LEX LOCALIS-JOURNAL OF LOCAL SELF-GOVERNMENT
ISSN:1581-5374 E-ISSN:1855-363X
VOL. 22, NO. 3(2024)

ECONOMETRIC MODEL TO UNDERSTAND TREND FOR TRANSMISSION MECHANISMS OF RESERVE BANK OF INDIA - 2014 TO 2024

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Abstract
The last decade witnessed a change in the functioning and use of financial policy. From financial year 2015, the Reserve Bank of India (RBI) has fundamentally reshaped in application and use of monetary policy. The central bank of Country moved from a multi-indicator approach to Flexible Inflation Targeting (FIT), this is the primary objective behind stability in price. To improve the effectiveness of this policy, the RBI also mandated that banks should link new floating rate loans to an external benchmark, such as the repo rate. To ensure that changes in policy rates are benefits the borrowers swiftly. This reform was aimed to strengthen the monetary transmission mechanism. This process helps the central bank policy to have a great impact & influence over the broader economy. The present study is based on the transmission mechanism for Reserve Bank of India and the shift that has taken place from the last decade i.e. 2014 to 2024. An econometric model is proposed to analyse the transmission during this period of 2014 to 2024. The main objective behind the study is to analyse the rate of changes and impact of this transition in the Indian economy. That has helped to maintain a smooth rate of growth in the midst of slow down due to corona and global dip in the economy,

Keyword: Price Stability, External Benchmark, Monetary Transmission Mechanism, Econometric Model, Indian Economy, Flexible Inflation Targeting (FIT)

Introduction

Since 2014, the apex bank of our country known as Reserve Bank of India (RBI) has made drastic changes to its monetary policy structure, shifting from Flexible Inflation Targeting (FIT) and adopting new tools to improve the effectiveness of the policy. This period has seen a phased transition from internal benchmarks for lending rates to external ones, aimed to strengthen the monetary transmission mechanism.

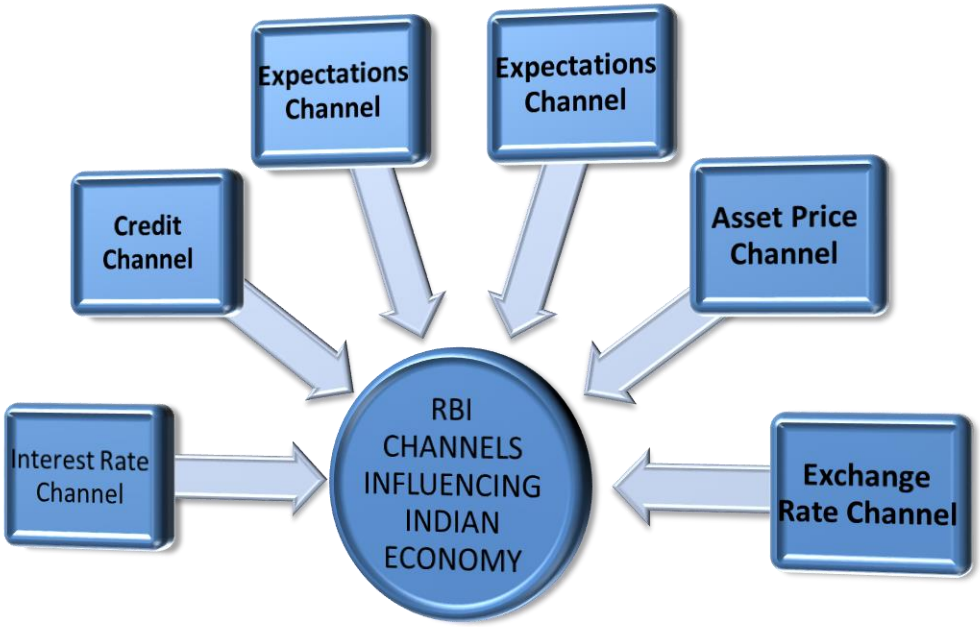

EXHIBIT 1 RBI CHANNELS TO INFLUENCY INDIA'S ECONOMY

The RBI's policy actions mainly work through the following channels to influence the Indian economy. Interest Rate Channel is the most applied technique as this is the most direct channel. Changes in the repo rate the rate at which the RBI lends to commercial banks are intended to be passed on to other interest rates in the economy, including deposits rates and lending to customers.

External Benchmark-Based Lending Rate (EBLR) is another important techniques. A major reform was the RBI's mandate in 2019 for all banks to link their new floating-rate loans to an external benchmark, such as the repo rate. This had a direct response to the weak transmission on earlier internal benchmarks, like the Marginal Cost of Funds Based Lending Rate (MCLR), which were found to be slow and incomplete. The move to EBLR has made the interest rate channel more effective, leading to faster and more enhanced manner of policy rate changes to new loans.

Credit channel is another medium that influences the economy**.** In a bank-dominated economy like India, this channel is most crucial one. The RBI's policy rate helps to change influence on the credit supply and the cost of borrowing for businesses and households. For instance, a cut in the repo rate lowers the cost of funds for banks, which results in and encourage banks to lend more, stimulating investment and consumption.

Expectations channel has gained significant prominence since the adoption of FIT. The RBI's commitment to a specific inflation target (4% with a +/- 2% band) helps to anchor inflation expectations among economic agents. When citizens as well as the business believe that RBI will keep inflation in check, their wage and price-setting behaviour becomes more stable, making it easier for the central bank to manage inflation.

Any change in the asset price channel in the repo rate directly influences the asset prices, such as bond yields and equity prices. For example, a rate cut can lead to lower bond yields and higher stock prices, which increases household wealth and encourage spending.

Exchange rate channel works as a more open economy, India's exchange rate channel is increasingly significantly. A cut in the policy rate can lead to capital outflows, causing the Indian Rupee to depreciate. This will make Indian exports cheaper and imports more expensive goods, resulting in the boost in net exports and economic growth.

Review of Literature

Understanding Monetary Policy Transmission, The Reserve Bank of India (RBI) plays a crucial role in regulating the country's economy through monetary policy. A key aspect of this understands the transmission mechanisms of monetary policy, which refers to the process by which changes in policy rates affect the broader economy. According to Kumar and **Sachdeva (2021),** the transmission of monetary policy to bank lending rates has improved in recent years, particularly with the introduction of the External Benchmark-based Lending Rate (EBLR) system[1]

Chattopadhyay and Mitra (2022) highlight the importance of the interest rate channel, where changes in policy rates influence lending and deposit rates. They also note that the transmission of policy rate changes to bank lending rates is influenced by bank-specific factors, such as capital adequacy and liquidity[2].

Similarly, Ghosh (2009) finds that industry effects of monetary policy transmission are significant in India, with certain industries being more responsive to changes in policy rates [2].

Das (2015) finds that the pass-through of policy rate changes to bank lending rates is incomplete, but has improved in recent years. The study also notes that bank-specific factors, such as size and liquidity, influence the transmission of policy rate changes to lending rates [2].

Patra et al. (2016) find that the transmission of policy rate changes to short-term interest rates is significant, but the transmission to longer-term rates is slower [3].

Kashyap et al. (2023) find that the introduction of the EBLR system has improved the transmission of policy rate changes to bank lending rates. The study also notes that the pace of transmission is expected to improve further as the proportion of EBLR-linked loans increases,[3]

Kumar et al. (2022) find that the transmission of policy rate changes to bank lending rates has improved in recent years, particularly during the tightening cycle .[4]

Objective of the Paper

The primary objective of the paper is to find the channel that influences the Indian economy, while **t**he main objective behind the study is to analyse the rate of changes and impact of this transition in the Indian economy. That has helped to maintain a smooth rate of growth in the midst of slow down due to corona and global dip in the economy,

Research Methodology

The study is based on the secondary data, having a applied macro econometric analysis. A model is developed to calculate the GDP. On the basis of the GDP the growth indicators may be known. The model framework comprises of important components which affects the GDP that is repo rate, inflation, investment expenditure, consumption expenditure and commercial bank lending rate. The econometric model analyse the growth at the time of pandemic and after the period of pandemic.

Applied Macro econometric Analysis

Applied macro econometric analysis is the use of statistical and mathematical models to analyze and predict the behaviour of an economy as a whole. In the milieu of monetary policy,

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[2] Chattopadhyay, S.K., and Mitra, A.K., (2022), "Monetary Policy Transmission in India under the Base rate and MCLR regimes: a Comparative Study", RBI Working Paper Series 10 (2022).

[3] Kashyap, Y., et al. (2023). Monetary Policy Transmission in India: Recent Dynamics. RBI Bulletin November 2023.

[4] [4] RBI Payment System Report (2024)

this analysis is used to comprehend transmission mechanisms. Econometric models help to identify and quantify the channels through which monetary policy decisions impact the real economy. For example, a change in the central bank's policy rate affects short-term interest rates, which also influences in long-term rates, asset prices, exchange rates, and ultimately, consumer and business spending.

When we look at the Apex Bank i.e. RBI's models forecast economic variables. The Central banks use this models to forecast key economic indicators like inflation, GDP growth, and unemployment, which provide them with the information that has been needed to make informed policy decisions. It also evaluates the effectiveness of policy for our economy. Econometric analysis helps to assess the historical impact of past monetary policy and their actions. This feedback loop allows central banks to refine their strategies and improve their effectiveness in stabilizing the economy.

Simulating the scenarios in which Macro econometric models can be used to simulate hypothetical scenarios, such as the potential impact of an oil price stock or a new government spending program, to understand how the economy might respond and what policy adjustments would be necessary. These macro econometric models are very useful.

In this study the given econometric model is a model by which we understand the transmission mechanism of the Reserve Bank of India's (RBI). RBI's policy from 2014 to 2024 would need to account for the major shifts in India's monetary policy framework during this period. The model captures the different channels of transmission, including the interest rate, credit, and expectations channels, while recognizing the impact of policy changes like the shift to the Marginal cost of Funds Based Lending Rate (MCLR) in 2016, the liquidity management during the COVID-19 pandemic, and the full adoption of the External Benchmark-based Lending Rate (EBLR) in 2019.

Here is a simplified structural Vector Auto regression (SVAR) model framework.

The Model Specification

The model would be a system of equations that links the Reserve Bank of India's policy instruments to key macro-economic variables. Let Yt be a vector of endogenous variables at time t.

$$\mathbf{Yt=(Rt\ policy,Rt\ bank,Ct,It,\pi t,YtGDP)}$$

Where:

- Rt policy is the RBI's policy rate (e.g., repo rate).
- Rt bank represents the commercial bank lending rate (e.g., weighted average lending rate).
- Ct is consumption expenditure.
- It is investment expenditure.
- πt is the inflation rate.
- Yt GDP is the real GDP or industrial production index.

The structural form of the model is:

$$\mathbf{A0Yt=\sum i=1pAiYt-i+BXt+\epsilon t}$$

Where:

- A0is the contemporaneous coefficient matrix, which captures the simultaneous effects among variables.
- Ai are matrices of coefficients for lagged variables.
- Xt is a vector of exogenous variables (e.g., global oil prices, US Fed policy rate, fiscal policy variables).
- ϵt is a vector of structural shocks, which are assumed to be uncorrelated.

Econometric Analysis and Evolution of Transmission Channels

The model's coefficients would be estimated using a time series of monthly or quarterly data from 2014 to 2024. The analysis would then focus on how the shocks to the policy rate transmit to the other variables, with a specific focus on the sub-periods.

1. 2015-2019: The Marginal cost of Funds Based Lending Rate (MCLR) Regime

In this period, the Base Rate and the Marginal Cost of Funds Based Lending Rate (MCLR) systems were dominant. The RBI's policy rate cuts were not fully transmitted to lending rates because banks' lending rates were tied to their internal cost of funds, which are "sticky" due to the large portion of fixed-rate deposits.

Model Analysis: The impulse response functions (IRFs) shows a slow and partial transmission. A one-unit stock (e.g., a 25 basis point cut) to Rt policy would have a muted and lagged effect on Rt bank. This weak link would in turn dampen the impact on Ct and It.

$$\textbf{Rt bank}=\alpha+\beta 1\ \textbf{Rt}-1\ \textbf{policy}+\beta 2\ (\textbf{MCLRt}-1)+...$$

The coefficient β1 would be small, indicating poor pass-through.

2. 2020: The Pandemic and Unconventional Measures

This was a period of extraordinary liquidity management. The RBI not only cut the repo rate but also introduced Targeted Long-Term Repo Operations (TLTROs) and large-scale Open Market Operations (OMOs). Targeted Long Term Repo Operations (TLTROs) are a monetary policy tool used by central banks, like the Reserve Bank of India (RBI), to provide banks with longer-term funding at the prevailing policy repo rate, with the condition that the borrowed funds are invested in specific sectors or securities, such as investment-grade corporate bonds, non-banking financial company (NBFC) debt, or commercial paper. The primary aim is to inject liquidity into specific segments of the economy, promoting investment and supporting growth, especially during times of economic stress. While the Large-scale Open Market Operations (OMOs) are a central bank's significant and impactful buying or selling of government securities to regulate the economy's money supply and interest rates, ultimately aiming to control inflation, promote economic growth, and maintain financial stability. These large-scale operations can involve buying securities to inject liquidity for an expansionary policy or selling them to absorb excess liquidity during a contractionary policy to influence lending capacity and economic activity.

Model Analysis: To capture this, the model includes dummy variables or a separate sub-model. The IRFs shows that a policy stock had a rapid and significant impact on bond yields and short-term money market rates, but the effect on bank lending rates was also influenced by liquidity injections. The credit channel became paramount.

$$\Delta \text{Rt bank}=\gamma+\delta 1\Delta \text{Rt}-1\ \text{policy}+\delta 2\ (\text{Liquidity Injection})+...$$

The coefficient δ2 would be highly significant, indicating that liquidity operations were a crucial transmission tool, separate from the repo rate alone.

3. 2024: EBLR and Effective Transmission

By 2024, the External Benchmark-based Lending Rate (EBLR) system, which was mandated for new floating-rate loans from October 2019, has become a major force.

Model Analysis: In this period, the model would show a fast and near-complete transmission. A policy rate change is now directly and immediately reflected in bank lending rates for new loans. The IRFs would reveal a much stronger and faster link between Rt policy and Rt bank.

$$\textbf{}\Delta\textbf{Rt bank}=\phi+\rho\Delta\textbf{Rt policy}+...$$

The coefficient ρ will be close to 1, demonstrating a significant improvement in the pass-through. This is because banks are compelled to link their lending rates to the repo rate,

reducing the lag and strengthening the monetary policy's impact on consumption and investment.

The overall econometric exercise would involve comparing the IRFs and variance decompositions across all the three distinct periods. The result empirically demonstrates how policy and institutional changes have made the RBI's monetary policy more potent and predictable in its effect on the Indian economy.

Discussion

The period from 2014 to 2024 had been marked by significant efforts to improve the effectiveness of monetary transmission.

- **Before EBLR (2014-2019):** Studies during this period consistently highlighted the ineffective pass-through of policy rate changes to banks' lending rates. Despite several repo rate cuts, banks were slow to reduce their lending rates due to various factors, including the high cost of deposits and an overhang of non-performing assets (NPAs).
- **After EBLR (2019-2024):** The mandatory shift to EBLR has significantly improved the speed and completeness of monetary transmission for new loans. The transmission to older loans (linked to MCLR or other benchmarks) remains slower, but the overall effectiveness has enhanced. However, challenges persist, such as the transmission being asymmetric (faster for rate hikes than for rate cuts) and the influence of government-administered interest rates on small savings schemes, which compete with bank deposits and can impede the pass-through.
- **COVID-19 and its aftermath (2020-2022):** The pandemic and subsequent global inflation surge tested the transmission mechanism. The Apex bank i.e. RBI adopted a highly accommodative stance, and the EBLR framework ensured that the rate cuts were transmitted relatively quickly to borrowers. Subsequently, the rapid and aggressive rate hikes to combat inflation were also passed on, demonstrating the improved responsiveness of the system.

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