

THE POWER OF DIGITAL TRANSACTIONS: CURRENCY IN CIRCULATION DECLINES IN A BUSY DIWALI WEEK FOR THE FIRST TIME IN 20 YEARS (IN 2009, A MARGINAL DECLINE OF RS 9.5 BN BUT REFLECTING THE CRISIS!)Issue No. 42, FY23
Date: 03 Nov 2022

Liquidity deficit in the banking system that remained in deficit mode on an average by Rs 540 bn, surprisingly turned positive. The immediate reason for such was a decline in recourse to MSF window by banks. **However, Indian economy is undergoing a structural transformation.**

In a remarkable development, for the first time in 20 years, currency in circulation declined during the Diwali week. The innovations in technology has changed the Indian payment system. Over the years, the Indian cash lead economy now has changed to smart-phone lead payment economy. A lower currency in circulation also is akin to a CRR cut for the banking system, as it results in less leakage of deposits and it will impact monetary transmission positively!

The success of the digital journey is primarily due to the relentless push by the Government to formalize and digitalize the economy. Further, the interoperable payments systems like UPI, Wallets & PPIs have made it simple and cheaper to transfer money digitally, even for those who don't have bank accounts. Over the years, the system has expanded rapidly with new innovations like QR code, NFC etc and has also seen the swift entry of big tech firms in this industry. If we look at the latest retail digital transactions data, NEFT holds a share of 55% in value terms and most of the transactions are done through either at branch or through internet banking. **However, if we look only transactions done through smart phones like UPI, IMPS & e-wallet, they have share of around 16%, 12% and 1% respectively. So, the small retail payments done through UPI/e-wallets holds around 11-12% in the payment industry.** The slow pace of 'm-wallets' may be due to the rise in UPI payments from August 2016 onwards reaching Rs 12 lakh crores in October 2022, capturing the market very quickly.

In total payment system, we have defined digital transactions as the transactions in IMPS, UPI, and PPI; cash transactions as CIC. The trends are revealing, as the share of CIC in payment systems has been declining from 88% in FY16 to 20% in FY22 and is estimated to go down further to 11.15% in FY27. Consequently, the digital transactions share is continuously increasing from 11.26% in FY16 to 80.4% in FY22 and is expected to touch 88% in FY27.

To test the result of UPI transactions on currency in circulation empirically, we carried out a Structural VAR model to find out the impact of UPI and Prepaid Payment Instruments (PPI) on the Currency in Circulation (CIC), M0, M3, Money Multiplier (MM), and Bank deposits, individually, with short run constraints. Monthly data has been used for all variables in the unit of INR crores, for the period of April 2016 to June 2022, in the SVAR model with UPI as impulse variable, and for the period of January 2011 to June 2022 in the SVAR model with PPI as impulse variable, the reason being data of UPI is only available from April 2016.

The results from the model are as follows:

- ◆ **As expected, the results reveal that the increase in PPI is negatively impacting the CIC and M0. Further, increase in PPI is positively affecting the M3. Increase in UPI is negatively affecting the M0 and M3 but it has no significant impact on CIC.**
- ◆ It has also been found that increase in UPI and PPI are not significantly affecting the Money Multiplier, though the coefficients are negative.
- ◆ It has been estimated that every INR crore increase in UPI leads to decrease in M0, M3 and SCB deposits by 0.81 crore, 0.96 crore and 1.22 crores respectively.
- ◆ Further, every INR crore increase in PPI leads to decrease in CIC, M0, and SCB deposits by 1.52 crore, 3.28 crore, and 0.23 crore respectively. Every INR crore increase in PPI leads to increase in M3 by 11.79 crore.

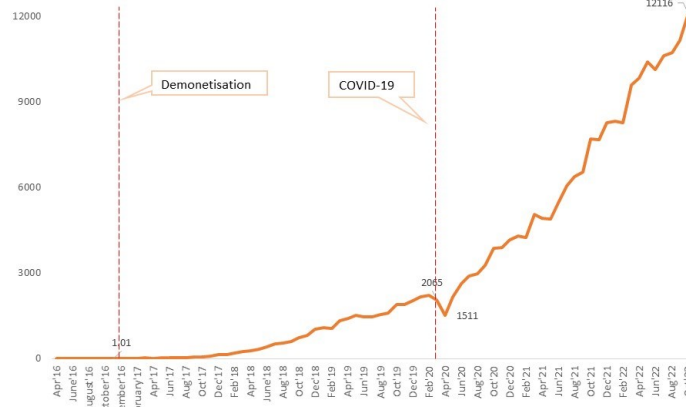
Interestingly, the impact of the UPI transactions on monetary aggregates is revealing in terms of the structural VAR model. In case of CIC, it results in a decline in CIC for around 3 months than it wanes out after 4 months. In case of M0, it results in a decline in M0 for one month and starts waning out after 4 months. In simple terms, it implies that the RBI has to print less of currency given that UPI transactions impact currency in circulation with a lag. **This is a win-win for both RBI and government, as it results in saving of seignorage costs and also a less cash economy.** This will also mean all the analysis of currency leakage impacting bank deposits, liquidity estimation now could see a fundamental reorientation in the future!

Clearly, UPI transactions have given a lot of food for thought! The increasing usage of pre-paid instruments (PPIs, also a part of e-money) has the potential to impact the measure of monetary aggregates. **For example, if a consumer prefers to use e-money (or PPI in the case of India) vis-à-vis currency, then for a given stock of currency, the money multiplier might decline.**

INNOVATIONS IN DIGITAL TRANSACTIONS CHANGES PAYMENT HABITS OF INDIANS

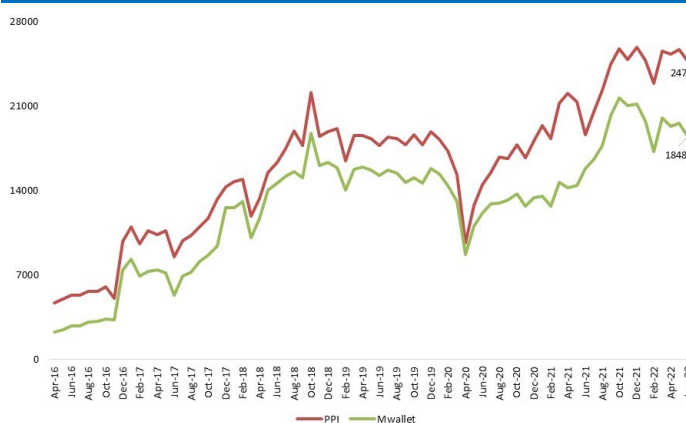
- ◆ The innovations in technology has changed the Indian payment system. Over the years, the Indian cash lead economy now has changed to smart-phone lead payment economy. The COVID-19 pandemic has caused disruption to embrace contactless digital transactions, especially for day-to-day transactions, as people tried to protect themselves from the virus.
- ◆ With the increased acceptance of digital payments in the country, the over reliance on cash is slowly fading away. The India’s digital payment journey is built on the India Stack - a comprehensive digital identity, payment and data management system. This open-access software standards facilitate digital payments between banks, fin-techs and digital wallets. **The expansion in digital payments facilitated by the stack, is an important driver of economic development in India and has helped stabilize incomes in rural areas and boost sales for firms in informal sector.**
- ◆ The success of the digital journey is primarily due to the relentless push by the Government to formalize and digitalize the economy. Further, the interoperable payments systems like UPI, Wallets & PPIs has made simple and cheap way to transfer money digitally, even though who don’t have bank accounts. Over the years, the system has expanded rapidly with new innovations like QR code, NFC etc and has also seen the swift entry of big tech firms in this industry.
- ◆ If we look the latest retail digital transactions data, NEFT holds a share of 55% in value terms and most of the transactions are done through either at branch or through internet banking. However, if we look only at transactions done through smart phones like UPI, IMPS & e-wallet, they have share of around 16%, 12% and 1% respectively. **So, the small retail payments done through UPI/e-wallets holds around 11-12% in the payment industry.**
- ◆ The share of Credit & Debit cards in transaction value has remained flat, while UPI has jumped to 16% in FY22 from 0% in FY16. Paper based instruments such as cheque etc has declined from 46% in FY16 to 12.7% in FY22.
- ◆ The slow pace of ‘m-wallets’ may be due to the rise in UPI payments from August 16 onwards reaching to 12 lakh crores in October 2022, capturing the market very quickly.

Trend in UPI Transactions (Rs bn)



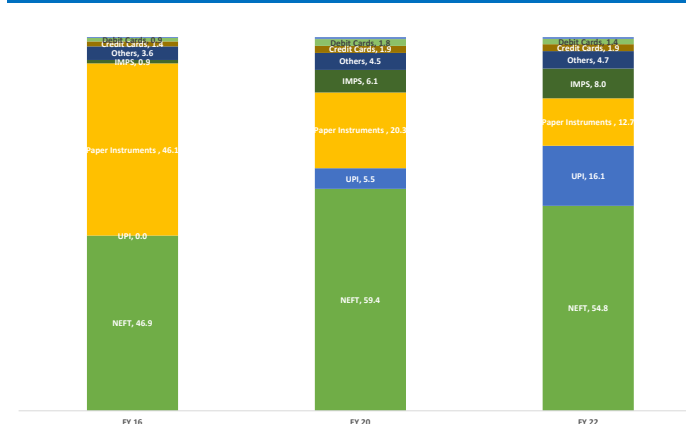
Source: NPCI, SBI Research

Trend in PPI & M-wallet Transactions (Rs crore)



Source: RBI, SBI Research

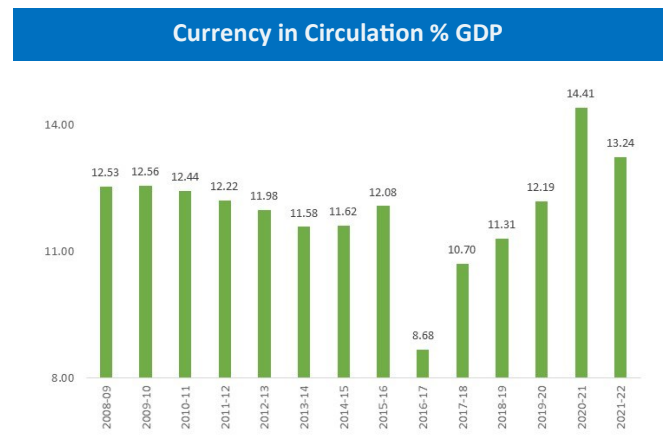
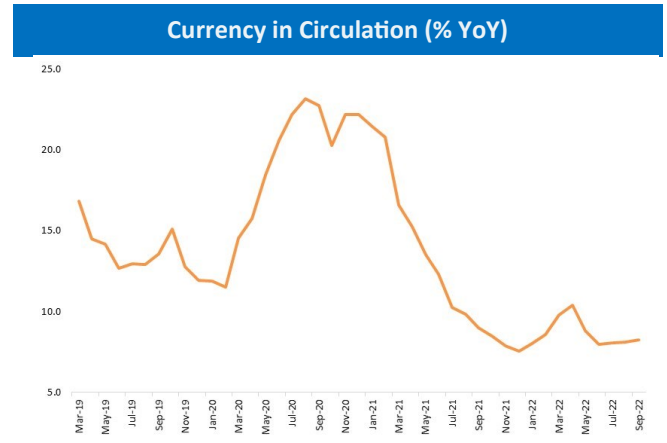
Channel wise Share (%) in Value of Transactions



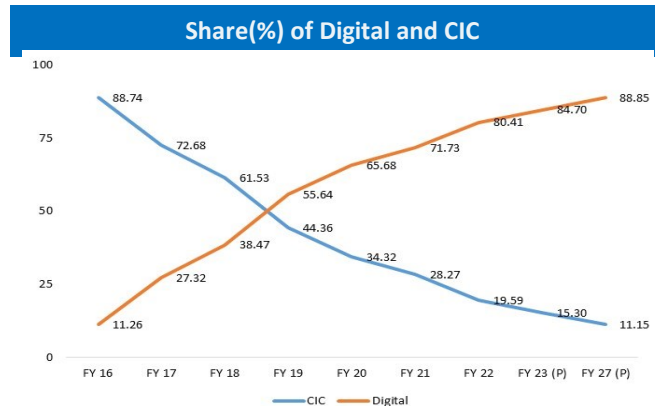
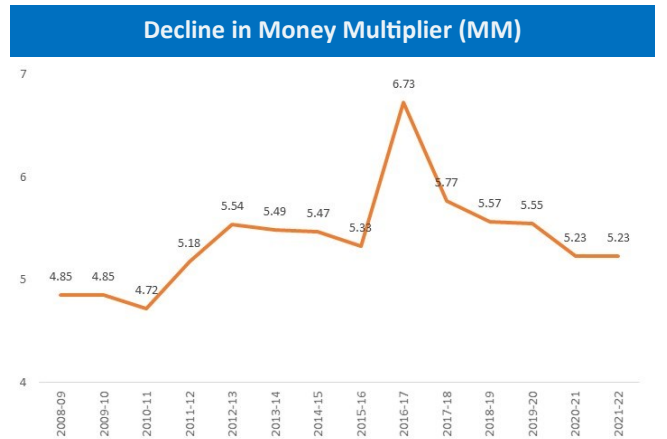
Source: RBI, SBI Research

MEASURING MONEY SUPPLY IN INDIA

- ◆ In view of the ongoing changes in the Indian economy and developments in monetary sector, RBI usually set up working groups periodically to review and refine the monetary aggregates. Till now, three working groups have been set up so far, viz., the First Working Group on Money Supply (FWG) (1961), the Second Working Group (SWG) (1977) and the “Working Group on Money Supply: Analytics and Methodology of Compilation” (WGMS) (Chairman: Dr. Y.V. Reddy) (1998).
- ◆ With the recommendation of the first working group on Money Supply (1961) and subsequent recommendations by the Y V Reddy Committee (1998), India compiles four monetary aggregates on the basis of the balance sheet of the banking sector in conformity with the norms of progressive liquidity: M0 (monetary base), M1 (narrow money), M2 and M3 (broad money), which are used in monetary policy making decisions. As per the definition, M0 is the monetary base and its components never change. This is the money created by the central bank. M3 (broad money), is defined as the total stock of money (paper notes, coins and demand deposits of bank) in circulation which is held by the public at any particular point of time.
- ◆ As the digital transactions through UPI and e-wallet has been increasing, the demand for cash is declining. If we look the data on CIC, though it is increasing with the rise in economy but the trend is declining. Since the inception of UPI, every month transactions has been increasing and has touched Rs 84 lakh crore in FY22. During Apr-June, FY23, the amount of UPI transactions has touched Rs 30 lakh crore.
- ◆ We however believe that the increase in digital transactions may result in a decline in money multiplier, even though the overall measure of broad money has been expanded. In particular, there has been a substitution from currency and much of it has gravitated towards digital mode of payments.
- ◆ To look the trend of digital and cash transactions in total payment system, we defined digital transactions as the transactions in IMPS, UPI, PPI and cash transactions as CIC. The trends are revealing, as the share of CIC has been declining from 88% in FY16 to 20% in FY22 and estimated to go down further to 11.15% in FY27. Consequently, the digital transactions share is continuously increasing from 11.26% in FY16 to 80.4% in FY22 and expected to touch 88% in FY27.



Source: RBI, SBI Research



Source: RBI, SBI Research

- ◆ Though, all the money transacted through UPIs are from the deposits of the banks and counted in money supply aggregates. While, the money stored in e-wallets are not considered in any of the money supply aggregates of M0, M1, M2 or M3. The increased use of pre-paid instruments (especially m-wallets) has changed the composition of both reserve money as well as monetary base and has further impacted central bank’s control of money supply.

DIGITAL TRACTIONS AND THEIR IMPACT ON MONETARY AGGREGATES

- ◆ China’s central bank — People’s Bank of China (PBOC) — has rolled out its own e-currency (digital yuan), on a pilot basis. This may play a role in making domestic and international payments faster and cheaper for both large-scale and consumer transactions. The PBOC had been working on its digital yuan programme since 2014, shortly after bitcoin gained attention in the country.
- ◆ China has positioned its DC/EP product as a substitute for M0, which is basically the amount of physical money in the economy at a given time.
- ◆ The increasing usage of pre-paid instruments (PPIs, also a part of e-money) has the potential to impact the measure of monetary aggregates.
- ◆ **For example, if a consumer prefers to use e-money (or PPI in the case of India) vis-à-vis currency, then for a given stock of currency, the money multiplier would go decline.** It is expected that e-money might be used mainly for small value transactions and thus, could be used to substitute central bank notes and coins at least partially.

STRUCTURAL VAR MODEL

- ◆ To test the result of UPI transactions on currency in circulation empirically, we carried out a Structural VAR model to find out the of the impact of UPI and Prepaid Payment Instruments (PPI) on the Currency in Circulation (CIC), M0, M3, Money Multiplier (MM), and Bank deposits, individually, with short run constraints.
- ◆ The VAR (p) model in its standard form is expressed as:

$$Y_t = \beta X_t + u_t$$

Where,

Y_t is the (2*1) vector of the two endogenous variables

X_t is the lag of endogenous variables

u_t is residual of (2*1) vector

- ◆ SVAR framework as follows:

$$e_t = Au_t$$

e_t and u_t are vectors of residuals obtained from reduced VAR and structural shocks, respectively

- ◆ The relationship between VAR residuals and structural shocks in this model is defined as follows:

$$A = \begin{bmatrix} 1 & 0 \\ A_{21} & 1 \end{bmatrix}$$

- ◆ Monthly data has been used for all variables in the unit of INR crores, for the period of April 2016 to June 2022, in the SVAR model with UPI as impulse variable, and for the period of January 2011 to June 2022 in the SVAR model with PPI as impulse variable. The reason being data of UPI is only available from April 2016.
- ◆ As expected, the results reveal that the increase in PPI is negatively impacting the CIC and M0. Further, increase in PPI is positively affecting the M3. Increase in UPI is negatively affecting the M0 and M3 but it has no significant impact on CIC.
- ◆ It has also been found that increase in UPI and PPI are not significantly affecting the Money Multiplier, though the coefficients are negative.
- ◆ It has been estimated that every INR Crore increase in UPI leads to decrease in M0, M3 and SCB deposits by 0.81 Crore, 0.96 crore and 1.22 crores respectively.
- ◆ **Further, every INR crore increase in PPI leads to decrease in CIC, M0, and SCB deposits by 1.52 crore, 3.28 crore, and 0.23 crore respectively. Every INR crore increase in PPI leads to increase in M3 by 11.79 crore.**

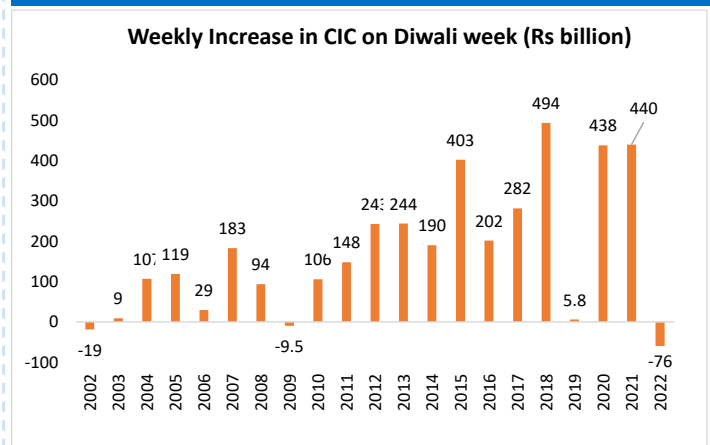
Structural Parameters Estimates			
Response variable	Impulse Variable	Corresponding Coefficient	P-value
Impact on Currency in Circulation			
CIC	UPI	-0.0259672	0.822
CIC	PPI	-1.520773	0.000***
Impact on M0			
M0	UPI	-0.8148166	0.000***
M0	PPI	-3.285775	0.000***
Impact on M3			
M3	UPI	-0.9690434	0.000***
M3	PPI	11.79173	0.000***
Impact on Money Multiplier			
MM	UPI	1.02e-06	1.000
MM	PPI	0.0000111	1.000
Impact on SCB Deposits			
SCB Deposits	UPI	-1.223749	0.000***
SCB Deposits	PPI	-0.2364625	0.007**
*** Significant at 1% level			
** Significant at 10% level			

- ◆ Impulse of PPI negatively affects the CIC, M0 and M3. In case of CIC, it results in a decline in CIC for around 3 months than it wanes out after 4 months. In case of M0, it results in a decline in M0 for one month and starts waning out after 4 months. In case of M3, it results in a decline in M3 for one month thereafter M3 rises sharply till 3 months then the effect of shock fades out after 5 months.
- ◆ Impulse of UPI negatively impacts M0 and M3 for one month than it tries to recover, and the impact starts waning out after 4 months and vanishes after 6 months.
- ◆ Impulses of UPI and PPI sharply decrease the SCB deposits for one month, thereafter SCB deposits increase till 2nd month and 3rd month each for the shocks of UPI and PPI respectively. Impact of both UPI and PPI Shocks on SCB deposits are felt till 6 months.

CURRENCY MOVEMENT IN DIWALI WEEK

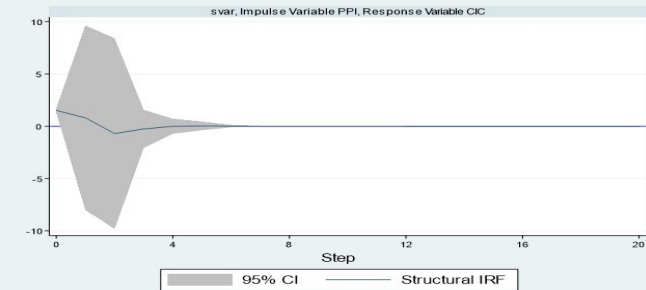
- ◆ **With the increase in digital transactions, this is the first time after 2002 that currency in circulation during the Diwali week shows a decline during the Diwali week, assuming that the marginal decline in 2009 was purely because of economic slowdown.**

Weekly Increase in CIC on Diwali week (Rs billion)



Source: SBI Research

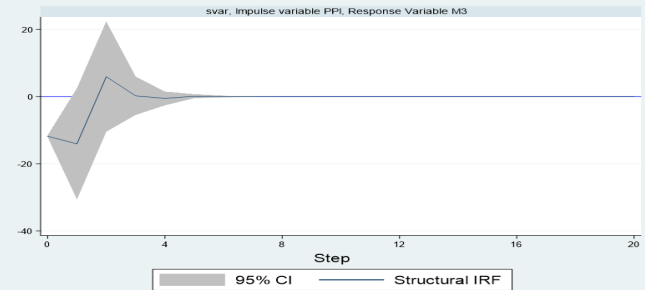
Impulse Response of PPI on Currency in Circulation



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

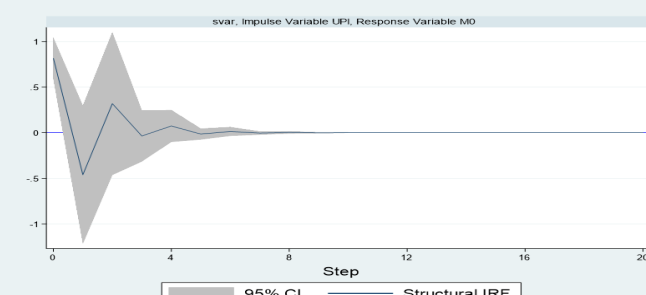
Impulse Response of PPI on M3



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

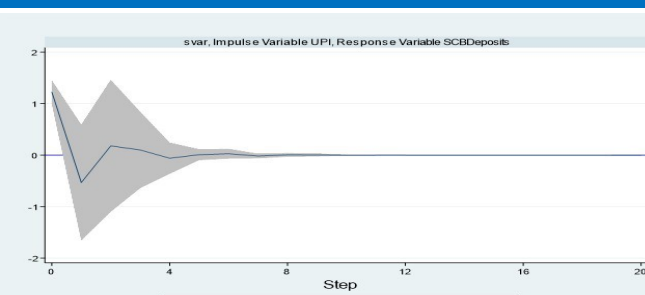
Impulse Response of UPI on M0



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

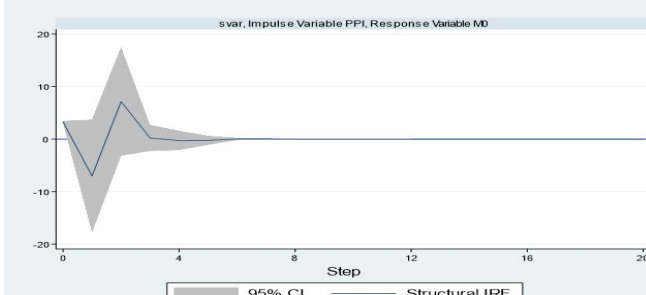
Impulse Response of UPI on SCB Deposits



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

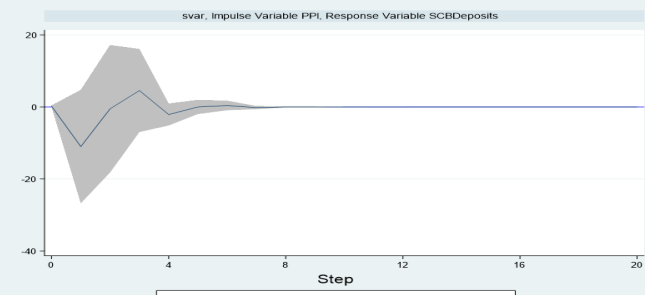
Impulse Response of PPI on M0



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

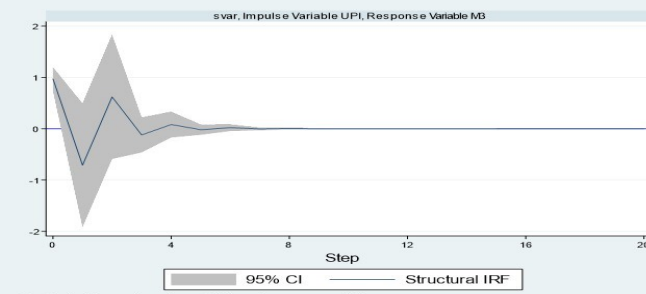
Impulse Response of PPI to SCB Deposits



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

Impulse Response of UPI on M3



Graphs by irfname, impulse variable, and response variable

Source: SBI Research

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