Effectiveness of Monetary Policy under Demand and Supply Constrained Conditions

April 25, 2025

Motivation

In this paper we attempt to study *effectiveness of monetary policy during periods of negative output gap, which are further categorised into periods of supply and demand constraint.*

Overview

1. Data description
2. Defining periods of negative output gap
3. Identification of periods of negative output gap as periods of demand constraint and/or supply constraint
4. Monetary policy actions during negative output gap
5. Effectiveness of monetary policy during periods of negative output gap

Part I

Data description

Data description

- **Real GDP** series is used at a **quarterly (calendar year)** frequency from **1999 Q2 till 2024 Q1**.
- We use X-13 ARIMA SEATS to seasonally adjust the real GDP series.

Part II

Defining periods of negative output gap

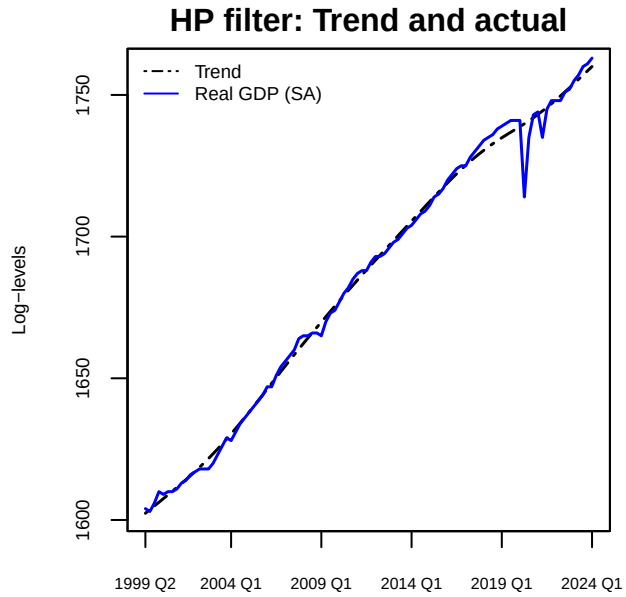
Output gap

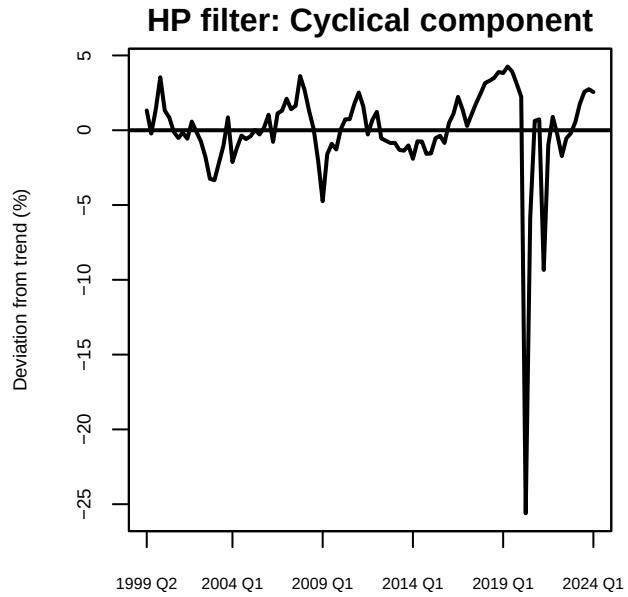
- Output gap is measured as the difference between actual output and potential output (trend component).
- Potential output is the maximum output that the economy can produce at full capacity.
- A common method of measuring potential output is the application of statistical techniques that differentiate between the short-term ups and downs and the long-term trend.

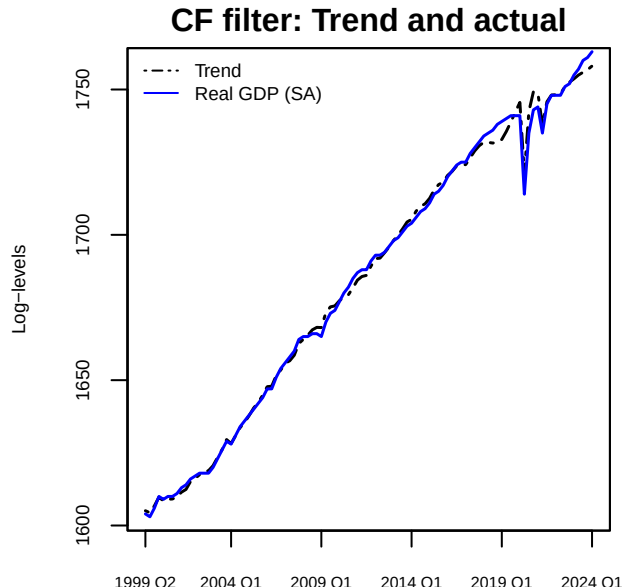
Measuring potential output

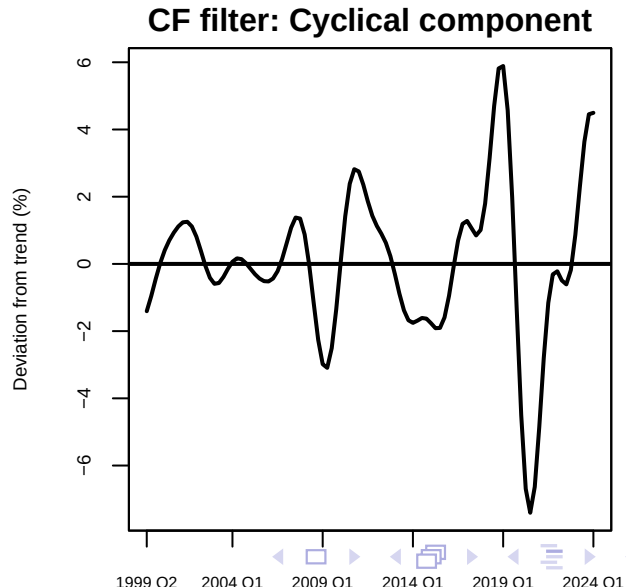
- **Filter based approach**: We use two filters to decompose the series into trend and cyclical components: -
  1. Hodrick-Prescott (HP), high pass filter - *Lambda (smoothening parameter - 1600).*
  2. Christiano-Fitzgerald (CF), a band pass filter.
  3. The CF filter eliminates the slow-moving trend components and high frequency components while retaining the intermediate frequencies.
  4. *Business cycles with a periodicity ranging between 8-32 quarters are retained*
- We use two filters to assess the sensitivity of the trend-cycle extraction to the choice of the filter.
- *Periods where the actual GDP is less than the trend are negative output gap period.*
- *Or, periods of negative cyclical component are periods of negative output gap.*

Trend and cyclical components of seasonally adjusted real GDP









Dates with negative output gap

HP Filter	CF Filter	Common Dates
1999 Q3	1999 Q2	1999 Q3
2000 Q4	1999 Q3	**2002 Q3**
2001 Q1	1999 Q4	**2002 Q4**
2001 Q2	2002 Q3	**2003 Q1**
2001 Q3	2002 Q4	**2003 Q2**
2002 Q1	2003 Q1	**2003 Q3**
2002 Q2	2003 Q2	2005 Q1
2002 Q3	2003 Q3	2005 Q3
2002 Q4	2003 Q4	2006 Q2
2003 Q1	2005 Q1	**2008 Q4**
2003 Q2	2005 Q2	**2009 Q1**
2003 Q3	2005 Q3	**2009 Q2**
2004 Q1	2005 Q4	**2009 Q3**
2004 Q2	2006 Q1	**2009 Q4**
2004 Q3	2006 Q2	**2013 Q1**
2004 Q4	2006 Q3	**2013 Q2**
2005 Q1	2008 Q2	**2013 Q3**
2005 Q3	2008 Q3	**2013 Q4**
2006 Q2	2008 Q4	**2014 Q1**
2008 Q4	2009 Q1	**2014 Q2**
2009 Q1	2009 Q2	**2014 Q3**
2009 Q2	2009 Q3	**2014 Q4**
2009 Q3	2009 Q4	**2015 Q1**
2009 Q4	2013 Q1	**2015 Q2**
2011 Q3	2013 Q2	**2015 Q3**
2012 Q2	2013 Q3	**2015 Q4**
2012 Q3	2013 Q4	**2020 Q2**
2012 Q4	2014 Q1	**2020 Q3**
2013 Q1	2014 Q2	**2021 Q2**
2013 Q2	2014 Q3	**2021 Q3**
2013 Q3	2014 Q4	**2022 Q2**
2013 Q4	2015 Q1	**2022 Q3**
2014 Q1	2015 Q2	**2022 Q4**
2014 Q2	2015 Q3	
2014 Q3	2015 Q4	
2014 Q4	2016 Q1	
2015 Q1	2016 Q2	
2015 Q2	2019 Q4	
2015 Q3	2020 Q1	
2015 Q4	2020 Q2	
2020 Q2	2020 Q3	
2020 Q3	2020 Q4	
2021 Q2	2021 Q1	
2021 Q3	2021 Q2	
2022 Q2	2021 Q3	
2022 Q3	2021 Q4	
2022 Q4	2022 Q1	
	2022 Q2	
	2022 Q3	
	2022 Q4	

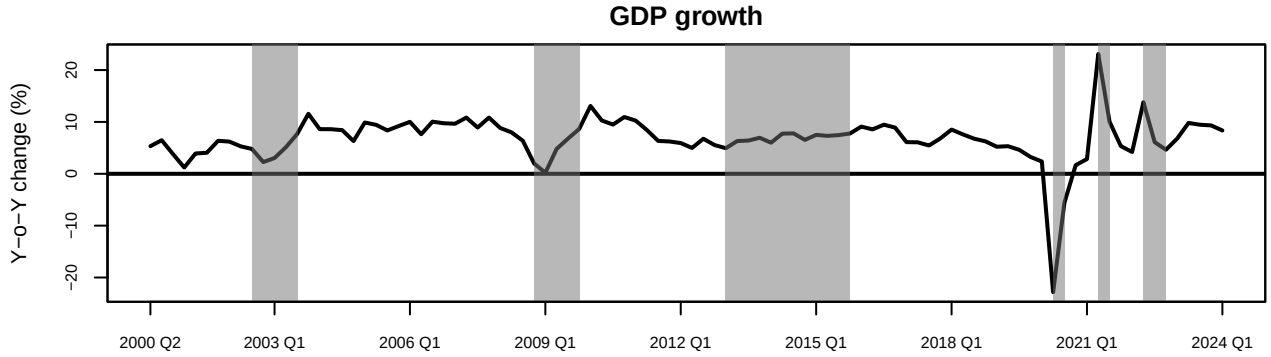
Common dates identified

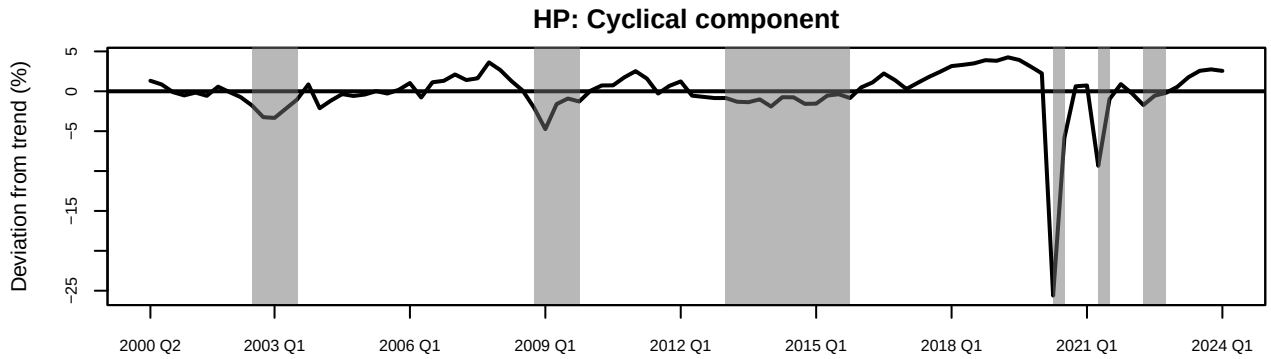
- Early 2000s - 2002 Q3 to 2003 Q3
- Period post the global financial crisis - 2008 Q4 to 2009 Q4
- Period corresponding to the taper tantrum episode - 2013 Q1 to 2015 Q4
- First COVID lockdown - Q2-Q3 of 2020
- Second COVID lockdown - Q2-Q3 of 2021
- Period post invasion of Ukraine by Russia - Q2-Q4 of 2022[1]

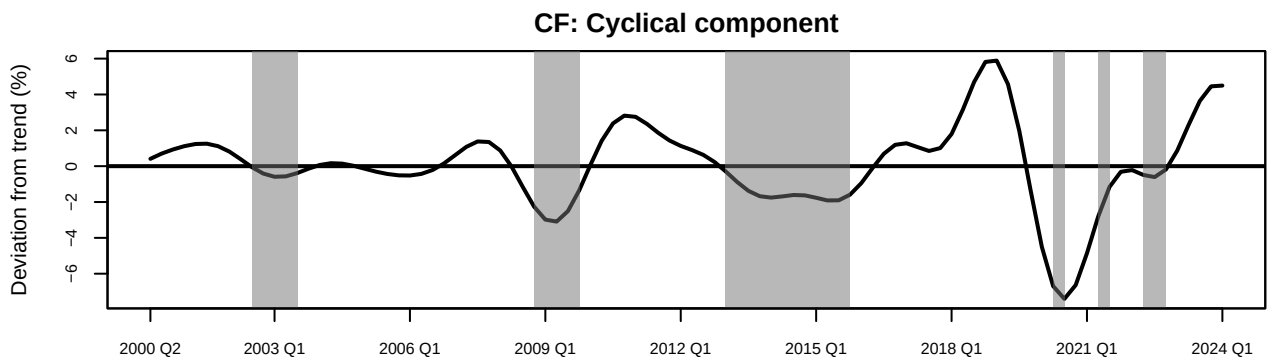
[1] These identified periods are in line with B. K. Bhoi and H. K. Behera (2016), Patra, H. Behera and John (2021), RBI's monetary policy report for FY 2015 and FY 2023.

Real GDP growth and cyclical component of the filters

Common dates of negative output gap







Part III

Periods of negative output gap as periods of demand constraint or supply constraint

Identification of drivers of negative output gap

Using inflation series

- Our identification strategy is based on the following premise:
  - **Periods of supply constraint**: Correspond to periods where WPI (primary articles) and/or WPI (fuel & power) along with CPI Food and/or Fuel & Light are seen to be increasing.
  - **Demand constraints**: CPI overall and core are seen to be declining. CPI overall is used for periods prior to 2011-12 while CPI core is used for periods post 2011-12.
- *CPI core* is used as it excludes transitory and short-term fluctuations in prices, thereby representing the prevailing aggregate demand conditions.
- An increase in indicators of both supply and demand constraint is identified as a purely *supply constraint period*.
- A decrease in indicators of both supply and demand constraint is identified as a purely *demand constraint period*.
- While in case of increase in supply indicators and moderation in demand indicators, *the period is characterised as a period where both demand and supply are constrained*.

Data

Indicators	Categories	Time span
WPI[2]	Primary article	2000 Q1 till 2024 Q1
	Fuel & power	2000 Q1 till 2024 Q1
CPI[3]	Overall	2000 Q1 till 2024 Q1
	Food	2012 Q1 till 2024 Q1
	Fuel & Light	2012 Q1 till 2024 Q1
	Core	2012 Q1 till 2024 Q1

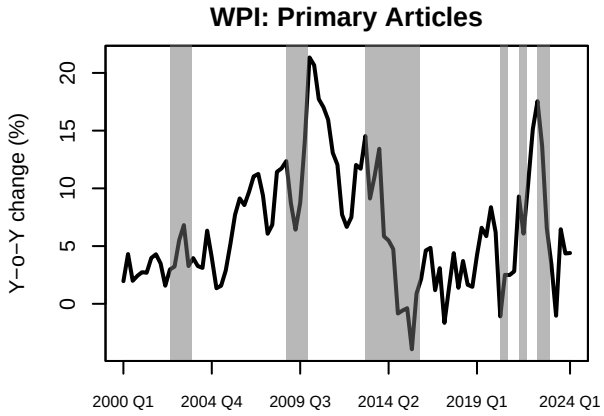
[2]Spliced series for WPI sub-sub categories like food articles, etc., is not available.

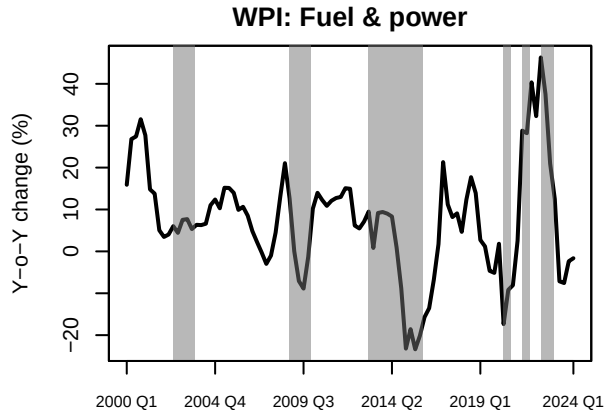
[3]Data for CPI sub-categories is only available from 2011 onwards. Thus the Y-o-Y growth rates start from 2012.

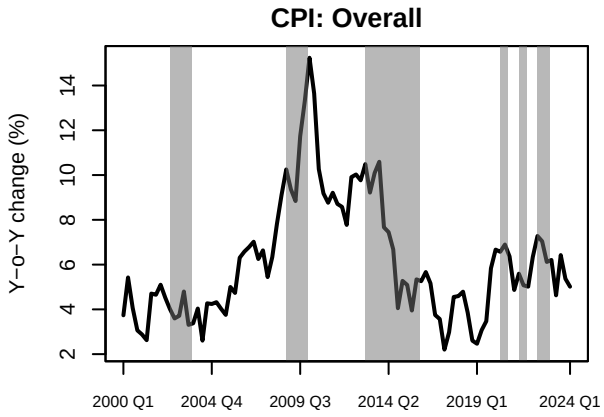
Identification of demand and supply constrained periods

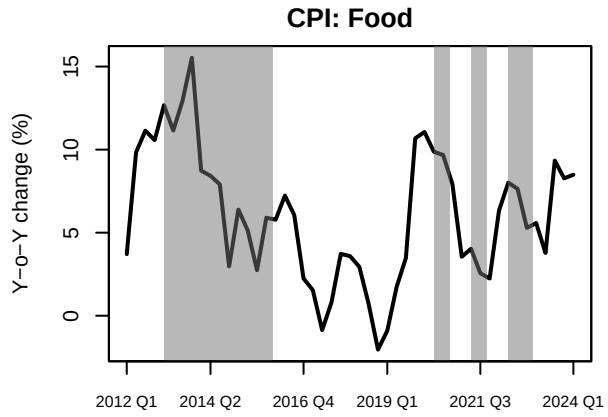
Negative output gap periods	WPI		CPI				Constraint
	Primary article	Fuel & power	Overall	Food	Fuel & light	Core	
2002Q3 - 2003Q3	↑	↑	↓				Demand & supply
2008Q4 - 2009 Q2	↓	↓	↓				Demand
Q3-Q4 of 2009	↑	↓	↑				Supply
Q1-Q4 of 2013	↑	↑	↑	↑	↓	↓	Demand & supply
Q1-Q4 of 2014	↓	↓	↓	↓	↓	↓	Demand
Q1-Q4 of 2015	↓	↓	↓	↓	↓	↓	Demand
Q2-Q3 of 2020	↑	↓	↑	↑	↑	↑	Supply
Q2-Q3 of 2021	↓	↑	↓	↓	↑	↑	Supply
Q2-Q4 of 2022	↓	↓	↑	↑	↑	↑	Supply

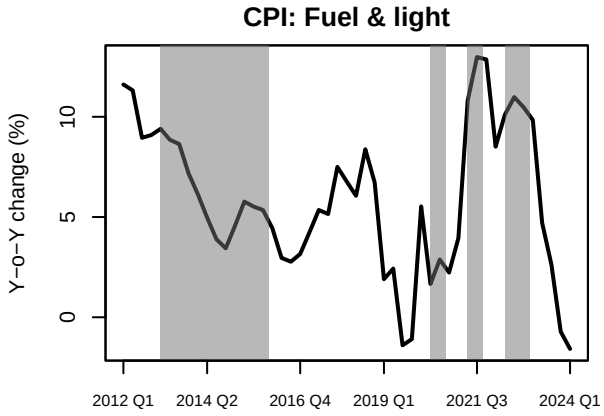
Inflation performance

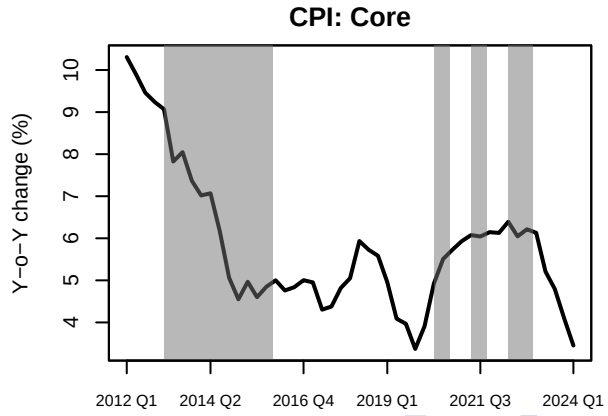












Shortage of rain and supply constraints

	South-West Monsoon (India, % deviation from normal)	Kharif foodgrain production (in billion tonnes)	Rabi foodgrain production (in billion tonnes)
2000-01	-10.47	101.77	95.05
2001-02	-9.02	111.76	101.09
2002-03	**-22.06**	**86.92**	**87.85**
2003-04	1.25	116.61	96.58
2004-05	-11.41	102.96	95.40
2005-06	-1.37	109.47	99.14
2006-07	4	110.20	107.09
2007-08	8.62	120.46	110.32
2008-09	0.01	117.68	116.79
2009-10	**-21.38**	**103.53**	**114.58**
2010-11	1.95	120.81	123.67
2011-12	1.61	131.23	128.05
2012-13	-7.14	128.07	129.05
2013-14	5.69	128.69	136.35
2014-15	**-11.86**	**128.07**	**123.96**
2015-16	**-13.71**	**125.09**	**126.45**
2016-17	-2.6	138.33	136.78
2017-18	-4.69	140.47	144.55
2018-19	-9.4	141.52	143.69
2019-20	10.36	143.81	153.69
2020-21	9.18	150.58	160.17
2021-22	-0.69	155.36	160.25
2022-23	6.47	155.71	173.98
2023-24	-5.6	155.77	176.53

Periods identified as

- Purely supply-side constraint periods - Q3-Q4 of 2009, Q2-Q3 of 2020, Q2-Q3 of 2021 and Q2-Q4 of 2022.
- Purely demand-side constraint periods - 2008Q4 - 2009 Q2, Q1-Q4 of 2014, and Q1-Q4 of 2015.
- Demand and supply constraint periods - 2002Q3 - 2003Q3, and Q1-Q4 of 2013.

Part IV

Monetary policy response to negative output gap

Theoretical underpinnings

- Monetary policy response differs based on the characteristics and nature of the shock causing negative output gap.
- **Demand constraint**: Causes deflationary pressures in the economy. Monetary policy is typically eased when facing such constraints, to boost demand in the economy.
- **Supply constraint**: Causes inflationary pressures in the economy. The monetary policy response to such constraints depends on whether the central bank is concerned about second-round effects: -
  - **Look through the shock**: Used in case of transitory shocks, as their impact dissipates within a short span of timey.
    Response towards such shocks could be counterproductive due to delay in monetary policy transmission.
  - **Respond due to concerns around second-round effects**: Higher share of food in consumer price index, means that food inflation could influences/shape inflation expectations.
  - Such shocks if persistent could spillover to generalised inflation, by feeding quickly into wages and core inflation.

Monetary policy response: A preview

- 2002 Q3 till 2003 Q3: Easing of monetary policy despite supply shocks.
- 2008 Q4 to 2009 Q4: Easing of monetary policy to tackle the spill over effects of the global financial crisis.
- 2013 Q1 to 2015 Q4: Response driven by considerations of currency defence despite subdued growth.
- 2020 Q2-Q3: Focus was on revival of growth as inflation spikes were considered transitory.
- 2021 Q2-Q3 Mostly status quo on rates.
- 2022 Q2-Q4: Monetary policy tightening.

Part V

Monetary policy actions during the 2013 Q1 - 2015 Q4 period

Shifting focus of monetary policy response

- The focus of monetary policy response during this period shifted from growth (easing monetary policy) in the first half of 2013 to currency defence (tightening monetary policy) in the second half of 2013, for which RBI undertook various additional measures, apart from raising policy rates.
- The end of 2013 and 2014 saw reversal of the additional measures taken to defend rupee. The focus of monetary policy shifted to fighting inflation.
- As inflationary pressures ebbed in 2015, RBI shifted focus again on reviving growth in the economy.

Q1-Q2 of 2013

- During this period the RBI eased the monetary policy rates to address the consistent moderation in GDP that became broad-based, thereby affecting consumption, and investment, amidst moderating inflationary pressures.
- RBI expected this easing cycle to encourage investment, anchoring medium term inflation expectation, and improve liquidity conditions in the economy.

Q3-Q4 of 2013 I

- Tight monetary policy was pursued in the second half of 2013 in response to the depreciation pressure on the rupee amidst capital outflows after the US Fed indicated that it will soon start to slow down its bond purchases.
- Key monetary policy actions taken to support rupee were:
  1. *Monetary policy tightening, 15 July 2013*.
     - 1.1 The Marginal Standing Facility (MSF) rate was raised to 300 basis points above the policy repo rate to 10.25% under the Liquidity Adjustment Facility (LAF).
     - 1.2 Bank rate was also recalibrated to 10.25 per cent.
     - 1.3 The allocation of funds under the LAF was limited to 1.0 per cent of the Net Demand and Time Liabilities (NDTL) subject to an overall cap of Rs 750 billion.
     - 1.4 As a liquidity tightening measure, the Reserve Bank conducted Open Market Sales of Government of India Securities on July 18, 2013.
  2. Further during this period MSF became the defacto policy rate.
  3. *Monetary policy tightening, 23 July 2013*. Money available to a bank under LAF was further restricted to 0.5% of that bank's NDTL. Banks were required to maintain a minimum of 99% of the required CRR on all days. This was an increase from the earlier average daily requirement of 70%.

Q3-Q4 of 2013 II

4. *Liquidity tightening measure, 8th August, 2013*: To tighten liquidity RBI announced the decision to auction GoI Cash Management Bills for a notified amount of Rs. 220 billion once every week.

- To defend the currency, RBI undertook easing of capital inflows and tightening of outflows:
  - Raising of FII (Foreign Institutional Investors) limit in rupee denominated government bonds,
  - Curbs on gold import
  - Raising the interest rates on Non-resident Indian deposits, US dollar-rupee swap, etc.

2014 Q1 - 2015 Q4

- With the ebbing of external pressures, focus shifted to addressing inflation concerns (mainly due to high inflation). The policy rates were raised in January 2014 and then a status quo was maintained throughout the year.
- However, as inflation reading softened, RBI eased the monetary policy rates in 2015, tracking weakness in capacity utilisation, production indicators, investment demand, and domestic demand.

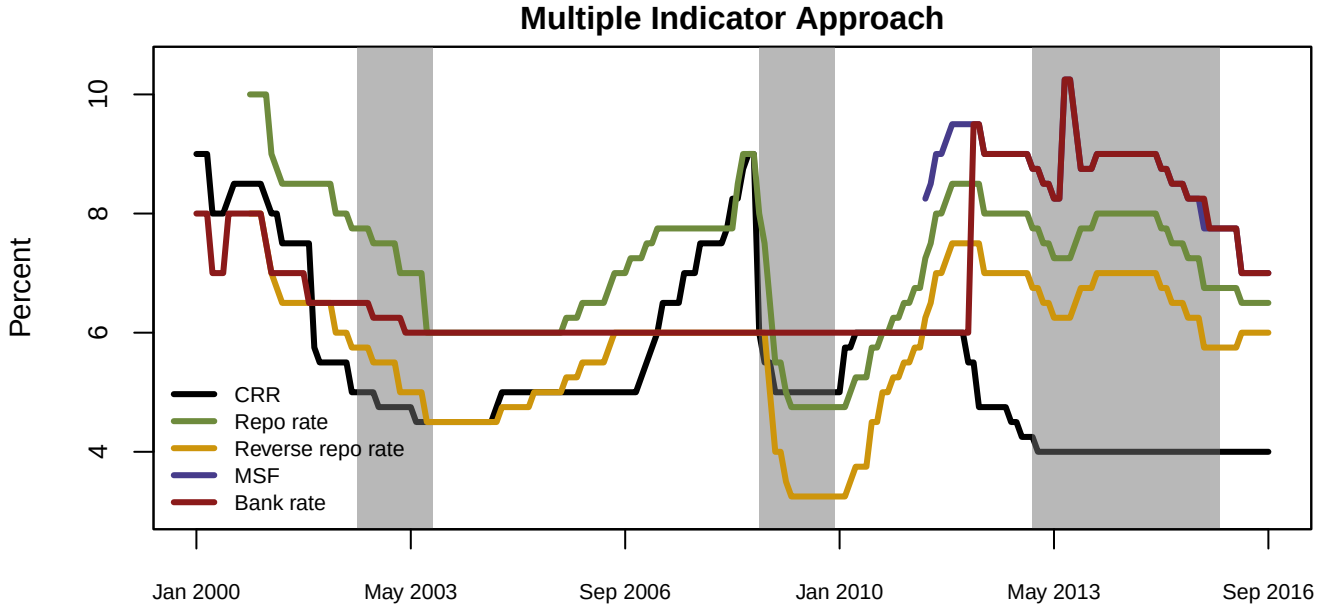
Part VI

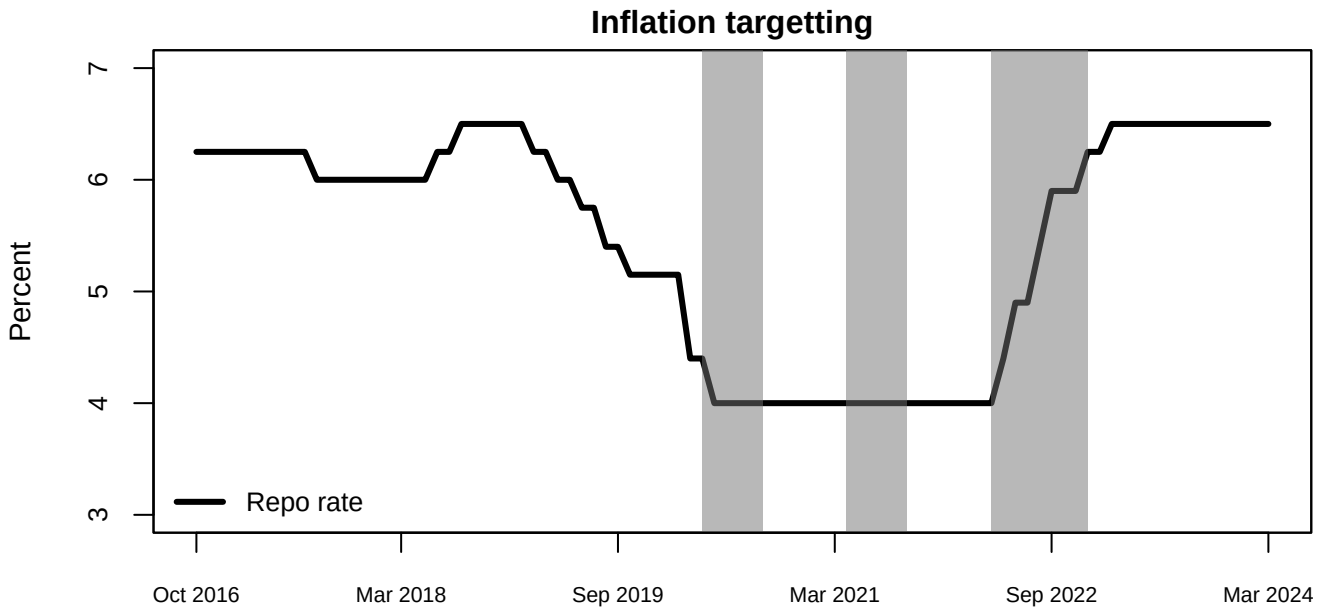
Monetary response during COVID periods and Russia-Ukraine war period

Monetary response during COVID periods and Russia-Ukraine war period

- **Q2-Q3 of 2020**: Monetary Policy Committee (MPC) during this period eased policy rates to address the adverse macroeconomic impact of the pandemic and ensure revival of economic growth. Inflationary spikes during this time were assessed to be transitory by the MPC.
- **Q2-Q3 of 2021**: A status quo was held on the policy rates as supply side shocks in the form of rising crude prices, were considered transitory.
- **Q2-Q4 of 2022**: MPC raised policy rates as it was concerned about the upside risks to inflation trajectory due to challenging global environment.

Monetary policy actions





Changes in policy rates are more responsive to demand constraints

Multiple Indicator approach

Negative output gap period	Constraint driving negative output gap	Monetary policy response	Cash Reserve Ratio	Repo rate	Reverse Repo Rate	Bank Rate	Marginal Standing Facility (MSF)
2002Q3 - 2003Q3	Demand & Supply	Easing	Reduced from 5% in 2002 Q3 to 4.5% in 2003 Q3 (50 basis points)	Reduced from 7.75% in 2002 Q3 to 6% in 2003 Q3 (175 basis points)	Reduced from 5.75% in 2002 Q3 to 4.5% in 2003 Q3 (125 basis points)	Reduced from 6.5% in 2002 Q3 to 6% in 2003 Q3 (50 basis points)	
2008Q4 - 2009 Q2	Demand	Easing	Reduced from 9% in 2008 Q3 to 5% in 2009 Q2 (400 basis points)	Reduced from 9% in 2008 Q3 to 4.75% in 2009 Q2 (425 basis points)	Reduced from 6% in 2008 Q3 to 3.25% in 2009 Q2 (275 basis points)	kept unchanged at 6%.	
Q3-Q4 of 2009	Supply	Status quo	Unchanged at 5%	Unchanged at 4.75%	Unchanged at 3.25%	kept unchanged at 6%.	
Q1-Q2 of 2013	Demand & Supply	Easing	Reduced from 4.25% in 2012 Q4 to 4% in 2013 Q2 (25 basis points)	Reduced from 8% in 2012 Q4 to 7.25% in 2013 Q2 (75 basis points)	Reduced from 7% in 2012 Q4 to 6.25% in 2013 Q2 (75 basis points)		Reduced from 9% in 2012 Q4 to 8.25% in 2013 Q2 (75 basis points)
2013 Q3	Demand & Supply	Tightening	Kept unchanged at 4%	Increased to 7.5% (25 basis points)	Increased to 6.5% (25 basis points)		Increased to 9.5% (125 basis points)
2013 Q4	Demand & Supply	Tightening	Kept unchanged at 4%	Increased to 7.75% in 2013 Q4 (25 basis points)	Increased to 6.75% (25 basis points)		Reduced to 8.75% in 2013 Q4 (70 basis points)
Q1-Q4 of 2014	Demand	Tightening and then Status quo	Kept unchanged at 4%	Increased to 8% in 2014 Q1, and kept unchanged throughout the year (25 basis points)	Increased to 7% in 2014 Q1, and kept unchanged throughout the year (25 basis points)		Increased to 9% in 2014 Q1, and kept unchanged throughout the year (25 basis points)
Q1-Q4 of 2015	Demand	Easing	Kept unchanged at 4%	Reduced to 6.75% in 2015 Q4 (125 basis points)	Reduced to 5.75% in 2015 Q4 (125 basis points)		Reduced to 7.75% in 2015 Q4 (125 basis points)

Changes in policy rates are more responsive to demand constraints

Inflation targeting

Negative output gap period	Constraint driving negative output gap	Monetary policy response	Repo Rate	Reverse Repo	Standing Deposit Facility (SDF)	MSF
Q2-Q3 of 2020	Supply	Easing	Reduced from 4.4% in 2020 Q1 to 4% in 2020 Q2 (40 basis points)	Reduced from 4% in 2020 Q1 to 3.35% in 2020 Q2 (65 basis points)		Reduced from 4.65% in 2020 Q1 to 4.25% in 2020 Q2 (40 basis points)
Q2-Q3 of 2021	Supply	Status quo	Kept unchanged at 4%	Kept unchanged at 3.35%		Kept unchanged at 4.25%
Q2-Q4 of 2022	Supply	Tightening	Increased from 4% in 2022 Q1 to 6.25% in 2022Q4 (225 basis points)	Kept unchanged at 3.35%	Increased from 4.65% in 2022 Q2 to 6% in 2022 Q4 (135 basis points)	Increased from 4.25% in 2022 Q1 to 6.5% in 2022 Q4 (225 basis points)

Part VII

Effectiveness of monetary policy response

Monetary policy actions and output gap

- Empirical evidence suggests that monetary policy actions are felt with a lag of 2-3 quarters on output (Acharya, 2017).
- **2002 Q3 till 2003 Q3** - First instance of reduction in 2002 Q4, the output gap closed in 2003 Q4.
- **2008 Q4 till 2009 Q4** - First instance of reduction occured in 2008 Q4 the gap closed in 2010 Q1.
- **2013 Q1 till 2015 Q4** -
  - First instance of reduction occured in 2013 Q1, however the central bank reversed course and increased the interest rates in 2013 Q3 and kept them elevated till the end of 2014.
  - The first instance of easing, during this negative output gap period occured during 2015 Q1, and the gap closed by 2016 Q1.
- **Q2-Q3 of 2020** - First instance of easing in 2020 Q1, gap closed in 2020 Q4.
- **Q2-Q3 of 2021** - No change in policy rates, as the central bank felt the constraints were transient in nature.
- **Q2-Q4 of 2022** - First instance of tightening was in 2022 Q2 and the gap closed in 2023 Q1.

Transmission of monetary policy I

- For monetary policy reponse to be effective in addressing negative output gap, it is essential that the transmission mechanisms work smoothly.
- There are five transmission channels: -
  1. **Interest rate channel** - Transmission from short-term interest rates like call money rate, etc., to long-term interest rates like yield on government securities, bank lending and deposit rates, etc., to be able to influence the spending and investment decisions of economic agents.
  2. **Credit channel** - This channel works in tandem with interest rate channel. It mainly works through bank lending and bank balance sheet channel. Change in monetary policy should ideally change the bank lending rates and thereby the cost of borrowing thereby affecting aggregate demand in the economy.
  3. **Exchange rate channel** - Changes in policy rate lead to either an appreciation or depreciation in exchange rate. A decrease in policy rate might causes exchange rate to depreciate, which then makes imports expensive and exports cheaper. This eventually results in an increase in demand for domestic goods thereby increasing domestic production.

Transmission of monetary policy II

4. **Asset price channel** - Lower interest rates boost asset prices such as housing and equity prices as these can be purchased at cheaper borrowing costs. The resulting boost to household / corporate wealth and improved cash flows on the back of lower interest rates also add to the demand.
5. **Expectations channel** - Refers to how a central bank's monetary policy actions, particularly interest rate changes, affect economic activity and inflation through their influence on the *expectations* of businesses and households.

Requirements for transmission channels

- Active liquidity management by the central bank so that the inter-bank rate closely tracks policy rate and demand for liquidity matches supply.
- Well integrated financial markets
- Well capitalised and healthy banking system
- Asset and liability structure of the banks being responsive to changes in policy rates.
- Absence of distortions in the form of interest subvention and mismatch of administered interest rates with those in the market.
- Effective communication of monetary policy decisions

Literature on monetary policy transmission in India I

- Studies have found interest rate channel to be the most effective in India.[4]
- Pandit and Vashisht (2011) have found that credit channel in India is an important tool in determining demand for bank credit by firms, which thereby confirmed the role of countercyclical monetary policy tool for setting the pace of economic activity.
- In the case of exchange rate channel, there exists ambiguity, as Bhattacharya, Patnaik and Shah(2010) indicate that the channel is most effective, while Raghuvanshi and Ahmad (2024) and Sharma (2020) find it to be weak owing to central bank interventions in the forex market, high share of non-tradeables in CPI, price rigidity on the part of exporters and importers to retain their market share.
- In the case of asset prices also, there exists mixed evidence.
  - Singh and Pattanaik (2012), find that credit market shocks explain significant proportion of asset prices changes. Further they find that asset price changes do not influence the inflation path.
  - Additionally, Ahmed, et.al (2022) that changes in monetary policy have a statistically significant impact on both the short and long term risk free rates and corporate yields, but less so on equity prices.

Literature on monetary policy transmission in India II

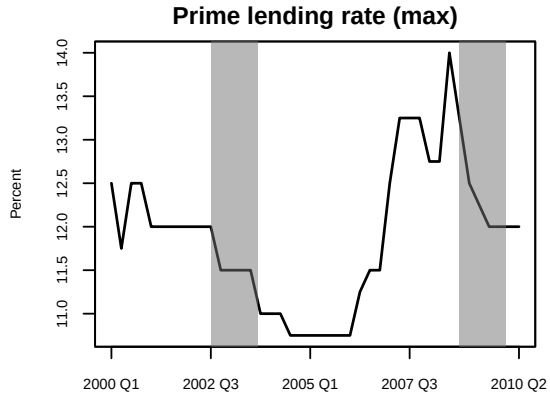
  - While Khundrakpam and Jain (2012) find the asset price channel to be one of the most important apart from interest and credit channels for transmission of monetary policy changes.
- Goyal and Parab (2021) find mixed evidence on the effectiveness of expectation channel.
- *We focus on studying the effectiveness of monetary policy transmission through interest rate channel in addressing the negative output gap.*

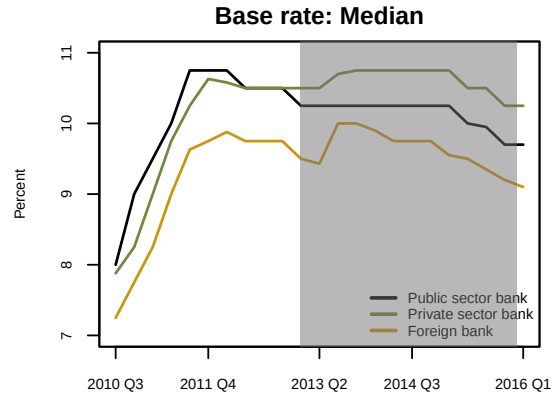
[4] Acharya (2017), Khundrakpam and Jain (2012) and Bhoi et al. (2016)

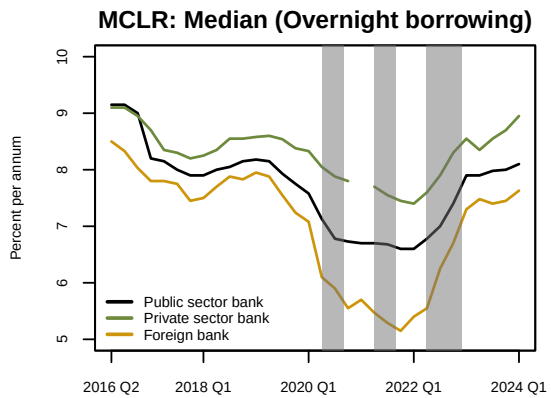
Interest rate channel

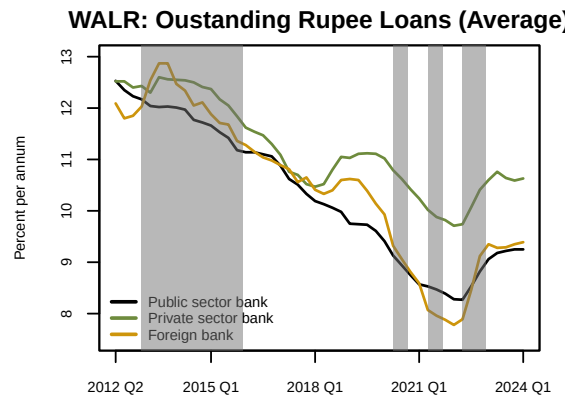
- Over the years, RBI has refined the benchmark rates system using which banks set their lending rates.
- The goal behind the refinement was improving transmission, and transparency to borrowers and providing greater flexibility to banks to set their lending rates.
- The system has evolved from: -
  - Prime lending rates (PLR; 1994)
  - Benchmark prime lending rates (BPLR; 2003)
  - Base rate (2015)
  - Marginal cost of funds-lending rate (MCLR; 2016)
- Banks link their floating interest rates with these benchmark rates.

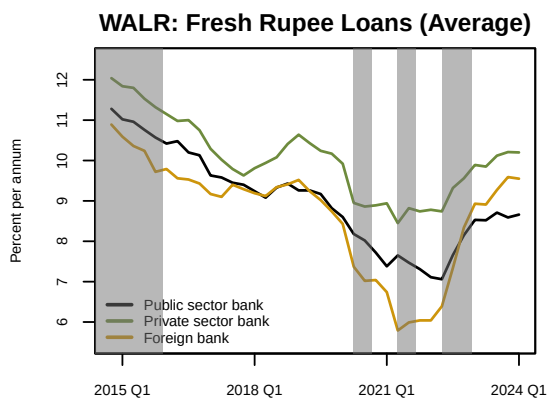
Bank lending rates











WALR - Weighted average lending rate

The plot for PLR and BPLR is the same. We plot the maximum value, derived from a poll conducted across banks.

Partial passthrough to lending rates

Negative output gap periods	Constraint driving negative output gap	Policy rate	PLR/BPLR (Max)	Base Rate (Median)			MCLR (Median)		
				Public sector banks	Private sector banks	Foreign banks	Public sector banks	Private sector banks	Foreign Banks
2002 Q3 - 2003 Q3	Demand & Supply	Reduction Repo - 175 basis points Reverse repo - 125 basis points CRR - 50 basis points Bank rate - 50 basis points	Reduced from 12% in 2002 Q3 to 11.5% in 2003 Q3 (50 basis points}						
2008 Q4 - 2009 Q2	Demand	Reduction Repo - 425 basis points Reverse repo - 275 basis points CRR - 400 basis points Bank rate - unchanged	Reduced from 14% in 2008 Q3 to 12.25% in 2009 Q2 (175 basis points)						
Q3-Q4 of 2009	Supply	Status quo	Further reduced to 12% (25 basis points)						
Q1-Q4 2015	Demand	125 basis point cut in all the policy rates		Reduced from 10.25% in 2015 Q1 to 9.7% in 2015 Q4 (55 basis points)	Reduced from 10.75% in 2015 Q1 to 10.25% in 2015 Q4 (50 basis points)	Reduced from 9.55% in 2015 Q1 to 9.20% in 2015 Q4 (35 basis points)			
Q2-Q3 2020	Supply	40 basis points reduction in repo rate					Reduced from 7.13% in 2020 Q2 to 6.78% in 2020 Q3 (35 basis points)	Reduced from 8.05% in 2020 Q2 to 7.88% in 2020 Q3 (17 basis points)	Reduced from 6.1% in 2020 Q2 to 5.9% in 2020 Q3 (20 basis points)
Q2-Q3 2021	Supply	Status quo					Reduced from 6.7% in 2021 Q2 to 6.68% in 2021 Q3 (2 basis points)	Reduced from 7.7% in 2021 Q2 to 7.55% in 2021 Q3 (15 basis points)	Reduced from 5.47% in 2021 Q2 to 5.29% in 2021 Q3 (18 basis points)
Q2-Q4 2022	Supply	Repo rate increased by 225 basis points					Increased from 6.78% in 2022 Q2 to 7.4% in 2022 Q4 (62 basis points)	Increased from 7.6% in 2022 Q2 to 8.3% in 2022 Q4 (70 basis points)	Increased from 5.55% in 2022 Q2 to 6.7% in 2022 Q4 (115 basis points)

Transmission to WALR

Negative output gap periods	Constraint driving negative output gap	Policy rate	WALR (Average) (Percent per annum)					
			Outstanding loans			Fresh Loans		
			Public sector banks	Private sector banks	Foreign Banks	Public sector banks	Private sector banks	Foreign Banks
Q1-Q4 2015	Demand	125 basis point cut in all the policy rates	Reduced from 11.66% in 2015 Q1 to 11.18% in 2015 Q4 (48 basis points)	Reduced from 12.37% in 2015 Q1 to 11.84% in 2015 Q4 (53 basis points)	Reduced from 11.88% in 2015 Q1 to 11.36% in 2015 Q4 (52 basis points)	Reduced from 11.02% in 2015 Q1 to 10.57% in 2015 Q4 (45 basis points)	Reduced from 11.84% in 2015 Q1 to 11.32% in 2015 Q4 (52 basis points)	Reduced from 10.59% in 2015 Q1 to 9.72% in 2015 Q4 (87 basis points)
Q2-Q3 2020	Supply	40 basis points reduction	Reduced from 9.13% in 2020 Q2 to 8.94% in 2020 Q3 (19 basis points)	Reduced from 10.79% in 2020 Q2 to 10.62% in 2020 Q3 (17 basis points)	Reduced from 9.32% in 2020 Q2 to 9.06% in 2020 Q3 (26 basis points)	Reduced from 8.18% in 2020 Q2 to 8.02% in 2020 Q3 (16 basis points)	Reduced from 8.95% in 2020 Q2 to 8.86% in 2020 Q3 (9 basis points)	Reduced from 7.37% in 2020 Q2 to 7.02% in 2020 Q3 (35 basis points)
Q2-Q3 2021	Supply	Status quo	Reduced from 8.53% in 2021 Q2 to 8.47% in 2021 Q3 (6 basis points)	Reduced from 10.02% in 2021 Q2 to 9.88% in 2021 Q3 (14 basis points)	Reduced from 8.07% in 2021 Q2 to 7.96% in 2021 Q3 (11 basis points)	Reduced from 7.65% in 2021 Q2 to 7.47% in 2021 Q3 (18 basis points)	Increased from 8.45% in 2021 Q2 to 8.82% in 2021 Q3 (37 basis points)	Increased from 5.79% in 2021 Q2 to 5.99% in 2021 Q3 (20 basis points)
Q2-Q4 2022	Supply	Policy repo rate increased by 225 basis points	Increased from 8.27% in 2022 Q2 to 8.82% in 2022 Q4 (55 basis points)	Increased from 9.74% in 2022 Q2 to 10.41% in 2022 Q4 (67 basis points)	Increased from 7.89% in 2022 Q2 to 9.12% in 2022 Q4 (123 basis points)	Increased from 7.06% in 2022 Q2 to 8.15% in 2022 Q4 (109 basis points)	Increased from 8.74% in 2022 Q2 to 9.56% in 2022 Q4 (82 basis points)	Increased from 6.39% in 2022 Q2 to 8.34% in 2022 Q4 (195 basis points)

Issues with transmission to lending rates

- A key reason for the muted transmission in the pre-COVID negative output gap years was that a sizable proportion of loan portfolio of banks being linked to the PLR, BPLR, base rates and MCLR.
- Banks hold discretionary powers to set these benchmarks, which made then rigid and inflexible in relation to the direction of policy interest rates.
- Further, in the case of MCLR, banks have flexibility in determining their cost of funds (average, marginal or blended cost). The transmission under this system was hindered as the cost of funds didn't move in line with the changes in policy rate.
- *Most banks in India recently, have linked their lending rates to repo rate directly. This is expected to improve transmission through interest rate channel.*

Thank you