EXCHANGE RATES: CONCEPTS, MEASUREMENTS AND ASSESSMENT OF COMPETITIVENESS

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Lecture outline

- Competitiveness
- Bilateral nominal exchange rate and cross rates
- Nominal effective exchange rate (NEER)
- Real effective exchange rate (REER)
- Exchange rate indices as indicators of competitiveness and equilibrium
- Assessment of Competitiveness

The Concept of Competitiveness

Tradable goods can be produced domestically and then be sold either domestically or abroad in exchange for other goods.

Competitiveness is the incentive for domestic/foreign economies to produce and/or purchase these goods in/from the domestic economy, rather than in/from foreign economies.

At the level of individual producers, competitiveness is generally defined on the basis of (quality-adjusted) prices: lower-price producers are more competitive.

Measuring Competitiveness

There are many aspects of competitiveness:

- o product quality

- o ability to innovate

- o capacity to adjust rapidly to customers' needs

- o absence of restrictive practices

- o price or cost competitiveness.

Effects of Losing Competitiveness

If competitiveness worsens, tradable goods produced abroad are cheaper than those produced domestically:

o demand for goods produced domestically (either from the domestic economy or from abroad) will decrease

o less incentive to shift resources to the tradable sector and/or there will be less capital inflows

o exports ↓ and imports ↑; eventually, either the domestic economy becomes more indebted to the rest of the world or its credit position will deteriorate

Significance of Competitiveness

- Competitiveness is key to economic performance

- Insufficient competitiveness can lead to
  - Economic downswing and unemployment
  - Stunted tradable goods sector and reduced long-run growth
  - Unviable external position

- Excessive competitiveness can lead to
  - Overheating and inflation
  - Underdeveloped non-tradable goods sector
  - Large current account surpluses and reserve accumulation

Exchange rates and Competitiveness

- An appreciating exchange rate is usually thought to be contractionary and deflationary;

- A depreciating exchange rate is usually thought to be expansionary and inflationary;

- Hence, the level of the exchange rate matters for the economy's cyclical position (output gap; inflationary pressures);

- An overly appreciated exchange rate may distort production in favor of nontradables and against tradables

- If productivity growth tends to be higher in tradables than in nontradables, adverse effect on economy-wide productivity growth

Exchange Rates: Concepts and Measurement

Bilateral Nominal Exchange Rate

- The exchange rate is the price of one currency expressed in terms of another currency
- Two conventions
  - E: Price of home currency in terms of foreign currency
  - R: Price of foreign currency in terms of home currency

$$E = 1 / R$$

Bilateral Nominal Exchange Rate - 2

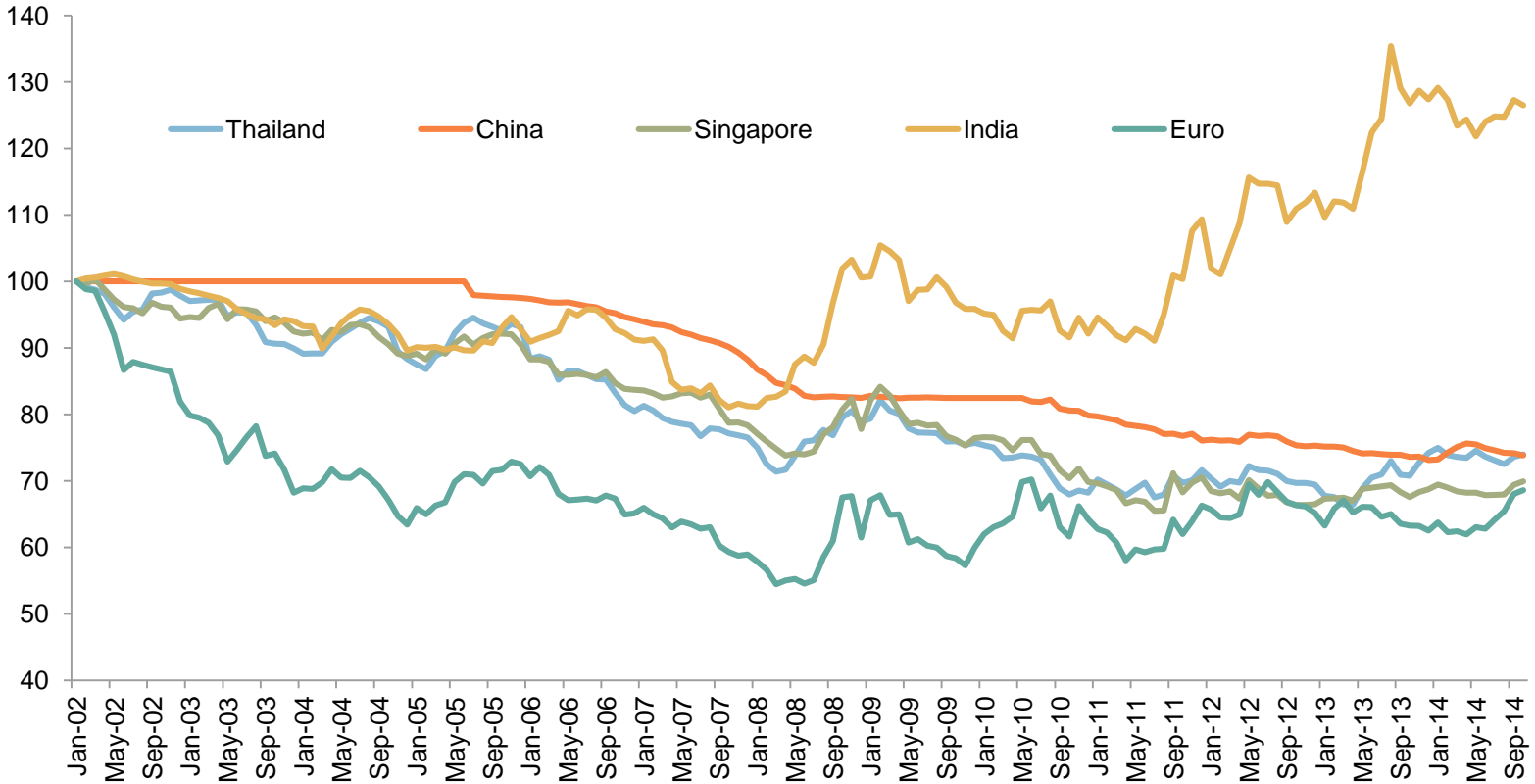| Symbol	Units	Appreciation of domestic currency	Depreciation of domestic currency
E	$US/Yuan (IMF)	↑	↓
R	Yuan/$US (Textbook)	↓	↑

Domestic currency =Yuan
Foreign currency =$USD

Cross rates

- Cross rates can be calculated from bilateral rates to USD

- Example

  USD 1 = CNY 6.129 & USD 1 = SGD 1.2979

  → SGD 1 = CNY 6.129/1.2979 = CNY 4.7222

  → E = 4.7222 (from Singaporean perspective)

  → R = 1/4.7222= 0.2118 (from Singaporean perspective)

- Arbitrage drives bilateral rates to equality with calculated cross rates: if E < 4.7222, say 4.60, it would be profitable to buy CNY for dollar, obtaining CNY 6.129, selling CNY for SGD, obtaining SGD 6.129/4.60 = 1.33, and selling SGD for USD, obtaining USD = 1.33/1.2979 = 1.027

Bilateral Nominal Exchange Rate (US)

Bilateral rates send conflicting messages about the nominal value of a country's currency

Legend: Thailand, China, Singapore, India, Euro

Source: CEIC, IMF

Nominal Effective Exchange Rate

An aggregate measure, the nominal effective exchange rate, provides a clearer picture of currency value developments (US Dollar)

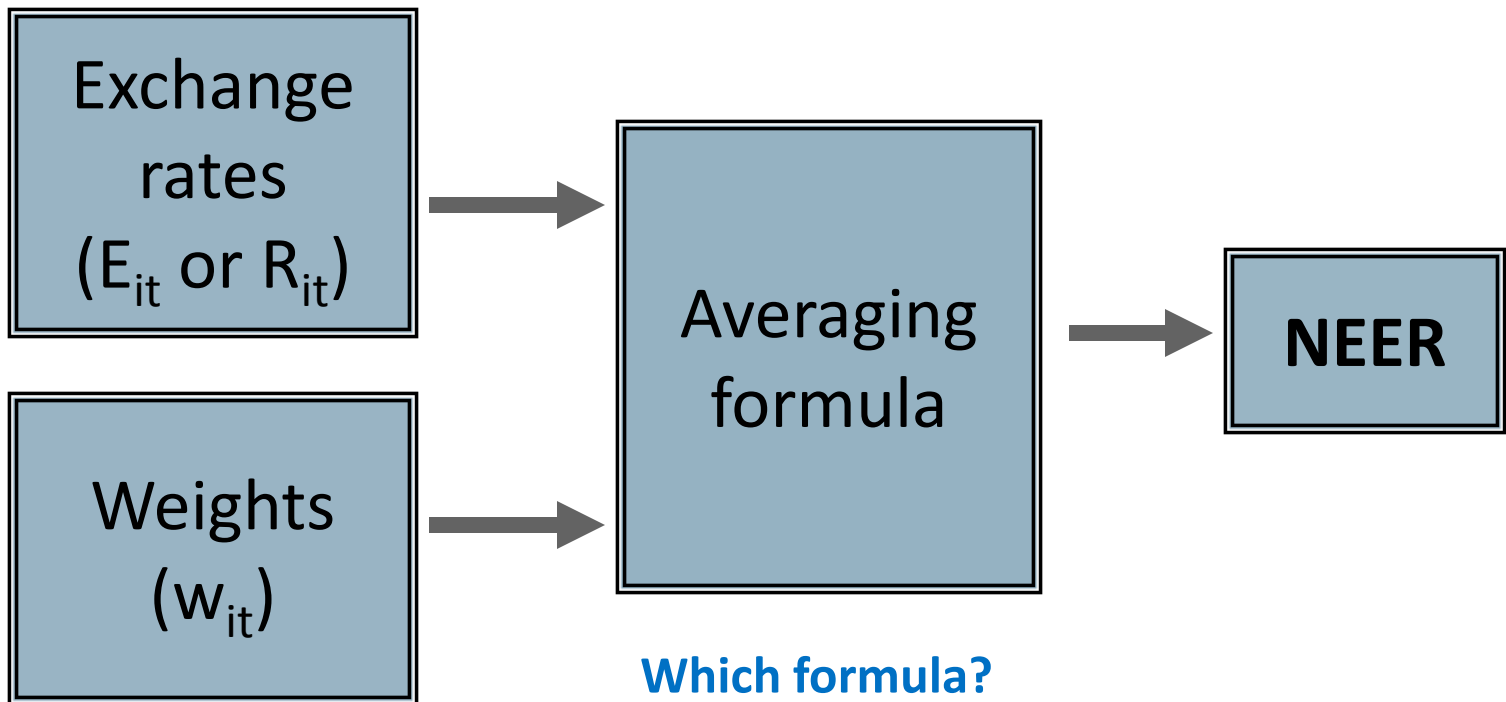Broad currency index (Mar 73 = 100)

Source: Federal Reserve Board 2014

How is the NEER calculated?

The NEER is a weighted average of indexed nominal bilateral rates
- Bilateral cross rates are expressed in foreign currency per domestic currency (E) and indexed to 100
- The more "important" a competitor, the higher the weight of its currency

Which currencies?

Exchange rates (E_{it} or R_{it}) → Averaging formula → **NEER**

Weights (w_{it}) → Averaging formula

Which weighting system?

Which formula?

Usefulness of NEER

- NEER movements are only a tenuous indicator of competitiveness developments because,
  - NEER is a nominal variable: the price of the national currency in terms of trading-partner currencies

- But NEERs
  - are widely available with little lags and high frequency for almost any country. Relatively straight-forward to calculate

- A more reliable indicator of competitiveness needs to also take into account price and wage developments
  - RER and REER

Example: Myanmar price pressures

Investment-Related Costs: Selected Indicators		
	Rank 1/	
	FY 2007	FY 2011
Labor costs	28/28	31/31
Office rents	20/28	5/32
Mobile phone basic charge	1/28	1/32
Residential rentals	17/28	12/32

1/ Based on major cities in Asia and Oceania. A higher rank indicates higher costs.

Source: JETRO, Survey of Investment-related costs in Asia and Oceania (2008, 2012)

Myanmar Art. IV, 2013.

The Real Exchange Rate

- Neither E, nor R, nor the NEER indicate the relative (*real*) price of goods: given prices in local currencies and the exchange rate, does 1 bag of Thailand-produced rice exchange for 1 bag of U.S.-produced rice of the same type?

- We need to use the real exchange rate (RER): nominal exchange rate times the ratio of the price levels:

$$RER = E \frac{p}{p^*}$$

A PPP-based definition of the Real Exchange Rate

$$RER = E \frac{P}{P^*}$$

RER = the real exchange rate

E = the nominal exchange rate

P= the domestic price level

P*= the foreign price level

The Real Exchange Rate

Consider
$$RER = E \frac{p}{p^*}$$

<u>Example 1</u>: suppose that E is fixed; if p increases more than p^* (RER $\uparrow$) goods produced domestically ("Thailand") become more expensive than the same goods produced externally (the "U.S."): there is less incentive to buy / produce these goods domestically

<u>Example 2</u>: suppose that E decreases by 5%, p increases by 20% and p^* by 10% (RER $\uparrow$ by about 5%); even if domestic currency becomes cheaper, domestic goods becomes more expensive than foreign goods

The real exchange rate: definition

□ When R_t increases (a real exchange rate appreciation), the domestic consumption basket becomes more expensive than the foreign basket
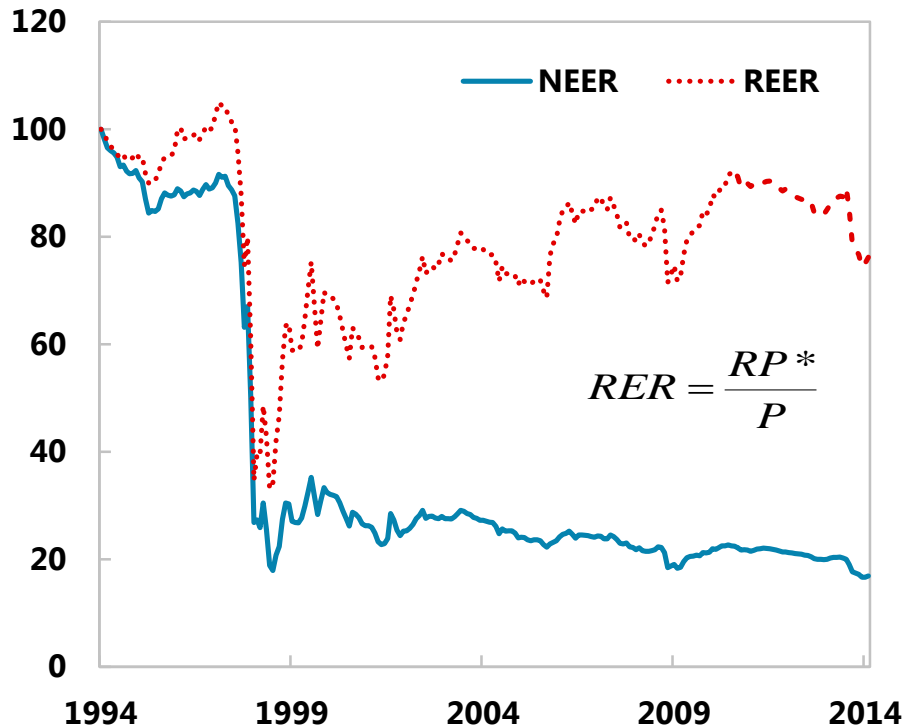
$$\% \Delta R_t = \% \Delta P_t - (\% \Delta P_t^* - \% \Delta E_t)$$

The information content of Real Exchange rates
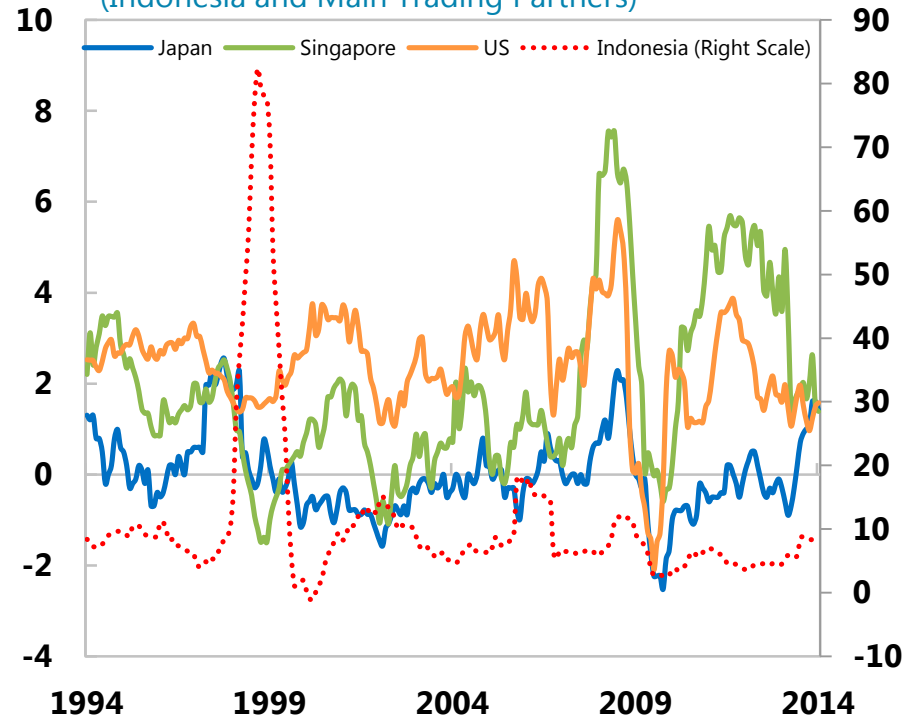
Two channels of REER variation :
- changes in NEER
- price or cost inflation differentials
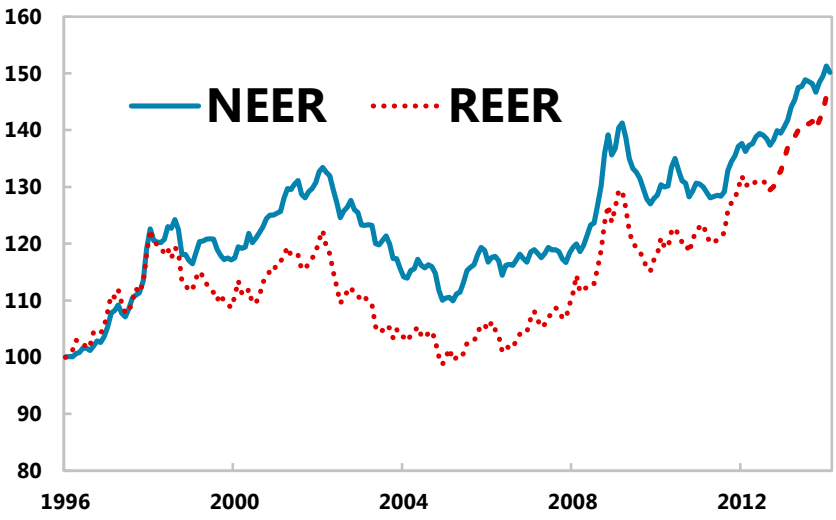
Effective Exchange Rate Indices (Indonesia)

NEER —— REER ·······

$$RER = \frac{RP*}{P}$$

Inflation Rates
(Indonesia and Main Trading Partners)

Japan —— Singapore —— US —— Indonesia (Right Scale) ·······
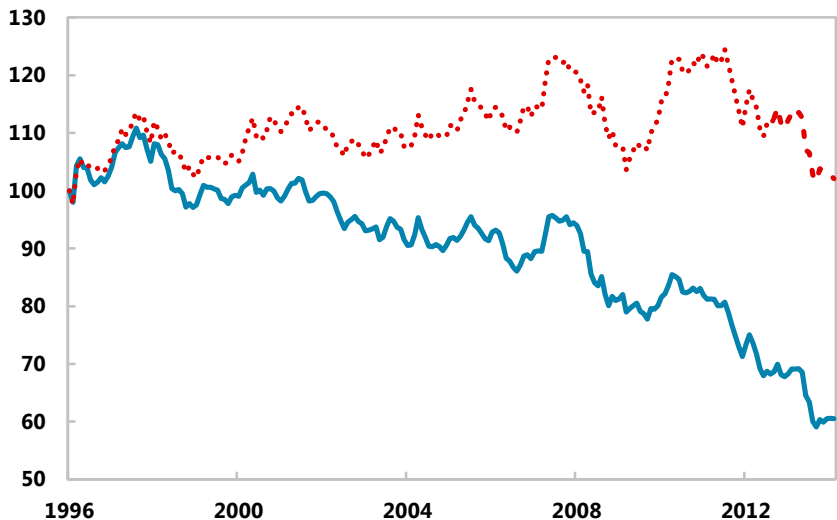
Source: CEIC, BIS, IMF

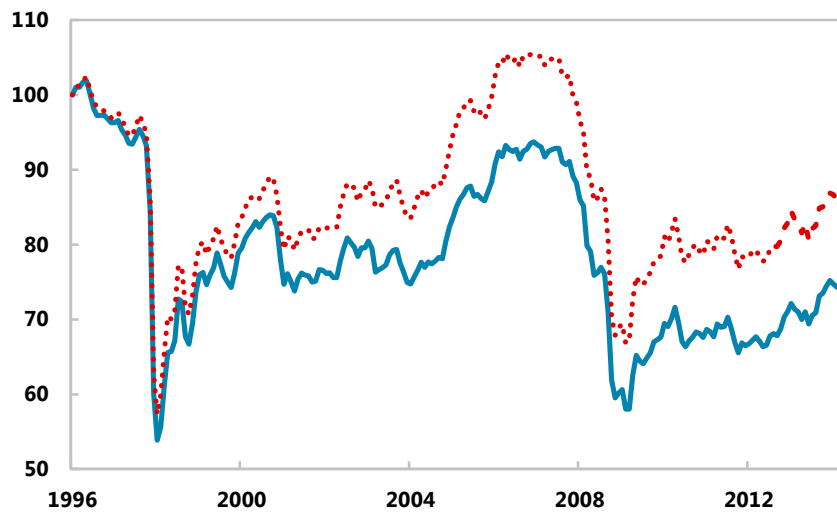# Indicators of Competitiveness

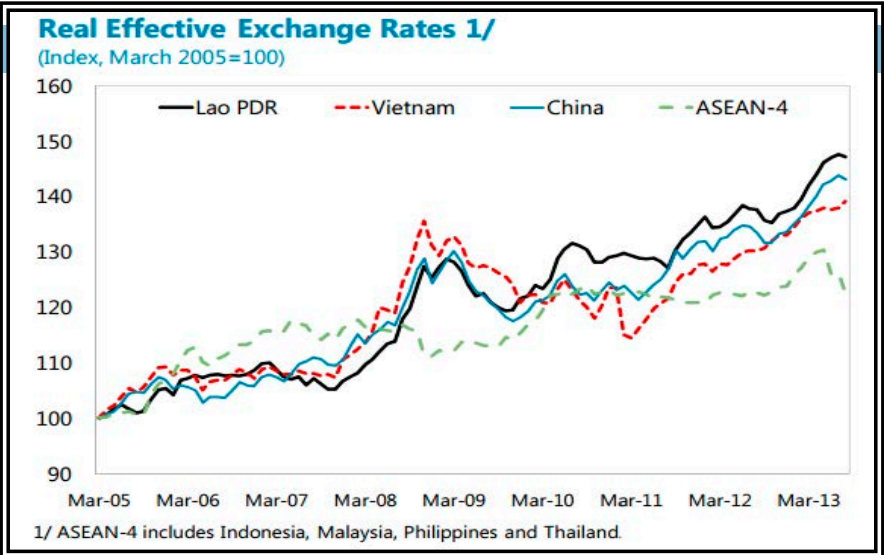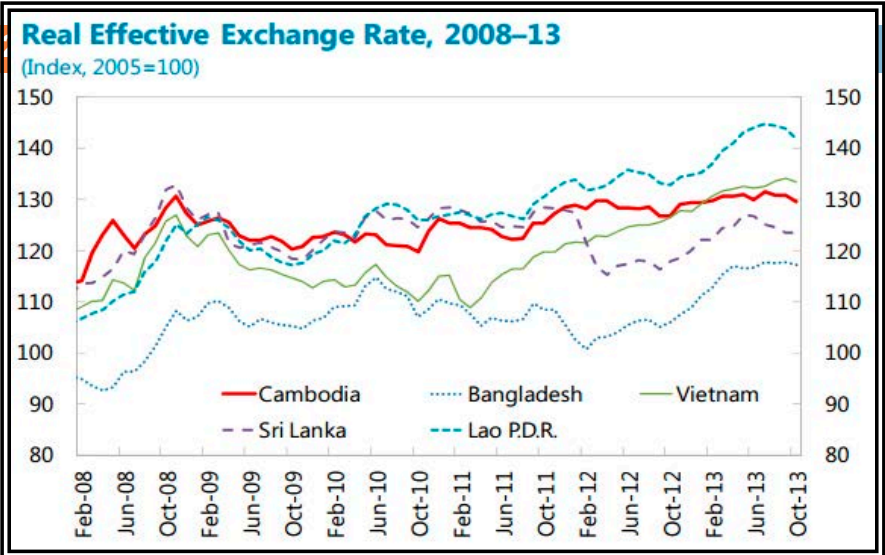## REER AND NEER developments often diverge (1996 – 2011) [Jan 1996 = 100]

CHINA

INDIA

KOREA

Philippines

Source: CEIC, BIS

NEER and REER, last 10 years.

Real Effective Exchange Rate, 2008–13
(Index, 2005=100)

Cambodia, Bangladesh, Vietnam, Sri Lanka, Lao P.D.R.

Real Effective Exchange Rates 1/
(Index, March 2005=100)

Lao PDR, Vietnam, China, ASEAN-4

1/ ASEAN-4 includes Indonesia, Malaysia, Philippines and Thailand.

Vietnam

Market and Effective Exchange Rates (EER) 1/
(Index, 2005=100)

Real EER, Nominal EER, Kyat/USD (RHS, reverse)

Sources: Authorities; and IMF staff calculations.
1/ Auction rates (kyat/USD) are applied starting April 2012.

Effective Exchange Rates
(2000=100)

Nominal effective exchange rate, Real effective exchange rate

Source: IMF staff estimates.

Choice of price or cost index

- Aggregate Price Index based measures
  - Consumer price index
  - Wholesale or producer price index
  - Export unit values
  - GDP deflator

- Unit labor cost (ULC) based measures

- REERs based on CPIs and ULCs most common

- IMF publishes REERs based on CPIs for almost all countries and ULC-based REERs for most industrial countries

Real Effective Exchange Rate (REER)

The Real Effective Exchange Rate index is a nominal effective exchange rate index <u>adjusted for relative movements in national price or cost indicators</u> of the home country and selected other countries (or currency unions).

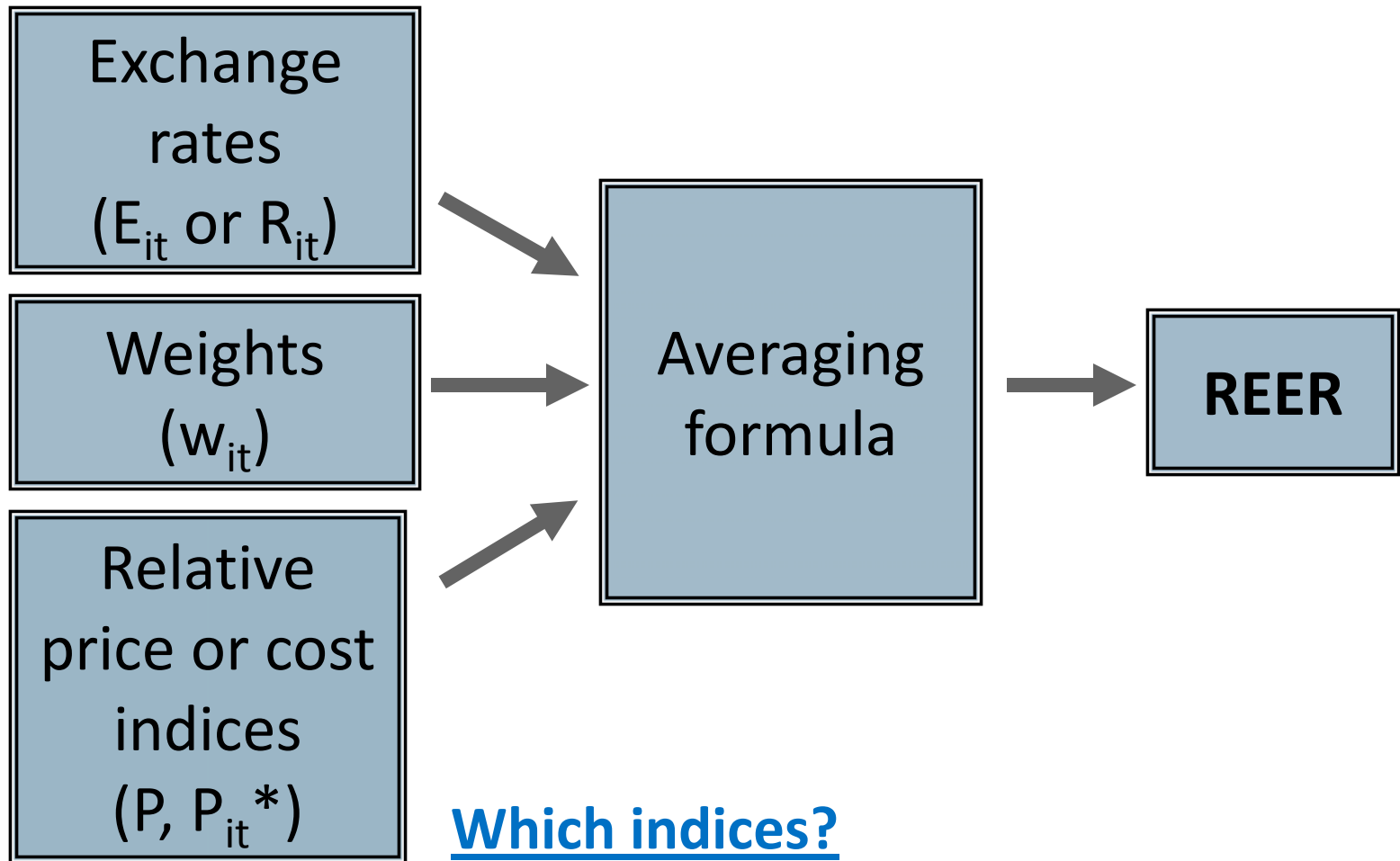$$REER = \frac{P}{\prod_i (P_i^*)^{w_i}} NEER$$

$$NEER = \prod_i E_i^{\,w_i}$$

Why REER?

- Why is such an adjustment sensible for competitiveness assessment?

  - A nominal depreciation matched by a positive inflation differential with trading partners leaves relative prices of domestic and foreign goods, expressed in a common currency, unchanged

  - Similarly, a nominal depreciation matched by a rising cost differential gives exporters no additional edge over foreign competitors

REER calculation

Exchange rates (E_{it} or R_{it})

Weights (w_{it})

Relative price or cost indices (P, P_{it}^*)

Averaging formula

REER

Which indices?

REER-Consumer Price Index

□ Advantages:

- fairly comparable across countries
- reasonably accurate
- rapidly available
- published frequently

□ Disadvantages:

- Includes different CPI basket weights across countries
- excludes capital goods
- affected by taxes, subsidies & price controls

Unit labor cost-based REER

□ Interpretation as a competitiveness indicator: An increase in unit labor costs implies lower profitability.

□ Advantages

◻ Availability of fairly comparable data across countries

◻ Covers a large share of non-traded costs

□ Disadvantages:

◻ Interpretation of index as a competitiveness measure is based on two assumptions

▪ Price of traded goods is equal across countries

▪ No change in capital-labor ratios

◻ Cyclical variation in unit labor costs

Estimating the Equilibrium REER

Why do we care about the equilibrium REER?

□ Why should we care about it:

  ➢ Overvaluation of a currency may induce global investors to speculate on a devaluation;
  ➢ REER expectations may affect borrowers' decisions about borrowing in national/foreign currency;
  ➢ International trade and politics.

□ Use of estimates of the equilibrium REER:
  ➢ Make medium-term forecasts
  ➢ Assess the sustainability of existing exchange rate policies

What do we mean by equilibrium?

- When thinking about the equilibrium REER, should we focus on the short-run (day-to-day) or the long-run?

- Markets for foreign currencies are very liquid and efficient: the *nominal* exchange rates are thought to be always in equilibrium (they equalize demand and supply for foreign currency)

  - The question of whether the REER is in short run equilibrium is not sensible…

- Most approaches for assessing equilibrium ERs focus on medium-term equilibrium.

What do we mean by equilibrium?

The RER is in "equilibrium" if it is consistent with internal and external balance:

  ➢ Internal balance: no output gap and no inflationary pressures

  ➢ External balance: current account is financed with a sustainable level of capital flows

What do we mean by equilibrium?

Questions about the equilibrium:

- Shall we worry if the actual REER deviates from equilibrium? It depends on whether there are reasons to believe that the deviation will not be corrected

- Are there circumstances when an increasing REER is consistent with equilibrium? Yes, if the equilibrium REER is also increasing

- Can the equilibrium REER increase? Yes

- What factors determine the equilibrium REER? Many …

Methodologies to Estimate Equilibrium REER

Make some sensible assumption about the behavior of the REER:

- ➢ PPP approach

□ Think of the determinants of internal and external balance, think of what it means for the REER to be consistent with them, and estimate a relationship:

- ➢ Macroeconomic balance approach

- ➢ Reduced-form equilibrium REER approach

The PPP approach

- Under the PPP hypothesis the real exchange rate should oscillate around a constant (or a trend): there can be short-run deviations, but over the long-run the REER should show a tendency to converge to a constant (or a trend):

  - Long-run averages of the REER can be used to infer the equilibrium REER

- However, this approach does not take into account of structural changes in the economy (for instance, evidence that equilibrium RER might change with GDP-per capita or the level of foreign assets)

Macroeconomic Balance Approach

Macroeconomic Balance Approach

☐ Focus on the multilateral real exchange rate that is consistent with current account (CA) balance.

☐ The CA balance does not need to be zero in the medium-term equilibrium. It will depend on the level of savings and the return on domestic investment relative to investments abroad.

Macroeconomic Balance Approach

Think of possible determinants of the long-run S – I balance:

- ➢ Fiscal policy (a surplus contributes to saving);
- ➢ Level of development (in emerging markets the return on investment is higher than in mature economies);
- ➢ Net foreign asset position (high return on net assets encourages invest);
- ➢ Population dynamic (a younger or an expanding population draws down national savings)
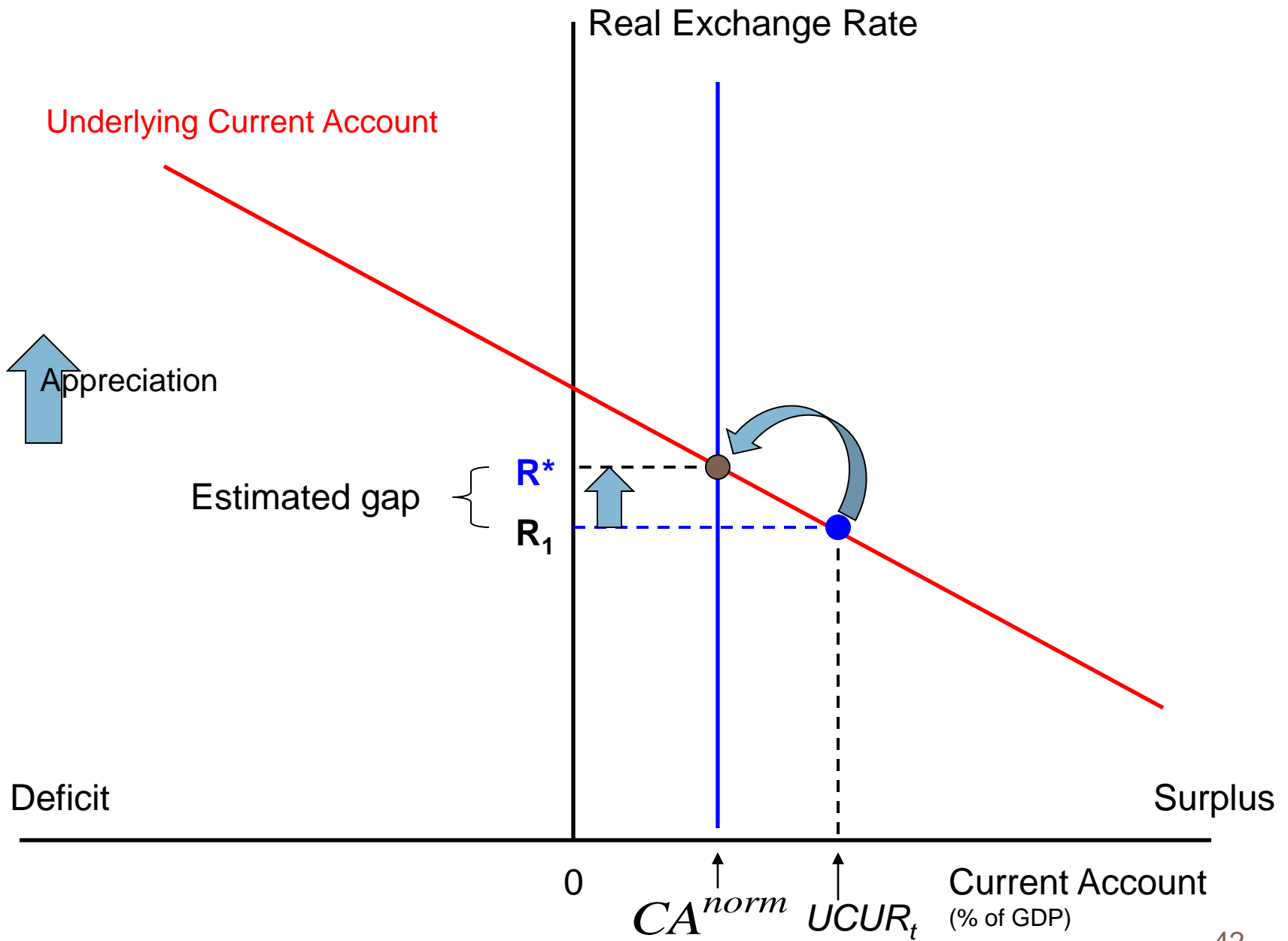- ➢ Others?

Macroeconomic Balance Approach

- □ Calculate current account CA "norm" based on the coefficient estimates and the medium-term values of the determinants.

- □ Determine relationship between the REER and the Underlying Current Account - UCA (export and import elasticities);

- □ The equilibrium REER is the level that closes the gap between the UCA and the CA norm.

Macroeconomic Balance Approach - steps

1. Find the relationship between CA balance and macroeconomic fundamentals. Use projected fundamentals to establish "the CA norm"

2. Project the underlying CA, "UCUR"

3. What exchange rate adjustment is needed to close gap between the norm CA and UCUR?

Real Exchange Rate

Underlying Current Account

Appreciation

Estimated gap

R*

R₁

Deficit

Surplus

0

CA^{norm} $UCUR_t$ Current Account (% of GDP)

Calculation of Over/under Valuation: Macroeconomic Balance Approach

Example: Exchange Rate Assessment
Calculation of Over/Under Valuation: Macroeconomic Balance Approach

Equilibrium CA (%) (A)	2.0
Underlying CA (%) (B)	5.0
Gap (A-B)	-3.0
|Elasticity of CA to the REER| (D)	0.5
Required REER Appreciation (%) (-Gap/D)	**6.0**

• The underlying CA surplus of 5 percent of GDP exceeds the equilibrium CA, estimated at 2 percent of GDP;
• The real exchange rate is undervalued, and needs to be appreciated by 6 percent for the equilibrium CA.

Laos: external sector assessment (2013 Art. IV)

	Macrobalance
Approach:	
Underlying current account balance	-15.1
Current account norm	-9.0
Required improvement in the current account	-6.2
Implied over (+) / under (-) valuation	24.3

Laos: external vulnerabilities

- Labor costs have risen by approximately 25 percent per year during 2009–2012.

- Significant REER appreciation, roughly half of this is due to higher domestic inflation.

- MB approach suggests almost 25% REER depreciation needed to restore external balance

Laos: reserve adequacy

Lao P.D.R.: Measures of International Reserves Coverage

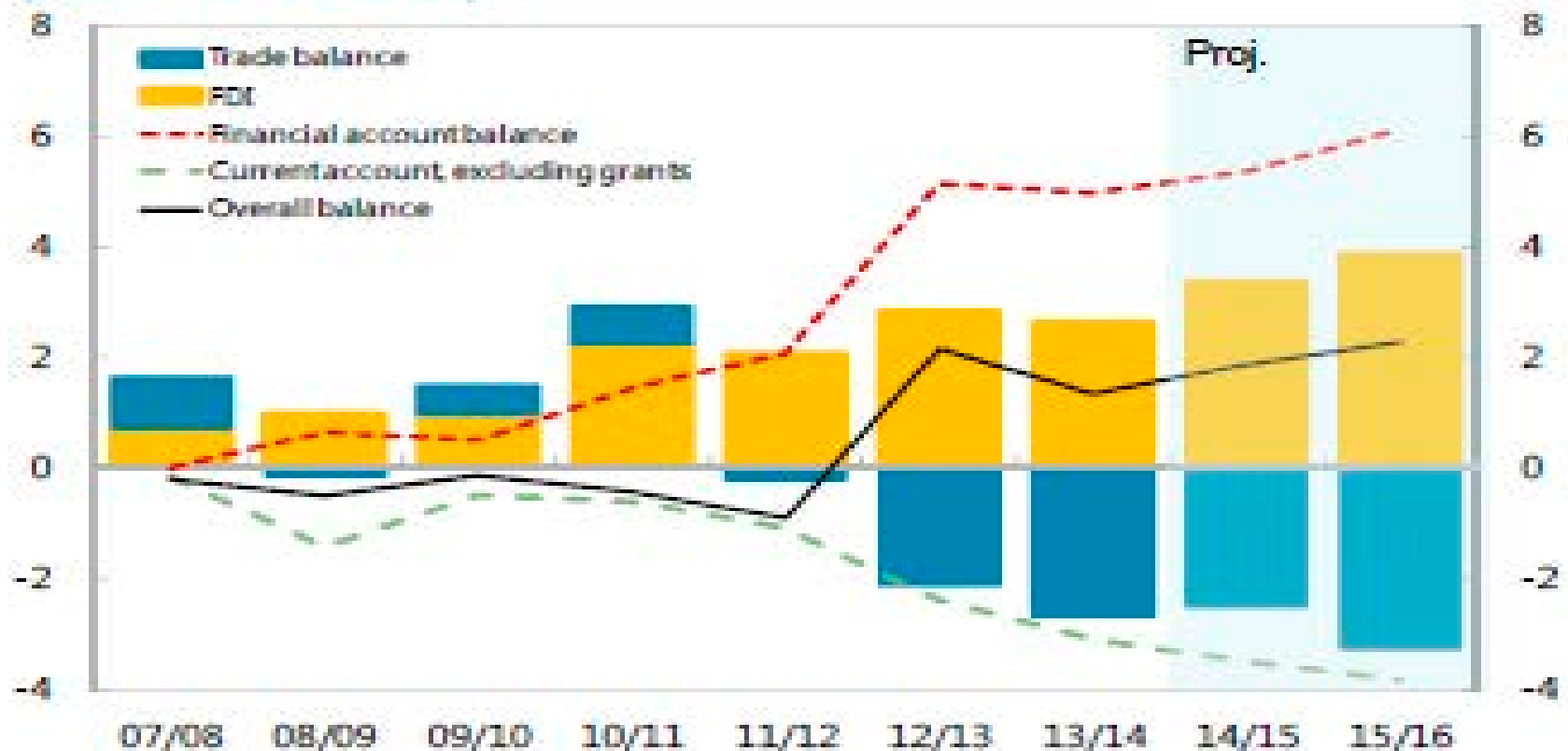|	2000–08 Average	2009	2010	2011	2012	2013 Latest
Gross International Reserves						
In millions of U.S. dollars	295.3	632.9	728.3	677.4	739.6	532.0
In months of prospective imports	2.2	2.0	1.8	1.2	1.2	0.8
In months of prospective imports, excluding resource imports	2.8	2.5	2.6	1.7	1.7	1.2
In percent of foreign currency deposits	81.3	76.8	63.9	45.4	39.0	25.5
In percent of broad money	50.8	35.4	28.1	19.9	16.5	9.9
In percent of external debt service	551.4	670.4	611.4	671.8	452.3	224.0

Myanmar: stable external sector

- The current account deficit is estimated to have widened to 5½ percent of GDP in 2013/14, but to have been more than financed by foreign direct investment (FDI), new loans, and inflows related to telecommunications licenses.

- International reserves held by the CBM increased to US$4.5 billion by end-March, covering nearly 3 months of prospective imports.

- The exchange rate appears broadly in line with fundamentals but reserves remain low

Myanmar: CA Deficit is financed largely by FDI flows

Balance of Payments
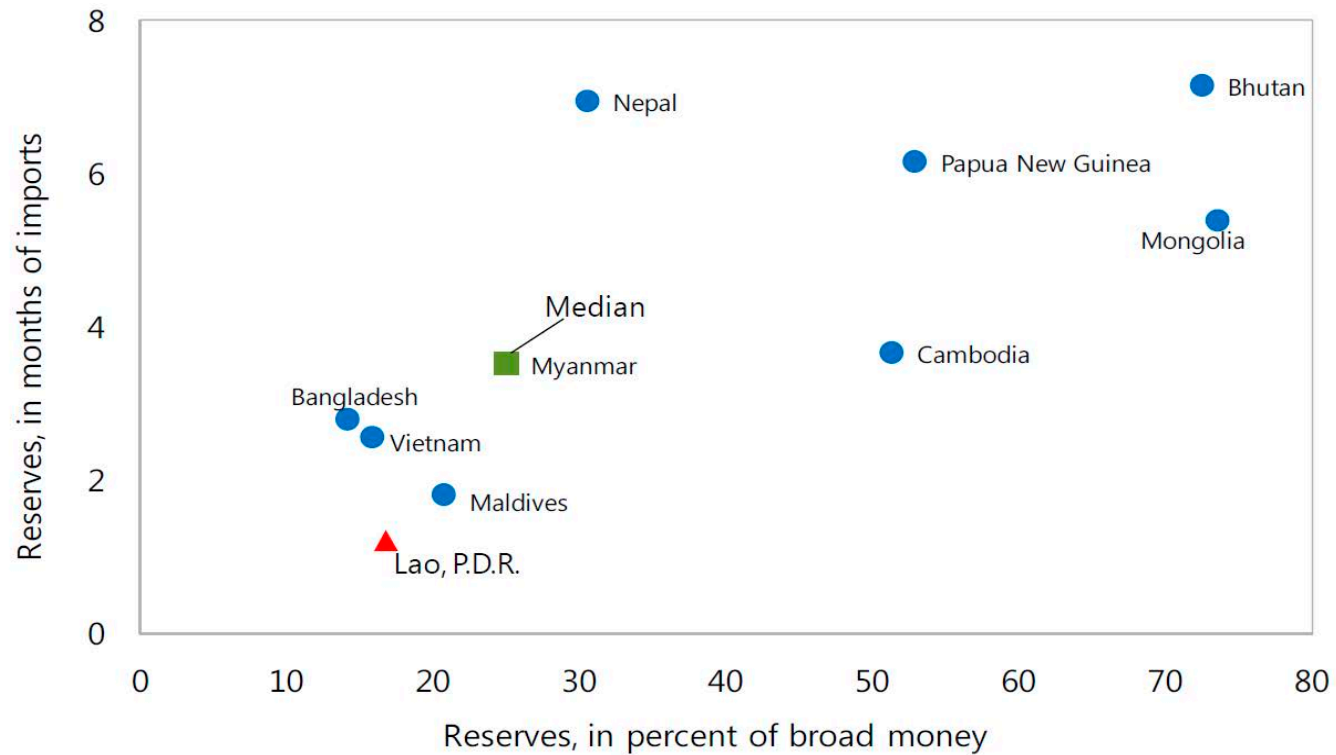(In billions of U.S. dollars)

Comparison to other regional LICs

Reserves: South and East Asian LICs
End 2012

Sources: Country authorities; IMF WEO.

Change needed in REER for sustainable CAB

Actual current account balance in 2014	
Using a target current account	
Current account gap (equilibrium - actual)	
REER change necessary to close the gap	
Imports to GDP (average 2011-2013)	-0.36
Exports to GDP (average 2011-2013)	0.30
Import elasticity to REER	0.92
Export elasticity to REER	0.71
Elasticity of current account to REER	
Adjustment in REER necessary to close the gap	

To compute the elasticity of the current account to REER you can use the formula:

$$\frac{\Delta CA}{Y}\frac{\Delta RER}{RER} = -\left|\varepsilon_X\right|\frac{X}{Y} + \left(1-\left|\varepsilon_M\right|\right)\frac{M}{Y}$$

Export and import elasticities with respect to REER

- Export elasticity (ε_x)– measures the responsiveness of the exports to changes in the REER ('the price')

- If REER depreciates by 10 percent resulting in exports increasing by 5 percent, then export elasticity would be equal to $5/10 = 0.5$

- If we know the export and import elasticities, we can measure the impact of change in REER on both exports and imports and the impact on the current account (exports minus imports)