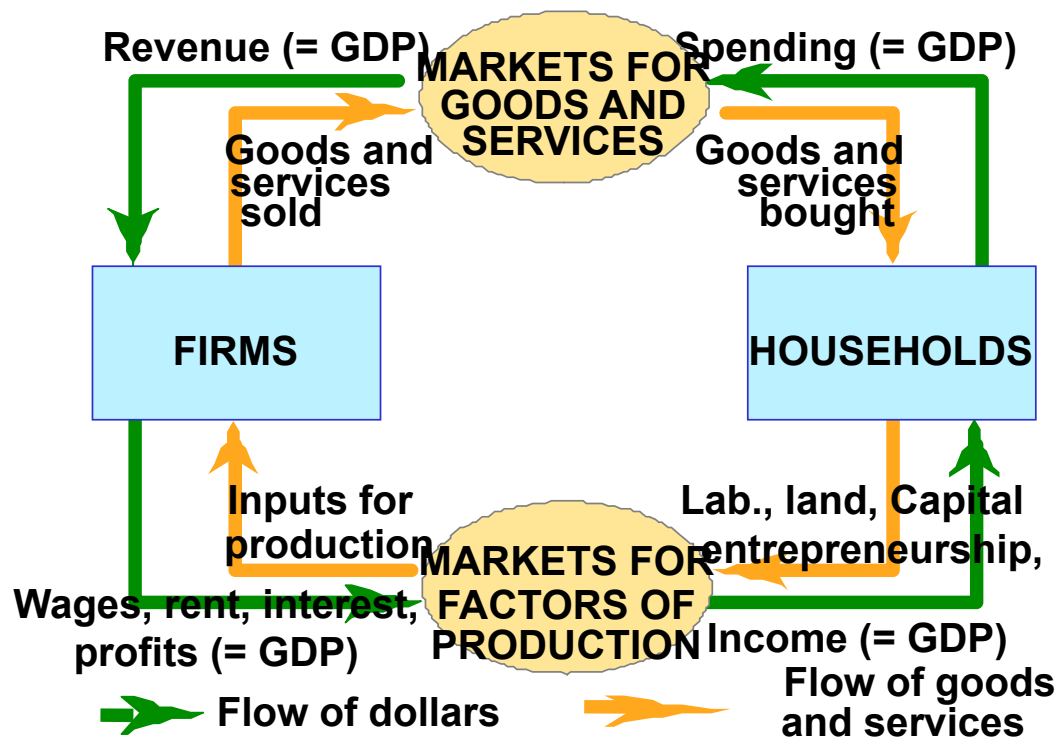# Introduction to the Real Sector Accounts in the Thailand FPP Framework

Rajan Govil

Consultant, TAOLAM

May 2014

Outline

- Major macroeconomic aggregates
- Nominal and real variables
- Forecasting real sector variables at constant prices
- Forecasting prices
- Forecasting real sector variables at current prices

The circular-flow diagram

The Main Macroeconomic Aggregates

- **Gross output (Q)** - value of all goods and services produced in the economy
  - Problem: double counting
- **Value added (VA)** = [Q - intermediate consumption]
  - at level of a firm, VA is its output minus value of inputs from other firms; at sector level – agri., manufacturing, etc.
- **Consumption (**spending by households on goods and services)
  - Intermediate
  - Final (**C**)
- **Gross Domestic Product (GDP):** sum of VA across all sectors of the economy

4

The Main Macroeconomic Aggregates (Cont.)

Gross Investment (I): change in physical stock of capital equipment, construction including housing and inventories

Depreciation: consumption of fixed capital

Net Exports: X-M
X = Exports of goods and services; M= Imports of goods and services.

Alternative Approaches to Measuring GDP

Production approach
GDP = sum of value added across all sectors of the economy (Sheet 'GDP Sector')

Income approach
GDP = sum of factor incomes, i.e. wages, interest, rent and profit,

Expenditure approach
GDP =C+I+(X-M) =A+(X-M)
(Sheet 'RGDP')

Real vs. Nominal Magnitudes

Current vs. Constant Prices

- <u>Nominal GDP</u> $\rightarrow$ Measures the value of the output of the economy at current prices.

- <u>Real GDP</u> $\rightarrow$ Measures the value of the output of the economy using the prices of a fixed base year. Measures changes in volume or real ouptut.

Implicit GDP Deflator

GDP deflator = (Nominal GDP/ Real GDP) *100

Index that measures the average price level of an economy's output relative to a base year.

7

Measuring Inflation

Inflation: sustained and persistent increase in an economy's overall price level.

Measures of Inflation

- Consumer Price Index (CPI)
- Wholesale or Producer Price Index (WPI/PPI)
- GDP Deflator

Differences:
a) Types of goods and services covered
b) GDP deflator includes only domestically produced goods
c) Prices of goods are aggregated differently.

8

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

Fundamental relation to be used over & over !

- Approximation: $\Delta\%V \approx \Delta\%P + \Delta\%Q$

- Exact relationship:

$(1+ \Delta\%V/100) =$

$$(1+\Delta\%P/100)*(1+\Delta\%Q/100)$$

9

Example: Real and Nominal Growth

Suppose: real GDP grows by 10%

prices increase by 50%

%ΔValue = (1+0.10)×(1+0.50) – 1 = 0.65

⇒ Nominal GDP grows by 65%

Forecasting variables at constant prices – Supply side and Demand side

- Step 1: Forecast GDP **growth** for the following year (1997 in Thailand case study)

- Step 2: Find the level of real GDP in 1997 from the supply side.

- Step 3: Forecast demand components: real consumption, real investment, real imports and exports of goods and services.

- Step 4: Compute GDP by expenditure for 1997 from the demand side.

- Step 5: Compare forecast of GDP obtained in Step 2 with forecast obtained from step 4.

12

Step 1: Forecast GDP growth for 1997

- Consider real GDP growth in Thailand over the period 1992-1996 (Tab. 2.4). Given the information we have on the Thai economy at the end of 1996, for 1997 shall we expect higher or lower growth than in 1996?

- **Background information**: up to 1996 **medium term** growth in Thailand was quite high:
  - Over the period 1976-1996 the average growth rate was 7.8%.
  - Trend growth rate over 1976-1996 was 8%.

    We know this from the trend equation:

    $$\text{Ln GDPR}_t = 6.41 \; + \; 0.08 \, t$$
    $$(215.3) \quad (32.2)$$

13

Step 2: Find real GDP for 1997 from the supply side.

- Forecast real growth in 1997 (%Chg) for value-added in different sectors in sheet 'GDP_sectors'

- Real Agriculture GDP in 1997 = Real Agriculture 1996 * (1+ %Chg in decimal); Real Manufacturing GDP in 1997 = Real Manufacturing 1996 * (1+ %Chg in decimal); etc.

- Level of real GDP in 1997 = sum of GDP in all the sub-sectors (Agriculture, manufacturing, etc.)

14

Step 3: Forecast demand components

- **Real Private Consumption**
  - Look at the ratio of real private consumption in real GDP in the past; or
  - Compute the elasticity with respect to real GDP in previous years; or
  - Use a regression model.

- **Real Government Consumption**
  - Obtain only a preliminary forecast of this item, on the basis of past trends (e.g. by considering the ratio of government consumption to GDP). This variable will be accurately forecasted in the fiscal accounts.

15

Step 3: Forecast demand components (cont.)

- **Real Private investment**
  - Look at the ratio of real private investment in real GDP in the past; or
  - Compute the elasticity with respect to real GDP; or
  - Use a regression model.

- **Real Government Investment**
  - Obtain only a preliminary forecast of this item, on the basis of past trends (e.g. by considering the ratio of government investment to GDP). This variable will be accurately forecasted in the fiscal accounts.

16

Step 3: Forecast demand components (cont.)

- **Real Exports and Imports of goods and non factor services**
  - Obtain only a preliminary forecast of these items. You can either use past trends or assumptions. These variables will be accurately forecasted in the external sector account

Step 4: Compute GDP by expenditure

GDP = Consumption + Investment + Exports of goods and non factor services- Imports of goods and non factor services

Step 5: Compare forecast of GDP obtained in step 2 with forecast obtained from step 4.

The goal is to minimize the discrepancy in estimates, recalling the statistical discrepancy in the past years. If the statistical discrepancy is too large, revise your forecasts.

Forecasting prices

- **%Chg.export Deflator** = (1+%Chg.Export price in US$)·(1+%Chg.exchange rate) –1
  - %Chg.Export price in US$ can be obtained from Sheet 'Assumptions'.
  - The %Chg.exchange rate has to be forecasted on the basis of past trends, assuming no change in policies.

- **%Chg.Import Deflator** = (1+%Chg.Import price in US$)·(1+%Chg.exchange rate)- 1
  - %Chg.Import price in US$ can be obtained from Sheet 'Assumptions'.

- To forecast the change in the **consumption deflator**, assume that the consumption deflator can be approximated by the CPI.

- For the **percentage change in CPI**, do you expect higher or lower inflation compared to 1996, given the information you have on the Thai economy?

- You can also decompose the percentage change in CPI as follows:

%Chg.CPI = $\alpha \cdot$%Chg.import deflator+ $(1- \alpha) \cdot$ %Chg.P_C^D

  - %Chg.P_C^D = percentage change in the price of domestically produced consumption goods
  - α = ratio of imported consumption goods in total consumption

Some examples on how to compute α

Value of Merchandise Imports (Mln. US$)

	1996
- Consumer goods	7,596
- Intermediate goods for consumer goods	12,331
- Fuel and lubricants	6,203
- Motor vehicles and parts	4,605
Total consumption at current prices in Mln US$	118,051.4

Option 1:α =(7,596+12,331+1/3*6,203)/ 118,051.4=18.6%

Option 2:α =(7,596+12,331+1/3*6,203+1/3*4,605)/ 118,051.4=19.9%

- To forecast the change in the **investment deflator**, you can assume a similar approach to the one used to forecast CPI:

%Chg.INV. Defl. = $\beta \cdot$%Chg.import deflator +(1-β) $\cdot$ %Chg.P_I^D

- %Chg.P_I^D = percentage change in the price of domestically produced investment goods
- β = ratio of imported investment goods in total investment

23

Some examples on how to compute β

Value of Merchandise Imports (Mln. US$)

	1996
• Capital goods	33,494
• Intermediate goods for capital goods	6,339
• Fuel and lubricants	6,203
• Motor vehicles and parts	4,605
Total investment at current prices in Mln US$	78,316

Option 1: β=(33,494+6,339+2/3*6,203+4,605)/78,316=62 %

Option 2: β=(33,494+6,339+2/3*6,203+2/3*4,605)/78,316=60%

24

Once you have forecasted the deflators' percentage change, you can obtain the **forecasts for price indices in 1997**:

For example:

- GDP deflator index in 1997 = GDP deflator index in 1996 × (1+ %Chg.GDP deflator)

- Consumption deflator index in 1997 = Consumption deflator index in 1996× (1+ %Chg.consumption deflator)

- And so on..

25

Forecasting real sector variables at current prices

- Consumption at current prices = consumption at constant prices × consumption deflator

- Investment at current prices = investment at constant prices × investment deflator....

- GDP at current prices = consumption at current prices + investment at current prices + exports at current prices – imports at current prices

- GDP deflator (1997) = 1997 GDP (at current 1997 prices)/1997 GDP at 1996 prices

27