Overview

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I. GDP

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**
  \[ \sum \text{sectoral "value added"} \]

- **Expenditure Approach**
  \[ Y = C + I + X - M \]

- **Income Approach**
  \[ Y = \text{wages} + \text{OS} + \text{TSP} \]

- OS=gross operating surpluses of enterprises (including profits, rents, interests)
- TSP=taxes less subsidies
Production Approach: GDP Shares

Composition of GDP in Lao PDR (% of GDP, Constant 2002 Prices)

Evolution of Value-Added in Industry Sector

Composition of Industry Value-Added (% of GDP, 2002 Prices)
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

\[ \text{GDP} = A + X - M \]

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
  \( \rightarrow \) both imported & locally produced goods

- **Investment (I)**
  Machines, equipment
  \( \rightarrow \) 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)
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
- Cost-push shock
- (Price Inflation)
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 shrunk
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:
  \[
  (1 + \frac{\Delta\%V}{100}) = (1 + \frac{\Delta\%P}{100}) (1 + \frac{\Delta\%Q}{100})
  \]

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**

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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

- Positive output gap: demand > supply
- Negative output gap: demand < supply

Non-Resource Real GDP and Trend in Lao PDR

- Real GDP excl. Resource Sector in natural logarithm
- Trend output
Supply Side: Production Function Approach for Forecasting Potential Growth

- \( Q = f(K, L, A) \)
  - \( K \) = 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:

\[
\frac{GDP_{i,t+1}}{GDP_i} = w_{agr} \frac{GDP_{agr,t+1}}{GDP_{agr,t}} + w_{man} \frac{GDP_{man,t+1}}{GDP_{man,t}} + w_{ser} \frac{GDP_{ser,t+1}}{GDP_{ser,t}} + \ldots
\]
Demand Side: Forecasting Expenditure

- GDP = (CP + CG) + (IP + IG) + (X – M)

- We should be able to forecast public consumption and investment (CG & IG) using information from the budget.
- We might be able to construct forecast equations for exports and imports (X – M) [External sector]
- Private consumption (CP) is often fairly steady and not that difficult to forecast
- Leaves private investment (IP) 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

Contribution to Headline Inflation 1/
(In percentage points)

1/ Core inflation excludes 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 ...

![Graph showing annual inflation rate and annual change in exchange rate](image)
... 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?

International Commodity Price Indices (in US$)

Output Gap and Inflation

Output Gap and Inflation (in percent of potential GDP)

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

\[
\begin{align*}
\text{Real Consumption} \times \text{Consumption Deflator} &= \text{Nominal Consumption} \\
\text{Real Investment} \times \text{Investment Deflator} &= \text{Nominal Investment} \\
\text{Real Exports} \times \text{Export Deflator} &= \text{Nominal Exports} \\
-\text{Real Imports} \times \text{Import Deflator} &= -\text{Nominal Imports} \\
\text{Real GDP} &= \text{Nominal GDP} \\
\text{GDP Deflator} &= \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100
\end{align*}
\]
Forecasting GDP Deflator

\[ \%\Delta P_{GDP} = W_C \%\Delta P_C + W_I \%\Delta P_I + W_X \%\Delta P_X - W_M \%\Delta P_M \]

- \( W_C \) = 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:** \( \%\Delta P_C = \%\Delta \text{CPI} \)
- **Investment:** \( \%\Delta P_I = (1-a) \%\Delta \text{CPI} + a \%\Delta P_M \)  
  \( a \) = share of imported investment goods
- **Export:** \( \%\Delta P_X = ((1+\%\Delta \text{Export price in US$/100}) \times ((1+\%\Delta \text{Exchange rate/100}) - 1)) \times 100 \)
- **Import:** \( \%\Delta P_M = ((1+\%\Delta \text{Import price in US$/100}) \times ((1+\%\Delta \text{Exchange rate/100}) - 1)) \times 100 \)
V.4 Putting It Together: Nominal GDP Forecast

- Forecast real GDP growth
- Forecast prices
  - CPI
  - Sub-components of GDP deflators ($C_G, I_p, I_C$)
  - 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!