via SEBI that to float the Initial Public Offering (IPO) its mutual fund arm subscribed under the institutional subscription. SEBI has ordered ICICI mutual fund to return INR. 2.4 billion invested in ICICI securities IPO¹⁰¹.

¹⁰¹ Economicstimes, 03 July 2018, SEBI orders ICICI MF to return INR.2.4 billion invested in I sec IPO, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/i-sec-ipo-sebi-asks-icici-pru-mf-to-return-rs-240-cr-of-investors-money-to-schemes/articleshow/64832383.cms>, accessed on 13 July 2018

Table No 11: Cross-holding across Financial Institutions in India

Financial Institution (Parent)	Financial Institution 1 (Stake)	Financial Institution 2 (Stake)	Financial Institution 3 (Stake)	Financial Institution 4 (Stake)	Financial Institution 5 (Stake)	Financial Institution 6 (Stake)
HDFC (Housing Development Finance Corporation)	HDFC Bank (18.53%- listed)	HDFC Investments (7.07%)	Gruh Finance (57.93% - listed)	HDFC Mutual Fund (59.99%)	HDFC Life (61.53% - listed)	
HDFC Bank	Housing Development Bank (HDB) Financial Services (95.86%)	HDFC Securities (97.67%)				
ICICI Bank	ICICI Housing Finance Corporation (100%)	ICICI Securities (100% - listed)	ICICI Mutual Fund (51%)	ICICI Lombard General Insurance (63.31% - listed)	ICICI Investment Management (100%)	
Axis Bank	Axis Securities (99.99%)	Axis Mutual Fund (75%)	Axis Finance (100%)			
Punjab National Bank	PNB HFC (39.08%- listed)	PNB Principal MF (21.38%)				
Canara Bank	Can Fin Homes (29.99% - listed)	Canara Robeco MF (51%)				
Kotak Bank	Kotak Securities (74.99%)	Kotak Mutual Fund (100%)	Kotak Prime (49%)	Kotak Mahindra Financial Services (73.36%)	Kotak Mahindra Pension Fund (95.71%)	Kotak Mahindra Life Insurance (77%)
State Bank of India	SBI MF (63.00%)	SBI Life Insurance (70.10%)	SBI Securities (100%)	SBI Pension Funds Pvt (20%)		
IDBI	IDBI MF (66.67%)	IDBI Capital market and Securities (100%)				
IDBI Capital market and Securities	IDBI MF (32.33%)					
LIC	LIC HFC (40.31%)					
LIC HFC	LIC HFL Care Homes Ltd (100%)	LICHFL Financial Services Ltd (100%)	LICHFL Mutual Fund (94.62%)			

Source: Compiled by authors, annual reports of banks and financial institutions

For Axis, Kotak, SBI and IDBI the subsidiaries are not listed in the financial system. These institutions have an interdependence amongst each other. Not only does the interdependence occur at the institution level but also to other institutions as well. These institutions form the largest share in the banking as well as in the asset management companies and insurance segment.

Proposition II: Do bank run mutual fund arms undertake liquidity transformation through indirect exposure of Non-Banking Financial Companies floated instruments?

- To test whether AMCs undertake liquidity transformation
- A positive relation between a AMCs scheme cash holdings and portfolio composition suggests liquidity transformation. (Sunderam and Cherenko, 2016)
- Liquidity transformation may cause financial stability problems (Goldstein et al (2015), Hanouna et al (2015), SEC (2015), FSOC (2014), Feroliet et al (2014), Chen et al (2010))

This leads to a fundamental question that does the systemic risk increase due to the joint exposure of the bank and its AMC to corporate run and bank run NBFCs. As shown in Diagram No.6, 7 and 8 there may be a possibility that the same client may have an exposure to multiple banks and NBFCs and these banks and NBFCs in turn may have an exposure to their AMCs. This will probably lead to a manifold increase the systemic risk faced in the financial system. This interdependency leads us to our final proposition

6.C. Results for Proposition II and Hypothesis II:

Proposition II leads us to formulate the Hypothesis II: To determine whether bank sponsored or financial institutions sponsored asset management companies undertake liquidity transformation

Null Hypothesis (Ho): Asset management companies do not undertake liquidity transformation

- i) A positive relation does not exist between a AMCs scheme cash holdings and portfolio composition suggests no liquidity transformation. (Sunderam and Cherenko, 2016)

Alternate Hypothesis (Ha): Asset management companies undertake liquidity transformation

- ii) A positive relation exists between a AMCs scheme cash holdings and portfolio composition suggests no liquidity transformation. (Sunderam and Cherenko, 2016)

After we fail to reject the alternate hypothesis II we proceed to test the hypothesis III

In this study we attempted to test whether mutual fund arms undertook liquidity transformation i.e. in debt oriented schemes. These debt schemes include money market mutual funds, liquid funds, GILT funds and debt schemes. Together these form 52% of the total AuM worth INR.21.26 trillion¹⁰² on 31 Dec 2017. Liquid and Money market funds form 13%, Gilt forms 1% and debt oriented schemes form 38% of the total AuM. Bank sponsored mutual funds form around 50% or more of the total AuM in the mutual fund industry as on 31 Jan 2018 with ICICI prudential and HDFC mutual fund leading the market with 13% and 12.9% share followed by State Bank of India (SBI) Kotak Mahindra mutual fund and Axis mutual fund at 9.2%, 5.3% and 3.3% respectively.

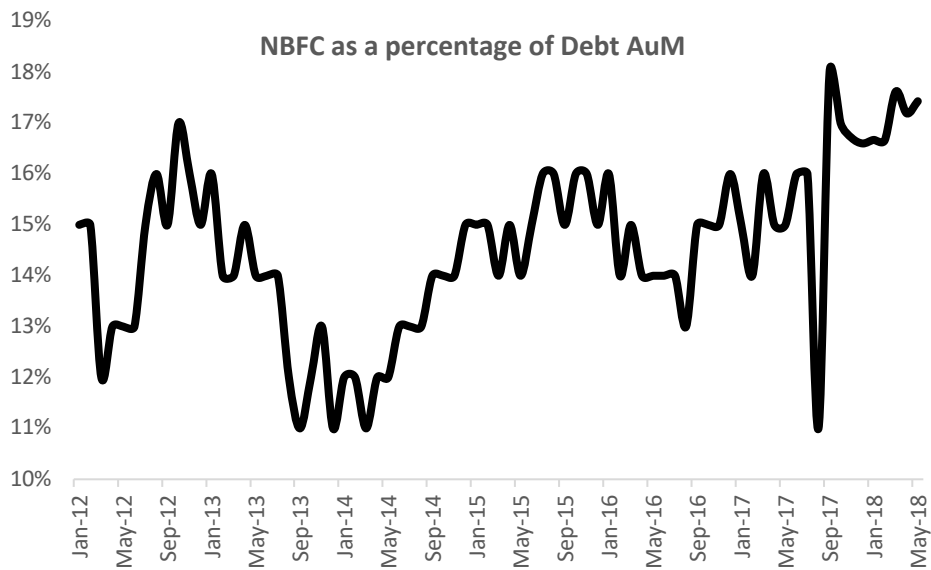
This study covered: a) overall debt oriented schemes and b) liquid fund of ICICI mutual fund. The reason for considering debt schemes is that these debt schemes subscribe to the NBFC floated

¹⁰² Association of Mutual Funds India (AMFI) AUM – Category /Age wise and folio data, available on the internet at, <https://www.amfiindia.com/research-information/aum-data/age-wise-folio-data>, accessed on 16 Mar 2018.

debentures and commercial paper which forms 44% of the total AuM on 31 Dec 2017 thereby supporting the NBFCs credit requirement.

Diagram No. 13: NBFC exposure to Debt schemes January 2012 – January 2018

This diagram presents the NBFC exposure that debt mutual fund schemes have on an aggregate level from January 2012 to May 2018. NBFC exposure is calculated as Total amount invested in NBFC floated instruments divided by total AuM.



Source: Securities Exchange Board of India (SEBI), Deployment of Debt funds reports

In Table No. 7, Page No. 67 we have provided a further break-up of the investments undertaken across debt schemes in various debt asset categories and the exposure to NBFC floated commercial paper and debentures over a period of March 2015 to March 2019.

Under SEBI guidelines the single sector exposure of mutual funds is capped at 30% of the net asset value (NAV) of a scheme i.e. NBFCs (this includes the housing finance companies)¹⁰³.

Under the liquid fund and money market mutual fund schemes, the NBFC floated securities form nearly 30% or more of their total AuMs. Although these are investment grade BBB and typically A and above rated. The reason for worry is that even top rated securities default. Ratings are opinions and recent occurrences of default at the hands of Amtek Auto, JSPL and others have left a mark on these mutual funds as they are exposed to these securities. Although, the example belongs to corporate floated securities, one can extend this example to NBFCs as well in two different ways.

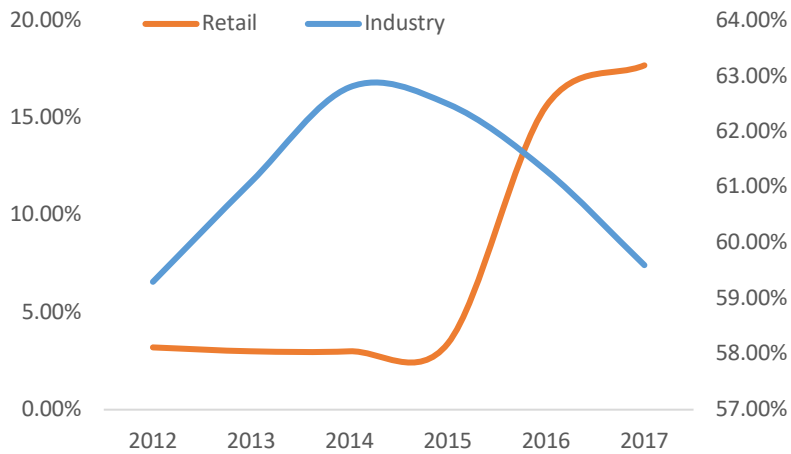
- A) Scenario A and B from Diagram No. 11 and 12, where a borrower defaults to whom both banks, NBFCs and the mutual fund arm may have an exposure.
- B) The NBFC may default on its securities i.e. commercial paper, debentures and others.

The reason for this stems from the fact that the sectoral deployment of the credit is focused on industry. In 2017, industry formed 59.6% of the total credit deployed by NBFCs.

¹⁰³ IndiaInfoline, The single sector exposure limit stipulated by SEBI for mutual funds is 30% of the net asset value of a scheme for NBFCs, available on the internet at, https://www.indiaonline.com/article/capital-market-mutual-funds-reports/the-single-sector-exposure-limit-stipulated-by-sebi-for-mutual-funds-is-30-of-the-net-asset-value-of-a-scheme-for-nbfc-116011200589_1.html, accessed on 16 March 2018

Diagram No. 14: Sectoral deployment of credit by NBFCs

This diagram presents the retail and industry credit deployment as a percentage of the total credit deployment of NBFCs. The left y-axis represents the industry percentages and the right y-axis represents the retail percentages. The x-axis presents the period from 2012 to 2017.



Source: RBI Bulletin October 2017

One observes that the sectoral deployment of the NBFCs like the scheduled commercial banking sector is tilted towards industry. However, since 2015 there is a sudden increase in the lending to the retail segment. With finite industry and retail participants, the possibility of both banks and these NBFCs having an exposure to the same borrower are extremely likely.

For testing whether liquidity transformation is undertaken by AMCs, we first consider the overall debt schemes portfolio composition. Here we look at the cash holding i.e. Collateralized Lending and Borrowing Obligations (CBLO) and T Bills and how they are related to the portfolio of securities held in the mutual fund scheme. Thereafter, we have checked for the second hypothesis as mentioned below.

Ha: A positive relation between portfolio securities and cash holding will suggest liquidity transformation undertaken

Ho: A negative relation between portfolio securities and cash holding will suggest no liquidity transformation undertaken

We have identified three propositions and have tested them using the methodology employed in the methodology section. To examine the propositions there are instances where the observed variables are not directly available, hence we have used proxy variables to represent the point that we are examining. Going forward we present the results under each of these three propositions.

Under the first proposition, we tested whether:

- a) Parent bank sponsored AMCs have exposure to a Parent bank – sponsored NBFC
- b) Parent bank sponsored AMCs have exposure to other Banks
- c) Parent bank sponsored AMCs have exposure to other Bank sponsored NBFC
- d) The AMC has exposure to individual banks and NBFCs within RBI limits

Joint exposure of AMC to banks and NBFCs

At the first level, we try to examine if an exposure exists to a particular bank, NBFC or multiple NBFCs. We observe in Table No. 8 that the parent bank sponsored AMCs has a direct exposure to a particular bank, NBFC or multiple NBFCs. A glance at the individual bank or NBFC exposure as a percentage of AUM suggests that these mutual funds have remained in the limits set under RBI guidelines i.e. within 10 – 15% of the total AUM. On the front of sector level exposure, the AMCs are within limits of 25 – 30% of total AUM.

Since, we have examined and have found evidence that joint exposure exists across these financial institutions. We proceed to test the second proposition.

Proposition II: Do bank sponsored AMC's undertake liquidity transformation?

- To test whether AMC's undertake liquidity transformation
- A positive relation between a AMC's scheme cash holdings and portfolio composition suggests liquidity transformation. (Sunderam and Cherenko, 2016)
- Liquidity transformation may cause financial stability problems (Goldstein et. al. (2015), Hanouna et. al. (2015), SEC (2015), FSOC (2014), Feroli et. al. (2014), Chen et. al. (2010))

We examined whether mutual fund arms undertake liquidity transformation i.e. in debt – oriented schemes. These debt schemes include money market mutual funds, liquid funds, GILT funds and debt schemes. Together, they form 52% of the total AUM worth INR. 21.26 trillion¹⁰⁴ on December 31, 2017. Liquid and Money market funds form 13%, Gilt forms 1% and debt – oriented schemes form 38% of the total AUM. Bank sponsored mutual funds form around 50% or more of the total AUM in the mutual fund industry as on January 31, 2018 with ICICI prudential and HDFC mutual fund leading the market with 13% and 12.9% share followed by State Bank of India (SBI) Kotak Mahindra mutual fund and Axis mutual fund at 9.2%, 5.3% and 3.3% respectively.

This study covers:

- a) Overall debt – oriented schemes,
- b) Liquid fund of ICICI mutual fund as an example

¹⁰⁴ Association of Mutual Funds India (AMFI) AUM – Category /Age wise and folio data, available on the internet at, <https://www.amfiindia.com/research-information/AUM-data/age-wise-folio-data>, accessed on 16 Mar 2018.

The reason for considering debt schemes is that these debt schemes subscribe to the NBFC floated debentures and commercial paper which forms 44% of the total AUM on December 31, 2017 thereby supporting the NBFCs credit requirement.

We first consider the overall debt schemes portfolio composition. Here we look at the cash holding i.e. Collateralized Lending and Borrowing Obligations (CBLO) and T Bills and how they are related to the portfolio of securities held in the mutual fund scheme.

We have tested for liquidity transformation through a proxy – the proxy being the relationship between cash holding and portfolio securities. If this relationship is positive it indicates liquidity transformation is undertaken in the system and vice-versa

Results for Proposition II (Continued)

We have employed a break-point model that employs Bai Perron L+1 Vs L sequentially determined breaks.

The data for the period January 2012 to January 2018 is considered in this study.

Table No. 12: Result for breakpoint regression

Dependent variable	CBLO + T Bills		
	Period 1	Period 2	Period 3
Date	Jan 12 – Nov 12	Dec 12 - Mar 17	Apr 17 – Jan 18
C	0.36	0.98***	0.28
Bank Certificate of Deposit	1.19	-0.94***	-0.09
Bank FD	-9.82**	-1.15***	-2.51***
Government Securities	0.70	-0.96***	-0.04
NBFC securities	-1.91***	-1.21***	1.18**
Real Estate	1.86**	-1.23**	9.10
Others	0.53	-0.81***	-0.57*
PSU Bond debt	-1.92***	-1.27***	-2.25**

***, **, * significant at level 1%, 5% and 10% respectively, Created by authors

This table is an indication of the relation between the portfolio and the cash holding of the debt mutual fund schemes. The period is split based on the Bai Perron measure to identify break points. Under this Table No. 12 data suggests that there exists a positive relation between cash holdings and NBFC securities and Real estate securities held in the portfolio. For every INR. 1 increase in the NBFC security the scheme has to hold INR. 1.18 extra. On a similar level, the scheme will hold INR. 9.1 for INR. 1 increase in real estate holding.

However, this doesn't account for the debt fund managers maintaining cash balances based on the previous years' trend of redemptions or the past few months redemption patterns or their holding cash till suitable investment opportunities arise or increased returns on the schemes. For the relation between cash holding (i.e. CBLO) and redemptions in the present year and over the past year refer to Appendix: Exhibit No. F.

All these factors have to be controlled for an unbiased result of the relation between cash holdings and portfolio securities.

Table No. 13: Result for least square regression with control for redemption (t-1)

Dependent variable	CBLO + Treasury Bills
Date	Jan 2012 – Jan 2018
C	-0.001
Bank Certificate of Deposit	0.03
Bank FD	-0.15
Government Securities	0.37**
NBFC securities	0.29
Real Estate	-0.38
Others	-0.13
PSU Bond debt	0.79**
R-square	70.6%
Adjusted R	67.3%

Source: Created by authors, ***, **, * significant at level 1%, 5% and 10% respectively

In Table No. 13, we have considered CBLO + Treasury (Cash holdings) as the dependent variable and the type of security offering as an independent variable. The results for the relation between suggest that government securities and PSU bonds display a significant positive relation with the cash holdings and is statistically significant at 5% levels of significance. NBFC floated securities and cash holdings also suggests a positive relation with each other. However, the relation is not statistically significant.

Table No. 14: Result for breakpoint regression with control for redemption (t-1)

Dependent variable	CBLO + T Bills (t)			
	Period 1	Period 2	Period 3	Period 4
	Jan 12 – Jul 13	Aug 13 – Feb 15	Mar 15 – Jun 16	Jul 16 – Jan 18
C	0.00	0.00	0.00	0.00
Bank Certificate of Deposit	0.03	-0.36**	-0.48***	0.56
Bank FD	-2.94***	0.35	0.63	-3.50
Government Securities	-1.24**	-0.34	0.02	1.06***
NBFC securities	1.30**	3.2**	0.22	0.04
Real Estate	59.96***	-13.16	9.67***	-0.63
Others	0.001	-0.96***	-0.20	0.11
PSU Bond debt	-0.07	1.97	1.09**	-0.47***
R-square				90%
Adjusted R				83.6%

Source: Created by authors, ***, **, * significant at level 1%, 5% and 10% respectively

Results presented in Table No. 14 suggest that there exists a positive relation between cash holdings and NBFC securities across the periods. However, Real estate securities held in the portfolio show a positive and negative relation with cash holdings intermittently. For every INR. 1 increase in the NBFC security the scheme has to hold INR. 1.30, 3.2, 0.22 or 0.04 extra. On a similar level, the scheme will hold INR. 59.6 and 9.67 for a INR. 1 increase in real estate holding. Another aspect is the positive relation displayed with Public Sector Units (PSU) bonds, bank Fixed Deposit and Government securities. This may indicate that these are not as liquid as they may appear. However, this needs to be further evaluated based on the credit spreads of PSU bonds and government securities during the periods when the relation between these turns positive. This may suggest that there may exist pressure on the liquidity of these securities.

The reasons behind a loss incurred at an AMC debt scheme may be a) The debt instrument that the scheme has subscribed to defaults on principal and interest repayment¹⁰⁵ b) the interest rate cycle is unfavourable with respect to the portfolio duration¹⁰⁶ c) the debt instrument is highly illiquid and the fund manager disposes it off at a discount to the purchase price.

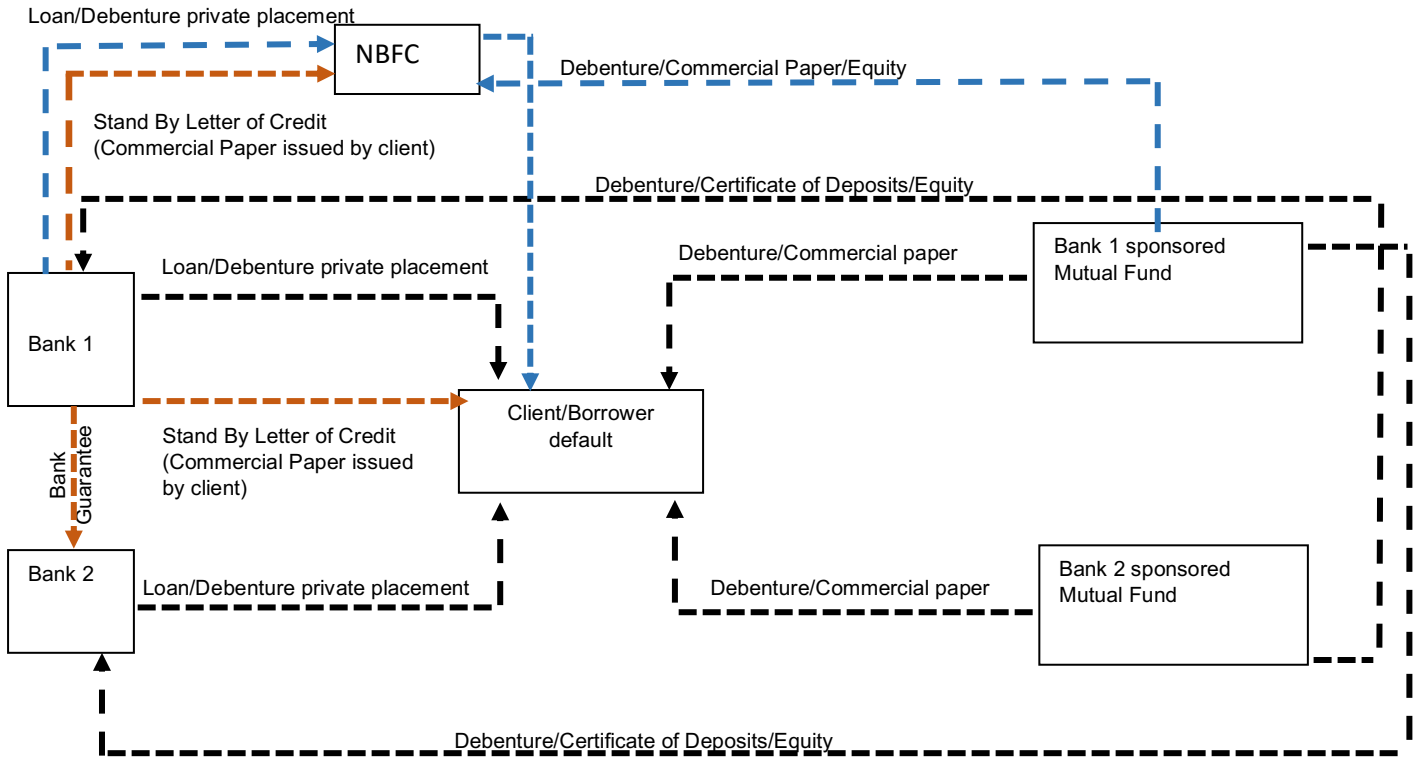
Dwelling further on the joint/dual exposure we consider the interdependency between these financial institutions. As discussed earlier while developing the proposition III, we have developed three scenarios under which the AMC and parent bank may come under pressure due to client default. In these three scenarios we consider NBFCs as the client that can default. The reason for choosing an NBFC client is that NBFCs also undertake liquidity, maturity and credit transformation. Hence, the trigger for a default on the part of the NBFC will occur only when a large scale NBFC client defaults or multiple clients default. These scenarios A and B have been developed in Diagram No. 11 and 12.

- Scenario A: Transmission of funds (without bank guarantees)
- Scenario B Transmission of funds (with bank guarantees)
- Scenario C: Transmission of funds (with bank guarantees and stand by letter of credit)

¹⁰⁵ In case of a corporate debt security such as a commercial paper and debenture. This scenario is possible. However, when the fund holds more of treasury securities. The default is not highly likely.

¹⁰⁶ The interest rate risk is inherent in every debt security and one can control the effect of this risk to a small extent.

Diagram No. 15: Scenario C - Transmission of funds (with bank guarantee and stand by letter of credit)



Source: Created by authors

This scenario C is an increment to the scenario B. Here, we add an arrow from Bank 1 to Client. Bank 1 also issues a stand by letter of credit (SBLC) on behalf of the client who issues commercial paper in the money market to raise working capital or short-term finance. This client may be a corporate house or a NBFC A SBLC is a lenders guarantee of payment to an interested third party in the event a client defaults on an agreement.

Example, recently Reliance Infrastructures' commercial paper worth INR 5 billion was to mature during the period May 2018 to October 2018. This commercial paper is backed by an SBLC issued by ICICI bank – this SBLC is irrevocable, unconditional and a non-transferable letter of credit¹⁰⁷.

This commercial paper is held at mutual fund houses such as Kotak, Franklin and Reliance. Schemes such as Kotak Money Market schemes, four franklin schemes and Reliance Nippons' debt schemes have an exposure of INR 4.6 billion to Reliance Infrastructure¹⁰⁸. In case of Reliance Infrastructures' default on the commercial paper, ICICI bank will be liable to pay the mutual fund houses an amount of INR 5 billion. The Reliance Infrastructure issued debentures have already been downgraded to "D" whereas the commercial paper still carries an "A1+ SO" rating since it is backed by ICICI bank¹⁰⁹. Franklin India Corporate Opportunities Fund INR 398.6 million (Commercial Paper), Franklin Income Opportunities Fund INR. 550.2 million (Commercial Paper), Franklin Indian Low Duration Fund INR. 99.6 million, Franklin India Income Builder Account INR. 398.99 million, Franklin India Dynamic Accrual Fund INR. 248.4 million as on March 2018¹¹⁰.

These SBLCs form a part of the off-balance sheet exposure and would be invoked only when a client defaults. This is typically a non – fund based exposure and hence doesn't feature in the regular risk mechanism system. This is one of the ways in which a bank can undertake shadow banking activities.

¹⁰⁷ Money Life, Will Reliance Infrastructure CP default have a domino effect on ICICI Bank?, available on the internet at, <https://www.moneylife.in/article/will-reliance-infrastructure-cp-default-have-a-domino-effect-on-icici-bank/54872.html>, accessed on 01 August 2018

¹⁰⁸ Business Standard, MFs with exposure to RInfra stare at losses on downgrade of debt paper, 02 August 2018, available on the internet at, https://www.business-standard.com/article/markets/mfs-with-exposure-to-rinfra-stare-at-losses-on-downgrade-of-debt-paper-118080201554_1.html, accessed on 03 August 2018

¹⁰⁹ Brickwork Ratings, 01 August 2018, Rating Rationale, available on the internet at, <https://www.brickworkratings.com/Admin/PressRelease/Reliance-Infrastructure-NCD-1Aug2018.pdf>, accessed on 25 July 2018

¹¹⁰ Franklin Templeton, Half report Portfolio statement disclosure, available on the internet at, <https://www.franklintempletonindia.com/downloadsServlet?docid=iq9o5q0w>, accessed on 25 July 2018

These scenarios lead us to answer our third proposition whether systemic risk increases due to inter dependence between parent banks and AMCs to clients such as NBFCs (Discussed later in this report). Recently a IMF ((International Monetary Fund) and World Bank FSAP (Financial Sector Assessment Program) report¹¹¹ and news reports¹¹² have been stressing on how debt mutual fund schemes exposure to NBFCs is posing a systemic risk for the financial system. Most of the scheme exposure lies in the liquid fund category which subscribe to highly rated commercial paper and debentures of these companies. However, the credit ratings are just opinions and may not reflect the true financial picture of the NBFCs in question. The Securities Exchange Board of India (SEBI)¹¹³ through its debt funds deployment report in September 2017 indicates that 3.78% of the total debt AUM exposure (INR 9508.3 billion) is to NBFCs commercial paper and 7.19% to NBFC floated bonds and debentures.

A typical look at the short-term mutual fund offerings suggest that top 18 money market fund schemes contribute 74% of the total AuM in that category (See: Table No. 15 on next page). In June 2017, the total AuM in Money Market Mutual Fund category was INR. 3449.235 billion, of which bank sponsored AMCs formed 55%. ICICI Prudential contributed 21% AuM, HDFC Mutual Fund 11%, SBI 8% and Axis 5%. Government run and financial institutions run contributed 45% of the total AuM. UTI – 15.11% followed by DSP – 3.5% and LIC – 3.2%

¹¹¹ The Dalal Street Investment Journal, FSAP raises concerns over rising MF exposure to NBFC bonds, 28 Dec 2017, available on the internet at, <http://www.dsij.in/DSIJArticleDetail/ArtMID/10163/ArticleID/32/FSAP-raises-concerns-over-rising-MF-exposure-to-NBFC-bonds>, accessed on 29 Jan 2018.

¹¹² The Economic Times, Debt MFs gorging on NBFC paper pose systemic risk, 27 Dec 2017, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/debt-mfs-gorging-on-nbfc-paper-pose-systemic-risk/articleshow/62262958.cms>, accessed on 29 Jan 2018.

¹¹³ SEBI Deployment of Debt Funds Monthly Report September 2017, available on the internet at, <https://www.sebi.gov.in/statistics/mutual-fund/deployment/2017/debtsep17.html>, accessed on 29 Jan 2018.

Table No. 15: Top 18 MMFs contribute 74% AuM under MMMF category

Scheme Name	Launch	AuM (INR.billion)	Market share
ICICI Prudential Liquid Plan	2005	308.47	8.9%
HDFC Liquid Fund	2000	226.02	6.6%
SBI Premier Liquid Fund	2007	215.36	6.2%
UTI Liquid Cash Plan	2003	205.18	5.9%
ICICI Prudential Flexible Income Plan	2002	198.60	5.8%
Axis Liquid Fund	2009	166.08	4.8%
HDFC Floating Rate Income Fund - Short Term	2007	144.43	4.2%
HDFC Cash Management Fund - Treasury	1999	138.18	4.0%
UTI Treasury Advantage Fund	2003	127.65	3.7%
DSP BlackRock Liquidity Fund	2005	122.48	3.6%
UTI Money Market Fund	2009	121.37	3.5%
ICICI Prudential Money Market Fund	2006	117.70	3.4%
LIC MF Liquid Fund	2002	112.31	3.3%
ICICI Prudential Savings Fund	2005	97.31	2.8%
IDFC Cash Fund	2004	97.19	2.8%
SBI Magnum InstaCash	1999	69.61	2.0%
UTI Floating Rate Fund - STP	2003	69.12	2.0%
DHFL Pramerica Insta Cash Plus Fund	2007	63.23	1.8%

Source: Created by authors

We run a sample for a bank sponsored mutual to evaluate the relationship between cash holdings and the individual securities based on the largest AuM scheme such as ICICI Prudential liquid scheme.

Table No. 16: ICICI Liquid Fund cash relationship with individual securities

Variable	2008 Jan- 2010 Apr	2010 May- 2012 Apr	2010 May-2013 Sep	2013 Oct - 2015 Mar	2015 Apr- 2016 Oct
C	0.34***	0.19***	0.34***	0.42***	0.39***
Corporate run NBFC* RD	-10.17***	-0.68	1.92**	2.39***	-0.08
Corporation*RD	0.01	17.00*	-1.96	-3.63	14.4**
FI & Other Bank run Sec	-1.00**	1.19	-1.79	-0.71	4.26***
FI run NBFC	-1.92	0.13	-1.91**	-0.69**	-1.09***
Other Bank run NBFC*RD	-2.58	-9.8*	-5.18	8.01	-4.67***
Other Banks*RD	0.58*	0.11*	-0.25	-1.03***	-0.23
NAVdummy	0.03	-0.10**	-0.01	-0.16***	-0.05
Govt & Govt run FI	-2.09***	26.48***	7.48	-15.11***	-0.95*
Govt run NBFC	-2.42**	-0.56	0.95	-0.74	-2.14***

Source: Created by authors

We observe in the above Table that the relationship between the cash holding and the corporate offered debt securities is positive. In addition to this, the FI and other bank offered debt securities also hold a positive relation with the cash holdings at the mutual fund level. This suggests that these securities are more illiquid compared to the other securities held in the mutual fund portfolio.

However, it would be in-appropriate to conclude that only bank sponsored AMCs display this liquidity transformation behavior. A look at the recent events where Principal AMC had an exposure to IL&FS debt securities suggested that cash holdings and the NBFC holdings display a positive relation. However, the relation and the magnitude of the coefficient depends on the level of illiquid securities held in their portfolio. The only issue why we are highlighting bank sponsored AMCs is because these AMCs tend to have an interdependency not only at one level but also at multi-layer level. We also argue that these bank run AMCs tend to provide funding to the existing borrowers who already have exposure on the parent bank on and off-balance sheet.

AMCs have been previously examined with respect to commission motivated brokers that steer consumers towards inappropriate offerings (Anagol et al., 2017 and Sane and Halan, 2017). Anagol et al. (2017) suggested that commission motivation is more prevalent among private banks where

- a) employees suggest products that help them earn higher commission as commission is directly related to sales of financial products
- b) the employee appraisal is related to the income generated from sale of financial products for the parent bank.

However, in the process of suggesting financial products (especially mutual funds), the employee may end up suggesting a product that may earn higher commission for the bank and the bank employee may overlook the interest of the depositor cum customer. To confirm this we follow the literature thread where Anagol et al. (2017) suggested that parent banks especially private banks sell inappropriate products to its customer to generate income for the bank and promote their own offerings. To investigate the same further, we collected and compared return data for the scheme-wise returns and the benchmark returns for ICICI, HDFC and Axis all private bank sponsored mutual funds. These three mutual fund arms contribute 31% to the total Indian mutual fund Assets under Management (AuM as on December 2018).

We compared scheme-wise since-launch return performance with similar period benchmark return performance over 13 quarterly periods between March 2013 and September 2018. In the table below, we find that more than 50% of the schemes reported at these three bank sponsored mutual fund arms underperform the benchmark returns under the since launch return categories. Underperformance is defined in this study as when the scheme returns are less than the benchmark returns. The difference between scheme returns and benchmark returns are negative.

Table No. 17: Percentage of Schemes Underperforming the benchmark from March 2013 to September 2018

This table presents the number of schemes underperforming the benchmark from March 2013 to September 2018. The compounded annualised yield returns considered are since launch for the scheme and the benchmark. In October 2017, SEBI had issued an order to mutual fund houses to categorise and rationalise the mutual fund schemes. Hence, equity schemes were classified into 10 categories, debt into 16 categories, Hybrid into six categories, solution oriented into two and other schemes into two. For more details visit the SEBI website link: https://www.sebi.gov.in/legal/circulars/oct-2017/categorization-and-rationalization-of-mutual-fund-schemes_36199.html. For reporting the outperformance or underperformance, this table does not consider the survivorship bias (for schemes) for this study.

Quarter	Axis Bank MF (Since Launch)	ICICI Bank MF (Since Launch)	Kotak Bank MF (Since Launch)
Sep-18	50%	41%	18%
Mar-18	57%	54%	29%
Sep-17	68%	67%	65%
Mar-17	73%	68%	64%
Sep-16	71%	70%	67%
Mar-16	69%	64%	38%
Sep-15	65%	60%	62%
Mar-15	44%	58%	69%
Sep-14	43%	1%	10%
Mar-14	27%	30%	32%
Sep-13	47%	17%	21%
Mar-13	63%	18%	NA
No of schemes Reporting returns in September 2018	62.00	279.00	95.00
Quarters Reported	12	12	11
No of Quarters where Returns are below Benchmark	7	7	5

Source: Compiled from Statutory Half yearly financial performance disclosure for mutual funds

These underperforming schemes form 40% of the total AuM held at each of these fund arms. A cursory glance at the annual commission earned at the fund arm, indicates that more than 50% of the total commission earned is generated by the parent banks in the case of ICICI and Axis. (We haven't considered the survivorship bias element in this report as it was not a part of this report and we have considered debt and equity schemes together.)

70-80% of these underperforming schemes tend to charge higher commission than the average mutual fund commission and fees charged ~ 1% of the total assets under management. For debt funds, the commission charged is on the lower side, however, the underperformance still exists at the same level as equity schemes. We also, checked whether the security in an underperforming mutual fund scheme and the parent bank had a loan exposure to the same security. For example, ICICI mutual fund and its parent bank had exposure to three Non-Banking Financial Companies (NBFC). Axis mutual fund and Axis bank had an exposure to five NBFCs. HDFC mutual fund and HDFC bank had an exposure to three NBFCs. (See Table No. 18 for Common Exposure of the same NBFC at both mutual fund portfolio and Parent Bank loan level).

Table No. 18: Common Exposure of NBFC at both mutual fund portfolio and Parent Bank loan level

This table displays the exposure of three parent bank sponsored mutual funds to the top ten NBFC holdings in their debt portfolios. The highlighted figures reported suggest that there exists a dual exposure to NBFC a) loan exposure at parent bank level on its balance sheet and b) Parent banks' mutual fund portfolio exposure. For example, Axis Bank has a loan exposure to Indiabulls Housing Finance and also subscribes to the commercial paper and debt instruments of Indiabulls through its mutual fund portfolio. Similarly, other exposures dual exposures of Axis are to HDFC, LIC Housing Finance (LICHFC), Dewan Housing Finance Limited (DHFL) and Edelweiss Commodities.

Sector	Percentage (% of total Debt AUM)	Total Amount (INR Billion)	Percentage (% of total Debt AUM)	Total Amount (INR Billion)	Percentage (% of total Debt AUM)	Total Amount (INR Billion)
Mutual Fund House	ICICI		Axis		HDFC	
HDFC	5.5%	65.22	5.05%	18.49	5.18%	65.68
Power Finance Corporation	2.9%	35.05	5.10%	18.67	4.27%	54.10
Indiabulls Housing Finance	2.6%	30.46	4.83%	17.70	3.18%	40.27
LIC Housing Finance	2.2%	25.64	2.30%	8.43	2.83%	35.91
India Infoline Finance Ltd	1.5%	17.91	NA	NA	NA	NA
Aditya Birla Finance	1.2%	13.77	NA	NA	1.78%	22.59
Dewan Housing Finance Ltd	NA	NA	4.49%	16.44	NA	NA
Edelweiss Commodities	NA	NA	2.30%	8.43	NA	NA
Mahindra & Mahindra Financial Services	NA	NA	NA	NA	2.21%	28.06
L&T Finance	NA	NA	NA	NA	1.72%	21.87

Source: Compiled from Portfolio Monthly Disclosure of Parent Bank sponsored Mutual Fund. The bank loan is a balance sheet based exposure in the form of working capital loans, secured or unsecured cash-credit, over-draft, secured or unsecured term-loans.

A bank employee assists the parent bank in cross-selling¹¹⁴ underperforming mutual fund schemes which generate higher incentives for the employee and the bank through sale of the product. However, does the bank employee knowingly assist the parent bank circumvent the bank regulatory capital requirement with respect to loan exposure to single/ group entities. Bank employees are not directly involved in the security selection of the mutual fund portfolio. However, commission charged on the scheme is determined between the mutual fund house and the distributors subject to the regulatory ceilings¹¹⁵. The parent banks' of mutual funds contribute the highest portion of the commission generated through sale and hence become a very important part while deciding the commission structure for the schemes. Although mutual fund fee income forms a minor part of the total parent bank fee income, but given the total exposure, the total quantum of fee may not be too small and be a cause of risk. This regulatory capital requirements circumvention allows the bank to indulge in lending to an entity without risking their own funds. The parent bank may be signalling to its fund house through this commission structure to invest in securities that may create common exposure to a particular entity (Corporate/NBFC) both at the bank level (through loans, investment and off-balance sheet exposures) and through its mutual fund arm (portfolio securities).

Bank employees can help to circumvent the regulatory norms and the parent bank may be accountable for the circumvention of the entity exposure regulatory capital requirement. The parent bank in India has regulatory capital requirements such as they cannot hold a loan exposure (both on Balance Sheet and off-

¹¹⁴ Cross-selling - Invite customers to buy related or complimentary products

¹¹⁵ What are the mutual fund commission regulatory caps? From October 2018, Mutual funds cannot use their profits to pay commissions to distributors and boost sales. Commissions will be paid out of the mutual fund scheme only. Upfront commission for one-time investments banned and for systematic investment plans reduced to 1% . TER for equity schemes to range between 2.25% for INR0-500 crore fund to 1.5% for INR.5,000-10,000 crore fund. For other schemes TER was to range between 2.0% for INR0-500 crore fund to 1.25% for INR.5,000-10,000 crore fund. LiveMint, 08 October 2018, available on the internet at, <https://www.livemint.com/Money/xzU7kiz82eyYaVsenYim6J/Opinion--MFs-will-now-be-cheaper-and-less-cheatable.html>, accessed on 26 March 2019

Balance Sheet) of more than 15% of their capital funds for single entities and 40% for group entities. When this limit is exhausted what would be the next best option to pursue. The parent bank through its influence over the mutual fund arm may extend its exposure to a single/group entity through the mutual fund investments. This may generate an overlap between the parent banks' loan exposure and its mutual fund arms portfolio exposure to the same single entity/ group entity.. The parent banks and the mutual fund arm have a common management and this generates an agent duality issue (Davis et al., 2007) where the parent banks management may influence the motivations and decisions of fund managers. This situation creates an interconnectedness between the mutual fund sponsors loan portfolio, investments portfolio and off-balance sheet exposures which may lead to a systemic risk. The interconnectedness is quite prevalent in the Indian context which leads to a potentially high systemic risk.

This gives rise to a situation of high systemic risk which leads us to proposition III.

Proposition III: Does consolidated bank systemic risk increase using joint exposure to a particular NBFC (bank sponsored or corporate sponsored) through direct bank exposure and indirect bank exposure (through the bank sponsored AMC or through SBLC issued to them for the commercial paper and debentures issued) to corporate and bank sponsored NBFCs.

- To test whether banks stress testing results will alter significantly when the joint exposure is considered.
- Should regulators such as RBI actively monitor the joint exposure undertaken by banks' and their mutual fund arm to the same corporate and bank run NBFC? At present, the regulators have laid out norms to curb exposure to NBFCs for banks and mutual funds schemes at an individual level. However, they have not considered the joint exposure to the same NBFC through both the bank and its mutual fund arm.

Hypothesis III: To determine whether the joint exposure among financial institutions and banks and liquidity transformation at the asset management company creates a financial instability in the financial system due to an event.

Null Hypothesis (Ho): Banks and Financial Institutions do not display interdependency

- i) Inward and Outward spillover does not exist among Public sector banks and Private sector banks
- ii) Inward and Outward spillover does not exist among banks (Public and Private) and Housing Finance Companies
- iii) Inward and Outward spillover does not exist within Public sector banks
- iv) Inward and Outward spillover does not exist within Private sector banks
- v) Inward and Outward spillover does not exist within Housing Finance Companies

Alternate Hypothesis (Ha): Banks and Financial Institutions display interdependency

- i) Inward and Outward spillover exists among Public sector banks and Private sector banks
- ii) Inward and Outward spillover exists among banks (Public and Private) and Housing Finance Companies
- iii) Inward and Outward spillover exists within Public sector banks
- iv) Inward and Outward spillover exists within Private sector banks
- v) Inward and Outward spillover exists within Housing Finance Companies

6.D. Results for Proposition III and Hypothesis III:

For the interconnectedness results, we have considered a sample of top 5 players from each of the three categories: public sector banks, private sector banks and housing finance firms. We have considered the spillovers over the last 150 days and considered these fifteen firms as a closed end system.

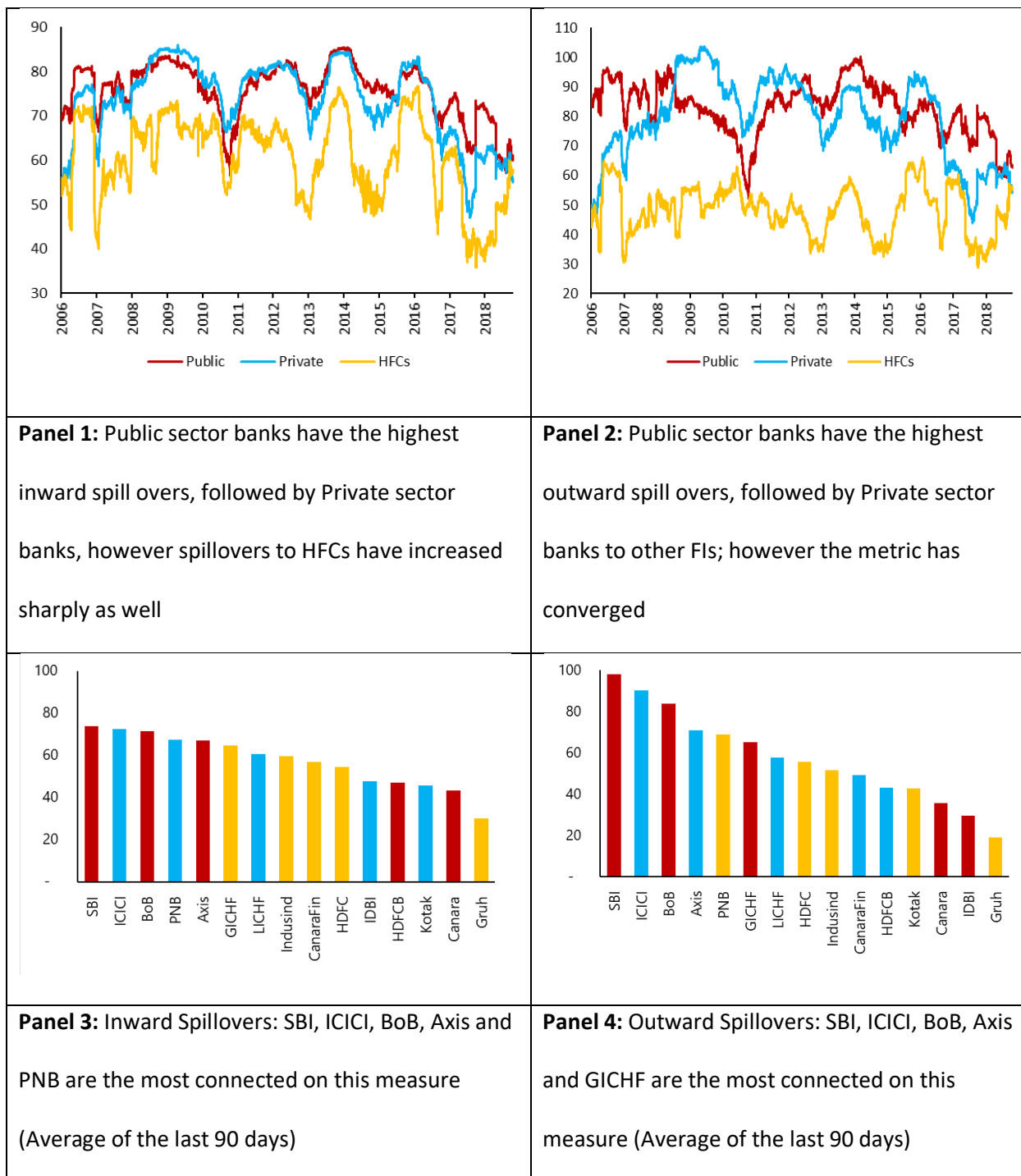
In terms of the spill-overs, we note that (diagram 3) HFCs have the lowest inward and outward spill-overs amongst the three categories. This is in-line with our priors given the relatively specialized and idiosyncratic nature of housing finance companies. On the other hand, public sector and private sector banks have similar inward and outward spillovers, on an average, as per the latest data points.

Considering the intertemporal nature of these spillovers, we note that 1) the interconnectedness across sectors peaked out in 2016 indicating that bank specific factors have started playing a much more important role in explaining the variance of returns. 2) Inward spillovers have historically been similar between public and private sector banks. However, the relationship broke from 2016-2018 beginning reflecting the severe asset quality pressures on PSUs. And 3) Spillovers from (as well as to) Housing Finance companies have increased rather sharply in the last few months (yellow line), with the HFC index now approaching that of public and private sectors. This is also indicative of the severe pressure on housing finance companies in the last few weeks, and reflects the building financial stress in the system and the potential spillovers to the rest of the system.

Panels 3 and 4 of Diagram No. 16 reflect the average inward and outward spillover for our sample firms (as per the latest data point). Within our selected sample of firms, we can see that the spillovers are the highest from the largest banks, namely SBI, ICICI, Bank of Baroda and Axis Bank. On the other hand, Gruh

finance has the least inward and outward spillovers. The result of the outward spillovers is in line with our priors and consistent with the size of the respective banks.

Diagram No. 16: Spill over between Private sector and Public sector banks and NBFCs - HFCs



Source: Created by authors

Looking at the pairwise indicator of outward spill overs in Matrix 1 (See: Matrix 1 on Page 122). There are a few interesting takeaways, we note that most of the groups have very high spillovers within the same group of banks. The matrix decomposes the variation of the equity returns for the banks on the y-axis, and how much of it is explained by banks on the x-axis. Public and private banks do have high spill-overs into each other, but there is not much spill-over to the housing finance sector. This also indicates the idiosyncratic nature of the housing finance sector.

While on an average, the interconnectedness of the HFC sector is relatively low, it is important to test whether interconnectedness exists between the bank and the bank sponsored NBFC. For these purposes, we highlight two results: a) the latest pairwise interconnectedness between each pair (Matrix 1: indicates the proportion of variance in returns of a column bank explained by that to a row bank); and 2) analyse the temporal relationship between HDFC and HDFC bank, and Canara Fin and Canara Bank. As we can see through the off-diagonal elements of Matrix 1, we do find a strong pairwise relationship between HDFC Bank and HDFC HFC (dark red at the two ends of the off-diagonals). Furthermore, as we can see through Diagram No.17, this interconnectedness has strengthened significantly over the last few months. On the other hand, the trend between Canara Bank and its HFC has followed an opposite trend with a sharp decline in their pairwise spill-overs. A possible reason for the decline may be attributed to the non-core asset sale of its eight domestic subsidiaries¹¹⁶ such as Canbank Financial Services Ltd, Canbank Factors Ltd, Canara Robeco Asset Management Co. Ltd, Canara HSBC Oriental Bank of Commerce Life Insurance Ltd, Canara Finance Homes etc undertaken by Canara Bank to raise capital for its Basel 3 requirements. Among these subsidiaries, Canara Robeco AMC is a bank sponsored AMC with Canara Bank holding a 51% majority stake. The bank had already sold off 13.45% stake in a non-core asset - Can Finance Homes, the banks'

¹¹⁶ LiveMint, 24 October 2017, Canara Bank to hire investment bankers for sale of non-core assets, available on the internet at, <https://www.livemint.com/Industry/IVEekzyYO0lbvoHJhsaBII/Canara-Bank-to-hire-investment-bankers-for-sale-of-noncore.html>, accessed on 02 October 2018.

Housing Finance Company (HFC) and also expressed plans to sell off a part of the remainder 30% stake. In March 2017, Canara bank sold off 13.45% stake in Can Finance Homes to Singapore based GIC affiliated arm - Caladium Investment Pvt Limited for INR. 7.53 billion and brought its stake down to 30%¹¹⁷. In December 2017, Canara Bank changed its plans to sell stake in its AMC and in March 2018, Canara bank changed¹¹⁸ its plans to sell 4% of the 30% stake in Canara Finance Homes¹¹⁹ since it did not receive decent valuations for the sale¹²⁰. In the above case, the parent bank was intending to sell off its stake in the non-core assets such as AMC and its Housing Finance Company (HFC) to raise funds to meet the Basel 3 capital requirement. A possible weakening in the spill-over effect between Canara Bank and its non-core asset – Canara Finance Homes may be attributed to Canara Banks’ decision to sell-off its AMC and other non-core asset - Can Finance Homes. The stake sale may have motivated the parent bank to not pursue its route to finance its HFC through the AMC or through the parent bank. However, the bank may resume its non-core assets sale to when they receive the right valuations.

¹¹⁷ The Hindu Business Line, Canara Bank sells 13.45% in CanFin Homes to GIC arm, 10 March 2017, available on the internet at, <https://www.thehindubusinessline.com/money-and-banking/canara-bank-sells-1345-in-canfin-homes-to-gic-arm/article9579233.ece>, accessed on 03 October 2018.

¹¹⁸ LiveMint, 29 December 2017, Canara Bank not to sell stake in AMC business, available on the internet at, <https://www.livemint.com/Industry/Fy0YNo72gkO6q5mdvAD2eO/Canara-Bank-not-to-sell-stake-in-AMC-business.html>, accessed on 03 October 2018

¹¹⁹ EconomicTimes, 31 March 2018, Canara Bank calls off divestment plan in Can Fin Homes, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/canara-bank-calls-off-divestment-plan-in-can-fin-homes/articleshow/63556544.cms>, accessed on 03 October 2018.

¹²⁰ Canara Bank Press Release, 10 January 2018, Monetization of Non-core assets: Stake Sale in M/s Can Fin Homes, available on the internet at, <https://canarabank.com/media/6538/monetizationofnoncoreassets.pdf>, accessed on 03 October 2018.

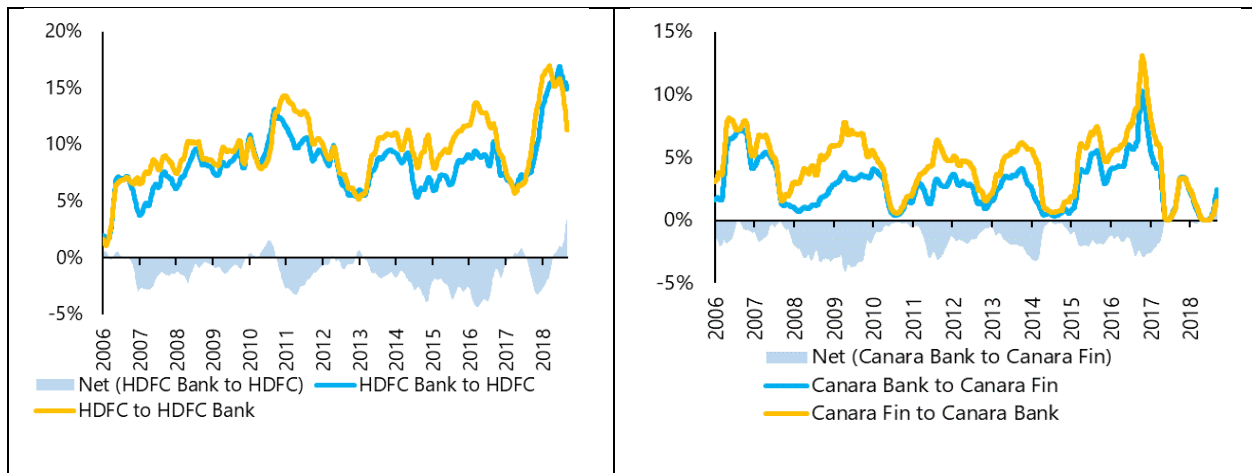
Matrix No. 1: Spill over between Private sector and Public – sector banks and NBFCs – HFCs

(Percentage terms)

	Private					Public					HFCs				
	HDFCB	Kotak	ICICI	Axis	Indusind	Canara	SBI	BoB	PNB	IDBI	LICHF	Gruh	CanaraFin	GICHF	HDFC
Private															
HDFCB		7%	1%	0%	0%	8%	0%	0%	0%	0%	3%	2%	1%	2%	15%
Kotak	7%		1%	0%	1%	11%	0%	0%	0%	0%	2%	4%	1%	1%	7%
ICICI	1%	0%		12%	7%	0%	16%	12%	9%	2%	3%	1%	3%	3%	2%
Axis	0%	0%	13%		10%	0%	11%	11%	8%	3%	4%	1%	4%	3%	2%
Indusind	0%	1%	10%	14%		1%	7%	6%	4%	2%	4%	2%	4%	1%	3%
Public															
Canara	7%	9%	1%	1%	1%		1%	0%	0%	0%	5%	4%	3%	5%	10%
SBI	0%	0%	15%	9%	4%	0%		14%	12%	2%	4%	1%	5%	5%	2%
BoB	0%	0%	13%	11%	4%	0%	16%		12%	3%	3%	0%	3%	4%	1%
PNB	0%	0%	10%	8%	3%	0%	14%	12%		4%	4%	0%	7%	6%	1%
IDBI	0%	0%	5%	6%	2%	0%	4%	5%	8%		2%	0%	5%	2%	1%
HFCs															
LICHF	2%	1%	4%	5%	4%	4%	6%	5%	6%	1%		2%	7%	6%	4%
Gruh	2%	3%	2%	2%	3%	5%	3%	0%	1%	0%	2%		6%	7%	6%
CanaraFin	1%	0%	4%	4%	4%	2%	7%	4%	8%	3%	6%	4%		14%	5%
GICHF	1%	0%	4%	4%	1%	3%	9%	6%	8%	2%	5%	4%	14%		4%
HDFC	11%	5%	4%	2%	3%	8%	3%	1%	1%	0%	4%	4%	6%	4%	

Source: Created by authors

Diagram No. 17: Pairwise spill over between Parent Bank and its NBFC

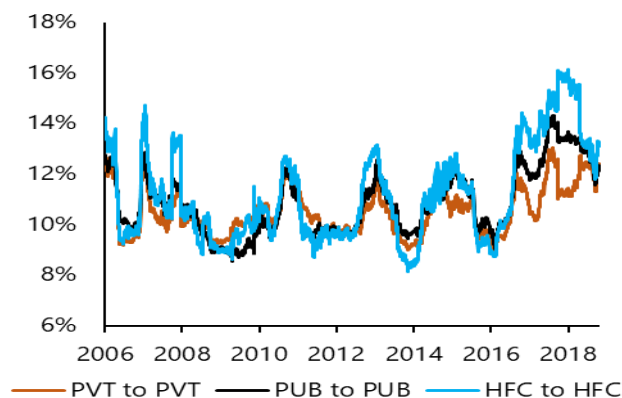


Source: Created by authors

Pairwise relationship between Private, Public and HFCs

While outward spill-overs and inward spill-overs at an aggregate level help analyse the interconnectedness of the respective entities, we are also interested in understanding the extent to which the concentration risk is increasing. Diagram No. 18 plots the spill overs within the segments. Variance is increasingly being explained by within the same sector. Another way to put this is that spill overs within the HFCs / private / public banks are displaying rising concentration risk. That said, there is a sharp shift in the spillovers within the HFC segment in 2018, implying that there are increasing spillovers to the other groups. This result is in-line with the trend which we have seen in the previous diagrams. These results are in line with the Scenario C, where the SBLC is an off-balance sheet exposure of banks to clients and in case the client defaults on commercial paper. The bank would be liable to pay for the amount due. This is bound to increase the risk faced at the bank level. Second, the mutual funds might face a temporary adverse effect on the Net Asset values (NAVs) due to the downgrade of the client issued debentures. The reliance infrastructure default is an example of this and it will put a dent in ICICI banks pockets to the tune of INR 5 billion.

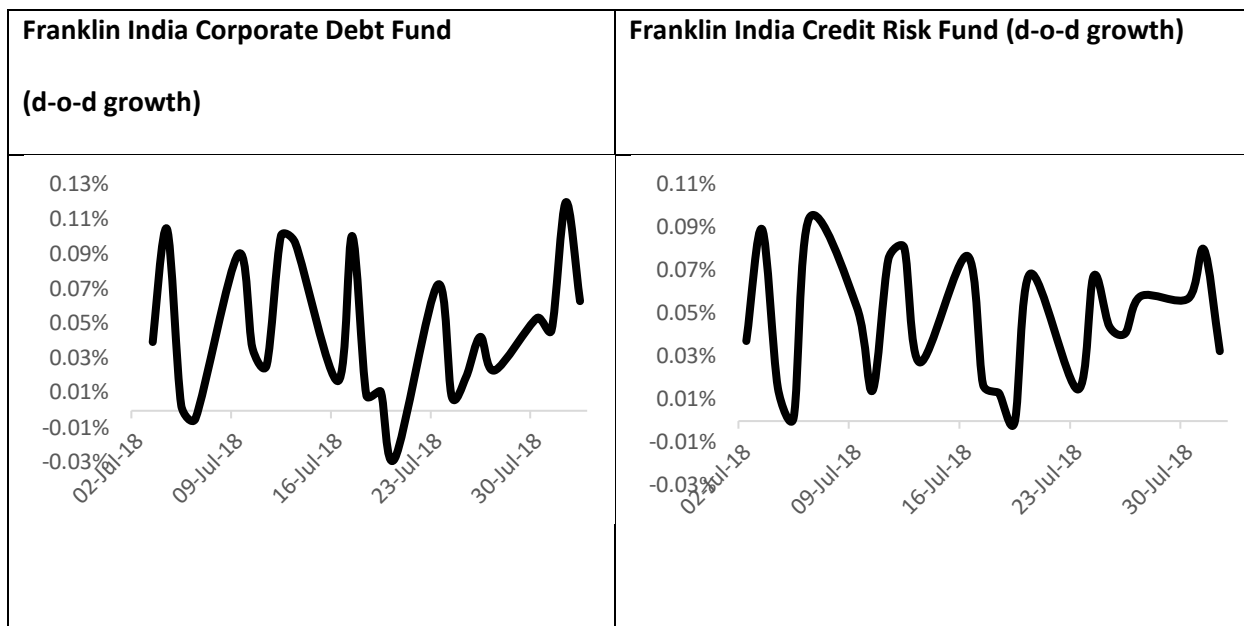
Diagram No. 18: Pairwise spill over between Private, Public sector banks and HFCs



Source: Created by authors

A look at the NAVs of two of the four Franklin schemes during this period of downgrade indicate that the NAV value of the scheme didn't witness a drastic fall as the commercial paper that these schemes were subscribed to were backed by the respective ICICI bank.

Diagram No. 19: NAV day on day growth of Franklin India Corporate Debt Fund (July 2, 2018 to August 2, 2018) i.e. erstwhile Franklin Corporate Income Builder Fund and Franklin India Credit Risk Fund i.e. erstwhile Franklin Corporate debt opportunities Fund



Source: Created by authors

Another event that occurred in early September was the rating downgrade of IL&FS debt securities. On 8 September 2018, ICRA revised its short-term rating for IL&FS and IFIN commercial paper to ICRA A4 from ICRA A1+. Subsequently on 17 September 2018, ICRA further downgraded IL&FS Financial Services commercial paper to “D” from A4. Corporate bonds and long-term loans were downgraded from AA+ to BB i.e. moderate risk of default.

18 open-ended mutual fund schemes had an exposure to IL&FS debt securities¹²¹. Top 8 schemes that had the highest percentage exposure to IL&FS debt securities are presented in Table No. 19 below.

Table No. 19: Select Open-ended debt funds exposure to IL&FS debt securities

Debt Funds	31 Aug 2018 to 28 Sep 2018	NAV on 28 Sep 2018	Exposure to IL&FS debt securities as a percentage of total AuM	AuM as on 31 Aug 2018 (Billion)
Motilal Oswal Ultra Short Term Fund	-6.14%	13.30	9.87	0.98
Principal Cash Management Fund	-8.24%	1607.28	9.81	10.40
Principal Ultra Short Term Fund	-5.15%	1947.90	8.96	1.19
Invesco India Credit Risk Fund	-2.04%	1409.34	7.73	0.31
DSP Credit Risk Fund	-2.55%	29.29	6.47	4.45
BOI AXA Credit Risk Fund	-1.63%	13.58	6.13	16.89
Tata Corporate Bond Fund	-2.30%	2367.53	4.60	0.25
Union Liquid Fund	-2.92%	1787.80	3.99	0.99

Source: Created by authors

We observe in Table No.19 that owing to the IL&FS rating downgrade the NAV of the schemes that had exposure to it have decreased in the range of 1.63% to 8.24%. This kind of NAV fluctuation is very uncommon among these category of debt funds. According to DSP mutual Fund President – Kalpen Parekh, IL&FS debt securities are near illiquid and mutual fund houses in order to maintain liquidity and to meet the advance tax requirements of September quarter resorted to selling off the liquid debt

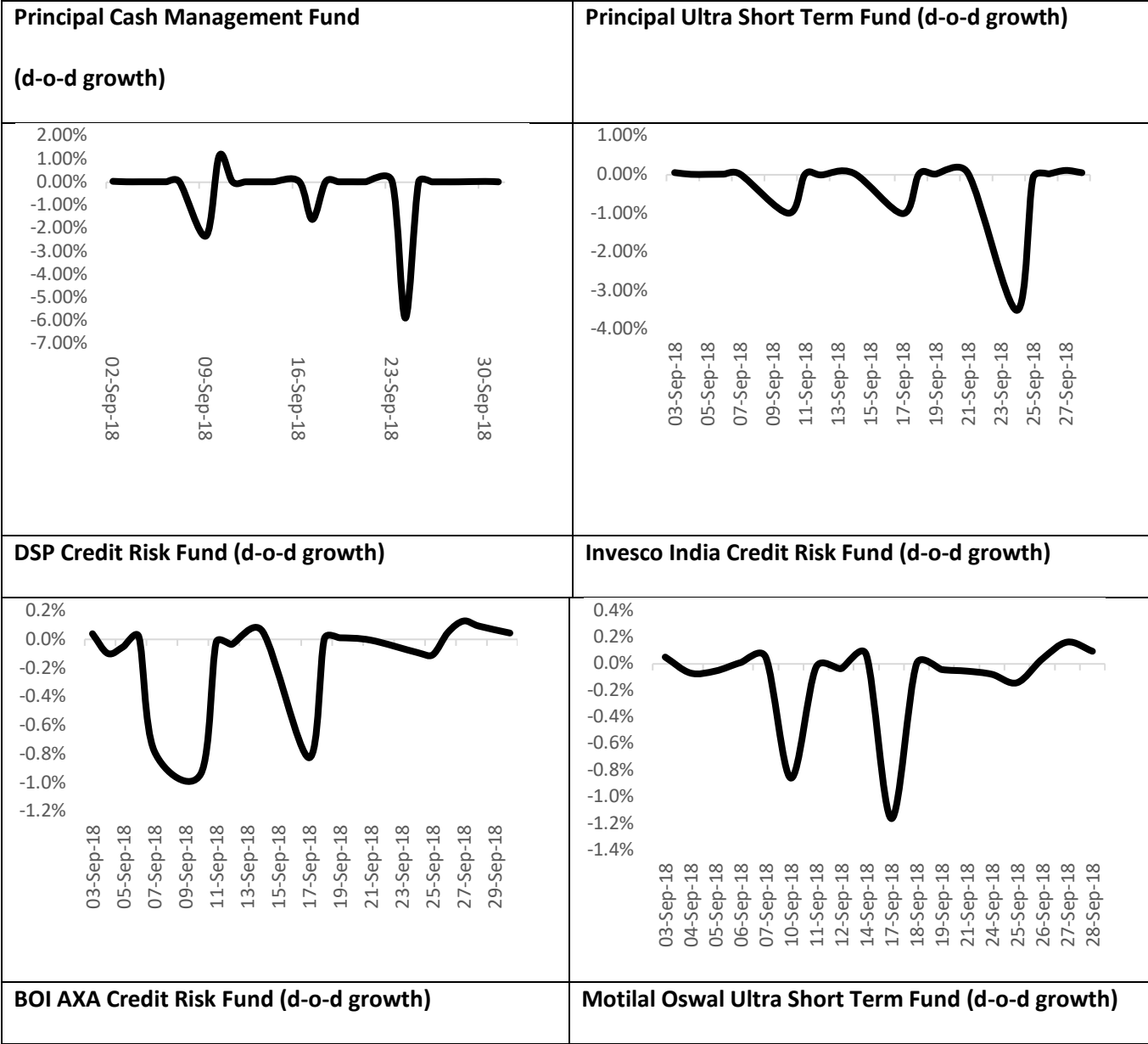
¹²¹ EconomicTimes, How the IL&FS Fiasco wiped out an entire years' gain in liquid funds, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/how-the-ilfs-fiasco-wiped-out-an-entire-years-gains-in-liquid-funds/articleshow/66027283.cms>, accessed on 02 October 2018.

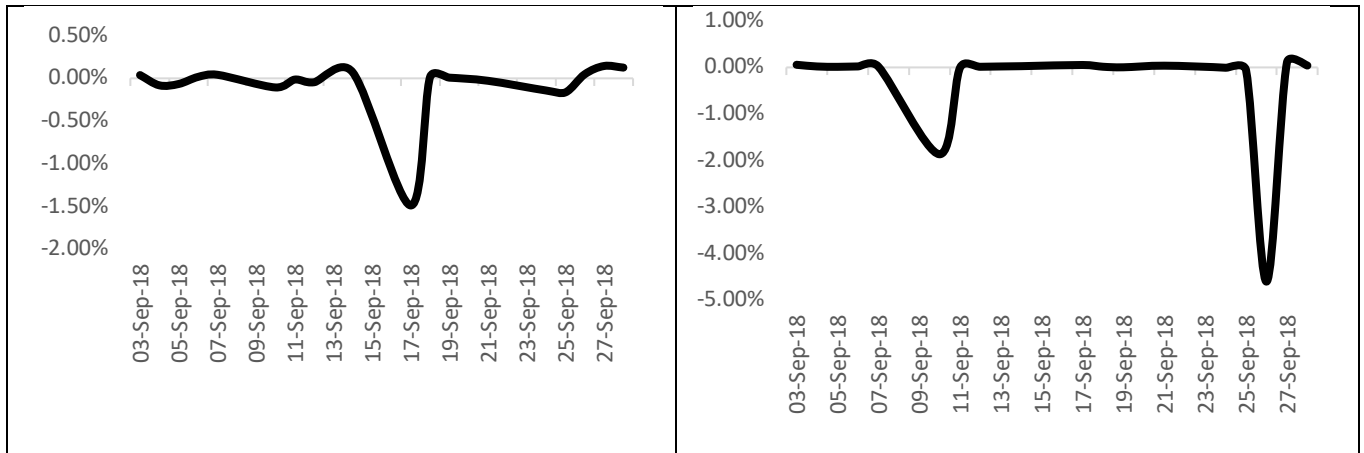
securities at a discount in the market¹²². To meet investor redemption demands for advance tax requirement, DSP mutual fund partly sold off their exposure to Dewan Housing Finance Limited (DHFL) at a discount as IL&FS debt securities were not liquid and saleable. On a separate note, mutual fund houses resorted to borrowing heavily in the CBLO market to the tune of INR. 1,175 billion in the week ended 28 September 2018, up 275% from 7 September 2018.

Diagram No. 20 displays the daily NAV growth (decline) for a few select schemes over the month of September 2018 - that had the largest exposure to IL&FS debt securities. We observe that DSP, Invesco, BOI and Principal witnessed a decline in their NAV when IL&FS received a rating downgrade to "D". The second dip occurred around 21st September 2018 when DHFL was rumoured to have liquidity problems. This rumour was later on dispelled by DHFL and SEBI demanded all mutual fund houses to disclose their exposure to DHFL as a precautionary measure. During the 21st September week, Principal and Motilal witnessed the steepest decline in the daily NAVs. Principal Cash Management Fund and Principal Ultra Short Term Fund NAV dipped 5.89% and 3.51% to INR. 1606.1381 and INR. 1945.6866 respectively as on 24 Sep 2018; on 26 Sep 2018 – Motilal Oswal Ultra Short Term Fund NAV dipped by 4.61% to INR. 13.2896.

¹²² Nivesh Manthan, Interview with Kalpen Parekh of DSP Mutual Fund on their exposure in IL&FS and Dewan Housing, 01 October 2018, available on the internet at, <https://www.youtube.com/watch?v=hGdRFm0vRtM>, accessed on 02 October 2018.

Diagram No. 20: NAV day on day growth of Select Open-Ended Debt Mutual Funds (August 31, 2018 to October 2, 2018) [i.e. erstwhile Principal PNB Asset Management now Principal Mutual Fund] that had exposure to IL&FS debt securities



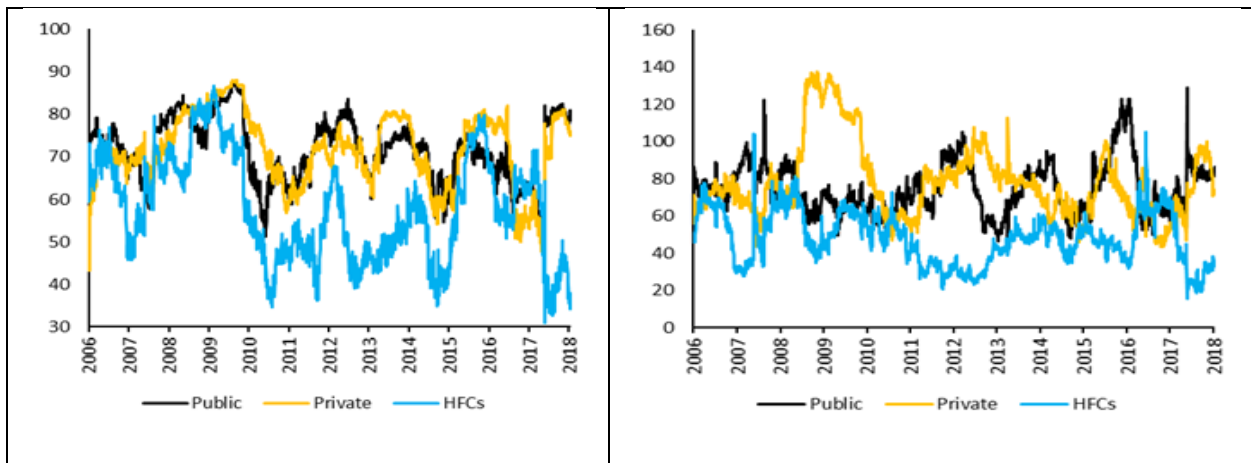


Source: Created by authors

Volatility Spill overs

In the analysis till now, we have focused on the variance of the returns to understand the extent to which there are spill-overs to and from institutions. The same metric is also calculated to measure the volatility interconnectedness, as shown in Diagram No. 21. We note that while the overall ranking amongst Public and private groups remain the same, there is an increasing divergence between the volatility interconnectedness of HFCs with those of the other groups.

Diagram No. 21: Spill over in other segments



Source: Created by authors

The system as a whole is relatively safer because of less spill overs, but it might be a challenge for the investors where the idiosyncratic risks are amplified and less benefits of diversification. Rising relationship between HDFC / HDFC Bank is also potentially disruptive mostly because of their size – but does not say much about the systemic-ness. HDFC and HDFC Bank are systematically important institutions and in case of failure there might be an adverse effect on the whole financial system.

Recently a IMF ((International Monetary Fund) and World Bank FSAP (Financial Sector Assessment Program) report¹²³ and news reports¹²⁴ have been stressing on how debt mutual fund schemes exposure to NBFCs is posing a systemic risk for the financial system. Most of the scheme exposure lies in the liquid fund category which subscribe to highly rated commercial paper and debentures of these companies. However, the credit ratings are just opinions and may not reflect the true financial picture of the NBFCs in question. The Securities Exchange Board of India (SEBI)¹²⁵ through its debt funds deployment report in September 2017 indicates that 3.78% of the total debt AUM exposure (INR. 9,508.3 billion) is to NBFCs commercial paper and 7.19% to NBFC floated bonds and debentures.

¹²³ The Dalal Street Investment Journal, FSAP raises concerns over rising MF exposure to NBFC bonds, 28 Dec 2017, available on the internet at, <http://www.dsij.in/DSIJArticleDetail/ArtMID/10163/ArticleID/32/FSAP-raises-concerns-over-rising-MF-exposure-to-NBFC-bonds>, accessed on 29 Jan 2018.

¹²⁴ The Economic Times, Debt MFs gorging on NBFC paper pose systemic risk, 27 Dec 2017, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/debt-mfs-gorging-on-nbfc-paper-pose-systemic-risk/articleshow/62262958.cms>, accessed on 29 Jan 2018.

¹²⁵ SEBI Deployment of Debt Funds Monthly Report September 2017, available on the internet at, <https://www.sebi.gov.in/statistics/mutual-fund/deployment/2017/debtsep17.html>, accessed on 29 Jan 2018.

7. Data Sources and Methodology

For hypothesis I, we haven't employed any tests since it was not an exercise to establish the significance of the exposure to the parent bank to other financial institutions. The first hypothesis was set up with the aim to test whether there existed a parent banks exposure to the same entity on its balance sheet and through its asset management company arm.

For testing hypothesis II, the methodology employed in this study is the General Method of Moments (GMM) Technique and Least Squares with Bai Perron (1998) tests identified L+1 sequentially determined break model. These tests preclude the presence of trending regressors. This test is helpful in the changes present and also it endogenously determines the points of break with no prior knowledge. More details about the model are available on the Eviews help guide.¹²⁶

For determining the structural breaks we have used the Breakpoint least squares model where we have employed the base variable and lag one of the same variable. Using the Eviews software we find break dates and have used the HAC consistent covariance estimators (Newey-West) with errors changing over distributions (For more details please refer to the Eviews website¹²⁷).

This work reports the results regarding the liquidity transformation aspect of the research proposition using Bai-Perron (1998) tests identified L+1 sequentially determined break model where we find evidence of liquidity transformation being undertaken by bank run AMCs through their liquid schemes.

¹²⁶ Eviews help guide, Estimating Least Squares With Breakpoints in eviews, available on the internet at, http://www.eviews.com/help/helpintro.html#page/content/multibreak-Estimating_Least_Squares_with_Breakpoints_in_EVi.html, accessed on 29 Jun 2018.

¹²⁷ Eviews website, Robust standard errors, available on the internet at, http://www.eviews.com/help/helpintro.html#page/content/Regress2-Robust_Standard_Errors.html, accessed on 25 July 2018

7.a. Bai Perron – Least Squares model

We have employed the Least Squares with Bai Perron tests identified L+1 sequentially determined break model (Bai & Perron (1998)) to determine the relationship between the mutual funds cash holdings and its portfolio composition.

We begin by considering the following linear regression with m breaks (m+1) regime.

$$y_t = x_t\beta + z_t\delta_j + \mu_t, t = T_{j-1}, \dots, T$$

for $(j = 1, \dots, m + 1, T_0 = 0 \text{ and } T_{m+1} = T$

where,

- y_t – is the observed dependent variable (Cash holdings)
- $x_t \in \mathbb{R}^p$ and $z_t \in \mathbb{R}^q$ are vectors of covariates (Portfolio composition – NBFC, Bank certificate of deposit, government securities, bank FD, Real estate, Public sector bond debt (PSU) and others)
- Period under consideration (t) = Jan 2012 to Jan 2018
- β and δ_j are the corresponding vectors of co – efficiencies with $\delta_i \neq \delta_{i+1} (1 \leq i \leq m)$
- μ_t , is the error term at time (t)
- The break dates (T_1, \dots, T_m) are explicitly regarded as unknown

This is a partial structure change model such that β does not shift and is effectively estimated over the entire sample period. The purpose is to estimate the unknown regression co-efficients and the break dates, that is to say $(\beta, \delta_1, \dots, \delta_{m+1}, T_1, \dots, T_m)$, when T observations on $(y_t, x_t \text{ and } z_t)$ are available.

Bai and Perron (1998) estimates were based on the least square principle. For an m – partition (T_1, \dots, T_m) denoted $\{T_j\}$, the associated least square estimator of δ_i is obtained by minimizing the sum of squared residuals $\sum_{i=1}^{m+1} \sum_{t=T_{i-1}}^{T_i} [y - x_t\beta + z_t\delta_i]^2$ under the constraint $\delta_i \neq \delta_{i+1} (1 \leq i \leq m)$. Let $\hat{\delta}(\{T_j\})$ be the resulting estimate. Substituting it in the objective function and denoting the resulting sum of squared residuals as $S_T(T_1, \dots, T_m)$ the estimated break dates $(\hat{T}_1, \dots, \hat{T}_m)$ are such that

$$(\hat{T}_1, \dots, \hat{T}_m) = \arg \min_{T_1, \dots, T_m} S_T(T_1, \dots, T_m)$$

Where the minimization is taken over all partitions (T_1, \dots, T_m) such as $T_i - T_{i-1} \geq [\varepsilon T]$. The term εT is interpreted as the minimal number of observations in each segment. Thus, the breakpoint estimators are global estimators are global minimizers of the objective function. Finally, the regression parameter estimates are obtained using the associate least-squares estimates at the estimated m -partition, $\{\hat{T}_j\}$, *e. d.* $\hat{\delta} = \hat{\delta}(\{T_j\})$

In this study we have employed a sequential test of l versus $l+1$ structural change.

$$\sup F_T \left(l + \frac{1}{l} \right) = \left\{ S_T(\hat{T}_1, \dots, \hat{T}_l) - \min_{1 \leq l \leq l+1} \inf_{\tau \in \Lambda_{l,\eta}} S_T(\hat{T}_1, \dots, \tau, \dots, \hat{T}_{l-1}, \dots, \dots, \dots, \hat{T}_l) \right\} / \hat{\sigma}^2$$

Where,

$$\Lambda_{l,\eta} = \{ \tau, \hat{T}_{l-1} + (\hat{T}_l - \hat{T}_{l-1})\eta \leq \tau \leq \hat{T}_l + (\hat{T}_l - \hat{T}_{l-1})\eta \}$$

$$S_T(T_1, \dots, T_{l-1}, \tau, T_l, \dots, T_l)$$

is the sum of squared residuals resulting from the least squares estimation from each m-partition (T_1, \dots, T_m) and $\hat{\sigma}^2$ is a consistent estimator of σ^2 under the null hypothesis. The asymptotic distributions of these tests are derived in Bai and Perron (1998) and the asymptotic critical values are tabulated in Bai and Perron (1998, 2003) for $\varepsilon = 0.05$ (M=9), 0.10 (M=8), 0.15 (M=5), 0.20 (M=3), and 0.25 (M=2).

Such a measure appeals for several reasons:

- a. The relationship between the portfolio composition and cash holdings is assumed to change over the period. A simple least square might be unable to capture this dynamic relationship.
- b. The portfolio composition has evolved over a period of time due to the regulations imposed in the industry. Hence, a simple least square method is unable to justify the relationship.

In the third hypothesis we employed Diebolds' model to test for interdependency through measuring interconnectedness using network connectivity.

7.b. Diebolds' model for joint exposure (Network Connectivity):

In the third and final hypothesis, we have attempted to test the interconnectedness among the financial institutions in particular Private Sector Banks, Public sector Banks and Housings Finance Companies. It was important to ascertain the interconnectedness in order to analyse the extent to which financial stress in one sector can spill-over to the other financial institutions and sectors, thus indicating possible contagion channels. Literature has used three popular techniques to assess the interconnectedness and stress test various financial stress scenarios. These three tests are a) Sole and Espinosa-Vega (2010)¹²⁸, b) Diebold and Yilmaz (2009)¹²⁹ and c) Simple moving correlations between asset prices. Sole and Espinosa-Vega (2010) use the various entity level exposures and calculate the estimated loss to bank capital from credit and funding shocks. A key benefit includes its ability to incorporate multiple rounds of capital losses (failure of bank X can lead to a failure in bank Y, which can in turn lead to a capital loss in bank Z), as well as analyse multiple sources of shocks. This methodology requires bank to bank exposure which is not publicly available and is generally supervisory information only

Owing to data availability constraint, we proceed to employ the Diebold and Yilmaz (2009)¹³⁰: model which involves the process to calculate both return and volatility spill-overs based on vector auto-regression (VAR) models from Engle et. al. (1988). This has been used extensively in the literature (Diebold and Yilmaz 2009, 2012) as well as for stress testing analysis (IMF 2018, IMF 2017, FSB 2017). This requires the daily stock price returns / volatility of the relevant listed financial entities. A key benefit of this methodology includes its ability to estimate both inward as well as outward spill-overs enabling us to measure both systemically important entities, as well as the most vulnerable ones. It

¹²⁸ Juan Sole & Marco A Espinosa-Vega, 2010. "Cross-Border Financial Surveillance; A Network Perspective," IMF Working Papers 10/105, International Monetary Fund.

¹²⁹ Francis Diebold & Kamil Yilmaz, 2009. " Measuring Financial Asset Return and Volatility Spillovers, with Application to Global Equity Markets"

¹³⁰ Francis Diebold & Kamil Yilmaz, 2009. " Measuring Financial Asset Return and Volatility Spillovers, with Application to Global Equity Markets"

also enables us to measure, understand and analyse the directional spill-overs over various time intervals and on a relatively higher frequency basis (as compared to bank entity exposures which are relatively slow moving in nature). We are more interested in understanding the extent of spill-overs, rather than analysing the origin of the shock.

This vector auto-regressions, with network connectedness measures based on variance decompositions (Diebold and Yilmaz (2009), Diebold and Yilmaz (2012), and Diebold and Yilmaz (2014)). First, it makes intuitive sense, answering a key question, which at the most granular pairwise level is “How much of bank “a” s future uncertainty (at horizon h) is due to shocks arising not with bank “a”, but rather with bank “b” or NBFi “x”. Second, connectedness measures based on variance decompositions allow connectedness to differ across horizons, facilitating examination of a variety of horizons and selection of a preferred horizon if desired. This is important because, for example, 1-day connectedness may be very different from 10 or 30 – day connectedness. Third, Diebold and Yilmaz (2014) show that connectedness measures based on variance decompositions are closely linked to modern network theory, in particular the degree distribution and mean degree, and that they are also closely linked to recently-proposed measures of systemic risk, such as marginal expected shortfall (Acharya et. al. (2010)) and CoVaR (Adrian and Brunnermeier (2008)). This methodology is more evolved than simple moving correlations.

The data has been sourced from the Reserve Bank of India database warehouse for NBFCs, Scheduled Commercial banks, RBI Bulletin, Financial Stability reports, Micro Finance Institutions Network (MFIN) publications, NBFC annual and quarterly report, SEBI deployment of debt funds monthly reports, news articles, Thomson Reuters database, Bloomberg, Association of Mutual Funds in India (AMFI), Asset

Management Companies Monthly Portfolio Disclosure, monthly CBLO¹³¹ data from Clearing Corporation of India Limited (CCIL), company shelf prospectus, Ministry of Corporate Affairs (MCA) index of charge and ACE Mutual Fund Database (Courtesy Indian Institute of Management, Bangalore). Monthly portfolio data was considered and the relation between cash holdings and the portfolio composition was studied during the period 2012 till January 2018. In some cases of data presentation - the data considered is till early May 2018 and March 2019

¹³¹ CBLO - Clearing Corporation of India Ltd. (CCIL) and Reserve Bank of India (RBI) operate Collateralized borrowing and lending obligations (CBLOs). This is a money market segment where financial institutions can obtain short-term loans to cover their transactions. Financial institution must provide eligible securities (such as Central Government securities, such as Treasury Bills, with at least six months left to the maturity date) as collateral to gain access to these funds. More details about CCIL and CBLO are available on the internet at, <https://www.ccilindia.com/CBLO/Pages/Introduction.aspx>, accessed on 11 August 2018.

8. Concluding remarks and recommendations:

We undertook the study of joint exposure, financial interdependency and liquidity transformation among bank sponsored mutual funds. We found evidence that banks and their bank run mutual funds have exposure not only to their own NBFCs but also to other private banks and other NBFCs (See: Table No. 8). Second, the parent banks tend to have an exposure to the same entity both at the bank balance sheet level and also the AMC level (See: Table No. 18). The results for joint exposure are presented for the one month in Jan 2018. The three fund houses ICICI, HDFC and Axis have been considered as an example as they form a major share (nearly 31%) in the mutual fund business.

On the liquidity transformation front, evidence suggests that CBLO i.e. Cash holdings and mutual fund portfolio display a positive relation with NBFC floated paper (See: Table No. 14) at the overall debt assets under management. The same positive relation between NBFC floated paper and cash holdings is witnessed at ICICI Liquid fund even after adjusting for redemptions and NAV.

On the financial interdependency front, we have observed that HDFC and HDFC bank indicate a risk spillover (See: Diagram No. 17). The spillover among private sector banks has increased. The same has occurred in public sector banks and NBFCs. This indicates that the concentration risk has increased. There is an increasing divergence between the volatility interconnectedness of HFCs with those of the other groups.

With the recent events in the market, the Reserve Bank has undertaken a slew of measures such as open market operations and a cut in the FALLCR to inject liquidity in the system. The RBI has also allowed NBFCs with loans of over five year maturities to sell their loan pools or securitise them on easier terms for the next six months. This has brought down the minimum holding period for loans to

be eligible for securitisation to six months from one year¹³². This guideline will primarily benefit housing finance companies as their eligible portfolio available for securitisation would now increase.

RBI is taking the following corrective steps:

- a) Streamlining the Asset Liability Mismatch guidelines for the NBFCs to ensure that over dependence on the short-term funding is reduced so that NBFCs don't have vast asset liability mismatches.
- b) Providing longer securitization windows

Our recommendations:

- a) RBI should conduct a Asset Quality Review for NBFCs similar to banks to avoid any restructuring problems like the banks
- b) The securitization window should be closely monitored as NBFCs such as Jana Financial had witnessed default in its structured obligations around early 2018, indicating stress in the asset quality of the NBFC. Instead of providing a blanket securitization approach the central bank should adopt a case to case basis. This will avoid hiding bad loans through window dressing.
- c) The central bank should also set up mechanisms to monitor if the NBFC client loan has been rolled over or multiple loans are given to repay the original loan.
- d) The central bank should undertake measures to strengthen the Asset Liability Management (ALM) guidelines for NBFCs which is already underway.
- e) The central bank should set up mechanisms to monitor the dual exposure undertaken by the parent bank and the AMC to the same entity or NBFC.

¹³² The Economic Times, 29 November 2018, RBI eases rules to improve cash flows of housing finance companies available on the internet at, [//economictimes.indiatimes.com/articleshow/66866968.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst](http://economictimes.indiatimes.com/articleshow/66866968.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst), accessed on 01 December 2018

- f) Risks and functions at these NBFCs and AMCs should be supervised similarly to banks in order to minimize scope for regulatory arbitrage. (The RBI has already instructed the NBFCs to have a Chief Risk Officer (CRO)).

We hope to further extend the work in the following areas in the future:

- a. While there is evidence to support the fact that banks and their bank run mutual funds have exposure not only to their own NBFCs but also to other private banks and other NBFCs; the analysis and results presented are at a given point in time. We hope to extend the same study to check for the joint exposure for the three fund houses considered (as they cover the major share of the market) over a longitudinal period.
- b. We will also try to study the top debt schemes such as liquid funds, money market funds, other debt schemes and their relation with CBLO and NBFC in each of these categories. This will, hopefully, help us provide evidence where maximum liquidity transformation occurs.
- c. Finally, we hope that the study can be extended to establishing a measure to test the interdependency between the mutual fund arms and the bank. At this stage, the mutual funds are not listed entities and hence, the Diebold Yilmaz model for return spillover cannot be used.

9. About the Research Investigators:

Principal Investigator

Jaslene Bawa received her Ph.D. in Finance and Accounting from Indian Institute of Management (IIM), Raipur. She has over five years of research experience in equity markets in India. Prior to joining FLAME University, she was associated for a brief while with Sadhu Vaswani Institute of Management Studies, Pune. Her areas of expertise are valuation, banking and building models that capture complex market and banking relationships.

Her primary research involves around Efficient Market Hypothesis, Adaptive Market Hypothesis and bank credit risk. She has been a reviewer for IIM B Review Journal. Jaslene has presented papers in international and nation conferences such as 2nd Applied Financial Modeling Conference and IIT Management Doctoral Colloquium. She has published four papers in referred journals such as Financial Research Letters, Physica A, Applied Economic Letters and IIM B Management Review. She is the first FPM student to graduate from IIM Raipur in 2017. (See: <http://www.flame.edu.in/flame-faculty/bawa-jaslene>)

Co-investigators

Sankarshan Basu is currently a Professor of Finance at the Indian Institute of Management Bangalore. His areas of interest in terms of research are in Capital Markets, Derivatives, Financial Products, Financial Calculus, Applications of Quantitative Techniques to Finance, Insurance, Reinsurance and Risk Management. He has presented his work at various international conferences across the globe and has, to his credit, a number of papers in reputed peer reviewed international journals of repute like Insurance: Mathematics and Economics, European Journal of

Operations Research, Journal of Emerging Market Finance, International Journal of Revenue Management and the Journal of Statistical Planning and Inference. He has served as the President of the Asia-Pacific Risk and Insurance Association (APRIA) between 2014 – 2015 and is currently the Secretary of the Indian Finance Association (IFA).

(See: <http://www.iimb.ac.in/user/102/sankarshan-basu>)

Dr. Asish Saha received his Ph. D. from the University of Calcutta as University Research Scholar. He did his Master's in Business Management (MBM) with specialization in Finance and was the topper of the pioneering batch of students in the MBM program of the University.

He joined the National Institute of Bank Management (NIBM) as Research Associate in 1982 and rose to the position of Professor, Finance in the year 1994. He was selected as the youngest Director, NIBM in August 2001 and served in the said position for over ten years. During his tenure, he transformed the institution as one of the centers of advanced learning in banking and finance in India. He is the architect of first ever Post Graduate Program in Banking and Finance in India at NIBM which has become one of the key identities of the institution. He has fostered academic collaborations of NIBM with the Kellogg School of Management, Chicago, Stanford Graduate School of Business, USA and The Federal Reserve Bank of New York, USA. The collaborative Leadership Development for Corporate Excellence Program instituted by him at NIBM with the Kellogg School of Management has groomed many CEOs and Executive Directors of Indian banks. Prior to joining FLAME University, he served as the Visiting Professor, Banking and Risk Management Department, in the AACSB accredited School of Economics, Finance and Banking, in the Universiti Utara Malaysia for a five-year period from October 2011 to 2016. He is the Chief Editor of the ERA listed International Journal of Banking and Finance (www.ijbf.uum.edu.my) of the university. (See: <http://www.flame.edu.in/flame-faculty/saha-asish>)

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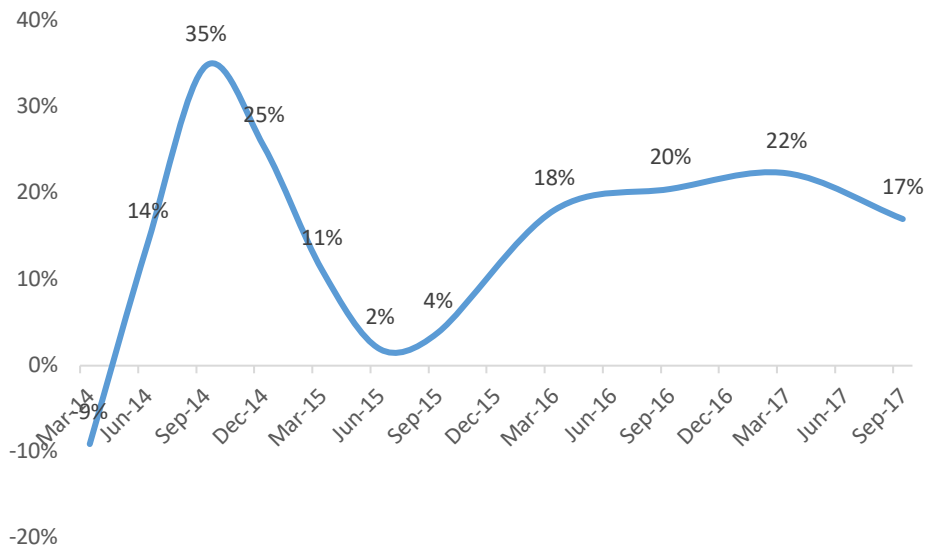
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11. Appendix

Exhibit No. A: Correlation between NBFC and Scheduled Commercial bank loan growth

The rolling correlation between NBFC loan growth and scheduled commercial bank loan growth is presented for the quarter ended March 2013 to September 2017. This rolling correlation is calculated for the period beginning March 2013 to March 2014. Subsequently, the next quarter is added to the correlation calculation. June 2014 correlation estimate considers March 2013- June 2014 growth figures.

Diagram 1. A: Rolling correlation between NBFC loan growth and Scheduled Commercial Bank loan growth



Source: Created by authors

Diagram 1.A presents the rolling correlation between NBFC quarterly loan growth (y-o-y) and Bank credit quarterly growth (y-o-y). The correlation is weak positive across the period March 2014 to Sep 2017. This indicates that the existing banking sector and the NBFCs serve as complements to each other. However, there are periods when they tend to serve as substitutes for lending but these periods are short lived.

Exhibit No. B: List of Public and Private Sector Banks

Public sector banks	Loan (INR Bn)	Private sector banks	Loan (INR Bn)
ALLAHABAD BANK	1508	AXIS BANK LIMITED	3731
ANDHRA BANK	1368	BANDHAN BANK LIMITED	168
*BANK OF BARODA	3833	CATHOLIC SYRIAN BANK LTD	81
BANK OF INDIA	3665	CITY UNION BANK LIMITED	238
BANK OF MAHARASHTRA	955	DCB BANK LIMITED	158
#BHARATIYA MAHILA BANK LTD.	6	FEDERAL BANK LTD	733
CANARA BANK	3420	HDFC BANK LTD.	5546
CENTRAL BANK OF INDIA	1394	ICICI BANK LIMITED	4642
CORPORATION BANK	1404	IDFC BANK LIMITED	494
*DENA BANK	726	INDUSIND BANK LTD	1131
^IDBI BANK LIMITED	1908	JAMMU & KASHMIR BANK LTD	498
INDIAN BANK	1277	KARNATAKA BANK LTD	370
INDIAN OVERSEAS BANK	1405	KARUR VYSYA BANK LTD	409
ORIENTAL BANK OF COMMERCE	1577	KOTAK MAHINDRA BANK LTD.	1361
PUNJAB AND SIND BANK	583	LAKSHMI VILAS BANK LTD	237
PUNJAB NATIONAL BANK	4195	NAINITAL BANK LTD	32
SYNDICATE BANK	1997	RBL BANK LIMITED	294
UCO BANK	1197	SOUTH INDIAN BANK LTD	464
UNION BANK OF INDIA	2865	TAMILNAD MERCANTILE BANK LTD	220
UNITED BANK OF INDIA	661	THE DHANALAKSHMI BANK LTD	64
*VIJAYA BANK	945	YES BANK LTD.	1323
State Bank of India	18684	Total Private Sector banks	22196
		Small Finance Banks	
		CAPITAL SMALL FINANCE BANK LIMITED	14
		EQUITAS SMALL FINANCE BANK LIMITED	57
Total Public Sector banks	55572	Total Small Finance banks	71

Source: Compiled by authors, RBI Statistical Tables Relating to Banks; * Bank of Baroda, Vijaya Bank and Dena Bank will be merged into one entity; ^Life Insurance Corporation will acquire 51% stake in IDBI Bank; #Bhartiya Mahila Bank was merged with State Bank of India on 01 April 2017

Exhibit No. C: Assets Under Management (AUM)

Public Bank sponsored	AUM (INR bn)	Private Bank sponsored	AUM (INR bn)
Baroda Pioneer Mutual Fund	122.40	Axis Mutual Fund	792.52
BOI AXA Mutual Fund	56.92	HDFC Mutual Fund	3070.82
Canara Robeco Mutual Fund	133.75	ICICI Prudential Mutual Fund	3105.61
IDBI Mutual Fund	105.74	Kotak Mahindra Mutual Fund	1278.30
*PRINCIPAL Mutual Fund	74.18		
SBI Mutual Fund	2334.74		
Union Mutual Fund	44.33		
Total Public bank sponsored AUM as a percentage of Total Industry AUM (Jun 2018)	12.25%	Total Private bank sponsored AUM as a percentage of Total Industry AUM	35.18%

Source: Compiled by authors, Association of Mutual Fund of India (AMFI) Average AUM, * Principal acquired the entire 21.38% stake that PNB held in the Principal PNB Assets Management Company (AMC) in August 2018.

Exhibit No. D: Parent banks' exposure to its own subsidiary NBFCs: Indian banking system connectedness with other Financial Institutions

The Indian banking system is interlinked with a majority stake in a number of financial institutions. These subsidiaries are in the form of other non-banking financial institutions such as housing finance companies, asset management companies, securities arm, life and general insurance institutions. As we observe in the Table no. 1.D that present financial institutions and their subsidiaries have cross-holdings in each other. This interlinking creates a possibility of systemic risk that may not only affect the individual institutions but also the holding institution. Another issue is that most of these Financial institutions are not listed which does curtail the risk on the front of the public but does generate a tremendous risk at the front of the investor in the company at the holding company level. A look at HDFC subsidiaries suggests that out of seven institutions only three are listed on the stock exchange. Under the ICICI wing, two out of five are listed on the exchange. With ICICI securities it was recently brought to notice via SEBI that to float the Initial Public Offering (IPO) its mutual fund arm subscribed under the institutional subscription. SEBI has ordered ICICI mutual fund to return INR 2.4 billion invested in the ICICI securities IPO¹³³.

¹³³ Economic Times, 03 July 2018, SEBI orders ICICI MF to return INR 2.4 billion invested in I sec IPO, available on the internet at, <https://economictimes.indiatimes.com/markets/stocks/news/i-sec-ipo-sebi-asks-icici-pru-mf-to-return-rs-240-cr-of-investors-money-to-schemes/articleshow/64832383.cms>, accessed on 13 July 2018

Table No 1.D: Cross-holding across Financial Institutions in India

Financial Institution (Parent)	Financial Institution 1 (Stake)	Financial Institution 2 (Stake)	Financial Institution 3 (Stake)	Financial Institution 4 (Stake)	Financial Institution 5 (Stake)	Financial Institution 6 (Stake)
HDFC (Housing Development Finance Corporation)	HDFC Bank (18.53%- listed)	HDFC Investments (7.07%)	Gruh Finance (57.93% - listed)	HDFC Mutual Fund (59.99%)	HDFC Life (61.53% - listed)	
HDFC Bank	Housing Development Bank (HDB)	HDFC Securities (97.67%)				
	Financial Services (95.86%)					
ICICI Bank	ICICI Housing Finance Corporation (100%)	ICICI Securities (100% - listed)	ICICI Mutual Fund (51%)	ICICI Lombard General Insurance (63.31% - listed)	ICICI Investment Management (100%)	
Axis Bank	Axis Securities (99.99%)	Axis Mutual Fund (75%)	Axis Finance (100%)			
Punjab National Bank	PNB HFC (39.08%- listed)	PNB Principal MF (21.38%)				
Canara Bank	Can Fin Homes (29.99% - listed)	Canara Robeco MF (51%)				
Kotak Bank	Kotak Securities (74.99%)	Kotak Mutual Fund (100%)	Kotak Prime (49%)	Kotak Mahindra Financial Services (73.36%)	Kotak Mahindra Pension Fund (95.71%)	Kotak Mahindra Life Insurance (77%)
State Bank of India	SBI MF (63.00%)	SBI Life Insurance (70.10%)	SBI Securities (100%)	SBI Pension Funds Pvt (20%)		
IDBI	IDBI MF (66.67%)	IDBI Capital market and Securities (100%)				
IDBI Capital market and Securities	IDBI MF (32.33%)					
LIC	LIC HFC (40.31%)					
LIC HFC	LIC HFL Care Homes Ltd (100%)	LICHFL Financial Services Ltd (100%)	LICHFL Mutual Fund (94.62%)			

Source: Compiled by authors, annual reports of banks and financial institutions

For Axis, Kotak, SBI and IDBI the subsidiaries are not listed in the financial system. These institutions have an interdependence amongst each other. Not only does the interdependence occur at the institution level but also to other institutions as well. These institutions form the largest share in the banking as well as in the asset management companies and insurance segment.

Exhibit No. E: Bank Vs AMC business model

One would argue that banks and mutual funds are fundamentally different in terms of their structure and investment agenda.

A traditional bank's function is to accept deposits (which entails a fixed return in the form of deposit interest rate) that are guaranteed by deposit insurance to the extent of INR 100,000. The banks lend these deposits after maintaining suitable cash and Statutory Liquidity Ratio reserves. The risk management of a bank involves keeping sufficient capital buffers and cash buffers to take care of loss incurred due to loan default and in case a bank faces a run. The downside for the bank is loan default and depositor run on banks. The downside for the bank customer is to lose funds in case of a bank goes bankrupt i.e. technically if a bank customer holds 100,000 he would receive that any amount in excess of that will be foregone. The lending for a bank is in the form of short-term loans and long-term loans. Other ways a bank earns income is through cross-selling of insurance, mutual funds and pension products.

For a mutual fund, the function is to serve as a platform to connect both investors and investments. The downside for a mutual fund is when the debt or equity of a fund cannot be liquidated it impacts the fund house liquidity system. The investor has the motivation to invest for returns based on his risk appetite. So, the downside for an investor is that in certain cases the investor can lose the entire amount invested. Now, the fundamental difference between a mutual fund and a bank is that the bank typically provides credit, liquidity and maturity transformation where a mix of short-term and long term deposits are matched with suitable short-term and long-term loans. However, deposits are withdraw able on demand and hence a bank has to keep a certain reserve aside to meet the withdrawal demands of depositors.

Similar to a bank, mutual funds especially open-ended funds also face withdrawal by investors at any point in time. To meet these investor withdrawal requirements mutual fund houses have to maintain a certain

cash balance in the form of cash and CBLO balances. But cash balance maintenance is not mandated by any regulatory requirement. Fund managers maintain this cash balance keeping in mind the redemption requirements faced in the previous months.

Majority of the investments that the mutual fund houses subscribe to in the equity securities market are highly liquid. But in case of debt mutual funds the investment in debt securities are not as liquid as the equity securities. Hence, the fund managers indulge in a certain form of liquidity transformation where they accept investor money to invest in illiquid securities. For debt securities it may be argued that fund managers shift the portfolio between different instruments bearing in mind the interest rate cycles. However, the security issuer composition does not tend to change drastically.

It can be argued that investors invest in mutual funds bearing in mind the risk associated with the investments and a returns target. However, parent banks tend to promote the schemes floated by their sponsored AMCs. This helps the parent banks in two ways, 1) it provides an easy fund flow from their bank depositors into the mutual fund offerings of the bank sponsored AMC 2) it helps the bank earn a commission income from the bank sponsored AMC as these AMCs are majority owned subsidiaries¹³⁴. Supposedly, parent banks and AMC fund managers maintain a Chinese wall when conducting a portfolio selection. However, the recent case of ICICI Prudential where the fund managers subscribed to the ICICI

¹³⁴ A number of these mutual fund houses are bank sponsored i.e. banks hold a majority stake in these fund houses. Banks also sell their mutual funds (bank sponsored) schemes to investors through the bank branches. Eg: Bank A also sells Bank A sponsored mutual fund schemes to bank depositors through its branches. This implies that banks are promoting their own sponsored mutual fund schemes. Eg: The commission paid by the AMCs to their sponsor banks increased by Rs.3.62 billion or 83% in the FY 2016-17. SBI Mutual Fund paid Rs.1.75 billion to SBI as against Rs.61 crore in FY 2015-16 i.e. a growth of 190%. SBI bank has received gross commission of Rs.1.79 billion in FY 2016-17. This indicates that the bank has received almost 98% of its total commission from its subsidiary fund house. HDFC Mutual Fund, the largest fund house in terms of equity AUM, paid Rs.1.68 billion or 23% of its overall commission paid to its sponsor HDFC Bank. In FY 2015-16, the fund house paid Rs.910 million to HDFC bank. HDFC Bank is the second largest distributor in the country and earned a gross commission of Rs.3.97 billion from all AMCs. It received 42% of its total earnings from HDFC Mutual Fund. IDBI bank has witnessed the highest increase in commission received from its subsidiary fund house. The fund house paid Rs.140 million to its sponsor last fiscal compared to Rs.50 million in FY 2015-16, an increase of 208%. IDBI Bank received a total of Rs.210 million as commission. Surprisingly, Canara Bank received almost 100% of its gross commission (INR 166.5 million) from Canara Robeco Mutual Fund. Cafe Mutual, 29 July 2017, Bank Sponsored fund houses paid INR 8 billion to their sponsor banks, available on the internet at, <http://cafemutual.com/news/industry/9314-bank-sponsored-fund-houses-paid-rs800-crore-to-their-sponsor-banks>, accessed on 11 Aug 2018

Securities Initial Public Offering (IPO) and invested INR 6.4 billion. ICICI Securities is a subsidiary of ICICI Bank and this IPO was launched to divest 24% stake that ICICI Bank held in the ICICI Securities¹³⁵. This IPO would not have been able to achieve subscription in the Qualified Investor Participation (QIP) category in case ICICI Prudential had not stepped in to subscribe to the shares in the IPO. The share of ICICI Securities listed and then began trading at a discount to the listed price. This led to a probe through the Securities Exchange Board of India (SEBI) for misuse of investor money on the part of ICICI Prudential AMC. Citing this example, one cannot deny that these mutual fund houses uphold the spirit of the Chinese wall between the parent bank and bank sponsored AMC. This suggests that they indulge in some form of maturity and liquidity transformation in the system. This inter-dependence between parent banks and bank sponsored AMCs may lead to generation of systemic risk.

¹³⁵ Business Standard, 11 July 2018, SEBI launches proceedings against ICICI Prudential MF, to probe officials, available on the internet at, https://www.business-standard.com/article/markets/sebi-launches-proceedings-against-icici-prudential-mf-to-probe-officials-118071001326_1.html, accessed on 11 Aug 2018.

Exhibit No. F: Least Square regression with Redemption lagged regressors

Table No. 1.F presents the results of a least squares regression with lagged regressors of the variable redemption (t) as a percentage of total AUM (t).

Table No. 1.F: results of a least squares regression with lagged regressors - Redemption (t)

Dependent variable	CBLO (t)			
	C		C	
C	0.04***		0.04***	
Redemption (t-1)	-0.04	\sum Redemption (t-12) from (t-24)	0.09*	
Redemption (t-2)	0.05	\sum Redemption (t-13) from (t-25)	0.02	
Redemption (t-3)	0.11**	\sum Redemption (t-14) from (t-26)	-0.06	
Redemption (t-4)	0.08*	\sum Redemption (t-15) from (t-27)	0.03	
Redemption (t-5)	-0.04	\sum Redemption (t-16) from (t-28)	-0.04	
Redemption (t-6)	-0.03	\sum Redemption (t-17) from (t-29)	-0.06	
		\sum Redemption (t-18) from (t-30)	-0.01	
R square	19.3%		21.8%	
Adjusted R square	11.1%		12.4%	

Source: Created by authors

The table indicates that the CBLO (i.e. representative cash holding) has a positive significant relation with redemptions (t-3) and (t-4). Hence, this suggests that a fund manager tends to hold more cash when there are higher cash flows. This is consistent with the understanding that when cash inflows increase in the debt – oriented schemes the cash holdings increase. The level of cash held is dependent on the previous cash flows. On the right side of the table in column 3 and 4, we find the relation between the redemptions for the year i.e. from (t-24) to (t-12) also display a positive significant relation with CBLO.

The average CBLO held in these debt – oriented schemes were 4.41% from the period January 2012 to January 2018. Of the 72 observations, 28 times the cash holding was above the average held \sim 4.41%. The cash holdings were increased when there was a redemption outflow was higher either during the month

(t) or (t-1) or (t-2). Hence, this suggests that a fund manager undertook to maintain more cash balances when there were large outflows in the previous months.

Exhibit No. G: Liquidity Operations conducted by RBI

Date	Liquidity Adjustment Facility				MSF	Standing Liquidity Facilities	Market Stabilisation Scheme	OMO (Outright)		Net Injection (+)/ Absorption (-) (1+3+5+6+9-2-4-7-8)
	Repo	Reverse Repo	Variable Rate Repo	Variable Rate Reverse Repo				Sale	Purchase	
	1	2	3	4	5	6	7	8	9	10
Jun. 18, 2018	61.96	65.53	-	76.17	0.75	-	-	-	-	-78.99
Jun. 19, 2018	122.01	78.9	220.06	-	3	2.64	-	-	-	268.81
Jun. 20, 2018	197.96	46.92	-	-	2.5	-	-	-	-	153.54
Jun. 21, 2018	241.36	86.78	200.09	-	10.09	-	-	-	-	364.76
Jun. 22, 2018	186.98	276.92	425.08	-	20.42	-	-	-	100	455.56
Jun. 25, 2018	91.36	121.33	-	-	0.1	-	-	-	-	-29.87
Jun. 26, 2018	48.41	332.26	225.02	146.5	-	-	-	-	-	-205.33
Jun. 27, 2018	38.41	304.55	-	153.3	-	-	-	-	-	-419.44
Jun. 28, 2018	37.23	409.79	-	34.11	-	-	-	-	-	-406.67
Jun. 29, 2018	97.18	169.21	158.1	137.69	31.25	-	-	-	-	-20.37
Jun. 30, 2018	41.34	511.29	-	-	47.3	-	-	-	-	-422.65
Jul. 2, 2018	38.71	425.44	-	195.18	6	-	-	-	-	-575.91
Jul. 3, 2018	38.41	452.91	68.42	231.13	1.56	-	-	-	-	-575.65
Jul. 4, 2018	38.97	544.32	-	185.55	14.5	-	-	-	-	-676.40
Jul. 5, 2018	38.96	464.25	-	147.76	3.15	-	-	-	-	-569.90
Jul. 6, 2018	44.92	202.66	54.3	200.02	39.12	-	-	-	-	-264.34
Jul. 7, 2018	126.92	40.26	-	-	13.5	-	-	-	-	100.16
Jul. 9, 2018	78.06	85.59	-	34.57	3.03	-	-	-	-	-39.07
Jul. 10, 2018	86.88	9.21	149	50.51	33.27	-	-	-	-	209.43
Jul. 11, 2018	66.46	68.78	-	74.77	4.2	-	-	-	-	-72.89
Jul. 12, 2018	61.43	108.6	-	138.84	0.55	-2.84	-	-	-	-188.30
Jul. 13, 2018	69.28	103.41	121.98	-	1.15	3.24	-	-	-	92.24
Jul. 16, 2018	134.68	85.79	-	29.36	9.25	-	-	-	-	28.78
Jul. 17, 2018	41.58	115.7	220.06	75.62	2.45	-	-	-	-	72.77
Jul. 18, 2018	38.73	52.8	-	108.75	0.7	-	-	-	-	-122.12
Jul. 19, 2018	37.96	104.8	-	159.7	0.73	-	-	-	-	-225.81
Jul. 20, 2018	163.81	114.56	99.34	-	29.82	-	-	-	100	278.41
Jul. 21, 2018	74.6	40.89	-	-	7	-	-	-	-	40.713
Jul. 23, 2018	223.59	68.62	-	-	11.2	-	-	-	-	166.17
Jul. 24, 2018	246.23	70.29	225.08	-	1.65	-2.20	-	-	-	400.47
Jul. 25, 2018	161.56	104.45	150.03	-	0.21	0.85	-	-	-	208.2
Jul. 26, 2018	49.23	86.86	-	128.29	0.2	1.35	-	-	-	-164.37
Jul. 27, 2018	115.18	190.29	135.75	94.84	6	-	-	-	-	-28.20
Jul. 30, 2018	156.66	197.61	-	60.93	21.15	-	-	-	-	-80.73
Jul. 31, 2018	143.01	152.21	225.06	140	0.1	-	-	-	-	75.96
Aug. 1, 2018	77.56	465.95	-	1.65	0.6	-	-	-	-	-389.44
Aug. 2, 2018	48.96	430.7	-	420.15	-	-0.70	-	-	-	-802.59
Aug. 3, 2018	59.38	545.16	22.37	251.79	11	-	-	-	-	-704.20
Aug. 4, 2018	-	44.97	-	-	0.2	-	-	-	-	-44.77
Aug. 6, 2018	44.16	289.94	-	155.5	-	-	-	-	-	-401.28
Aug. 7, 2018	42.81	103.2	67.25	30.04	-	-	-	-	-	-23.18
Aug. 8, 2018	89.41	37.47	-	-	17.23	-0.60	-	-	-	68.57
Aug. 9, 2018	194.8	85.93	-	-	-	0.85	-	-	-	109.72
Aug. 10, 2018	38.41	260.24	149.5	239.62	0.55	-	-	-	-	-311.40

Aug. 13, 2018	35.46	102.81	-	193.89	14.6	-	-	-	-	-246.64
Aug. 14, 2018	125.5	115.75	174.75	21.85	-	-	-	-	-	162.65
Aug. 16, 2018	52.21	313.8	215.67	87.68	1.85	-	-	-	-	-131.75
Aug. 18, 2018	-	-	-	-	-	-	-	-	-	-
Aug. 20, 2018	39.21	85.85	-	154.92	28.7	-	-	-	-	-172.86
Aug. 21, 2018	112.26	85.16	129.39	53.49	8.02	-1.70	-	-	-	109.32
Aug. 23, 2018	156.56	156.19	-	17.5	1.7	-4.87	-	-	-	-20.30
Aug. 24, 2018	76.49	296.34	197.67	-	0.3	6.57	-	-	-	-15.31
Aug. 27, 2018	39.48	225.94	-	155.73	2.02	-1.48	-	-	-	-341.65
Aug. 28, 2018	51.51	209.42	117.75	69.5	14.3	1.48	-	-	-	-93.88
Aug. 29, 2018	36.66	227.9	-	84.22	2	-	-	-	-	-273.46
Aug. 30, 2018	35.16	287.77	-	67.06	-	-1.91	-	-	-	-321.58
Aug. 31, 2018	53.01	501.07	155.5	47.05	1.25	1.91	-	-	-	-336.45
Sep. 1, 2018	29.24	54.89	-	-	0.01	-	-	-	-	-25.64
Sep. 3, 2018	39.21	411.59	40.92	274.24	11	-4.15	-	-	-	-598.85
Sep. 4, 2018	34.71	314.92	-	151.45	-	-3.24	-	-	-	-434.90
Sep. 5, 2018	35.91	272.96	-	177.23	0.3	-	-	-	-	-413.98
Sep. 6, 2018	38.46	312.69	-	133.09	-	-2.64	-	-	-	-409.96
Sep. 7, 2018	39.56	132	51.24	107.85	1.2	-	-	-	-	-147.85
Sep. 10, 2018	246.84	76.59	-	-	61.1	-	-	-	-	231.35
Sep. 11, 2018	155.79	293	475.04	-	1.01	2.42	-	-	-	341.26
Sep. 12, 2018	36.96	122.55	-	275.09	0.84	-	-	-	-	-359.84
Sep. 13, 2018	-	216.12	-	-	9.6	-	-	-	-	-206.52
Sep. 14, 2018	39.56	593.2	235.03	-	3	2.18	-	-	0.1	-313.33
Sep. 17, 2018	202.56	99.3	300.04	-	26	-	-	-	-	429.3
Sep. 18, 2018	86.6	56.26	230.01	-	1.5	-	-	-	-	261.85
Sep. 19, 2018	49.95	46.71	-	-	3.4	-	-	-	-	6.64
Sep. 20, 2018	-	49.42	-	-	37.15	-	-	-	-	-12.27
Sep. 21, 2018	40.06	151.68	230.07	-	3	-	-	-	100	221.45
Sep. 24, 2018	106.51	297.15	158	-	0.01	-1.20	-	-	-	-33.83
Sep. 25, 2018	39.36	785.95	480.05	-	2.35	1.2	-	-	-	-262.99
Sep. 26, 2018	37.46	1,205.15	-	-	-	-	-	-	-	-1,167.69
Sep. 27, 2018	39.21	984.36	-	481.05	0.81	-0.75	-	-	-	-1,426.14
Sep. 28, 2018	47.41	949.01	97.77	-	42	1.3	-	-	100	-660.53
Sep. 29, 2018	41.26	453.35	-	-	70.9	-	-	-	-	-341.19
Oct. 1, 2018	37.93	638.73	230.02	747.9	16.4	-	-	-	-	-1,102.28
Oct. 3, 2018	41.16	687.25	-	678.48	-	-	-	-	-	-1,324.57
Oct. 4, 2018	34.01	910.71	-	62.26	-	-	-	-	-	-938.96
Oct. 5, 2018	36.46	387.68	230.04	1000.06	0.5	-2.42	-	-	-	-1,123.16
Oct. 6, 2018	61.95	165.08	-	-	7	-	-	-	-	-96.13
Oct. 8, 2018	31.16	364.25	-	885.26	0.04	1.7	-	-	-	-1,216.61
Oct. 9, 2018	29.28	223.07	134	171.35	0.01	-	-	-	-	-231.13
Oct. 10, 2018	37.98	80.28	-	84.43	4.57	-0.21	-	-	-	-122.37
Oct. 11, 2018	39.09	155.59	-	-	3.5	-	-	-	-	-113.00
Oct. 12, 2018	71.28	389.12	230.62	76.44	12.15	-	-	-	120	-31.51
Oct. 15, 2018	197.22	112.36	-	-	60.35	-	-	-	-	145.21
Oct. 16, 2018	70.47	114.36	535	-	32.4	-1.80	-	-	-	521.71
Oct. 17, 2018	167.08	128.29	-	-	-	2.7	-	-	-	41.49
Oct. 18, 2018	-	103.75	-	-	1.9	-	-	-	-	-101.85

Oct. 19, 2018	39.94	156.9	373.42	-	-	1.15	-	-	120	377.61
Oct. 20, 2018	1.06	58.29	-	-	2.96	-	-	-	-	-54.27
Oct. 22, 2018	187.68	89.53	-	-	0.3	-	-	-	-	98.45
Oct. 23, 2018	65.46	155.6	235.02	-	-	-	-	-	-	144.88
Oct. 24, 2018	38.96	99.2	-	-	-	0.2	-	-	-	-60.04
Oct. 25, 2018	192.01	369.27	-	-	1	-	-	-	-	-176.26
Oct. 26, 2018	124.46	467.59	235.04	-	-	-	-	-	120	11.91
Oct. 29, 2018	57.46	138.59	-	-	0.04	-	-	-	-	-81.09
Oct. 30, 2018	38.76	139.18	235	-	-	-	-	-	-	134.58
Oct. 31, 2018	39.76	291.42	-	-	4.05	-	-	-	-	-247.61
Nov. 1, 2018	38.71	286.16	-	250.04	1.03	-	-	-	-	-496.46
Nov. 2, 2018	38.46	151.82	235.02	300.1	0.15	-0.75	-	-	100.02	-79.02
Nov. 3, 2018	3	297.8	-	-	-	-	-	-	-	-294.80
Nov. 5, 2018	41.73	258.42	-	506.67	8.06	1.63	-	-	-	-713.67
Nov. 6, 2018	132	205.79	230.03	-	-	-	-	-	-	156.24
Nov. 7, 2018	-	20.75	-	-	-	-	-	-	-	-20.75
Nov. 8, 2018	-	154.78	-	-	4.75	-	-	-	-	-150.03
Nov. 9, 2018	157.43	227.07	235.04	-	12.61	-	-	-	100	278.01
Nov. 12, 2018	63.43	138.39	-	-	7.45	-	-	-	-	-67.51
Nov. 13, 2018	38.56	336.74	635.05	-	-	-	-	-	-	336.87
Nov. 14, 2018	37.56	282.81	-	-	0.2	-	-	-	-	-245.05
Nov. 15, 2018	37.46	504.41	-	-	0.3	-	-	-	-	-466.65
Nov. 16, 2018	38.61	304.4	235	400.07	-	-	-	-	120	-310.86
Nov. 17, 2018	21.23	165.65	-	-	-	-	-	-	-	-144.42
Nov. 19, 2018	38.61	293.13	-	250.07	0.26	-3.11	-	-	-	-507.44
Nov. 20, 2018	74.11	136.21	230.01	-	10.6	-0.07	-	-	-	178.44
Nov. 21, 2018	-	121.7	-	-	17	-	-	-	-	-104.70
Nov. 22, 2018	141.58	241.59	235.01	-	-	3.18	-	-	-	138.18
Nov. 23, 2018	-	288.75	-	-	7.53	-	-	-	-	-281.22

Source: Created by authors