Decoding Policy Puzzles and Monetary Policy Transmission in Sri Lanka through Time-Varying Dynamics*

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*The views expressed in this paper are the authors' own and <u>not</u> of the Central Bank of Sri Lanka

Outline

- Introduction

- Objectives and Literature Review

- Policy Puzzles in Sri Lanka

- Data and Methodology

- Empirical Analysis

- Conclusion

Introduction

- Monetary policy formulation of Central Banks relies on,
  - data on recent developments

  - projections on future path

  - understanding on the evolution and nature of linkages among macrovariables

  - how the economic variables respond to shocks and policies

- Sri Lankan economy and its dynamics have evolved noticeably,
  - Central Bank of Sri Lanka (CBSL) gradually moved away from a monetary targeting regime towards a flexible inflation targeting regime

  - Signs of inflation becoming broadly stable and low in the last decade

  - linkages between key macroeconomic variables such as money-inflation; inflation-economic growth; money-economic growth, were found to be mixed in recent times

  - CBSL has allowed for greater flexibility in the determination of the exchange rate

Objective of this study…

Find answers to the following policy questions empirically

Time-varying dynamics analysis

- Has the relationship between money supply - inflation weakened in the recent years?
- Has the relationship between money supply-economic growth weakened in the recent years?
- Has the relationship between inflation-economic growth weakened in the recent years?
- Has Sri Lanka's trend potential growth reached lower levels compared to the historical average?

Interest rate pass-through

- Has pass-through of interest rate changed?

Time-varying monetary policy transmission

- Is there an evidence of changes in responses of GDP growth and inflation to monetary policy shock?

Literature Review

Studies on macroeconomic evolution

- Kim & Nelson (1999) study GDP growth stabilisation in the USA and found structural break in the GDP growth

- Primiceri (2005) study done on USA allowing for time-variation in coefficients and variance covariance matrix

- Benati and Mumtaz (2007) study the economic history of USA with TVP-SVOL identifying monetary policy

- Akram & Mumtaz (2019) investigate time series properties of Norwegian macroeconomic variables employing TVP-SVOL

Studies on monetary policy transmission- Sri Lanka

- Amarasekara (2005) suggest a complete and almost immediate (99.65%) pass-through of policy rate changes to money market rates, but incomplete and sluggish pass-through from the call money market rate to commercial bank retail interest rates in Sri Lanka

- Vinayagathasan (2013) interest rate played a significant role in the monetary policy transmission in Sri Lanka

- Ghazanchyan (2014) found that the interest rate channel was the strongest and the quickest channel

- Perera (2016) found that the interest rate pass-through of Sri Lanka is sluggish and incomplete except for prime lending rates

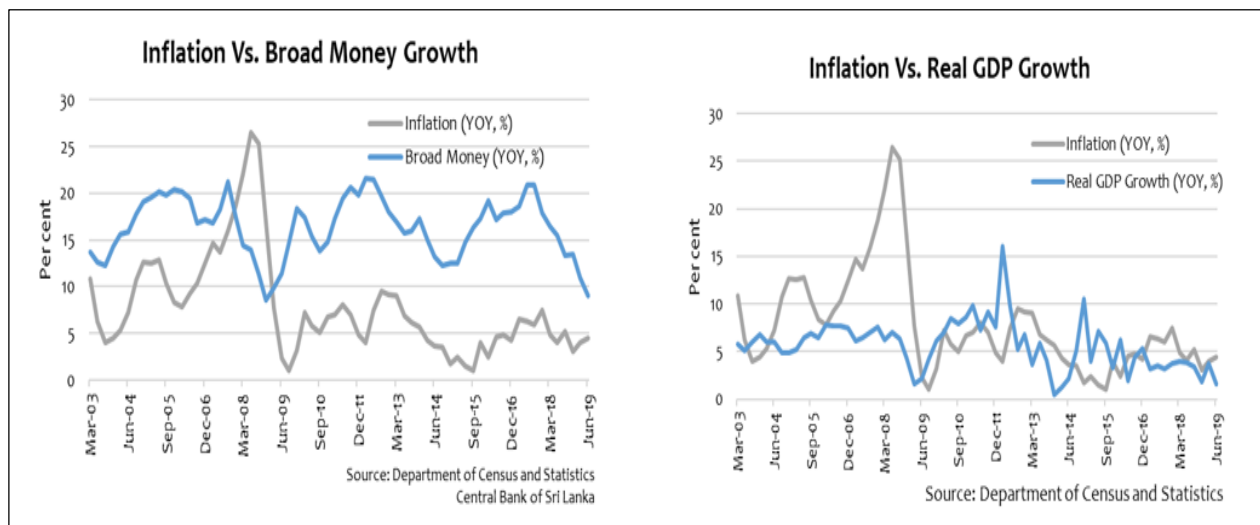# Policy Puzzles in Sri Lanka: The Challenge for Policymakers
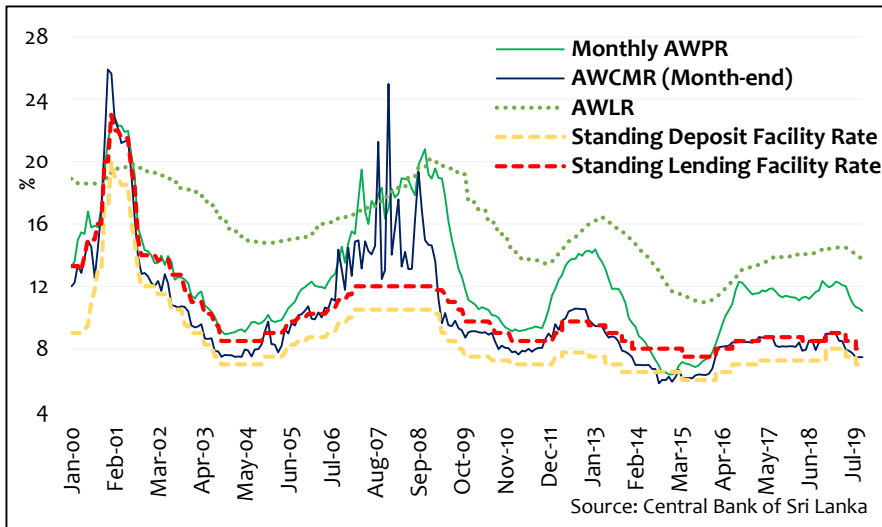
Weakened Macroeconomic Relationships?..

Source: Weerasinghe – Olcott Oration (2017)
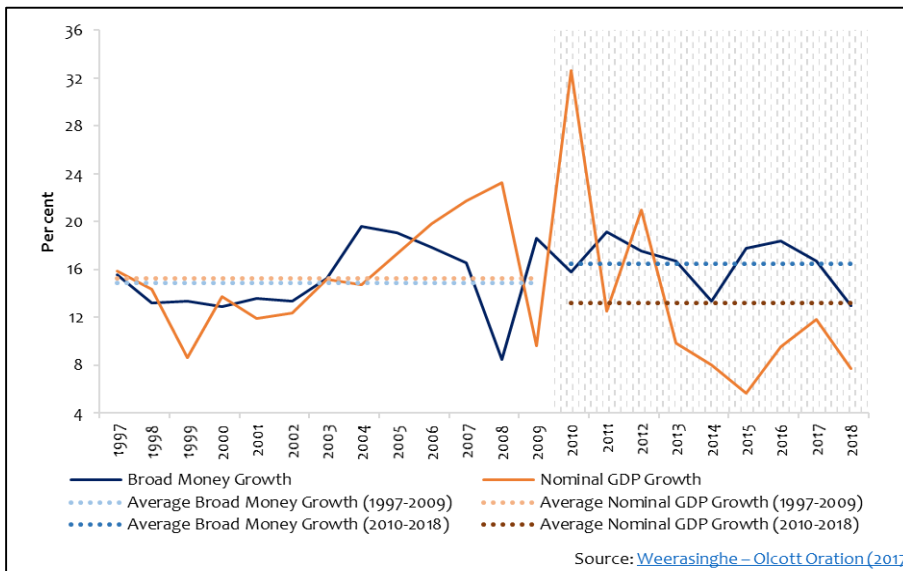
Money growth and nominal GDP growth- Disconnect?...

Inflation, Money and Economic Growth- Disconnect?

Inflation Vs. Broad Money Growth

Source: Department of Census and Statistics
Central Bank of Sri Lanka

Inflation Vs. Real GDP Growth

Source: Department of Census and Statistics

Signs of Weakening Transmission?..

Source: Central Bank of Sri Lanka
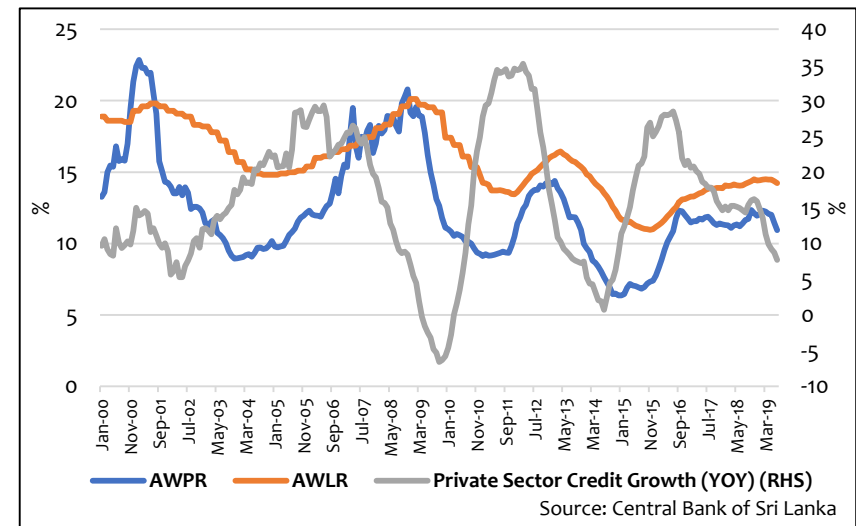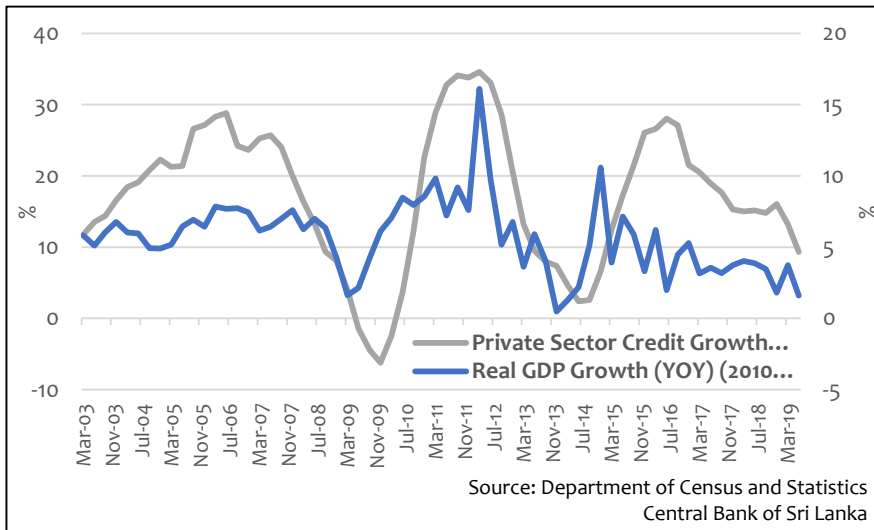
Policy Rates and Market Interest Rates- Weak transmission?

Market Interest Rates and Credit Growth- Disconnect?

Source: Department of Census and Statistics
Central Bank of Sri Lanka

Source: Central Bank of Sri Lanka

Credit Growth and Economic Growth- Disconnect?

Data & Methodology

Data and Methodology

- Data

Interest rate pass-through analysis

- Monthly data samples covering 2001 January to 2019 June

  - Policy interest rate, call money market rate (AWCMR) and selected lending (prime lending (AWPR) and lending rate (AWLR) and deposit rates (deposit (AWDR) and Fixed deposit rate (AWFDR)

Time-varying analysis

- Quarterly data from 1996 March to June 2019

  - GDP growth (Q-0-Q), Inflation (Q-o-Q), Interest rate (AWCMR) and Money supply (M_{2b}) (Q-o-Q)

- Methodology

Interest rate pass-through analysis- ARDL/ ECM

Time-varying analysis

  - Time-varying Vectorautoregression Model with Stochastic Volatility- TVP-SVOL
  - Bayesian estimation using Gibbs sampling algorithm
  - First 5 years of data used to estimate starting value of the prior

Data and Methodology *contd...*

- **Methodology for interest rate pass-through**

ARDL(1,1): $Y_t = A_0 + A_1 Y_{t-1} + B_0 X_t + B_1 X_{t-1} + \varepsilon_t$; Pesaran et al. (2001)

Error correction form,

$\Delta Y_t = B_0 \Delta X_t - \pi ECT_{t-1} + \varepsilon_t$; where ε_t is the error term

π: speed of adjustment

- **Methodology for Time-varying parameter model with stochastic volatility (TVP-SVOL)**

The VAR model with time-varying coefficient:

$Y_t = c_t + \sum_{l=1}^{L} \emptyset_{l,t} Y_{t-l} + \vartheta_t$; Akram and Mumtaz (2019)

Where Y_t contains GDP growth, inflation, short term interest rate and money supply growth

The covariance matrix:

$VAR(\vartheta_t) = R_t = A_t^{-1} H_t (A_t^{-1})'$;   Cogley and Sargent (2005)

The time-varying matrices:
$A_t \equiv \begin{pmatrix} 1 & 0 & 0 \\ a_{12,t} & 1 & 0 \\ a_{13,t} & a_{23,t} & 1 \end{pmatrix}$, $H_t \equiv \begin{bmatrix} h_{1,t} & 0 & 0 \\ 0 & h_{2,t} & 0 \\ 0 & 0 & h_{3,t} \end{bmatrix}$
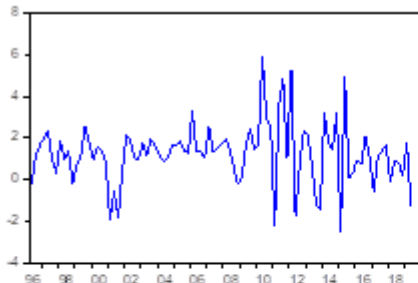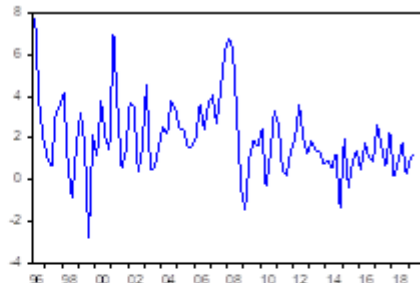
Primiceri (2005)

Empirical Analysis
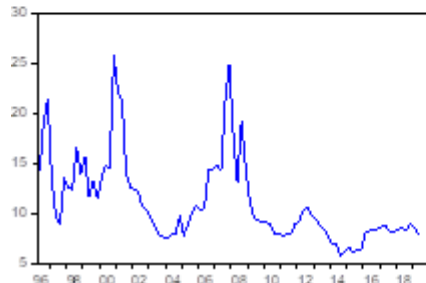
Preliminary Analysis of Data and Key Statistics

GDP Growth

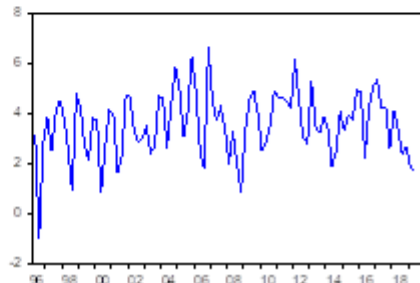Inflation

Interest Rate

Money Growth

Movements of the Selected Variables

|	**Key Descriptive Statistics – 2002Q1-2019Q2**			
	GDP Growth	**Inflation**	**Interest Rate**	**Money Growth**
Mean	1.40	1.88	9.84	3.74
Maximum	5.94	6.80	24.99	6.66
Minimum	-2.54	-1.44	5.77	0.84
Std. Dev.	1.55	1.61	3.47	1.20
	Correlation Analysis			
	GDP Growth	**Inflation**	**Interest Rate**	**Money Growth**
GDP Growth	1.00	-0.08	0.01	0.16
Inflation	-0.08	1.00	0.59	0.10
Interest Rate	0.01	0.59	1.00	-0.11
Money Growth	0.16	0.10	-0.11	1.00

Time-Varying Dynamics of Macroeconomic Variables

Time-Varying Trend of the Variables
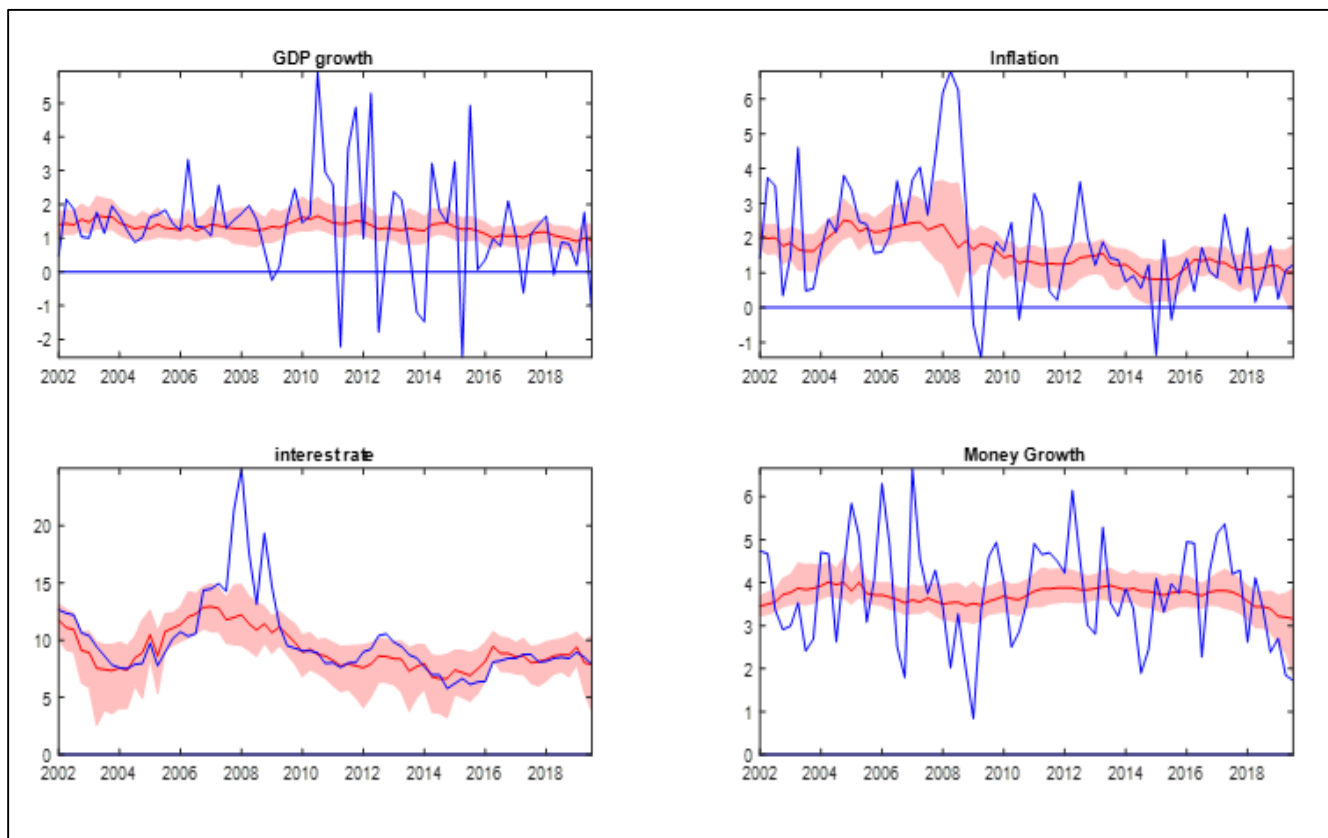
- No structural break in the data series. Trends evolve only smoothly

- No evidence of systemic moderation in economic growth

- Smooth decline in inflation trend

- Except 2008-2009, long-term mean of interest rate is smooth

- Broadly stable money growth trend

Time-Varying Dynamics of Macroeconomic Variables

**Time-Varying Stochastic Volatility(Panel 1) and Unconditional Standard Deviation (Panel 2)**
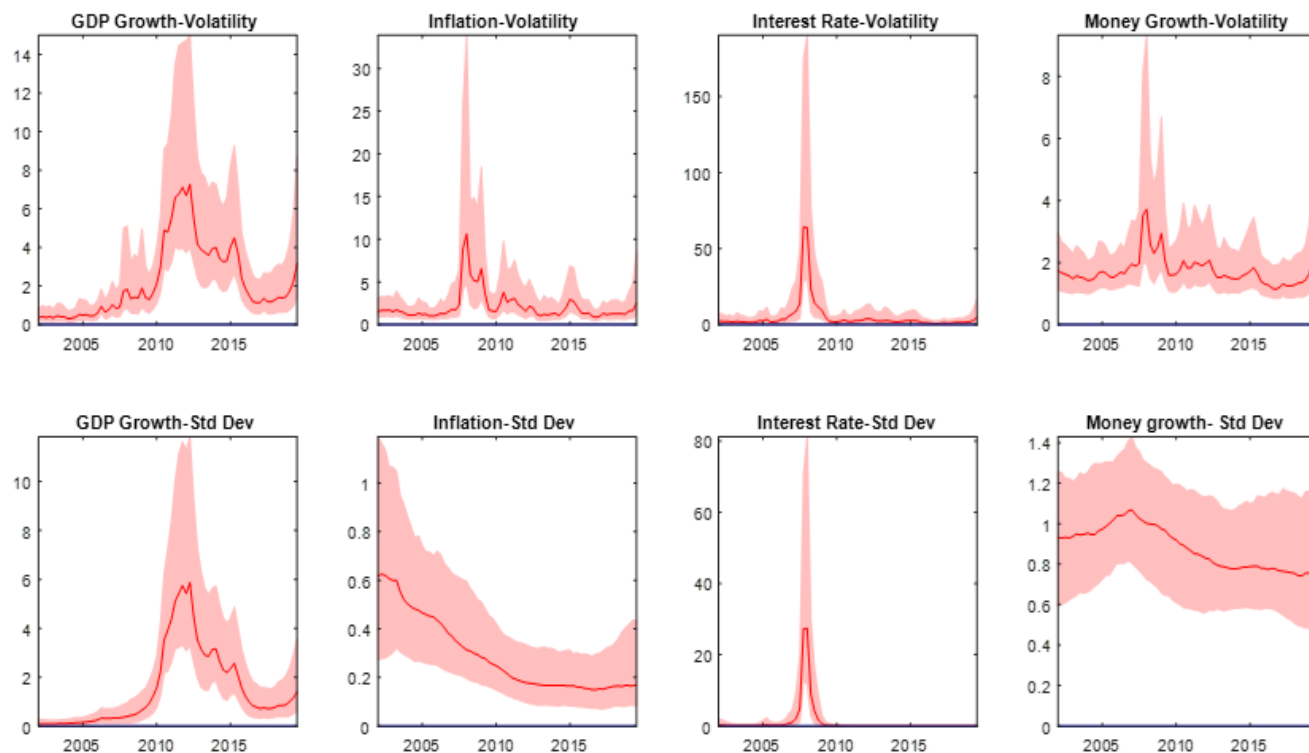
Key findings:

- Volatility in GDP growth in 2010-2015 is mainly explained by the volatility in shock

- Systemic moderation in inflation volatility

- No notable stochastic volatility in interest rates (except in 2008-2009)

- Volatility of money growth and its shock are not substantial

Time-Varying Dynamics of Macroeconomic Variables

Dynamic Correlation– Business Cycle Frequency
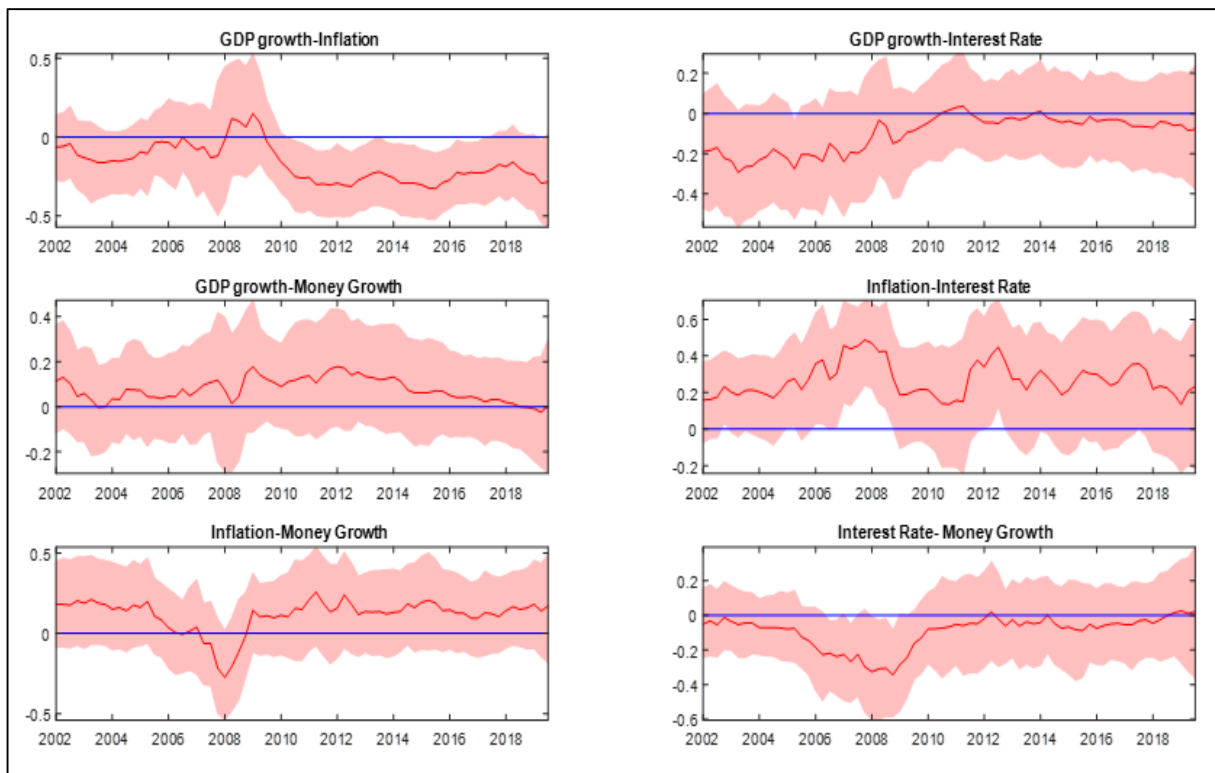
Key findings:

- Evidence of time-varying and evolving correlation

- GDP growth-Inflation: Negatively correlated since 2010

- GDP growth-Interest rate: Weakened negative correlation

- GDP growth-Money growth: Weak positive correlation

- Inflation-Interest rate: Positive correlation, broadly stable over time

- Inflation-Money growth: Positive correlation, broad stable over time (except during 2005-2009)

- Interest rate-Money growth: No significant relationship during most of the period, but negatively correlated

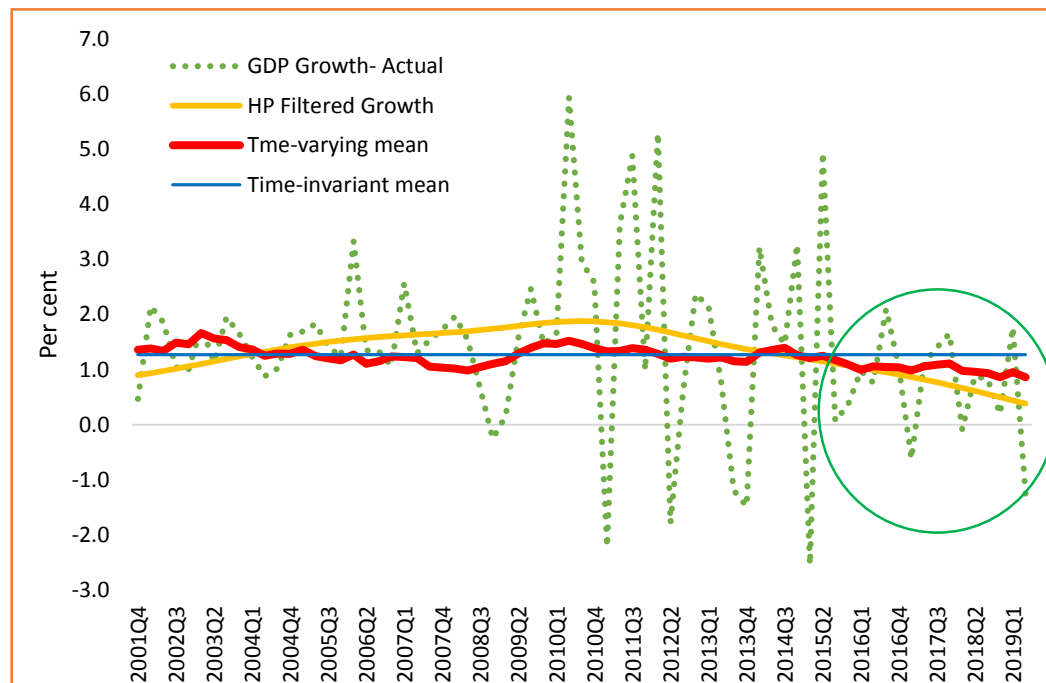# Key-takeaways from the time-varying analysis…

GDP growth

- No evidence of significant moderation in long term growth potential

  - Recent moderation could be associated with moderation in money growth

  - Policy attention required to revive growth

Inflation

- Systematic moderation observed in the magnitude and volatility of inflation that is not driven by stochastic volatility

Comparison of Different Measures of GDP Growth Trend

Key-takeaways from the time-varying analysis…

Interest rate

- Stable relationship between Interest rate-Inflation in recent times confirms the CBSL's increased commitment to price stability

- Weakened relationship between Interest rate-Money growth is inline with the CBSL's move away from monetary targeting

Money growth

- Weakened relationship between Money growth- GDP growth and Money growth- Interest rate

- However, no substantial evidence to show weakening relationship between Inflation-Money growth

Monetary Policy Pass-through using ARDL/ECM

- Interest rate Pass-through of Monetary Policy

	Mark up (A_0)	Long-run pass through (β)	Short-run pass through (B_0)	Speed of Adjustment (π)	Mean Adjustment Lag (Months)
Pass-through from policy rates to short term money market rates					
AWCMR	-0.9168	1.1889***	1.0856***	-0.1620***	0.5
Pass-through from short term money market rates to retail interest rates					
AWPR	1.1665	1.0823***	0.5217***	-0.0847***	5.6
AWLR	6.8040***	0.8392***	0.0403**	-0.0532***	18.0
AWDR	0.1362	0.7679***	0.0109	-0.0405***	24.4
AWFDR	0.4923	0.9930***	0.0215	-0.0515***	19.0

Pass-through from policy rates to money market rates: Full and complete (Both in long-run and short-run)

Pass-through from money market rates to retail interest rates

- Short-run : Pass-through is dismal
- Long-run : Almost complete and quick pass-through to AWPR. AWLR takes 1.5 years for 84 per cent transmission. Transmission of AWDR is sluggish and incomplete Almost complete pass-through in AWFDR, but it takes almost two years

- Findings are broadly consistent with Amarasekara (2005) and Perera (2016)

Monetary Policy Pass-through using TVP-SVOL

Response to a 1% increase in interest rate:
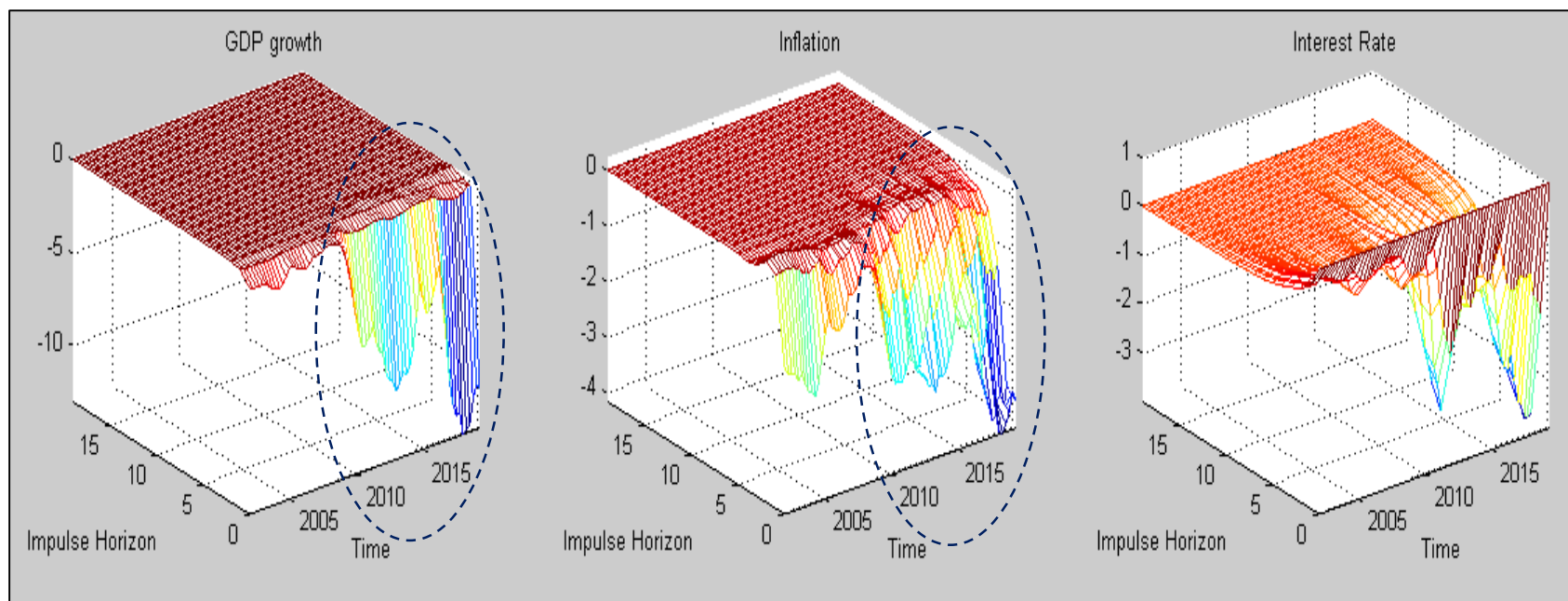
Impulse Responses of Monetary Policy Shock – Full Sample Period

Supports the use of time-variant models to study responses to monetary policy shocks…

Conclusion & Discussion

Important Findings…

- Key macroeconomic variables such as GDP growth, inflation and short-term interest rate show **no signs of any major structural break**

  - Provides evidence **against** the notion of a **reduced growth potential for Sri Lanka**

- Recent systemic **moderation in the magnitude and volatility of inflation** and stable relationship between inflation-interest rate

  - Supports **CBSL's forward-looking monetary policy and active communication**

Important Findings…

- **<u>Broadly stable long term mean of interest rate</u>** in the backdrop of a moderation in inflation

  - Supports the notion that the interest rate structure should be brought down

- **<u>Weakening relationship</u>** between **<u>money growth - economic growth and interest rate</u>**

  - Supports the CBSL's stance on **<u>discontinuing monetary targeting</u>** since mid-2000s

Important Findings…

- Pass-through of monetary policy

  - **Complete and quick pass-through** from policy rates to short-term money market rates

  - **Slower pass-through** from short-term money market rates to retail interest rates (around 1-2 years)

- Time-varying responses of economic growth and inflation to monetary policy shocks observed through TVP-SVOL

Future Research…

- Extending analysis including other macroeconomic variables such as exchange rate and fiscal variables

- Extending the time-varying transmission analysis to study transmission size, speed of adjustment and other underlying factors

- Include different identification methods to check the robustness of the time-varying monetary policy transmission

- Analyzing the interest rate pass-through employing time-varying cointegration analysis

Thank You…