

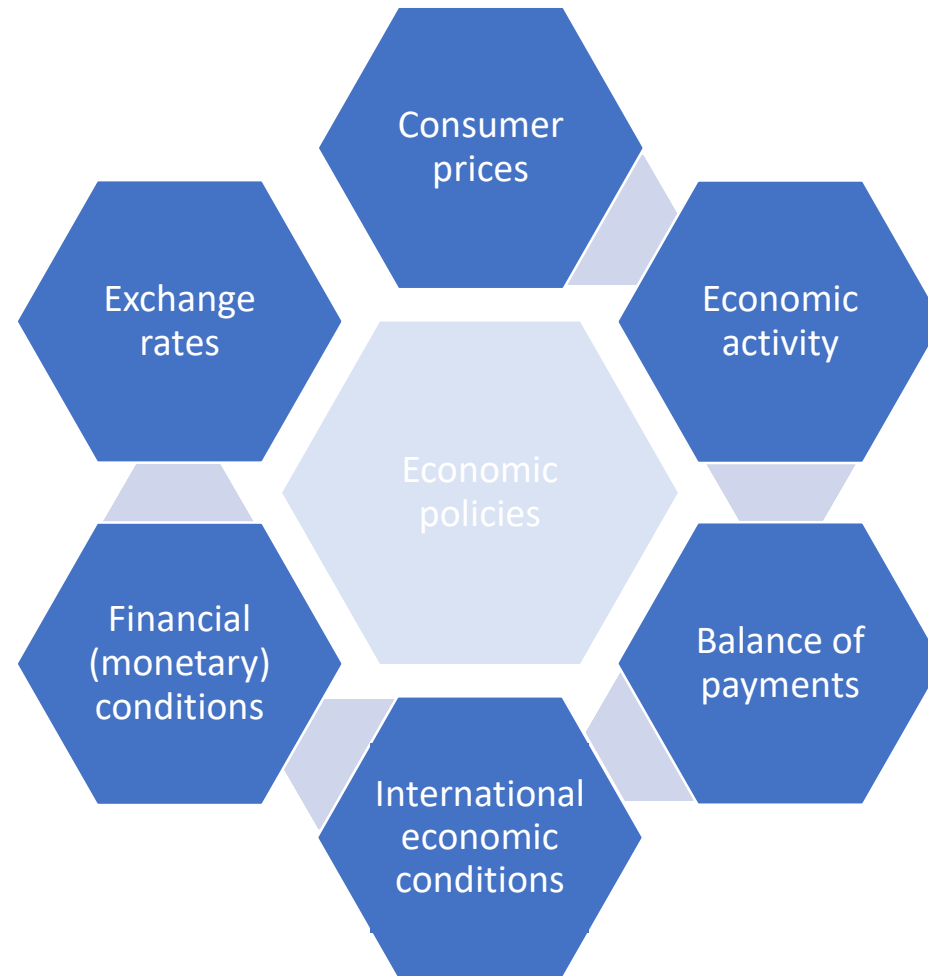


Assessment of international economic conditions

Macroeconomic Analysis Course
Prepared for Capital Alliance, Sri Lanka

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Macroeconomic assessment roadmap



Objectives

- Understand why central banks monitor international economic developments
- Understand where the monitoring sits in terms of overall macroeconomic assessment
- Strengthen essential skills for experts monitoring these sectors
- Learn basic tools for monitoring international economic developments

Outline

1. Setting the scene
2. Key data
3. Key economic concepts
4. Some measurement techniques



Setting the scene

Why do central banks employ experts to monitor international economic developments?

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

What signals should they look for in the data?

Why do central banks employ experts to monitor international economic developments?

- Foreign economic and financial developments affect the external economic balance of Sri Lanka
 - Foreign economic developments affect aggregate demand for Sri Lankan goods and services (output gap) - business cycle
 - International prices (import and export) affect import prices, domestic production costs, and therefore directly and indirectly domestic consumer price inflation
 - Foreign interest rates (financial conditions), inflation affect exchange rate
 - Foreign developments may affect financial stability
- In open economy, international developments affect domestic monetary policy stance.

What signals should you look for in the data?

- The same as for the domestic economy:
 - foreign GDP, potential output and output gap
 - inflation, trend and gap
 - exchange rate misalignment
 - real interest rate gap, forward guidance (monetary policy stance and strategy)
 - trend in interest rate differentials
 - credit and country risk perceptions
- Trade policy (FTAs, tariffs, etc.)
- Geopolitical risks

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

- Summary of foreign demand and judgement on its strength and support for domestic growth
- Summary of foreign price pressures on domestic inflation
- Summary of foreign export prices and pressures on CA and exchange rate
- Summary of foreign interest rates developments and judgement on foreign monetary strategy
- Implications for domestic monetary policy stance and achieving policy mandate.



Key data

Direction of trade

The same data we use for monitoring domestic economy – GDP, inflation, interest rate, fiscal stance, other

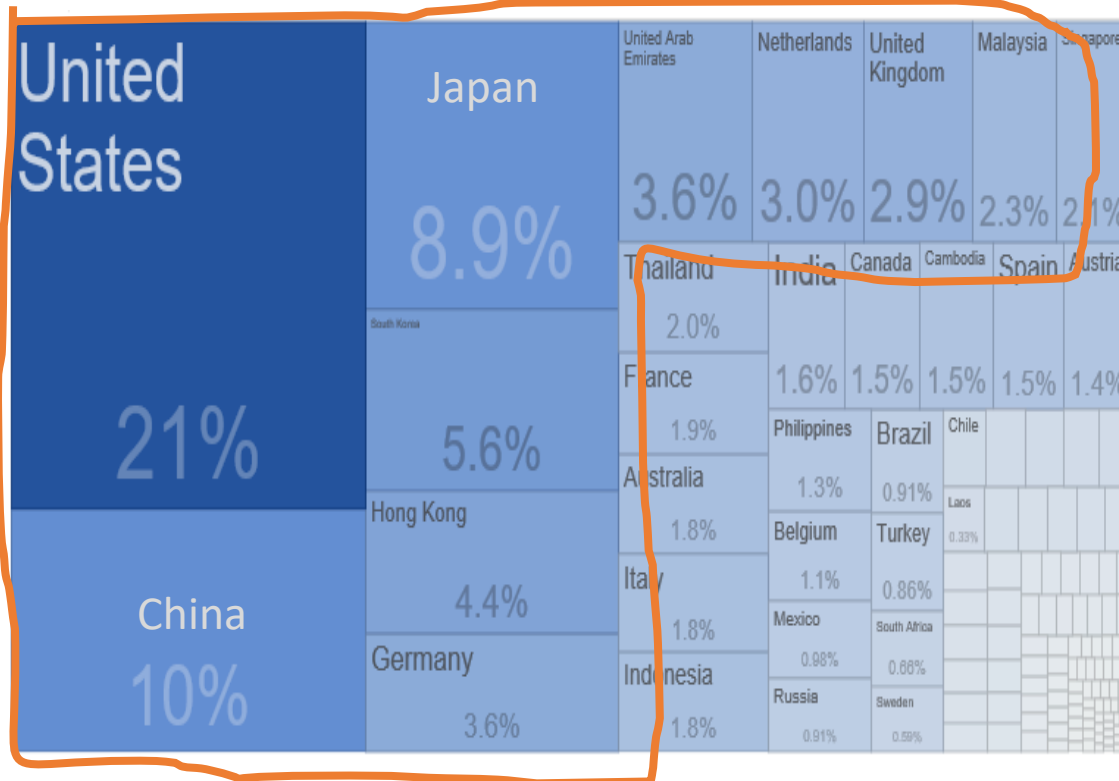
Commodity prices

Direction of trade and trade articles

- Guides priorities for country and commodity monitoring
- Construct effective aggregate demand
- Makes sense to focus on countries that contribute to the total of 60-70% of trade activity
- Commodity prices are usually monitored on individual basis (but don't forget to see the woods for the trees)

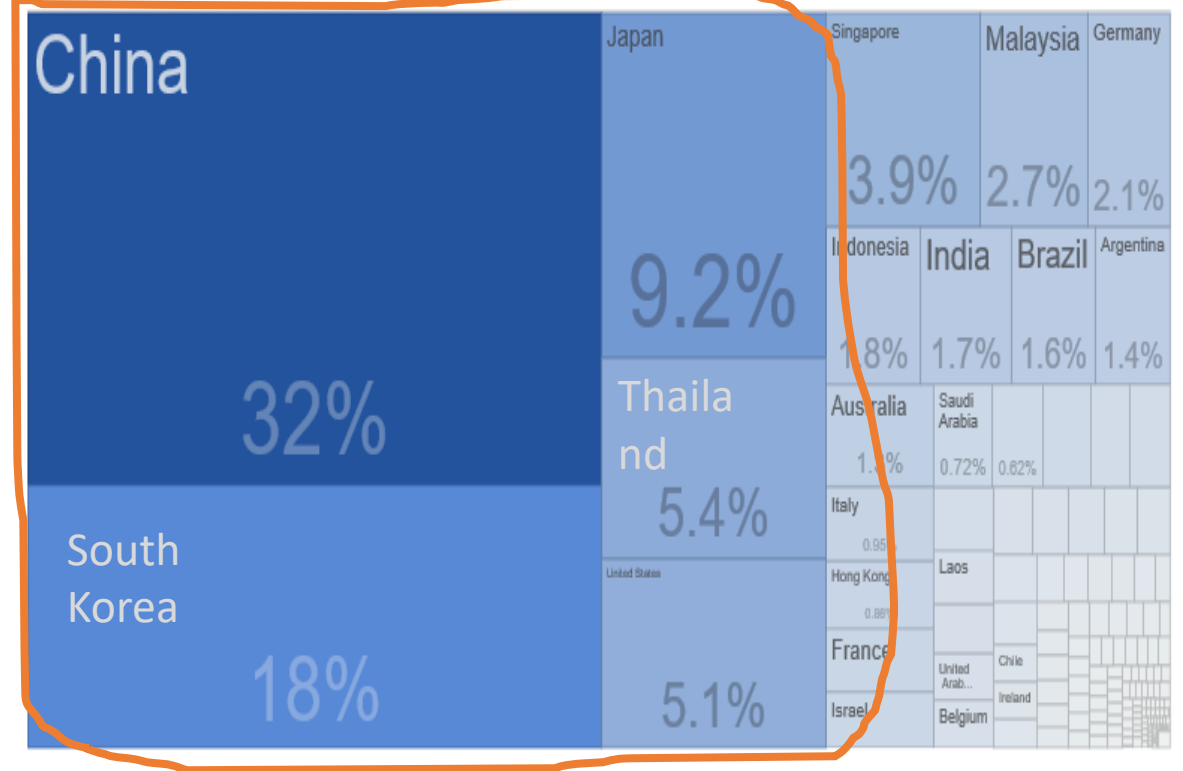
Trade direction

Export by country



10 countries, 61.8%

Imports by country



5 countries, 69.7%



Key economic concepts

Effective measures of foreign variables

Terms of trade

Data aggregation

- From individual country data to aggregate measures that are relevant for Sri Lanka
- We will refer to the aggregate measure as to “effective” measures
- It’s a similar to the idea of “effective exchange rate” measures.
- The most basic aggregation is taking simple average of values
- We are going to use weighted arithmetic average for variables like interest rates or output gaps, which are expressed in percentage points units (and take values of zero)
- Weighted geometric average for indices (CPI) or level variables (GDP)

Weighted arithmetic average

$$\bar{y}_t = (w_1 y_{1,t} + w_2 y_{2,t} + \cdots + w_n y_{n,t}) = \sum_{i=1}^n w_i y_{i,t}$$

where $y_{i,t}$ is an individual time series, w_i is the relative weight of the series i in the aggregate index, n is the total number of individual series we want to aggregate, $\bar{y}_t$ is the aggregate measure. $\sum_i w_i = 1$.

- Use to aggregate time series of output gaps, interest rates or inflation rates

Weighted geometric average

$$\bar{y}_t = (y_{1,t})^{w_1} * (y_{2,t})^{w_2} * \dots * (y_{n,t})^{w_n} = \prod_{i=1}^n (y_{i,t})^{w_i}$$

where $y_{i,t}$ is an individual time series, w_i is the relative weight of the series i in the aggregate index, n is the total number of individual series we want to aggregate, $\bar{y}_t$ is the aggregate measure. $\sum_i w_i = 1$.

- Use to aggregate time series of CPI, exchange rates or GDP



Some measurement techniques

Correlation - detecting regularities in co-movements

Leading or lagging?

Quantifying aggregation weights

Detecting regularities

- Correlation between two time series $y_{1,t}$ and $y_{2,t}$:

$$\text{corr}(y_{1,t}, y_{2,t}) = \frac{\text{cov}(y_{1,t}, y_{2,t})}{\sqrt{\text{var}(y_{1,t})\text{var}(y_{2,t})}} = \frac{E[(y_{1,t} - E(y_{1,t}))(y_{2,t} - E(y_{2,t}))]}{\sqrt{\text{var}(y_{1,t})\text{var}(y_{2,t})}}$$

- Variance: $\text{var}(y_{1,t}) = E[(y_{1,t} - E(y_{1,t}))^2]$

- Excel functions: **=correl(array1, array2)**

Measuring leading or lagging of variables

- $y_{1,t}$ is leading $y_{2,t}$ by i (months/quarters), $y_{2,t}$ is lagging $y_{1,t}$

$$\text{corr}(y_{1,t}, y_{2,t-i}) = \frac{\text{cov}(y_{1,t}, y_{2,t-i})}{\sqrt{\text{var}(y_{1,t}) \text{var}(y_{2,t-i})}} = \frac{E[(y_{1,t} - E(y_{1,t}))(y_{2,t-i} - E(y_{2,t-i}))]}{\sqrt{\text{var}(y_{1,t}) \text{var}(y_{2,t-i})}}$$

- $y_{2,t}$ is leading $y_{1,t}$, $y_{1,t}$ is lagging $y_{2,t}$

$$\text{corr}(y_{1,t-i}, y_{2,t}) = \frac{\text{cov}(y_{1,t-i}, y_{2,t})}{\sqrt{\text{var}(y_{1,t-i}) \text{var}(y_{2,t})}} = \frac{E[(y_{1,t-i} - E(y_{1,t-i}))(y_{2,t} - E(y_{2,t}))]}{\sqrt{\text{var}(y_{1,t-i}) \text{var}(y_{2,t})}}$$

Correlation and causality

- Correlation does not imply causality!
- Correlation is a summary statistics -- summarizing the closeness of co-movement of two variables
- (Granger) causality: one variable predicts values of other variable.

Quantifying weights for aggregation

- You can use trade weights – the most straight forward (common) way
- Alternatively, you can estimate elasticity parameters (how much does domestic variable changes in response to another), which you can then re-scale to obtain relative weights

- Step 1: Estimate the following linear equation using the OLS

$$y_{Sri\ Lanka,t} = a_{0,i} + a_{1,i}y_{i,t} + \varepsilon_t$$

- Step 2: Repeat for all contributing series $y_{i,t}, \forall i = 1, \dots, n$
 - Step 3: Collect all individual estimates of elasticities $a_{1,i}$, and sum them up: $\hat{a}_1 = \sum_i \hat{a}_{1,i}$
 - Step 4: Compute the weights: $w_i = \frac{\hat{a}_{1,i}}{\hat{a}_1}$, so that it holds that $\sum_i w_i = 1$.



Conclusion

Main takeaways

- Remember, for the assessment of international developments, we use exactly the same tools as for the assessment of domestic economy:
 - **output gap** to qualitatively assess foreign economic activity
 - **inflation gap** to qualitatively assess foreign inflation developments
 - **real interest rate gap** to qualitatively assess foreign monetary conditions
 - **real exchange rate gap** to qualitatively assess foreign competitiveness and exchange rate pressures
- The foreign gaps are interpreted in terms of their implications for their domestic counterparts - prices, econ activity, financial conditions and ultimately domestic monetary policy stance