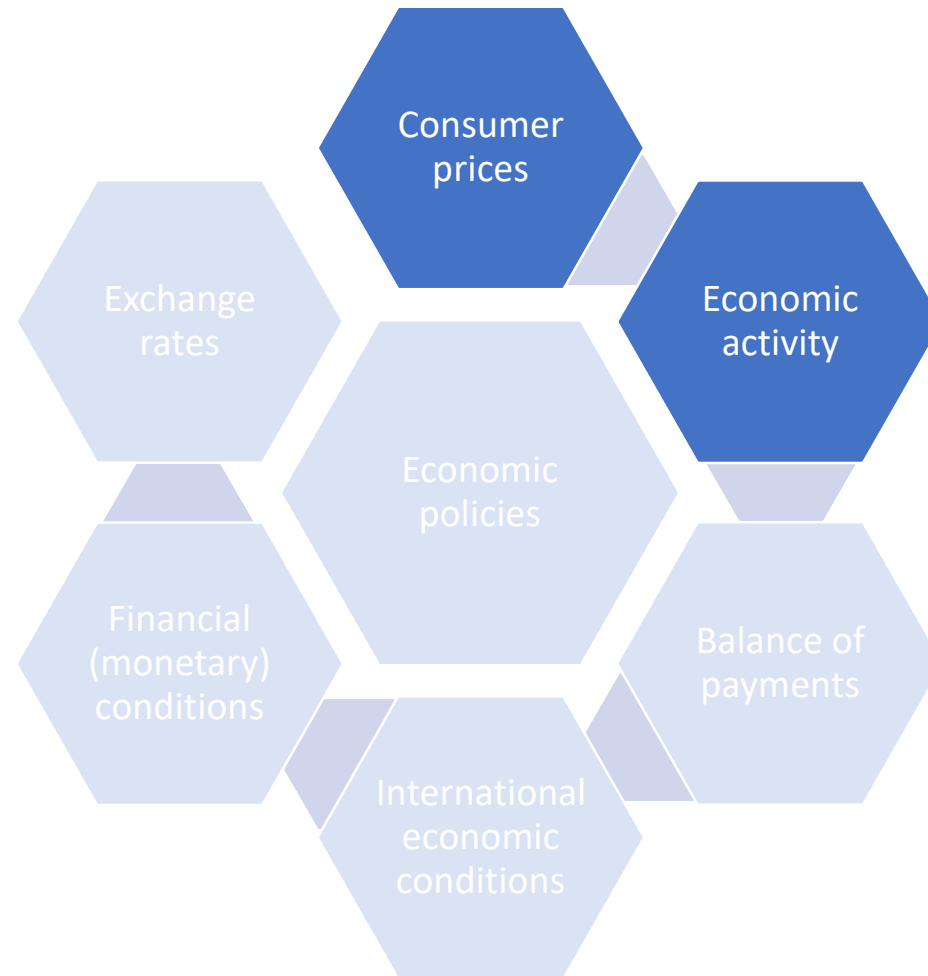# Internal balance assessment: Consumer Prices

Macroeconomic Analysis Course

Prepared for Capital Alliance, Sri Lanka

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Macroeconomic assessment roadma

Objectives

- Understand why central banks monitor consumer prices

- Understand where the monitoring sits in terms of overall macroeconomic assessment

- Strengthen essential skills for experts monitoring these sectors

- Learn basic tools for monitoring the sectors

Outline

1. Setting the scene

2. Key data

3. Key economic concepts

4. Key measurement techniques

Setting the scene

Why do central banks monitor inflation developments?

What information are the sector experts expected to provide to policymakers?

What signal should they look for in the data?

Why do central banks employ experts to monitor inflation developments?

- Central banks have policy mandate of guarding price stability
- It is typically a single policy objective, but sometimes there are multiple mandates (employment
- Historical experience led governments to give central banks operational independence in delivering the price stability objective

- Price stability can be achieved by various policies that differ in their sustainability and type of underlying economic system:
  - Price regulation
  - Monetary targeting
  - Inflation targeting
  - Exchange rate targeting

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Inflation can have numerous effects on the economy

- **Costs of (volatile and high) inflation**
  - Difficult to make sound decisions – uncertainty discouraging investment and savings.
  - Increases opportunity costs of holding money by eroding its future purchasing power.
  - Rising costs of hedging against soaring prices.
  - Indexation and menu costs.
  - Taxation – failure for tax code to adjust for inflation.
  - (Dis)trust in government policies in general.

- **Benefits of low and stable inflation**
  - More easy to make long-range plans.
  - Lower nominal and real interest rates.
  - Self-reinforcing of sustained low inflation.

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What is the Central Bank's of Sri Lanka policy mandate?

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What information are the sector experts expected to provide to policymakers?

- Are current and near-term inflation developments in line with the policy mandate?

- What are the implications for monetary policy stance?

What information are the sector experts expected to provide to policymakers? Elements of inflation commentary

- report on the current outturns of consumer price inflation, typically measured by the Consumer Price Index (CPI)

- report on how inflation is tracking relative to policy mandate

- report on recent (past 12 months) inflation trend: is inflation accelerating (speeding up) or decelerating (slowing down)?

- identify the main determinants of inflation trend – is inflation driven by demand or supply forces?
  - CPI components
  - economic factors

- predict near-term trend for inflation

- discuss implications for current monetary policy stance

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- Remember, the main focus is on understanding the trend and predicting turning points in inflation!

- Are current and expected inflation developments in line with the CBSL's price stability mandate?

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Is inflation in line with the CBSL's policy mandate?

Consumer Price Index
(Year-on-year percentage change)

Legend:
- Colombo CPI (headline)
- Colombo CPI (headline, 3MMA)
- Inner Target Band
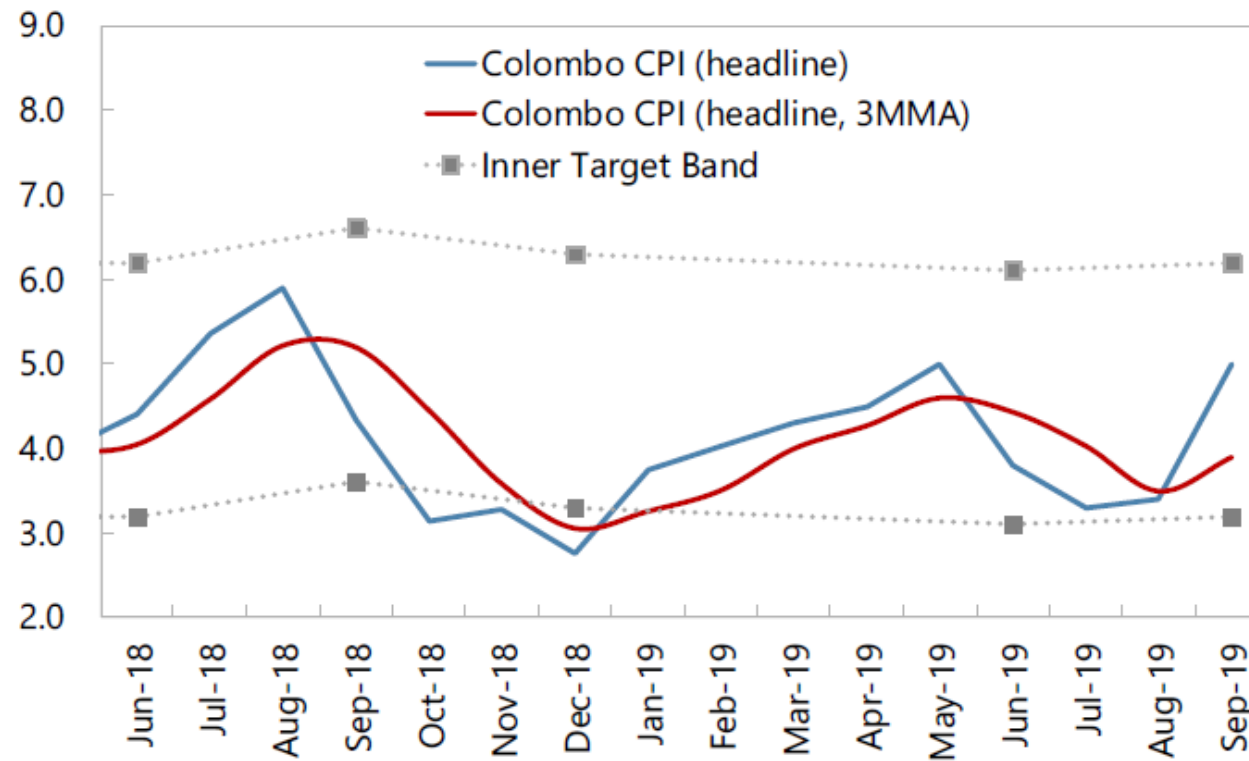
Source: DCS, CBSL, IMF

Key data

How do we measure prices and which measures to pick?

Consumer Price Index (headline, subcomponents, measurement)

Consumption deflator (measurement and differences from CPI)

Inflation expectations (surveys, financial markets expectations)

- From the National Income Accounts
  - GDP deflator
  - Personal Consumption Expenditure (PCE) deflator

- Consumer Price Index (CPI)
  - Headline CPI Inflation
  - Alternative CPI measures (e.g. core inflation)

Consumer Price Index: Key features

- CPI compares the cost of a fixed basket of goods and services purchased by consumers during the current period with the cost of the identical basket of goods and services in the base period

  - Tells how much the cost of living has risen or fallen due to price changes irrespective of changes in consumer behavior or good quality

- One of the most understood and widely used indicators of the change in the general level of consumer prices (inflation)

  - Consumers can compare movements in the CPI to changes in their personal income to monitor and evaluate changes in their financial situation

- The CPI is a *Laspeyres* or *base-weighted* index that uses **historical** weights
  - Price movements of the goods and services represented in the CPI are weighted according to the relative importance of goods and services in the total expenditures of consumers

- Let 0 and t be the base and current periods respectively

$$CPI_t = \frac{\sum_{i=1}^{N} p_t^i q_0^i}{\sum_{i=1}^{N} p_0^i q_0^i} \times 100$$

q_0^i is the base period quantity of good *i*

p_0^i is the base period price of good *i*

p_t^i is the time *t* price of good *i*

CPI measured by the Department of Census and Statistics

- In the past, the DCS used the Laspeyres index number formula to calculate the CPI. For each item in the sample its price collected in the current period was compared to its price in a fixed base period; this produced the long-term price ratifor each item.

- With the new NCPI, the DCS has introduced the use of the Modified, or Two-Stage, Laspeyres formula to calculate the CPI. The price collected in the current period is divided by its previous period price. This short-term ratio is multiplied by the item's estimated cost of base period spending in the previous month to obtain the current period estimate of the cost of base period spending assigned to the item. As before, the CPI is the sum of the current period estimated cost of base period spending divided by the spending in the fixed base period.

- More details on methodology at
  http://www.statistics.gov.lk/price/NCPI/NCPI%20Tecnical%20%20Note.pdf

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Structure of CPI basket in Sri Lanka

Main Categories	NCPI(Base 2013 =100)		CCPI(Base 2006/07 =100)	
	Value of Expenditure (Rs.)	Weight (%)	Value of Expenditure (Rs.)	Weight (%)
Total consumption expenditure	32,142.69	100	27,972.11	100
Food and non alcoholic beverages	14,156.29	44.04	11,476.50	41.03
Non food	17,986.40	55.96	16,495.61	58.97
Non Food				
1. Alcoholic beverages, Tobacco and Narcotics	728.89	2.27		
2. Clothing and footwear	1,105.09	3.44	879.53	3.14
3. Housing, Water, electricity and fuel	5,785.88	18.00	6,635.95	23.72
4. Furnishing, Household equipment & Routine Household maintenance	1,059.12	3.30	1,005.89	3.60
5. Health	1,301.96	4.05	884.42	3.16
6. Transport	3,134.84	9.75	3,430.49	12.26
7. Communication	746.61	2.32	1,329.27	4.75
8. Recreation and culture	509.60	1.59	419.27	1.50
9. Education	903.83	2.81	1,102.05	3.94
10. Restaurant and Hotels	1254.54	3.90		
11. Miscellaneous goods and services	1456.05	4.53	808.74	2.89

Source: Department of Census and Statistics

Index of the price level for all final goods and services included in GDP, computed as a **Paasche index**: current basket of goods at time t (not at time 0).

$$GDP\ deflator_t = \frac{GDP\ at\ current\ prices_t}{GDP\ at\ constant\ prices_t} \times 100 = \frac{\sum_{i=1}^{N} p_t^i q_t^i}{\sum_{i=1}^{N} p_0^i q_t^i} \times 100$$

- Important to monitor what households, firms, unions, financial sector thinks about inflation

- A key task in achieving price stability is monetary policy anchoring inflation expectations of everybody who participate in the market and contribute to price creation (price discovery)

- Inflation expectations can be measured through surveys or inferred from financial market prices (yields on risk-free assets)

Key economic concepts

Headline inflation, core inflation, analytical measures

Trend inflation (M*V = P*Y), inflation expectations, inflation target

- **Headline inflation** is the total movement of prices
- **Core inflation** is supposed to be the long-run, less volatile, component of CPI
- Core inflation reflects general inflationary pressures in the economy – trend inflation – it excludes some components
  - Energy
  - Food
  - Regulated prices
  - Mechanical – trimmed mean a la Australia
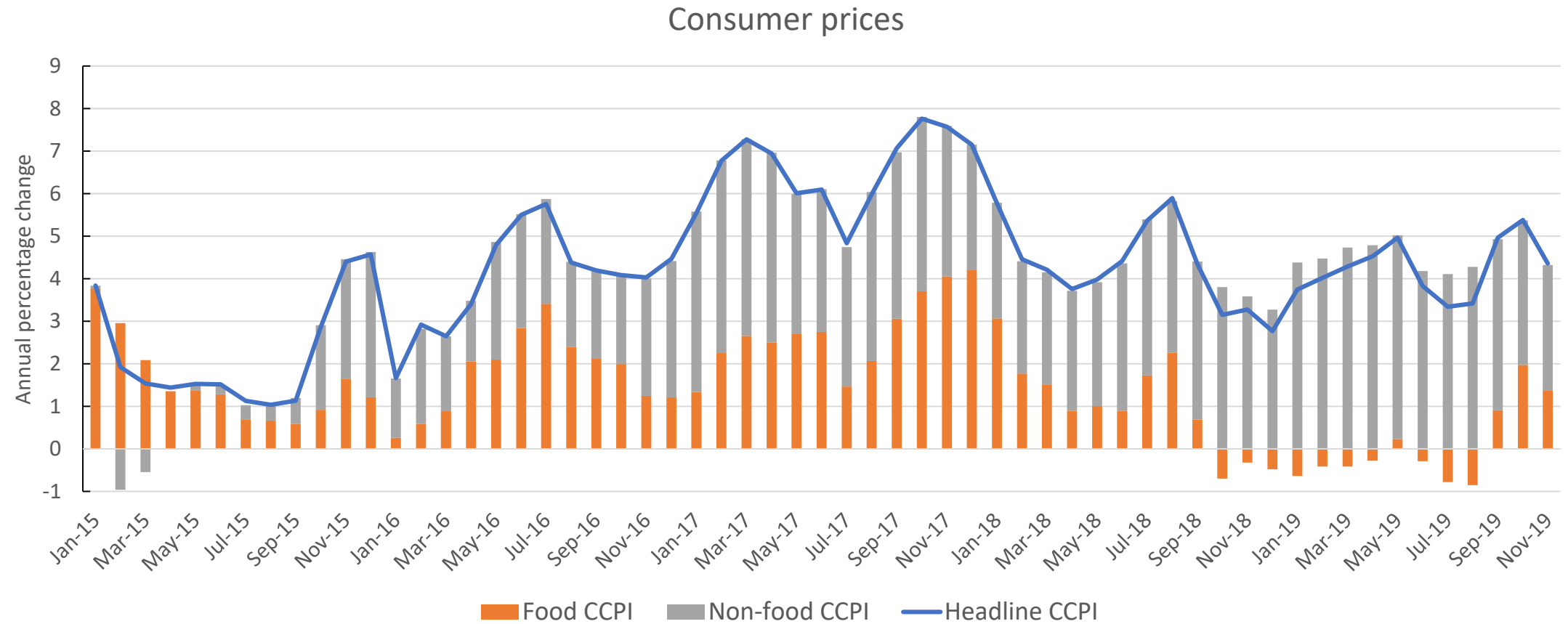- No firm theoretical basis; no generally agreed approach to measuring core inflation

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- Definition of core inflation depends on the purpose
  - Forecasting accuracy; exclude:
    - tax changes
    - Regulated prices
    - energy
    - food

  - Decision making; exclude:
    - tax changes – yes
    - energy prices – questionable
    - food prices – highly questionable
      - Typically a large part of the basket
      - Huge spillovers to the rest

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- Market CPI prices

- Administered (non-market) prices

- Tradables prices

- Non-tradables prices

- Durables prices

- Non-durables prices

Food and non-food CPI inflation in Sri Lanka

Consumer prices

Source: DCS, author's calculations

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- "Inflation is always and everywhere a monetary phenomenon." (M. Friedman)
- Quantity theory is the general theory of inflation

$$P = \frac{MV}{Y}$$

$$\Delta m + \Delta v = \pi + \Delta y \Rightarrow \pi = \Delta m + \Delta v - \Delta y$$

   where M is money, P is prices, Y is output, V is money velocity

- Constant velocity and money neutrality -> inflation follows money growth
  - In the long run, periods of hyperinflation
  - Less so in the short run in normal times

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Key measurement techniques

Computing inflation rates

Inflation components

Phillips curves as a prism for identifying factors affecting inflation

- Various inflation rates
  - Annual average (or year-on-year) inflation rate $= \left(\dfrac{CPI_{2016}}{CPI_{2015}} - 1 \right) \times 100$

  - The end-of-year or December inflation rate $= \left(\dfrac{CPI_{\text{Dec., 2016}}}{CPI_{\text{Dec., 2015}}} - 1 \right) \times 100$

  - The 12-month inflation rate $= \left(\dfrac{CPI_{\text{Feb., 2016}}}{CPI_{\text{Feb., 2015}}} - 1 \right) \times 100$

  - The monthly (or the quarterly) inflation rate $= \left(\dfrac{CPI_{\text{Feb., 2016}}}{CPI_{\text{Jan., 2016}}} - 1 \right) \times 100$

  - The annualized monthly (or quarterly) inflation rate $= \left(\left(\dfrac{CPI_{\text{Feb., 2016}}}{CPI_{\text{Jan., 2016}}} \right)^{12} - 1 \right) \times 100$

- Seasonal adjustment

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Inflation gap – measure of how inflation is tracking relative to policy mandate

Inflation deviation from

- CBSL's policy objective
- long-term trend
- Inflation expectations
- Inflation target (goal/plan)
- Inflation forecast

CCPI inflation gap in Sri Lanka
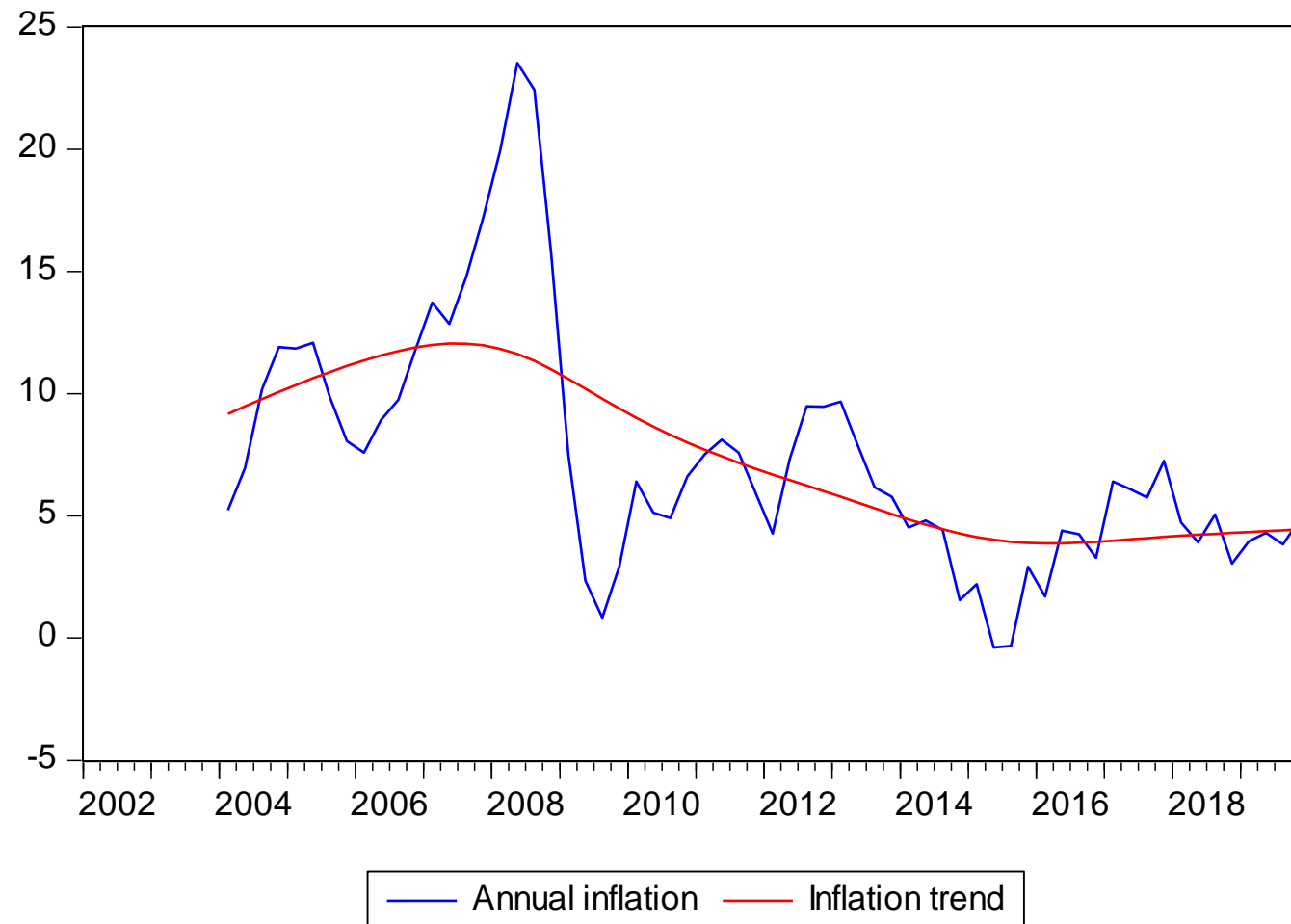
Source: DCS, author's calculations

What information to extract from inflation data?

- Analysis of the component level data

- Alternative aggregation schemes
  - Traded versus non-traded goods inflation
  - Core inflation measures

- These measures help understand recent developments:
  - Sources of changes in the inflation rate
 - Transitory or permanent shocks to inflation

- Analyze percentage changes for each component
  - Identify components where the price change was greatest

- Compute the contribution made by each component to the overall inflation rate
  - More informative
  - Captures both the size of the price change *and* the importance of that component

- **Caveat**: Changes in specific components of the CPI do not necessarily provide a good guide to their overall impact on inflation, in part because other prices may change in response (second round effects).

What determines inflation?

- **Components** analysis
  - Explain contribution of individual groups of prices to CPI
  - May explain changes to inflation trend/"natural" level
  - But does **not** explain why prices are moving

- **Underlying factors/determinants** of inflation
  - Identify shocks that push prices up or down in the short run
  - Can be used to explain propagation of inflation
 - Forecast it for the near future

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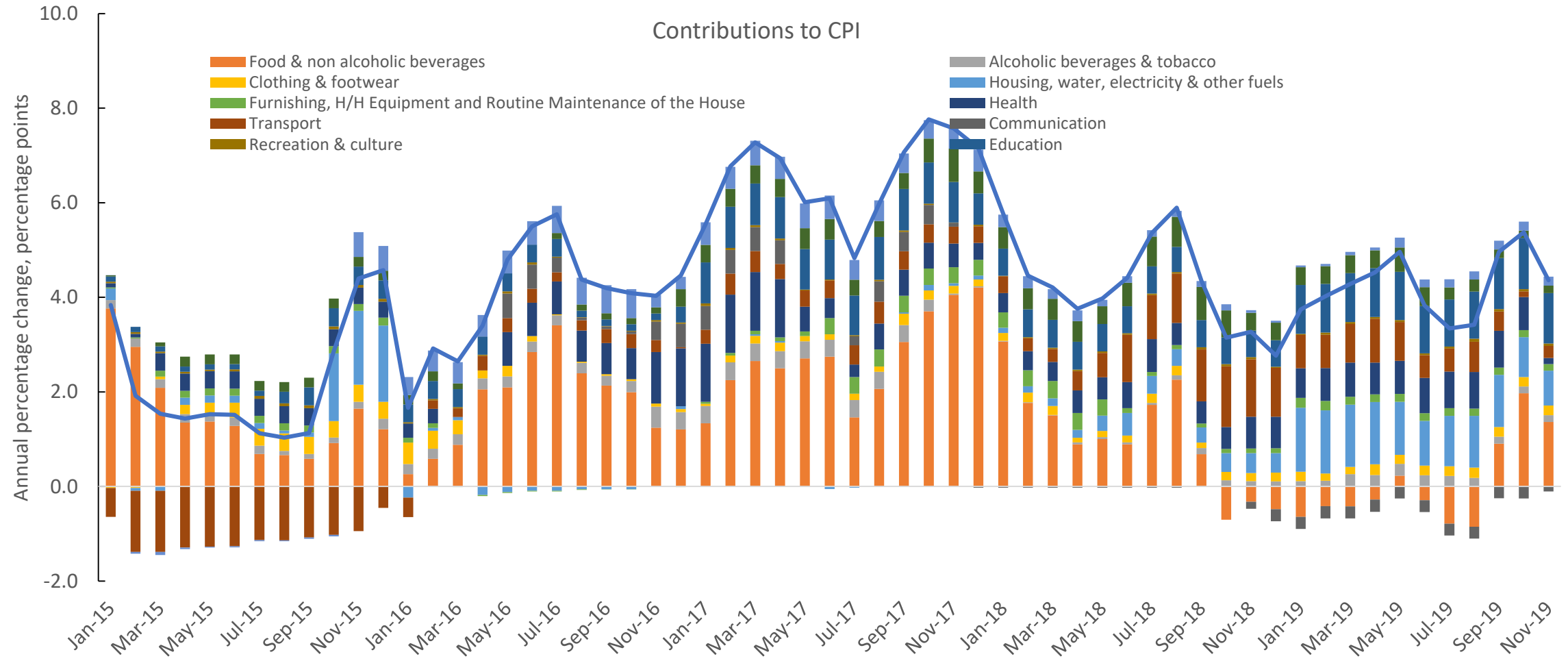
Inflation components

Source: DCS, CBSL

$$\pi_t = \alpha\pi^E + \delta\left(y_t - \overline{y}\right) + \varepsilon_t$$

- Expected Inflation (π^E)

- Deviations of unemployment from the natural rate or the output gap - demand shocks

- Other shocks, in particular supply shocks (ε_t)

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Phillips curve in Sri Lanka
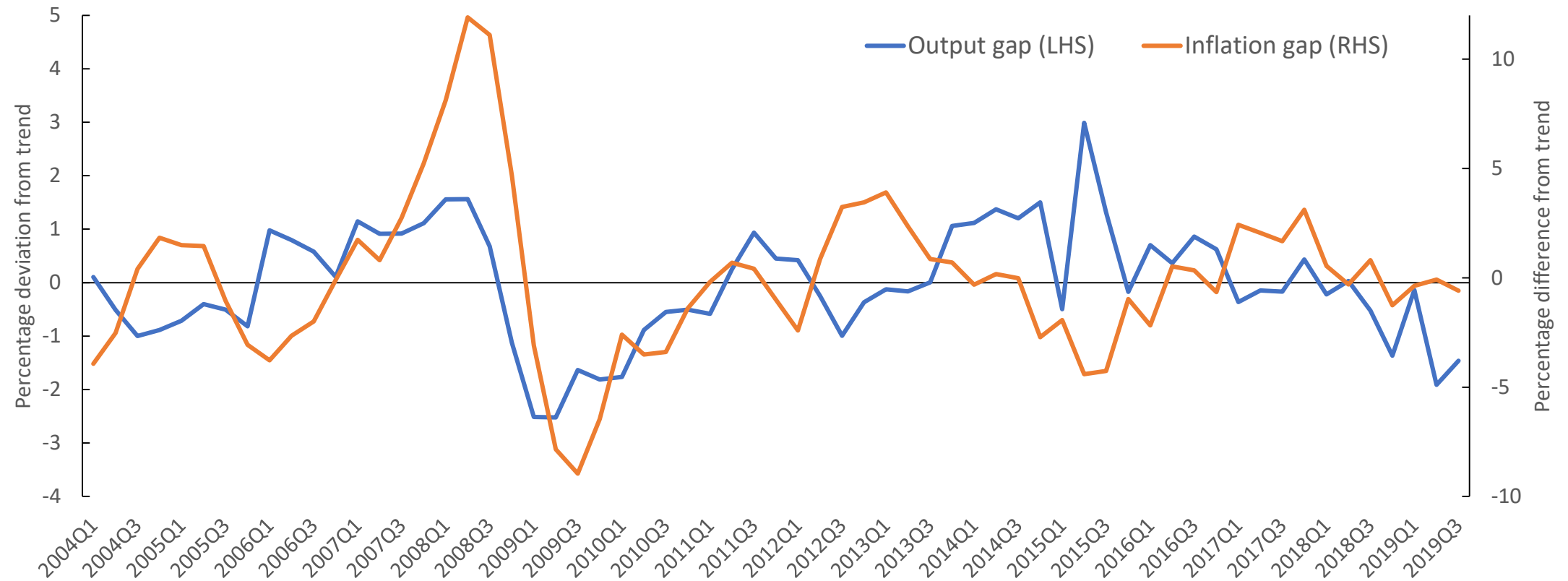
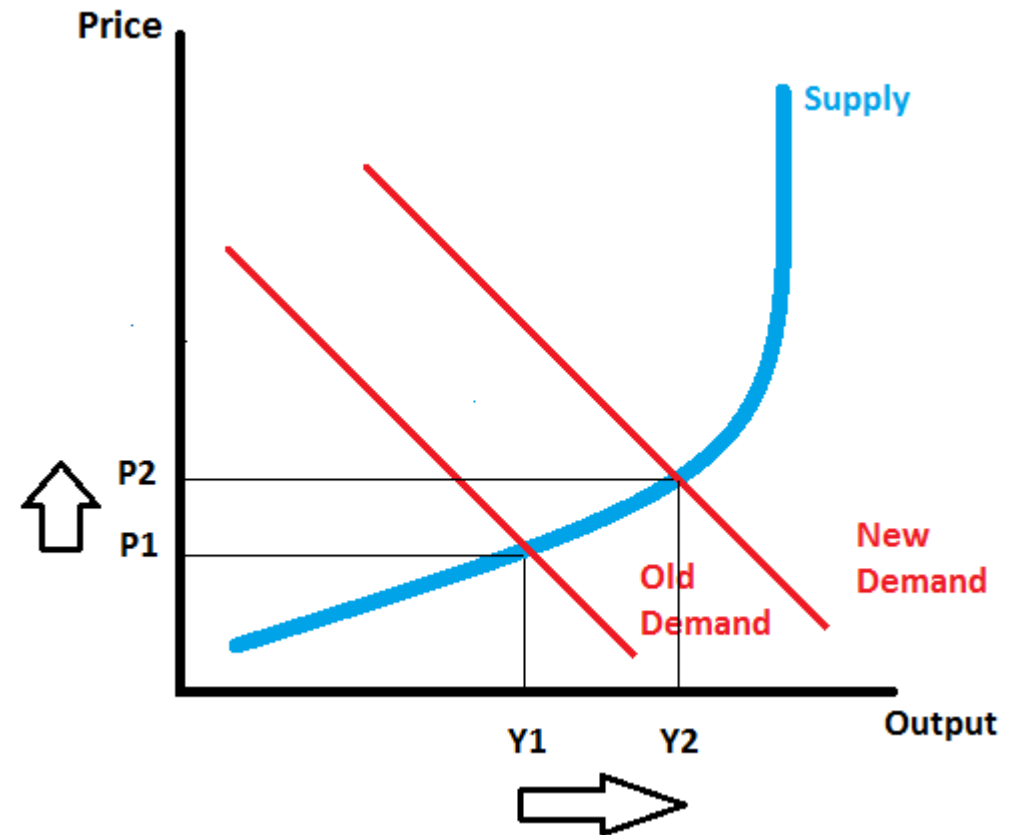**Source:** DCS, author's calculations
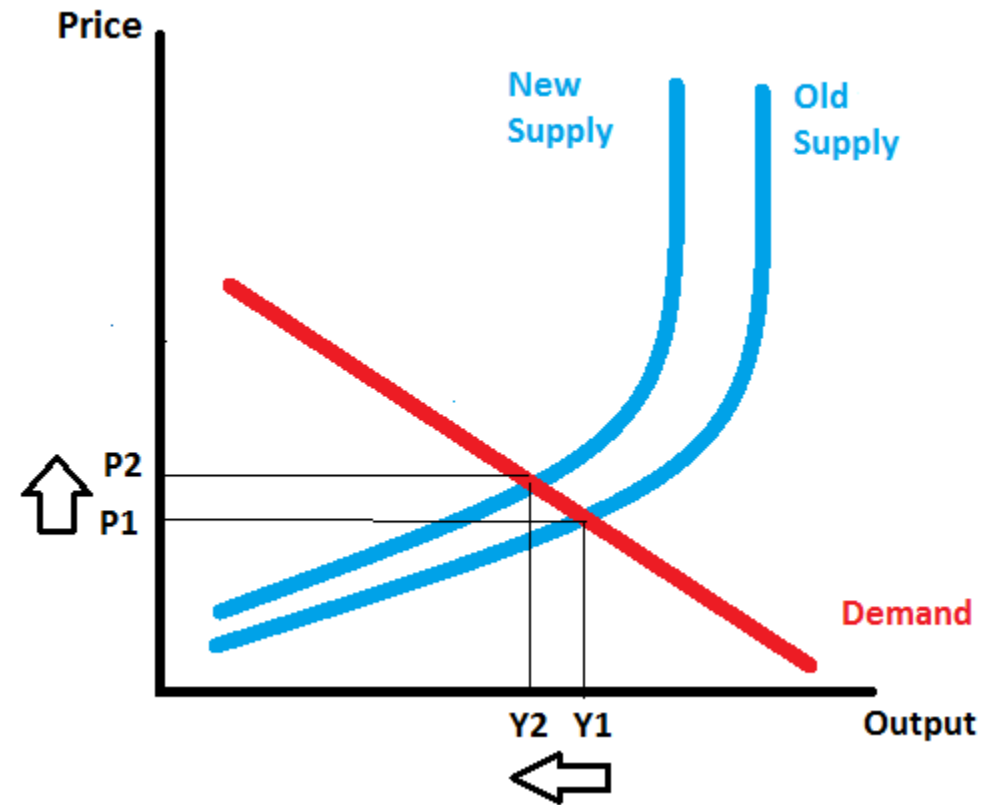
Demand curve shifts to new level

Examples of factor shifting demand:

- Unexpected monetary/credit expansion

- Increase in disposable income

- Expansionary fiscal stance, etc.

Supply-drive (cost-pushed) inflation

- Shortage of factors of production:
  - Industrial disputes
  - Samsung batteries problems
  - Natural calamities

- Global supply-side shock:
  - Import (in particular commodity) prices

- Tax and tariff changes

$$\pi_t = \alpha\pi_{t-1} + \left(1 - \alpha\right)\pi_{t+1}^e + \beta rmc_t + \varepsilon_t$$

- Prices are set via both backward and forward looking expectations

    e.g. a subset of firms set prices according to a backward-looking rule of thumb (contracts, wages)

- Transmission mechanism through real marginal costs (rmc)

  - Demand rises
  - Firms respond and produce more (no shortage on the market)
  - However, firms face increasing marginal costs
  - Firms must ask for higher price to maintain profitability (price markups may vary over time)

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What are the components of real marginal costs?

- Depends on the inputs used in individual sectors
  - Wages
  - Interest payments
  - Energy (electricity or oil) prices
  - Import price of capital goods
  - Taxes

- Real marginal costs are typically approximated by (Gali 2001)
  - Output gap or unemployment gap (summarizing domestic factors)
  - Real exchange rate gap (summarizing external/foreign factors)

Main takeaways

- Inflation/deflation is the movement in the **general level** of prices of goods and services in an economy **over a period of time**

- In the long-run inflation is a monetary phenomenon

- Study components of inflation is useful to understand policy change, but to tell economic coherent stories about inflation determinants, the use of structural models such as New Keynesian Phillips curve is needed

- Inflation performance is one of the main drivers of monetary policy stance

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