Introduction to the Real Sector

Overview

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Overview

I. GDP
II. Inflation
III. Nominal vs. Real
IV. Forecasting GDP
    1. Forecasting Real GDP
    2. Forecasting Inflation
    3. GDP Deflator
    4. Putting It Together: Nominal GDP Forecasts

I. GDP

Table 1. Lao P.D.R.: Selected Economic and Financial Indicators, 2010–14[1/]

	2010	2011	2012 Est.	2013 Proj.	2014
GDP and prices (percentage change)					
Real GDP growth	8.1	8.0	7.9	8.2	7.5
CPI (annual average)	6.0	7.6	4.3	6.5	7.5
CPI (end year)	5.8	7.7	4.7	7.4	7.7
Nominal GDP					
In billions of kip	56,523	65,398	73,257	82,260	94,041
In millions of U.S. dollars	6,855	8,162	9,169	10,002	10,814

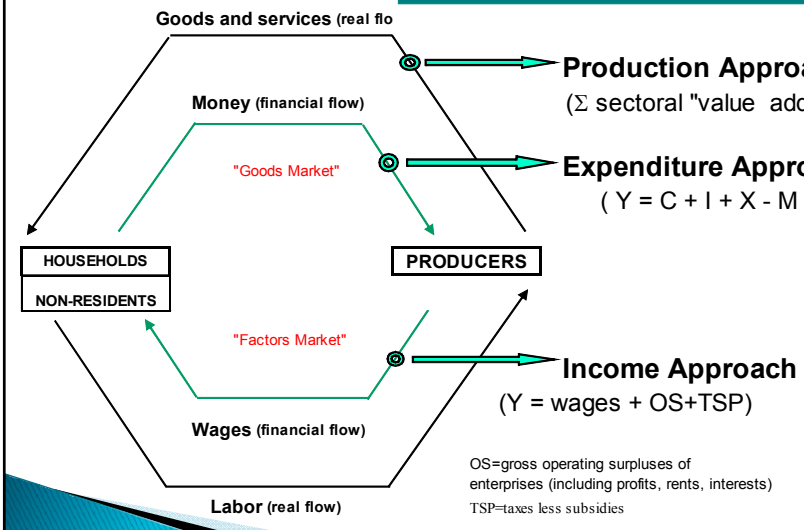
Why Is GDP so Important?

- Measure of output
- Approximation of welfare
- Many other variables are moving broadly proportional to GDP (e.g., revenues)
  → GDP ratios
  → GDP forecast is basis for revenue forecasts etc.
- Macroeconomic management: keeping GDP roughly in line with its potential

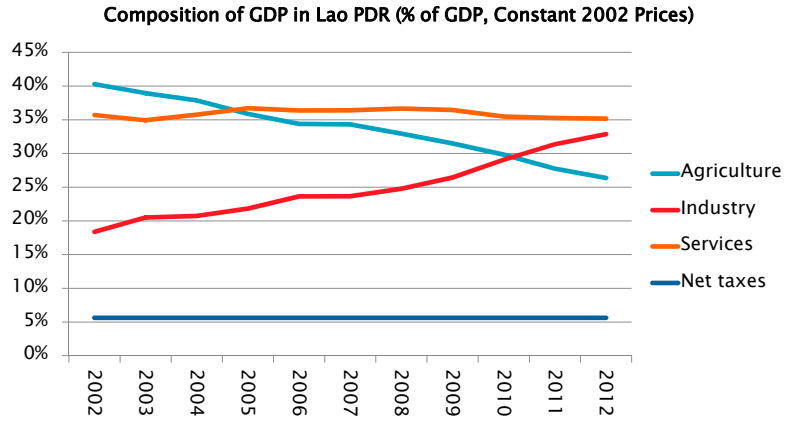
What is GDP and How Do We Measure It?

- **Gross output**: value of all goods produced in the economy (double counting; example of wheat used in production of bread)
- **Value added (VA)**: gross output minus intermediate consumption (eliminates double counting)
- **Gross Domestic Product (GDP)**: sum of value added across all sectors of the economy. Measures the value of final goods and services
- **Consumption**: can be **intermediate** (inputs into production) and **final** (goods and services used by households and government sector)
- **Gross investment** (also called gross capital formation): additions to the physical stock of capital in the economy, such as building of machinery, facilities

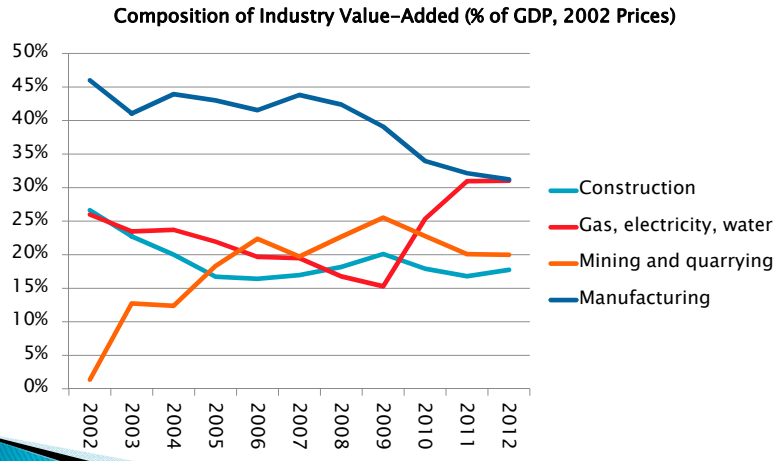
Estimate of GDP



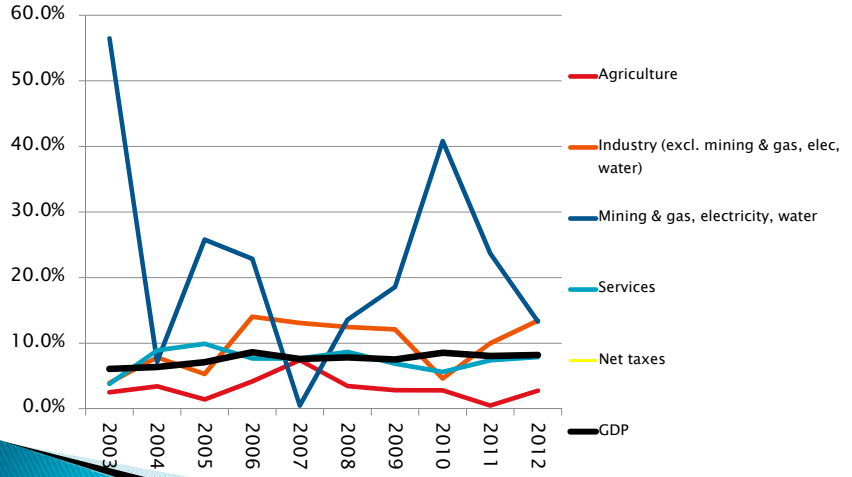
Production Approach: GDP Shares



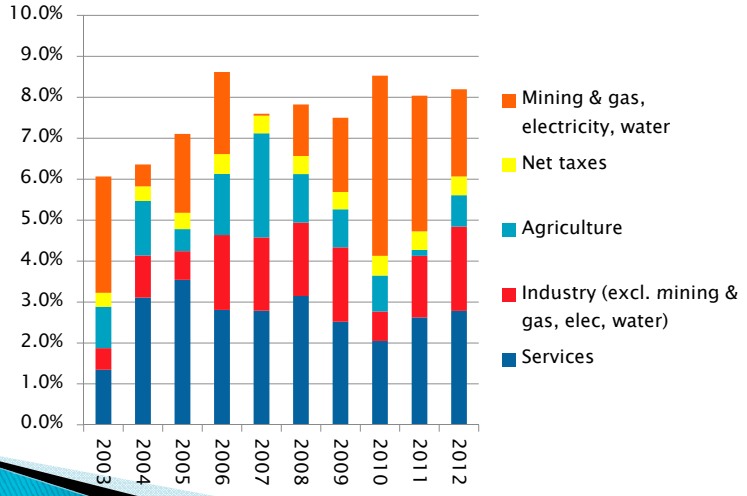
Evolution of Value-Added in Industry Sector



GDP Growth Rates – Production Approach



GDP Growth Contributions – Production Approach



GDP from the Expenditure Side

- **Absorption (A) = Final Consumption (C) + Investment (I):** $A = C + I$

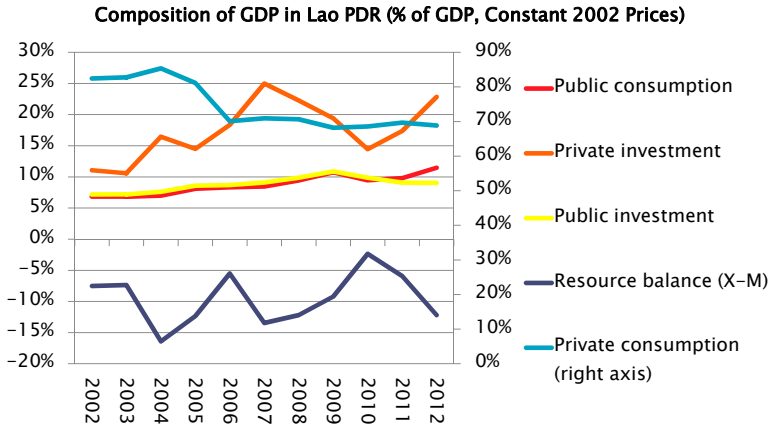
- **Net Exports (X–M)**
  X = Exports of goods and services
  M = Imports of goods and services

➢ GDP = A + X – M
Domestic Demand *Foreign Demand*

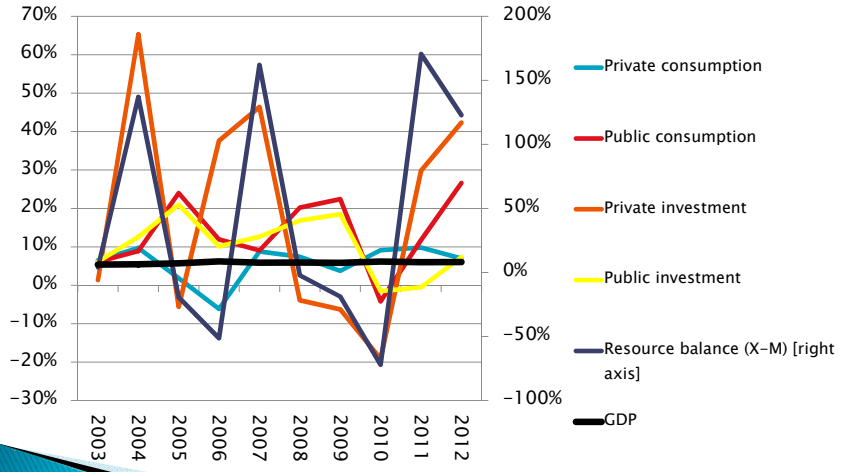
GDP from the Expenditure Side—Examples:

- **Final consumption (C)**
  Households: food, electricity, cars, mobile phones, etc.
  Government: 'goods & services' in recurrent budget
  → both imported & locally produced goods
- **Investment (I)**
  Machines, equipment
  → both imported & locally produced goods
- **Exports (X)**
  electricity, mineral commodities (gold, copper), garments, wood products etc.
- **Imports (M)**
  Cars, mobile phones, machines, equipment (see above)

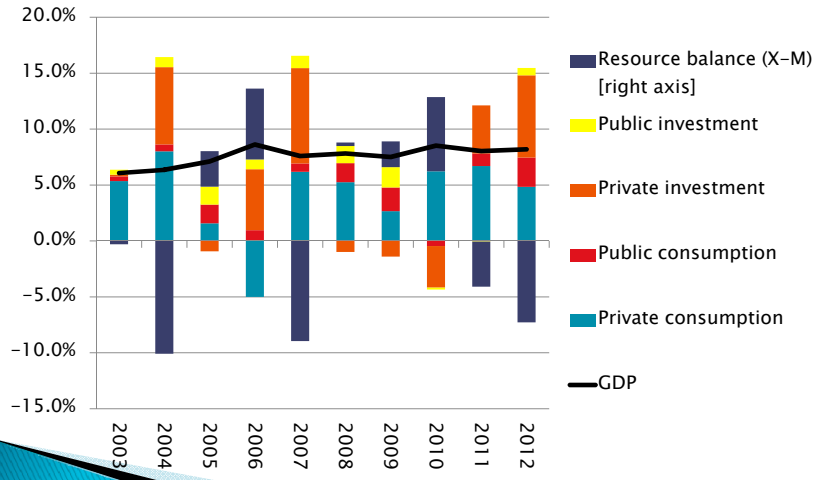
Expenditure Approach: GDP Shares



GDP Growth Rates – Expenditure Approach



GDP Growth Contributions – Expenditure Approach



III. Inflation

- Inflation is a **sustained** increase in the **overall** price level
  - Increase in average prices of all goods and services vs. change in relative prices of individual goods and services
  - One-time increase in the price level vs. underlying inflation

- Commonly used measures include *changes* in:
  - The consumer price index (CPI)
  - Wholesale (WPI) or Producer Price Index (PPI)
  - The GDP deflator (PGDP)

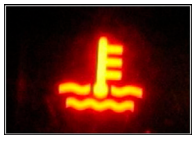
Why Do We Care About Inflation?

- Reasonably low inflation is equivalent to price stability
  → key element of macroeconomic stability
  → low inflation important for markets to function effectively, thereby supporting economic development
  → high inflation has adverse social impact, especially on poor
- Many macroeconomic variables have a price component, e.g.

  Nominal GDP = Real GDP * GDP Deflator

  → Inflation helps understanding the price component

Inflation Determinants



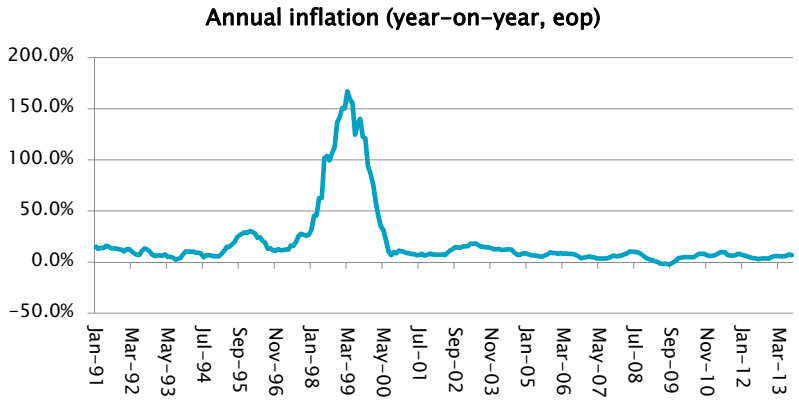
Demand pressures

Imported inflation

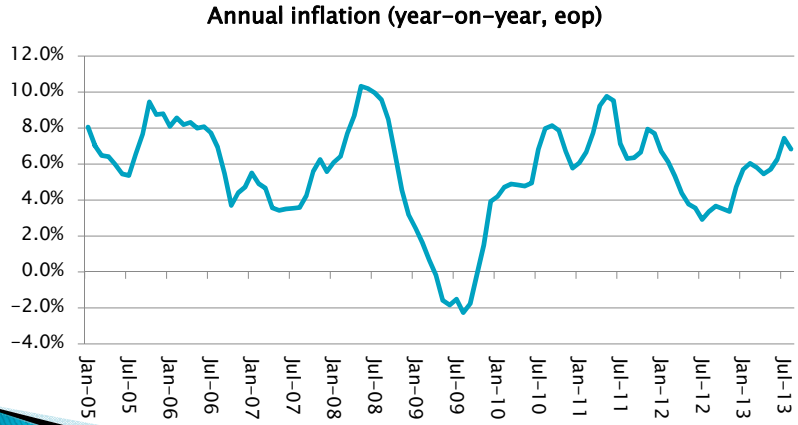
π (Price Inflation)

Cost–push shocks

Inflation in Lao PDR: The Long Run



Inflation in Lao PDR: Recent Years



IV. Nominal vs. Real

- *Nominal GDP:* measures the value of output of the economy at current prices
- *Real GDP:* measures the value of output of the economy -- changes in an economy's physical output -- using prices of a fixed base year
- Changes in nominal GDP over time reflect changes in both prices and physical output

Distinction Between Nominal & Real Is Useful For (1) Purchasing Power

Example: Nominal wages ↑ 20%

↑ If inflation was 10%,
Real buying power grew

BUT

↓If inflation was 30%,
Real buying power shrank

Distinction Between Nominal & Real Is Useful For (2) Accounting for Different Determinants

Value (V) = Price (P) * Quantity (Q)

Nominal GDP (V) = GDP Deflator (P) * Real GDP (Q)

Fundamental relation to be used over & over !

- Approximation: $\Delta\%V \approx \Delta\%P + \Delta\%Q$
- Exact relationship:
  $(1 + \Delta\%V/100) = (1+\Delta\%P/100)*(1+\Delta\%Q/100)$

V. Forecasting GDP

Why does forecasting GDP matter?

• GDP forecast is the starting point for many other forecasts, e.g., revenues or imports

• Similarly, GDP forecasts are necessary for projecting GDP ratios

• GDP forecasts are central for macroeconomic management

It's difficult …

- It's very rare that the forecast hits exactly the mark (if so, it's just luck!)
- The forecast 'number' is important (e.g., for the budget), but …
- … the 'story' behind the forecast is often as important

General Procedure

- Start with analyzing the past → what were key developments and how are they going to affect the present and future?
- What do we know about the present (nowcast)?
- Forecast is an extrapolation of past and present, taking policy (changes) into account

Specific Procedure

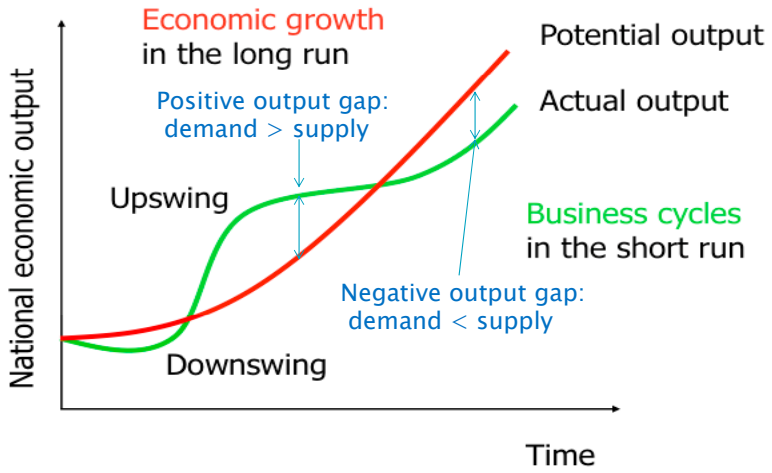
- **Forecasting Real GDP** (volume)
  - Potential output and output gap
  - Supply:
    - Production function
    - Sectoral forecasts
  - Demand: expenditures (C + I + X – M)
  - Reconciliation of Supply & Demand
- **Forecasting Inflation** (prices)
- **Obtaining Nominal GDP Forecast**

V.1 Forecasting Real GDP

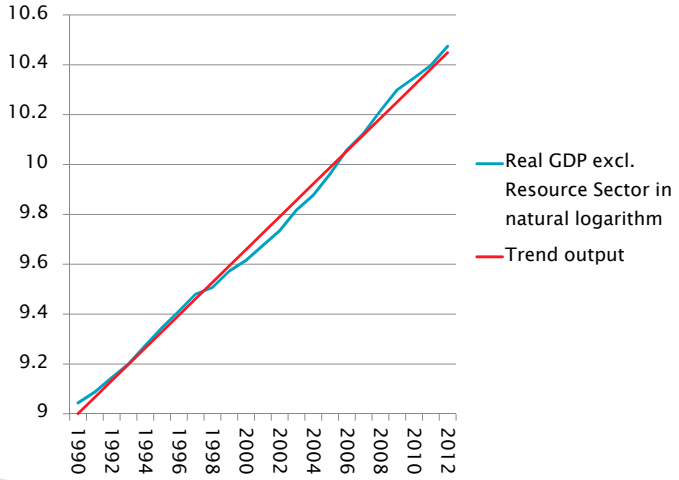
Potential Output & Output Gap

- **Potential GDP** is the level of output that can be sustainably produced without adding or subtracting inflation pressures. That is, demand and supply are broadly in balance.
- **Output gap**: The difference between actual and potential GDP.
- Output gap may be positive or negative.
  - A positive output gap would signify an expansion that could place excessive pressure on resources.
  - A negative output gap signifies idle resources—low capacity utilization of capital stock and higher unemployment—that is likely to lead to declining rates of inflation or deflation.

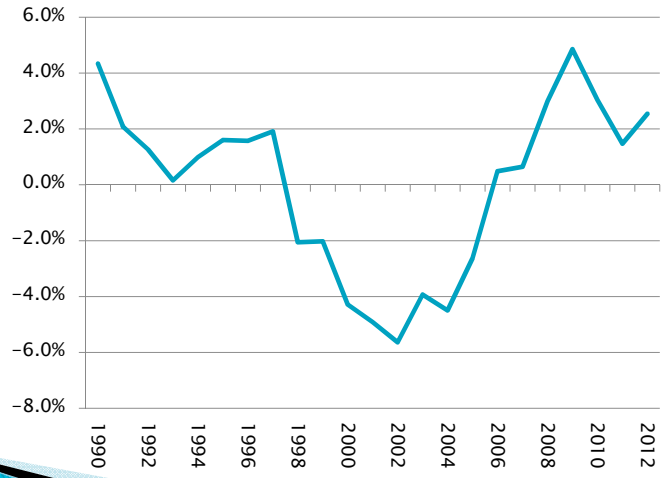
Output Gaps



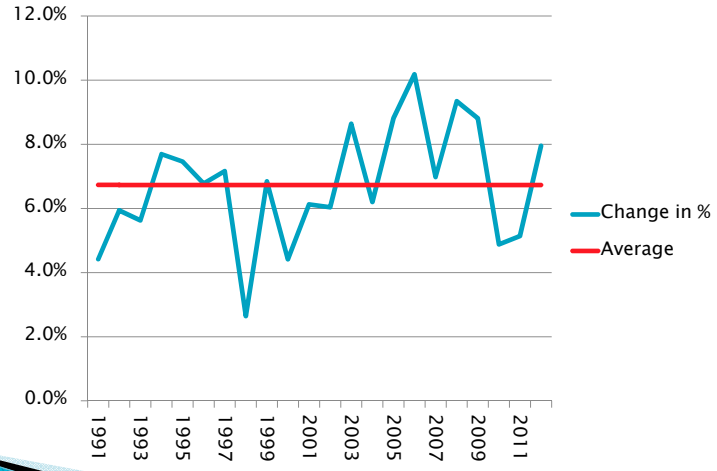
Non-Resource Real GDP and Trend in Lao PDR



Corresponding Output Gap in Lao PDR



Actual and Trend Non-Resource Real GDP Growth



Supply Side: Production Function Approach for Forecasting Potential Growth

- **Q = f (K, L, A)**
  where K = Capital
  L = Labor
  A = Technology, Institutions
- In the long run, increasing *supply* requires increasing A (through structural policies)

Supply Side: Sectoral Forecasts

Production Approach to GDP:

Forecast production in each sector separately as they may have different determinants, then add up the individual forecasts to obtain the total:

$$\frac{GDP_{t+1}}{GDP_t} = w_{agr}\frac{GDP_{agr,t+1}}{GDP_{agr,t}} + w_{man}\frac{GDP_{man,t+1}}{GDP_{man,t}} + w_{ser}\frac{GDP_{ser,t+1}}{GDP_{ser,t}} + \ldots$$

Demand Side: Forecasting Expenditure

- GDP = $(C_P + C_G) + (I_P + I_G) + (X - M)$

Fiscal sector — BOP

➔ We should be able to forecast public consumption and investment (C_G & I_G) using information from the budget.
➔ We might be able to construct forecast equations for exports and imports ($X - M$) [External sector]
➔ Private consumption (C_P) is often fairly steady and not that difficult to forecast
➔ Leaves private investment (I_P) as a very difficult element to forecast because this tends to be fairly volatile

V.2 Forecasting Inflation

Why does forecasting inflation matter?

• Inflation forecast is the starting point for the price component of many other forecasts, e.g., GDP deflator

• Keeping inflation under control is central macroeconomic objective, which requires inflation forecast

Simple Inflation Forecasts—Based on CPI Data Only

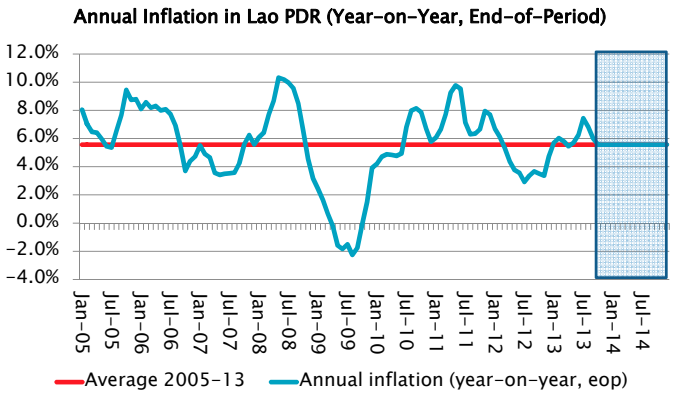
Simplest inflation forecast assumes return of inflation to its historical average:

Advantage:

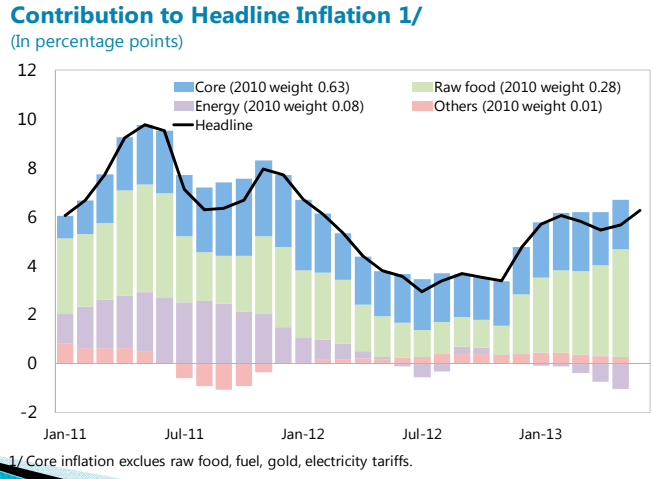
- Simple
- Surprisingly hard to beat with respect to forecast error

Disadvantage:

- Doesn't help with monetary policy formulation
- Structural breaks are major problem—i.e., what average to choose?



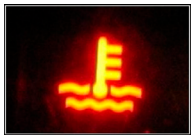
Identifying Role of Individual Inflation Components



1/ Core inflation exclues raw food, fuel, gold, electricity tariffs.

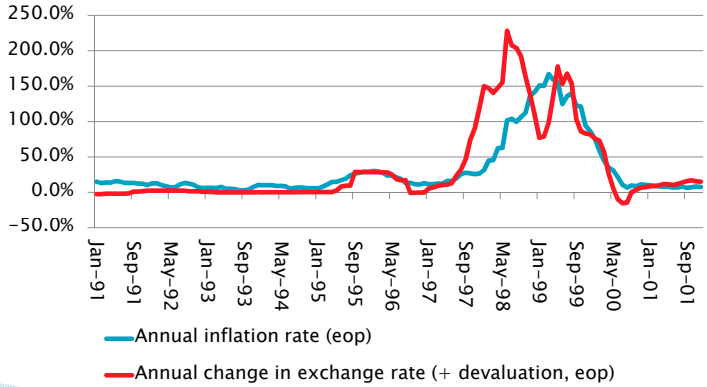
Adding Content to the Inflation Analysis—General Considerations

- Core vs non-core inflation (e.g., non-food vs food inflation)
- Overall demand conditions
- Exchange rates
- Imported prices
- Expectations

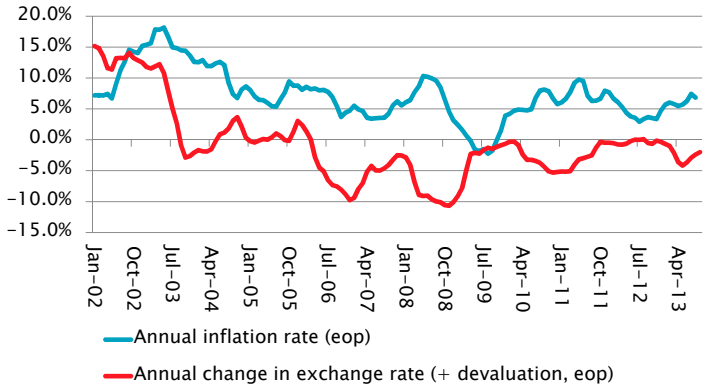


Exchange Rate Changes and Inflation

Exchange Rate Changes and Inflation Move in the Same Direction in the 1990s ...

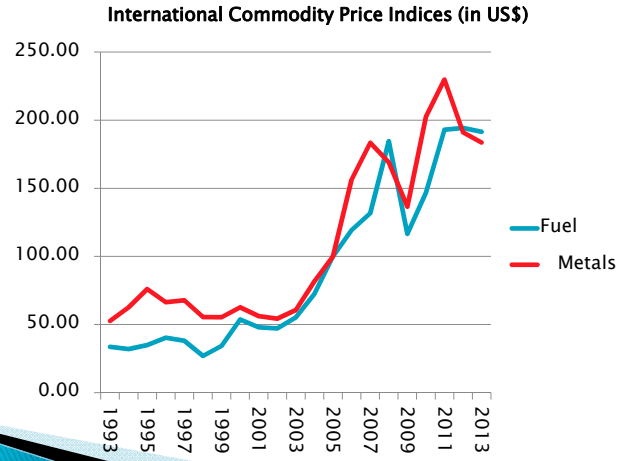


… But Often in Opposite Directions Since the Late 2000s.

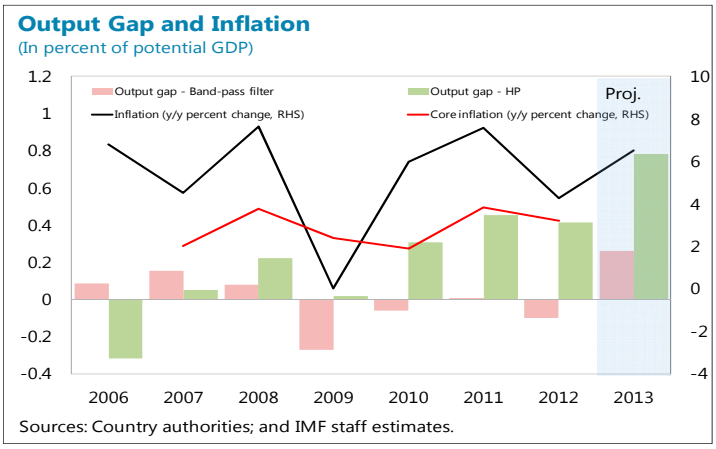


Any Ideas Why the Relationship Between Exchange Rates and Inflation Might Have Changed?

Could the Commodity Price Boom Have Something to Do With This?



Output Gap and Inflation



Sources: Country authorities; and IMF staff estimates.

Inflation Forecast: Practical Approach

When data is not extensively available --
Inertial Approach (with judgmental adjustment): $\pi_t = \pi_{t-1} + X_t$

- How and why would inflation rate be different from the previous year?

X: judgmental adjustment

Expected cost pressures:

World trade prices, exchange rate changes, wages, indirect taxes

Expected policy and other demand changes:

Changes in fiscal or monetary policy stance, slowdown in consumption due to rising unemployment, negative expectations

V.3 GDP Deflator

Real Consumption	×	Consumption Deflator	=	Nominal Consumption
Real Investment	×	Investment Deflator	=	Nominal Investment
Real Exports	×	Export Deflator	=	Nominal Exports
–Real Imports	×	Import Deflator	=	–Nominal Imports
Real GDP				Nominal GDP

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

Forecasting GDP Deflator

Decomposing GDP deflator into its components

$$\%\Delta P_{GDP} = W^C \%\Delta P_C + W^I \%\Delta P_I + W^X \%\Delta P_X - W^M \%\Delta P_M$$

W^C = consumption share in GDP

W^I = investment share in GDP

W^X = export share in GDP

W^M = import share in GDP

Forecasting Component Deflators

- **Consumption:** $\%\Delta P_C = \%\Delta$ CPI
- **Investment:** $\%\Delta P_I = (1\text{-}a)\ \%\Delta$ CPI $+ a\ \%\Delta P_M$
  (a = share of imported investment goods)
- **Export:**
  $\%\Delta P_X$ = ((1+%Δ Export price in US$/100) * (1+%Δ Exchange rate/100) –1) *100
- **Import:**
  $\%\Delta P_M$ = ((1+%Δ Import price in US$/100) * (1+%Δ Exchange rate/100) –1) *100

V.4 Putting It Together: Nominal GDP Forecast

- Forecast real GDP growth
- Forecast prices
  - CPI
  - Sub-components of GDP deflators (C_G, I_P , I_G)
  - GDP deflator
- Compute nominal GDP growth, using

$$Value_{t+1} = Value_t \times (1+\%\Delta P) \times (1+\%\Delta Q)$$

- CONGRATULATIONS!
- You are now well on your way to forecasting GDP and Inflation on your OWN!
- Thank you!