



Macroeconomic Modelling and Forecasting

The Sri Lankan Experience

06 April 2021

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The Central Bank of Sri Lanka's (CBSL) Journey Towards Model Based Monetary Policy Conduct...

1997

- Commencing research on modifications to monetary policy framework

2001

- Adopting the floating exchange rate regime

2002-
2003

- Streamlining CBSL objectives
- Strengthening the independence of CBSL by having a majority of the Monetary Board members (3 out of 5) from the private sector
- Establishing the Monetary Policy Committee (MPC)
- Commencement of active open market operations (active OMO) under a policy rate corridor approach
- Commencing the signaling of the changes in monetary policy stance based on policy interest rates
- Announcing the monetary policy stance through a monthly press release based on an advance release calendar

2004-
2010

- Starting to enunciate CBSL policies through a Road Map
- Establishing a Monetary Policy Consultative Committee (MPCC)
- Developing in-house inflation forecasting models
- Encouraging the Department of Census and Statistics (DCS) to update the inflation index
- Commencing conducting inflation expectations survey

2010-
2019

- Strengthening modelling and forecasting capacity of the CBSL
- Allowing greater flexibility in exchange rate
- Officially announcing the CBSL efforts to move towards FIT
- Strengthening forward looking monetary policy analysis and decision making

Importance of Modelling and Forecasting in an Inflation Targeting Regime

- Announced numerical inflation target
- Medium-term inflation forecast to facilitate forward looking monetary policy decision making
- Higher degree of transparency and accountability



Modelling &
Forecasting
becomes
Important

To implement Flexible Inflation Targeting (FIT) framework, **macroeconomic projections**, including inflation projections, are being **strengthened** using short-term as well as medium term structural forecasting tools and techniques

Forecasting and Policy Analysis System (FPAS)

- FPAS is a set of elements (tools) and organization of processes to deliver a consensual view on current economic developments and its forecast, including risks
- Near-term and medium-term model based projections to support the monetary policy process
- FPAS consists of:

Organization

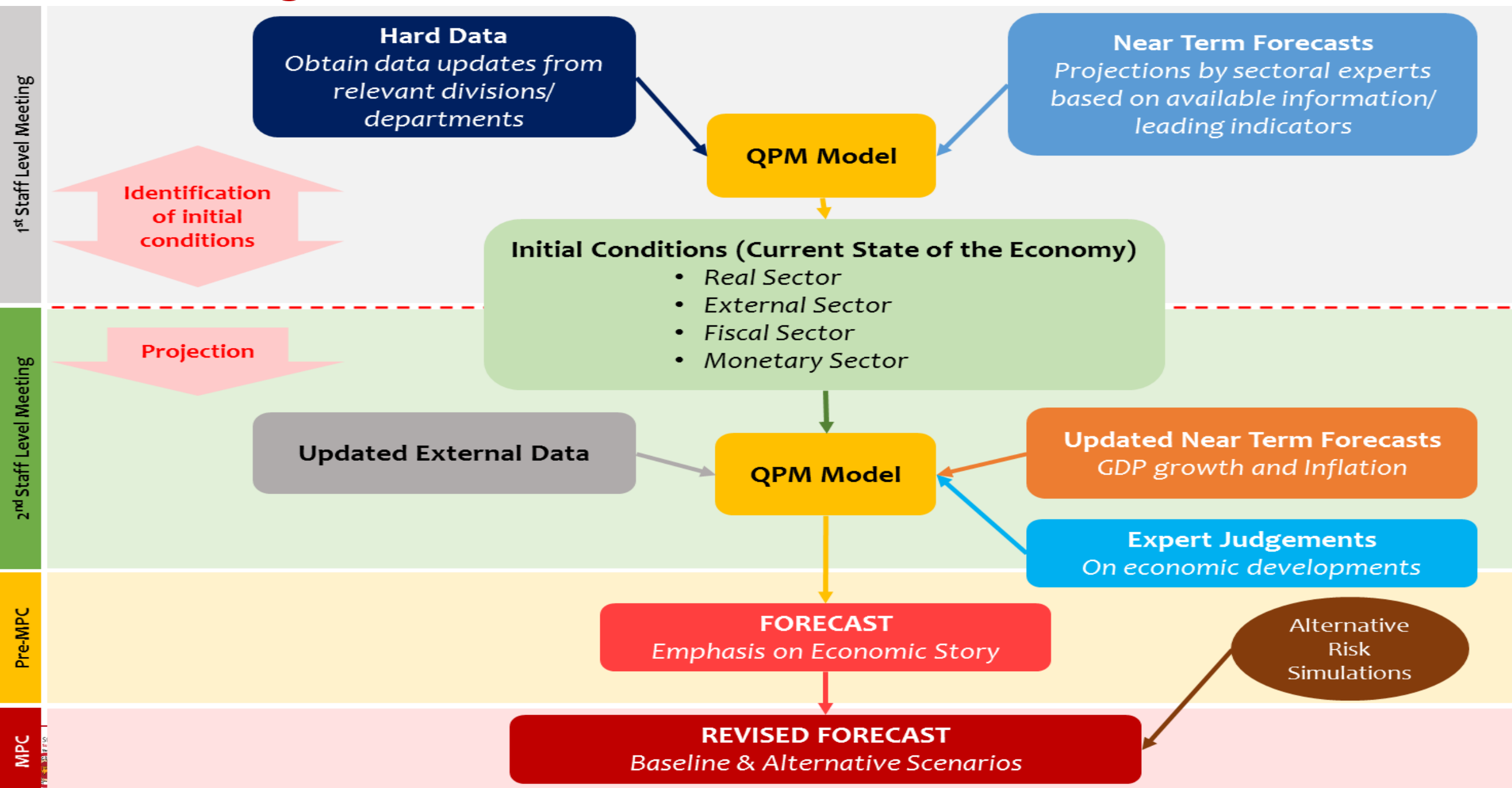
- Timing
- Meetings

Elements

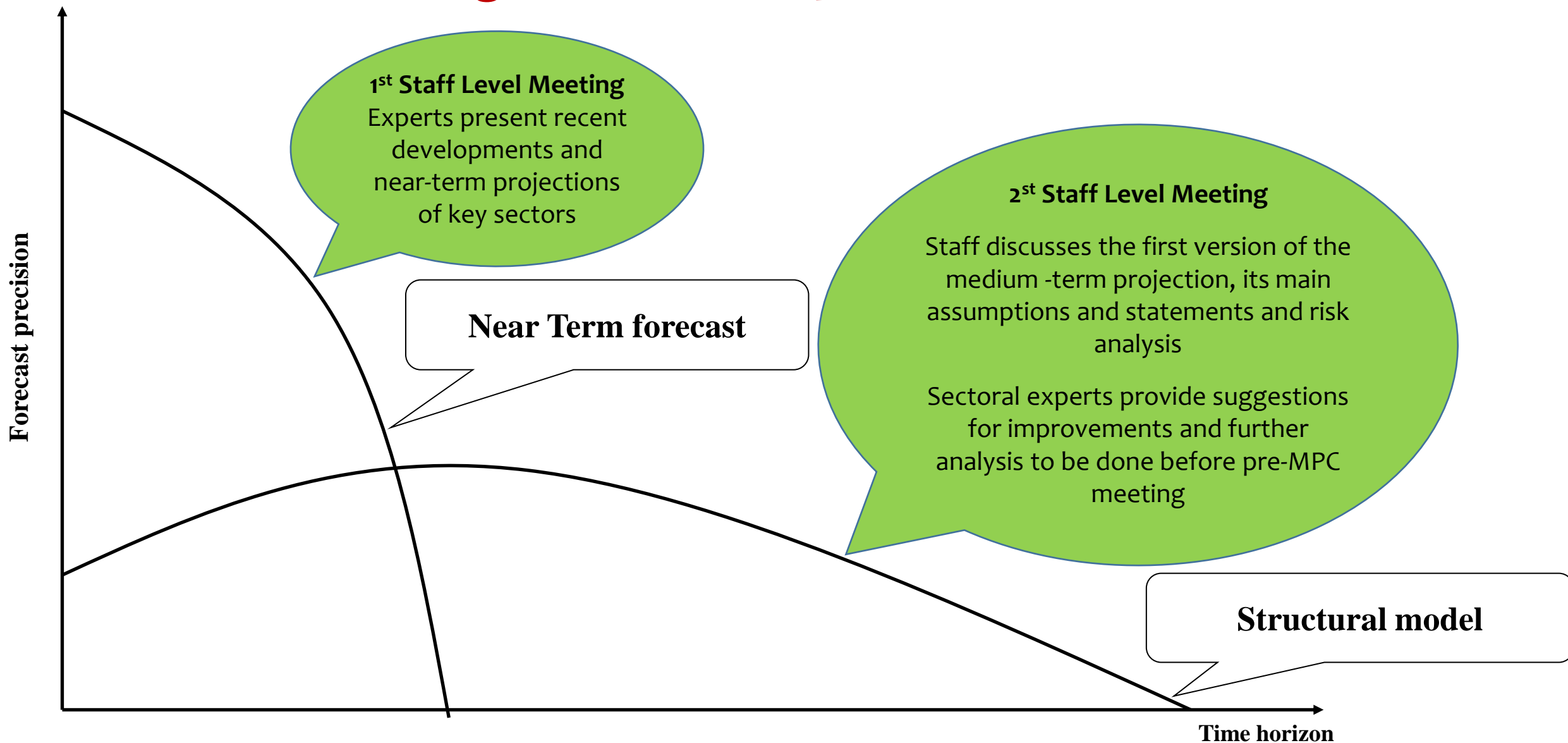
- Data management, evaluation, and monitoring
- Forecasting procedures
- Near-term procedures and near-term forecast (NTF)
- Medium-term procedures and medium-term forecast (MTF)
- Forecasting team
- Inflation (monetary policy) report

Forecasting Framework: Process

5



Different Forecasting Horizons in QPM

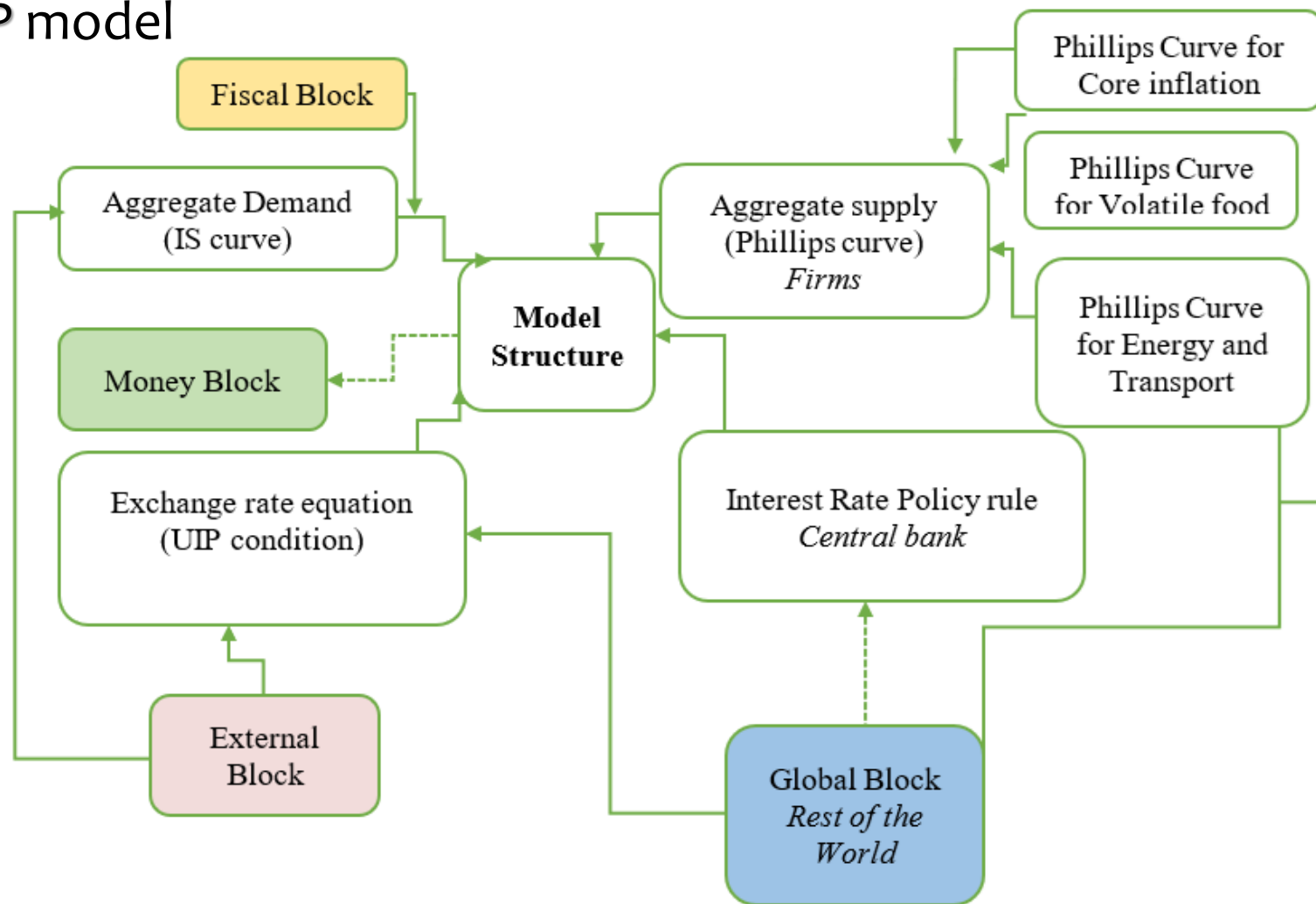


Near Term Forecasts

- Nowcast of current quarter **GDP growth** is made based on a range of available frequent indicators
- Near term forecasts for forthcoming two quarters are made on Dynamic Factor Modelling
- Satellite models are used to forecast **inflation** in the near term
 - Auto Regressive Integrated Moving Average Model (ARIMA)
 - **Vector Error Correction Model (VECM)**
 - ARIMA, with the recent price adjustments, gives the accurate immediate quarter forecast than VECM

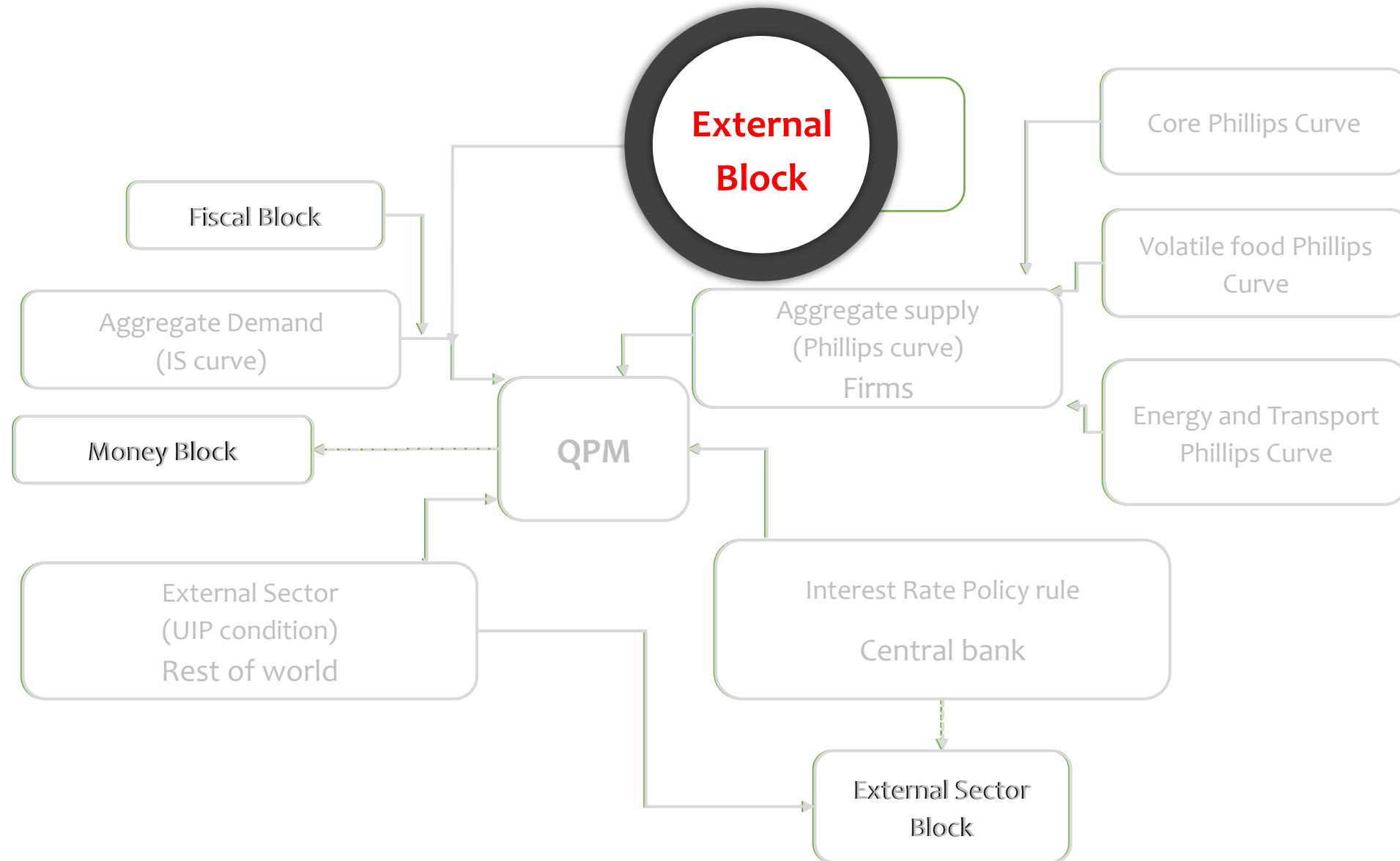
Quarterly Projections Model (QPM)

A semi-structural open economy model with an endogenous monetary policy reaction function – GAP model

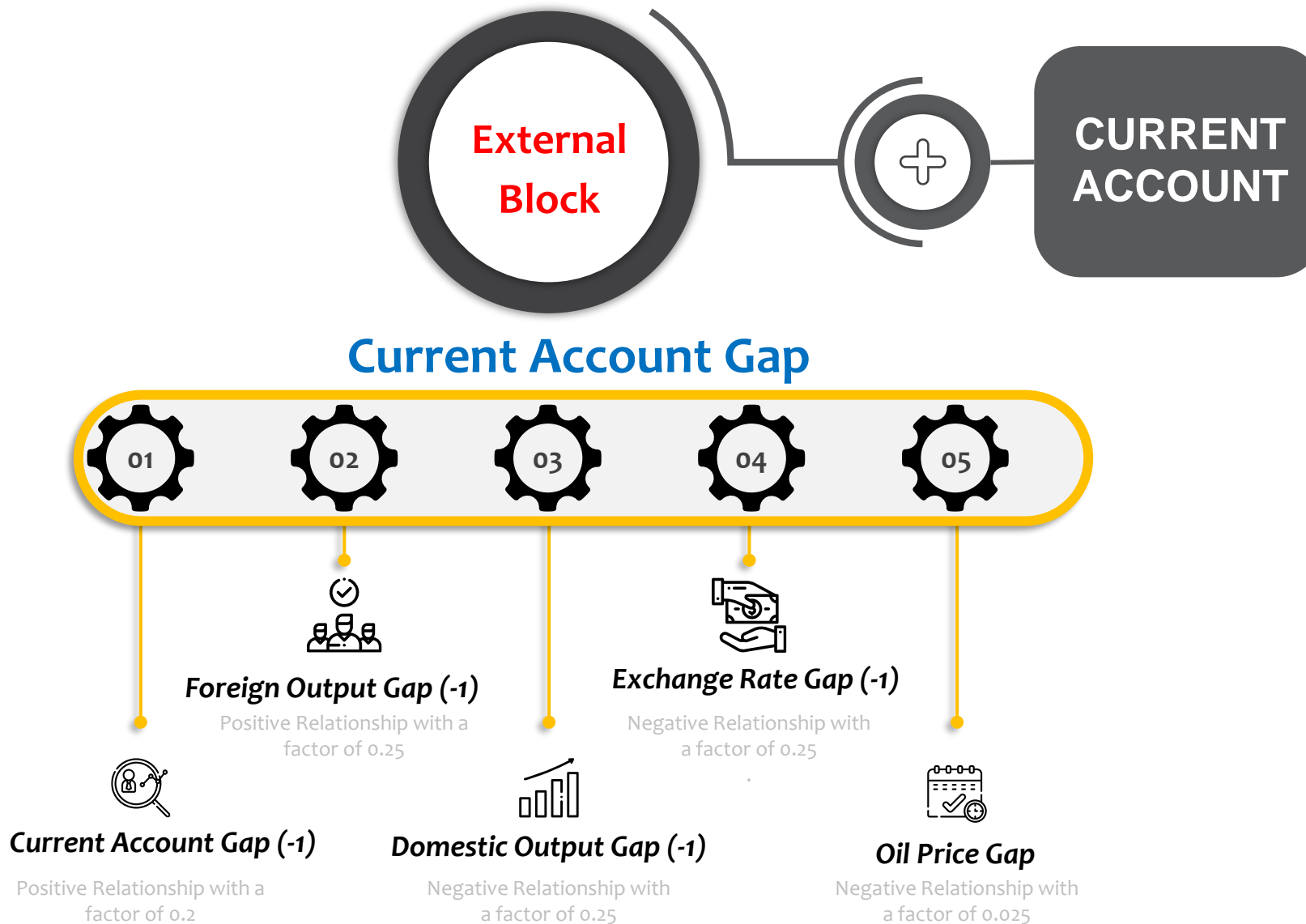


A Recent Improvement to the QPM - Introduction of Remittances

Introduction of Remittances to the Model

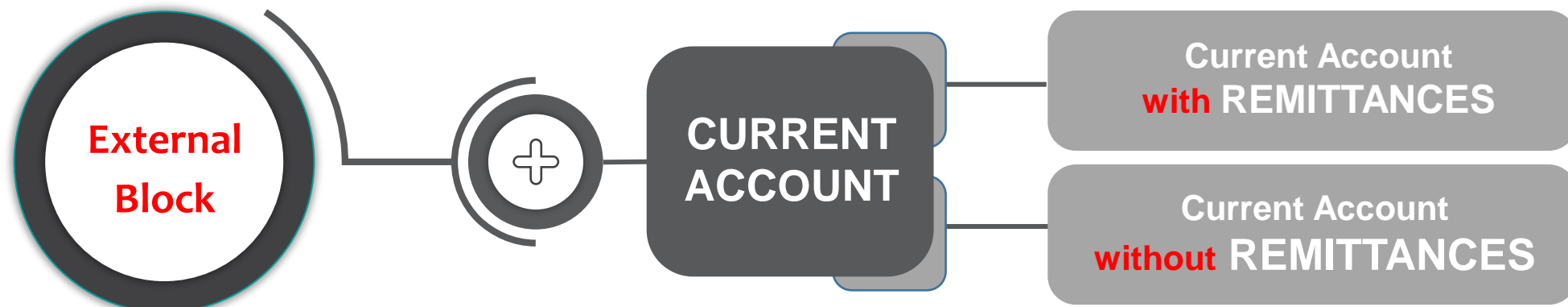


Introduction of Remittances to the Model

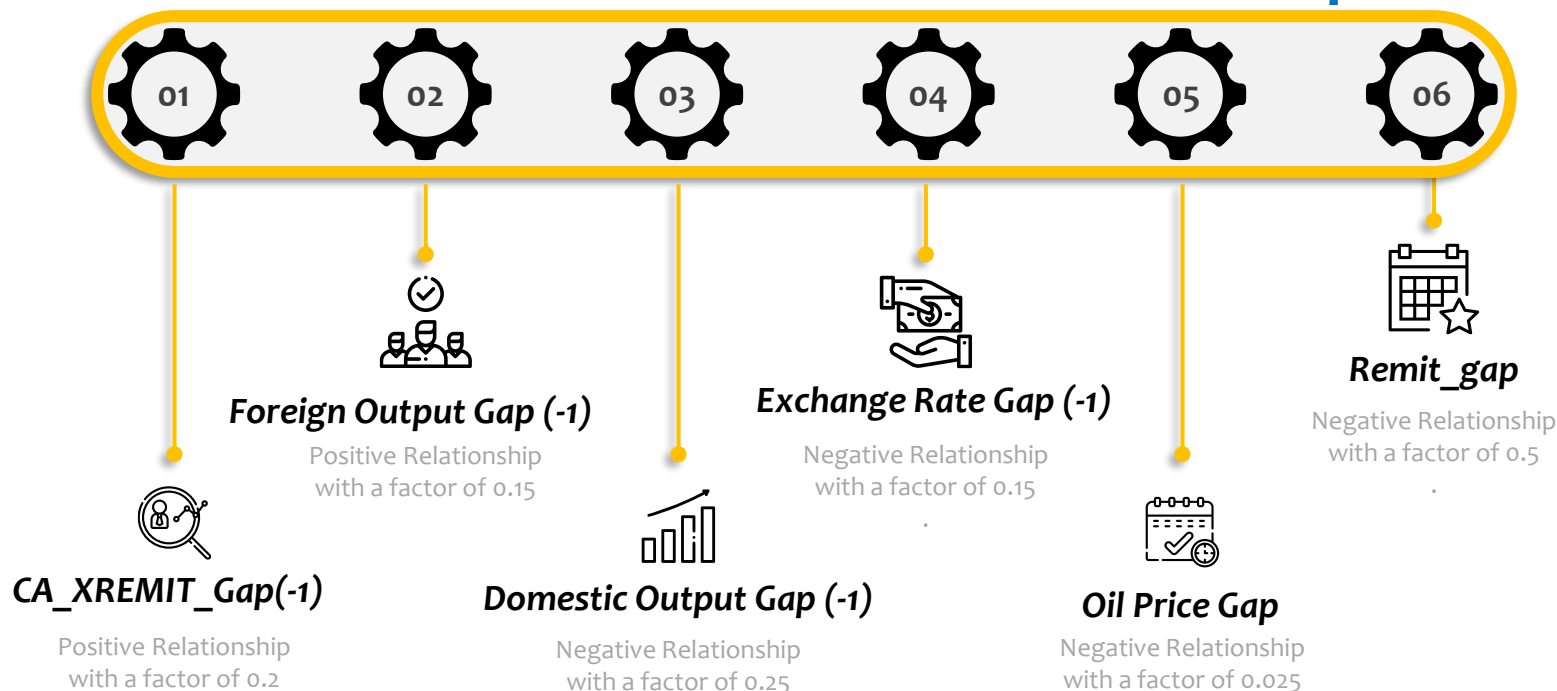


Introduction of Remittances to the Model

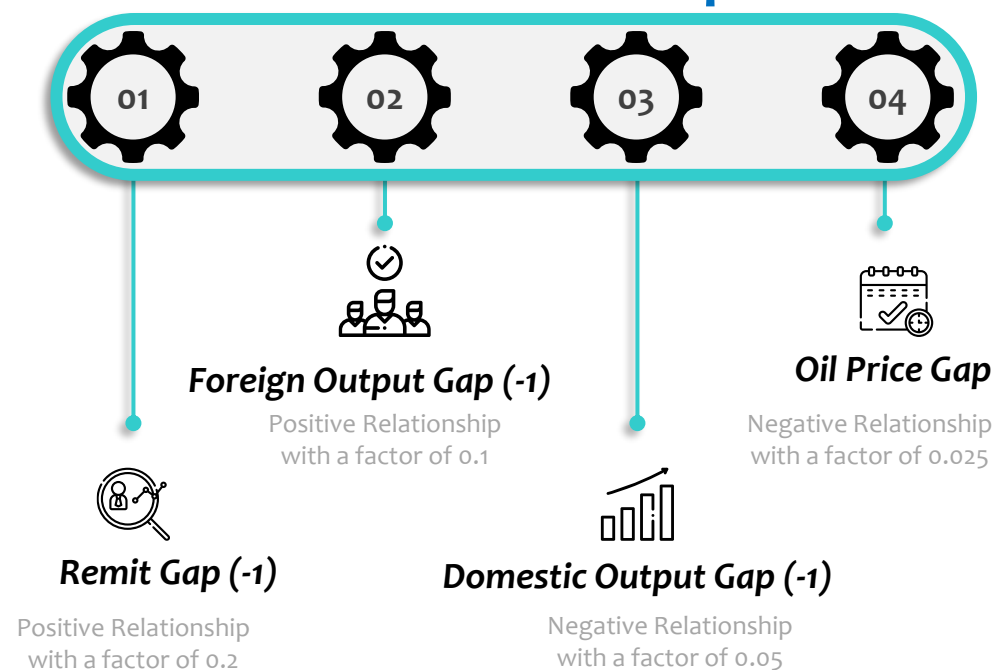
12



Current Account without Remittances Gap



Remittances Gap



Introduction of Remittances to the Model

Current Account (UIP)

Persistence (+), Foreign Output gap(+), Domestic output gap (-), Exchange rate (-), Oil price (-)

New Equation (UIP and IS curve)

Current Account = Remittances + Current Account (without Remittances)

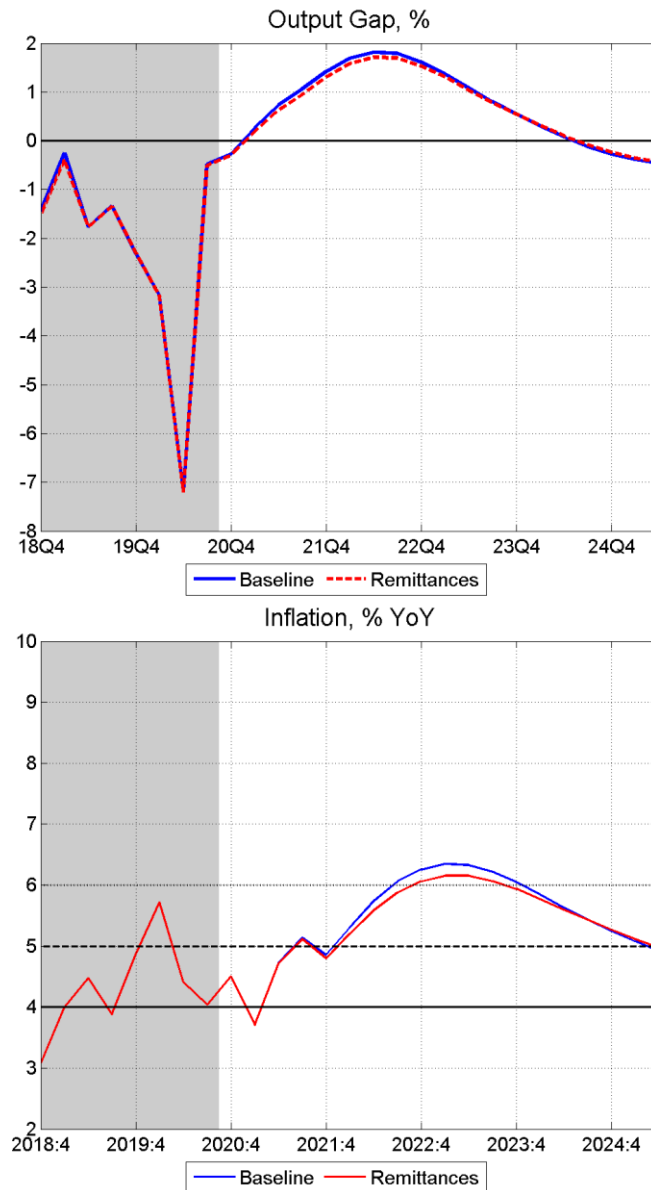
Remittances

*Persistence (+), Foreign Output gap(+),
Domestic output gap (-), Exchange rate (-)*

Current Account without Remittances

*Persistence (+), Foreign Output gap(+),
Domestic output gap (-), Exchange rate (-),
Oil price (-), Remittance(-)*

Effect of Remittances in QPM



Increase Negative Foreign output gap

Decrease Remittances

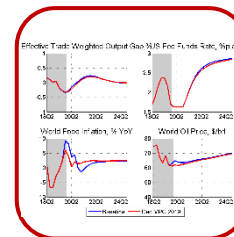
Negative demand shock to the domestic economy

Narrowing the positive output gap

Decrease the inflation

AN ILLUSTRATION OF QPM PROJECTIONS

Forecast Output / Projections



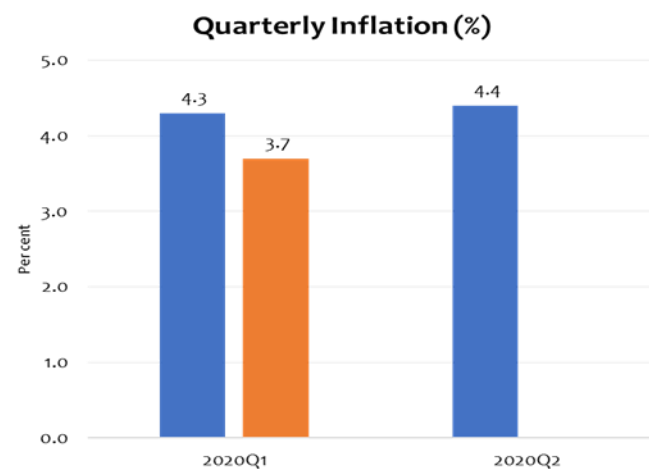
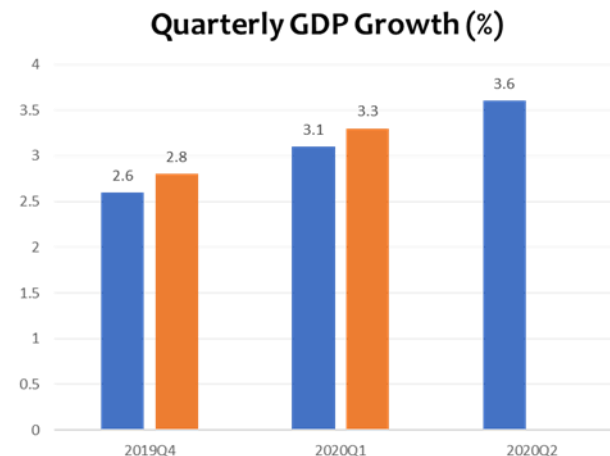
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#01_model_data
=====
## Dates ##
Historical range
Filter range
Forecast range

## External sector count
IN EZ CN US GB JP

## Ranges of the underlying
obs_1_cpi
obs_1_cpi_core
obs_1_cpi_food
obs_1_cpi_et
obs_fn
obs_1_s
obs_1_y
obs_1_y_agr
obs_1_y_nom
obs_def_fn
obs_debt
obs_1_m
obs_rn_us
obs_1_oil
obs_1_food
obs_1_y_in
  
```

Near Term Forecasts

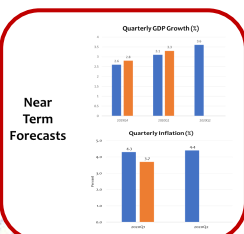


```

2003Q1 : 2019Q3
2003Q2 : 2019Q3
2019Q4 : 2024Q3

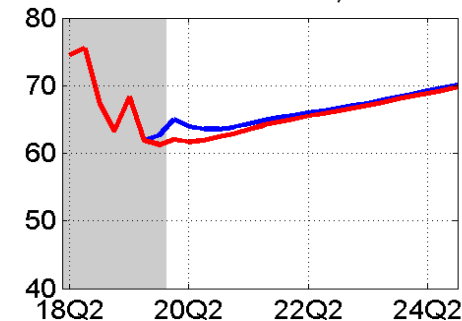
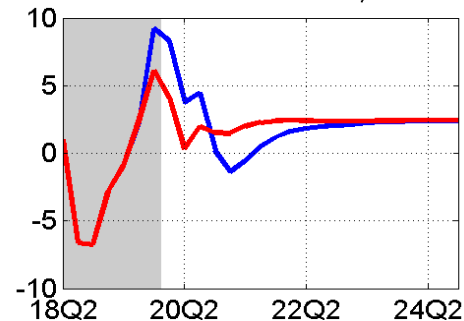
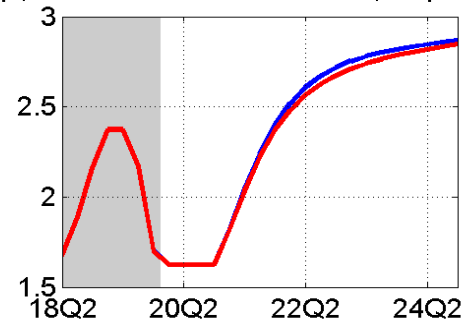
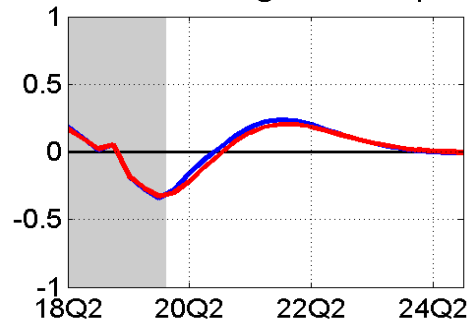
tries ==

Using hard data ==
2003Q1 : 2019Q3
2003Q2 : 2019Q2
2003Q3 : 2019Q3
2003Q4 : 2019Q3
2004Q1 : 2019Q3
2004Q2 : 2019Q3
1996Q1 : 2019Q2
1996Q2 : 2019Q2
1996Q3 : 2019Q2
1996Q4 : 2018Q4
1996Q1 : 2018Q4
1996Q2 : 2018Q2
1996Q3 : 2018Q2
1996Q4 : 2018Q2
1996Q1 : 2018Q2
1996Q2 : 2018Q2
1996Q3 : 2018Q2
1996Q4 : 2018Q2
1996Q1 : 2018Q2
1996Q2 : 2018Q2
1996Q3 : 2018Q2
1996Q4 : 2018Q2
  
```

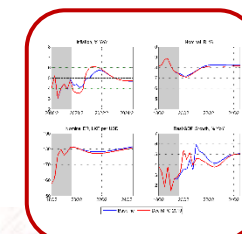



External sector count
IN EZ CN US GB JP

== Ranges of the underl

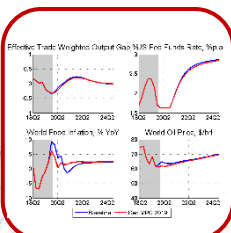


— Baseline — Dec MPC 2019



Forecasting Division
Research Department
Central Bank of Sri Lanka

Forecast Output / Projections

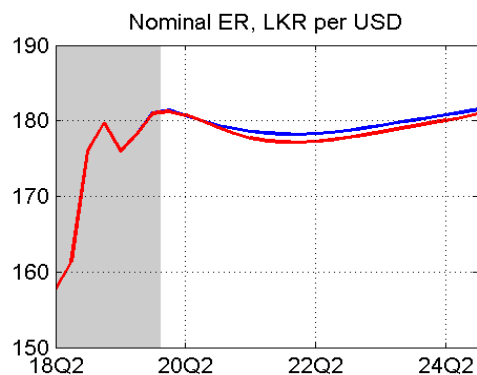
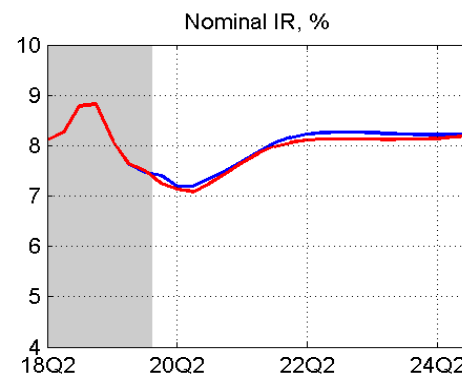
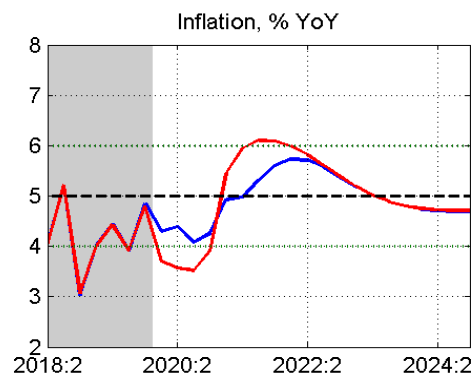


Historical range
Filtered range
Forecast range

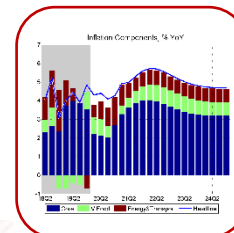
External sector components
IN EZ CN US GB JP

Ranges of the underlying

obs_1_cpi
obs_1_cpi_food
obs_1_cpi_et
obs_1_in
obs_1_s
obs_1_y
obs_1_y_agr
obs_1_y_nom
obs_def_gdp
obs_debt
obs_1_m
obs_in_us
obs_1_oil
obs_1_food
obs_1_y_in



Baseline Dec MPC 2019



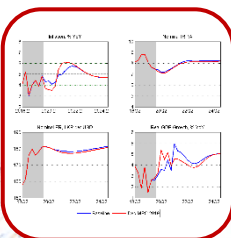
2003Q1 : 2019Q3
2003Q2 : 2024Q3
2019Q4 : 2024Q3

tries ==

Using hard data ==

2003Q1 : 2019Q3
2003Q2 : 2019Q2
2003Q3 : 2019Q3
2003Q4 : 2019Q3
2008Q1 : 2019Q3
2008Q2 : 2019Q3
2008Q3 : 2019Q3
2008Q4 : 2019Q3
1996Q1 : 2019Q2
1996Q2 : 2019Q2
1996Q3 : 2019Q2
1996Q4 : 2019Q2
1996Q1 : 2018Q4
1996Q2 : 2018Q2
1996Q3 : 2019Q3
1996Q4 : 2019Q3
1996Q1 : 2019Q3
1996Q2 : 2019Q3
1996Q3 : 2019Q3
1996Q4 : 2019Q3

Forecast Output / Projections



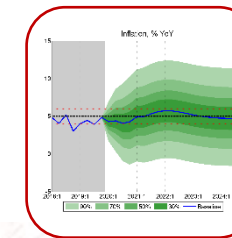
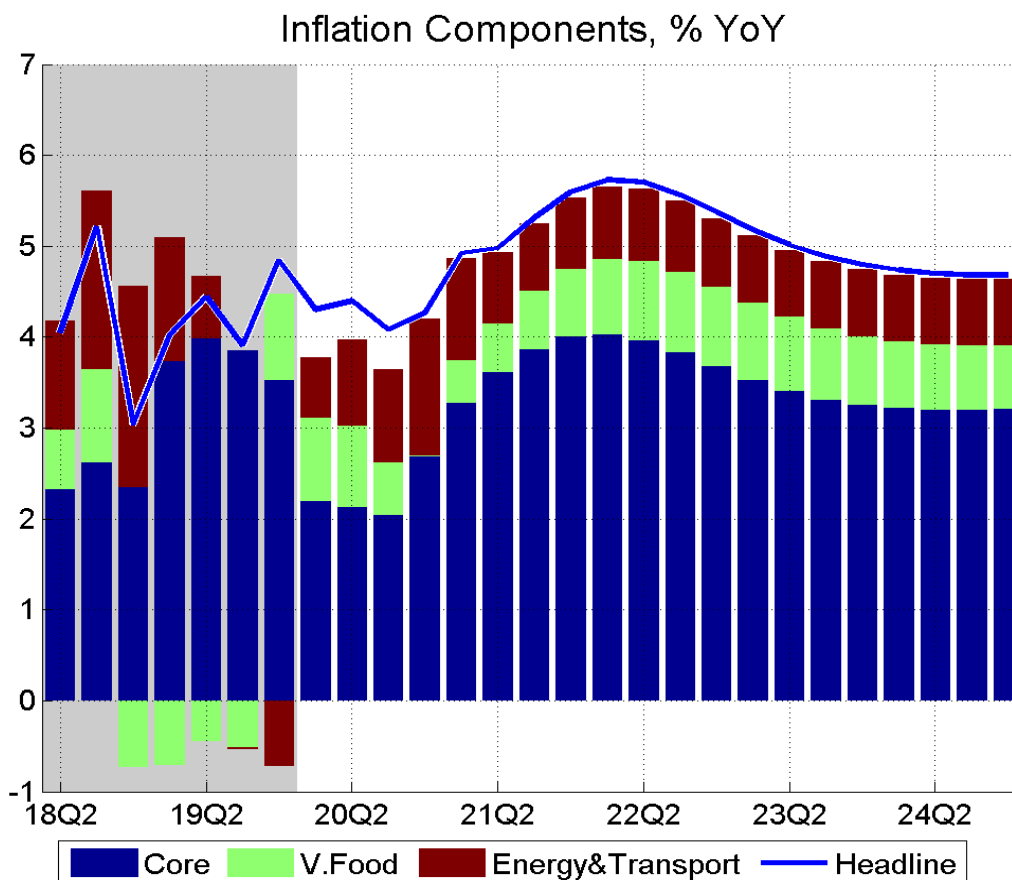
```

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Historical range
Filter range
Forecast range

# External sector count
IN EZ CN US GB JP

# Ranges of the underlying
obs_1_cpi
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obs_1_cpi_et
obs_1_cpi_et
obs_1_s
obs_1_y
obs_1_y_agr
obs_1_y_nom
obs_def_gdp
obs_def
obs_1_m
obs_1_m_us
obs_1_oil
obs_1_food
obs_1_y_in

```



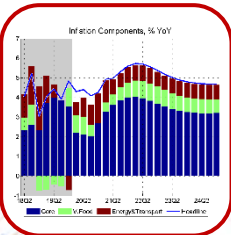
```

2023Q1 : 2019Q3
2023Q2 : 2019Q3
2019Q4 : 2024Q3

# Ranges of the underlying
obs_1_cpi
obs_1_cpi_food
obs_1_cpi_et
obs_1_cpi_et
obs_1_s
obs_1_y
obs_1_y_agr
obs_1_y_nom
obs_def_gdp
obs_def
obs_1_m
obs_1_m_us
obs_1_oil
obs_1_food
obs_1_y_in

```

Forecast Output / Projections



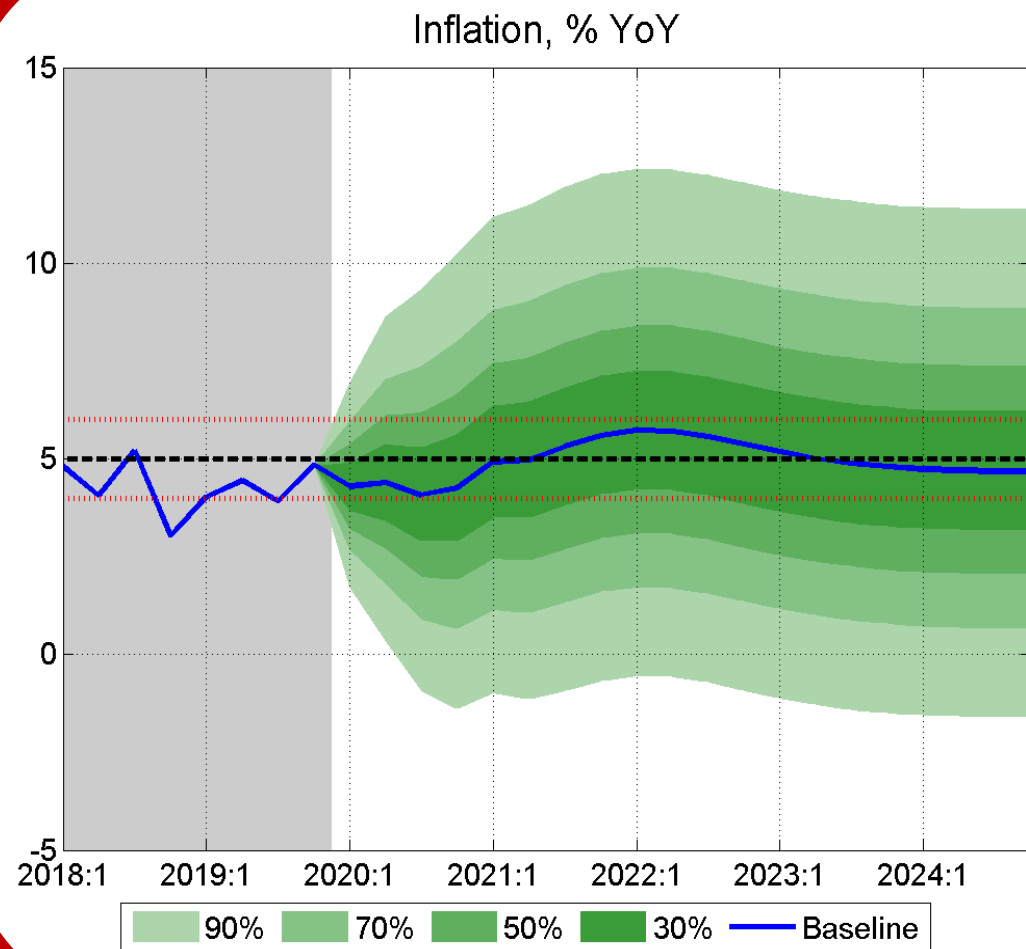
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obs_1_cpi_et
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obs_1_s
obs_1_y
obs_1_y_agr
obs_1_y_nom
obs_def_fin
obs_def
obs_1_m
obs_1n_us
obs_1_oil
obs_1_food
obs_1_y_in

```



```

2003Q1 : 2019Q3
2003Q2 : 2019Q3
2019Q4 : 2024Q3

files ==

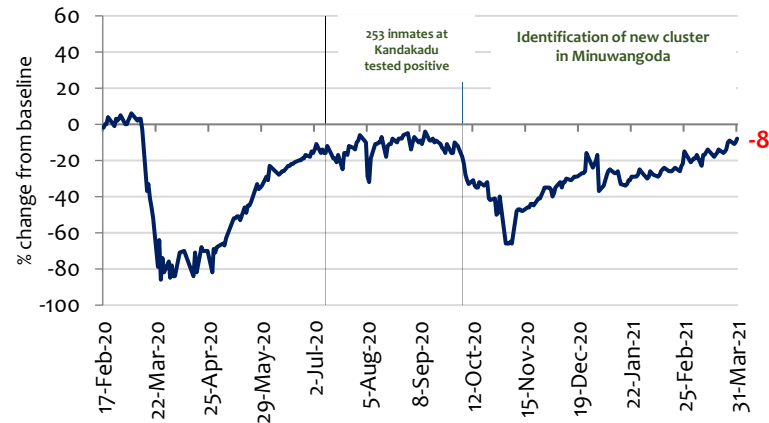
Using hard data ==
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2003Q1 : 2019Q3
2003Q2 : 2019Q3
2003Q1 : 2019Q3
2003Q2 : 2019Q3
1996Q1 : 2019Q2
1996Q2 : 2019Q2
1996Q1 : 2019Q2
1996Q2 : 2019Q2
1996Q1 : 2018Q4
1996Q2 : 2018Q4
1996Q1 : 2018Q4
1996Q2 : 2018Q4
1996Q1 : 2019Q3
1996Q2 : 2019Q3
1996Q1 : 2019Q3
1996Q2 : 2019Q3
1996Q1 : 2019Q3
1996Q2 : 2019Q3

```

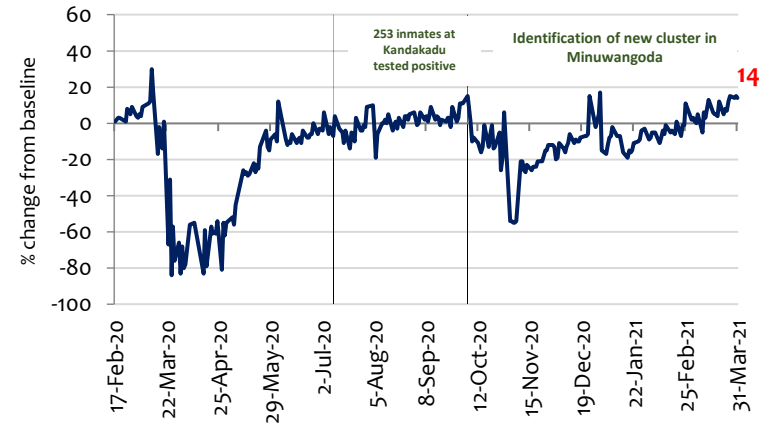
HIGH FREQUENCY DATA

Community Mobility in Sri Lanka

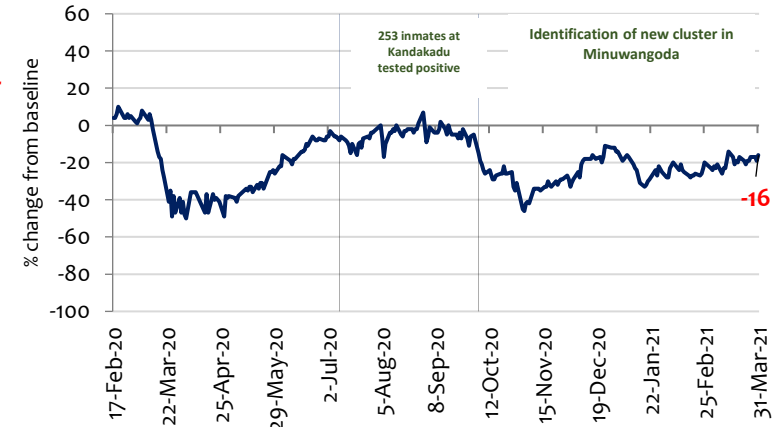
Retail and Recreation



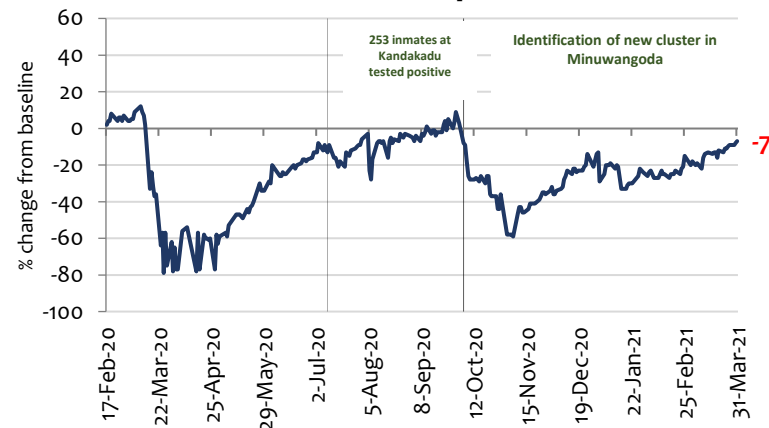
Supermarket and Pharmacy



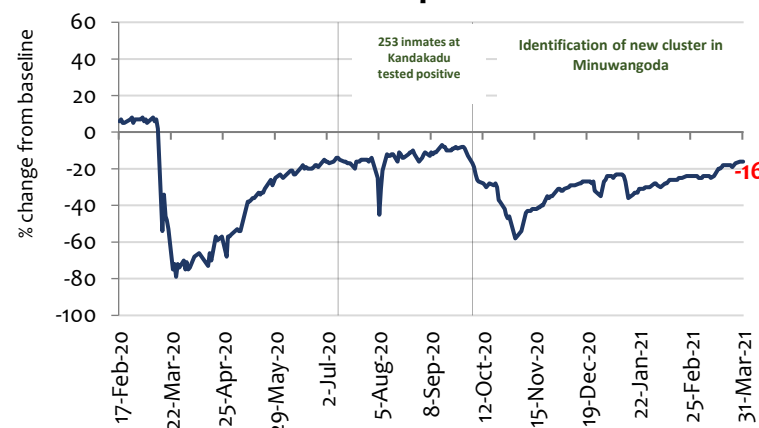
Parks



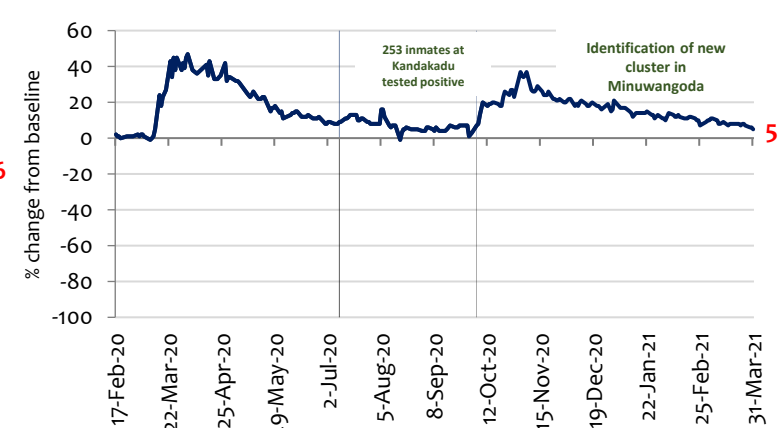
Public Transport



Workplaces



Residential

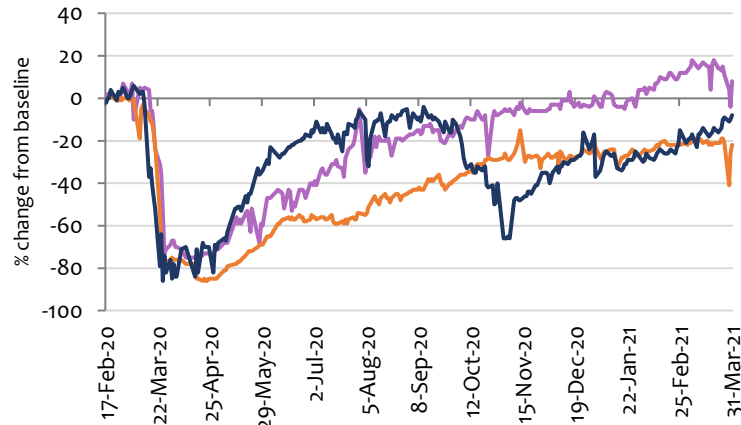


Note: Excludes weekends and Sri Lankan holidays

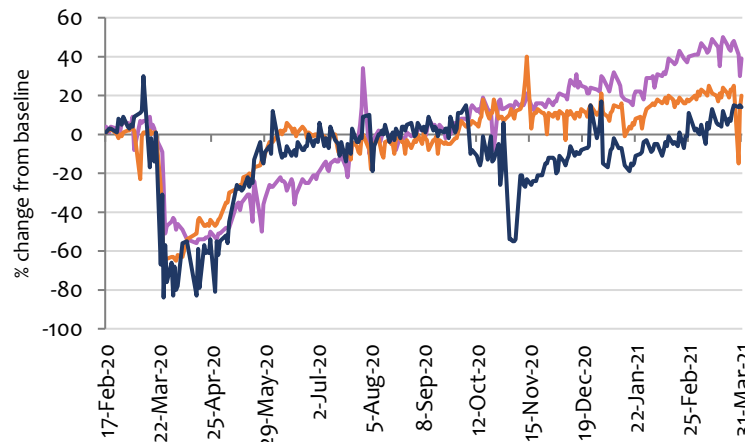
Source: Google mobility data as of 05 April 2021

Community Mobility – Bangladesh, India and Sri Lanka

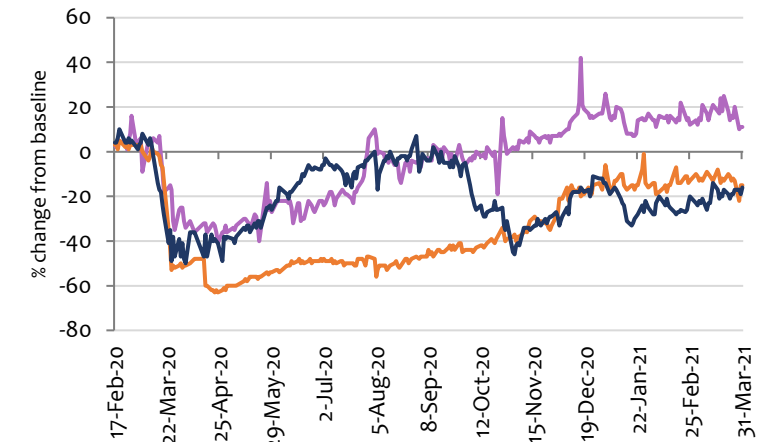
Retail and Recreation



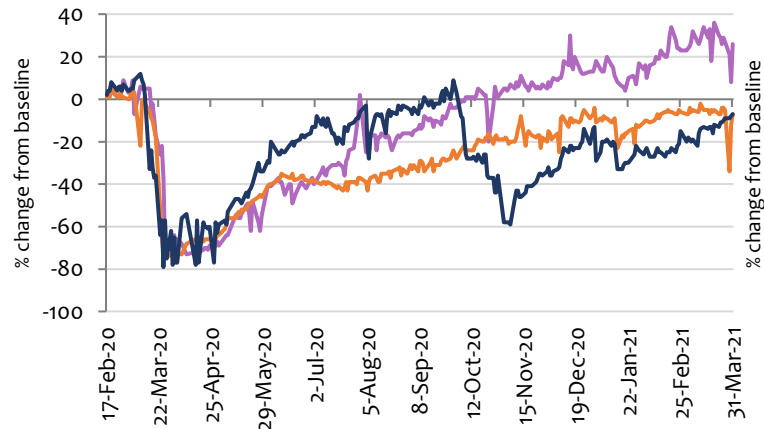
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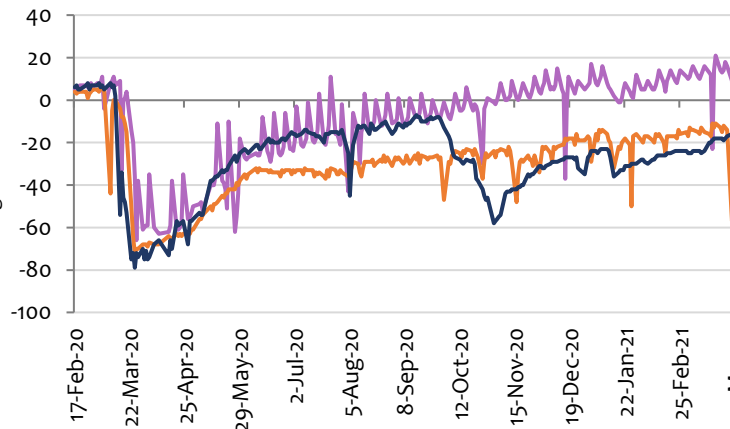
Parks



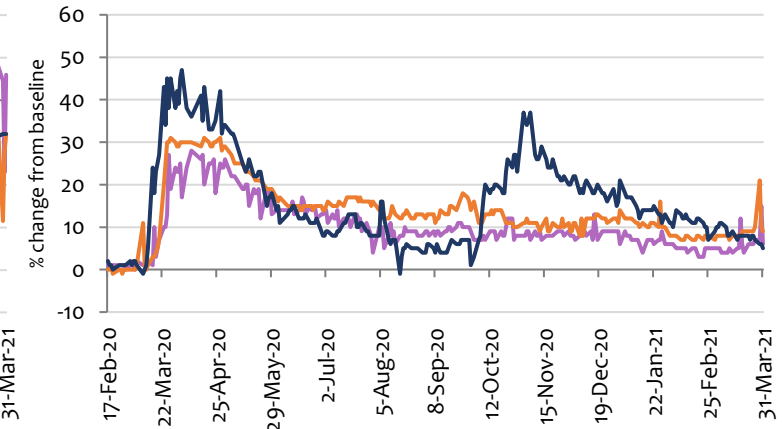
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Workplaces



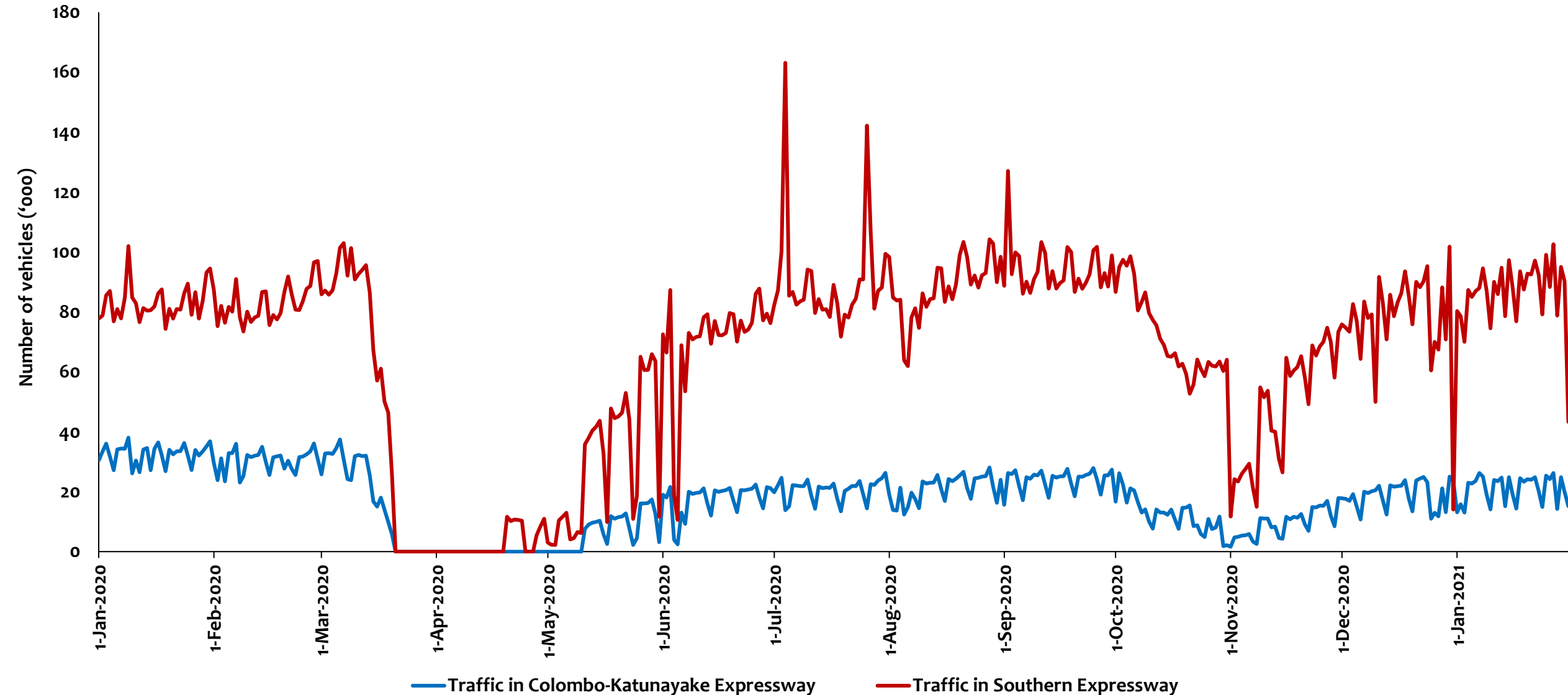
Residential



Note: Excludes weekends and Sri Lankan holidays

Source: Google mobility data as of 05 April 2021

Vehicular Traffic in Katunayaka and Southern Expressway



THANK YOU