GDP and the Standard of Living

Economics 152

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1 Introduction

In this handout we will go over some of the basic concepts of Macroeconomics, like Gross National Product (GNP), Gross Domestic Product (GDP), the two approaches to GDP measurement, some transactions that are excluded from GDP measurement and nominal and real GDP.

2 GNP & GDP

Gross National Product (GNP) is defined as the value of all final goods and services currently produced using domestically owned factors of production for a specified period of time, usually a year. Note the following points about GDP:

- GDP is a monetary measure, all commodities (goods and services) expressed in terms of value.
- GDP is the value of all *final* goods and services and not intermediate commodities. If we use intermediate goods and services then we need to work with the *value added* at each stage of the production process to come up with a correct measure of GDP.
- A part of GDP of a nation can be earned outside the boundaries of a country.

Gross Domestic Product (GDP) is the same definition as that of GNP with the proviso that aggregate output is produced with all factors of production domestic or foreign within the boundaries of a country.

3 Two Approaches to GDP measurement

There are two approaches to GDP measurement: The Expenditures Approach and The Income Approach.

The Expenditures Approach: The expenditures approach measures GDP as the sum of all expenditures by households, firms, the government and the foreign sector.

This is formally represented by the following equation:

$$Y = C + I_g + G + NX \tag{1}$$

where,

C = Personal Consumption Expenditures

I_g = Gross Private Domestic Investment

G = Government Purchases of Goods and Services

NX = Net Exports

The Income Approach: The income approach views GDP as the incomes generated in the production of the final output. We will look at a series of accounting relationships that will take us through GDP to DPI. These are given below:

GDP = C + I_g + G + NX

NDP = GDP - Consumption of fixed capital

NI = NDP - Net foreign factor earnings in the US - Indirect business taxes

NI = Compensation of employees + Rental income of persons + Net interest + Proprietors income + Corporate profits

PI = NI - Corporate Income Taxes - Undistributed Corporate Profits - Social Security Contributions + Transfer Payments

DPI = PI - Personal Taxes

DPI = C + S

4 Transactions That Are Excluded from GDP Measurement

Certain kinds of transactions are excluded from GDP measurement. These are:

1. Non-Production Transactions
   (a) Public Transfer Payments
   (b) Private Transfer Payments
   (c) Security Transactions
2. Second Hand Sales

5 Nominal GDP Versus Real GDP

Nominal GDP also called Current Dollar GDP or Unadjusted GDP is GDP evaluated at *current prices*. For an economy producing apples and oranges in the year 2002 only the nominal GDP denoted by NGDP is[1]

$$NGDP^{2002} = \$(P_{apples} * Q_{apples} + P_{oranges} * Q_{Oranges})$$

[1]You can generalize this concept to include as many commodities as you want.

GDP Data for 2002			GDP Data for 2003		
Item	Quantity	Price	Item	Quantity	Price
Apples	100	\$1.00	Apples	160	\$0.50
Oranges	200	\$0.50	Oranges	220	\$2.25

We will use the following data to compute real GDP using the traditional approach and the new method.

5.1 Traditional Real GDP Calculation

Traditionally, real GDP is defined as the value of output for a given year evaluated at base year prices. Let the base year be 2002. Then real GDP denoted by RGDP is

$$\begin{aligned} RGDP^{2002} &= \$(P^{2002}_{apples} * Q^{2002}_{apples} + P^{2002}_{oranges} * Q^{2002}_{oranges}) \\ &= \$(1 * 100 + 0.50 * 200) \\ &= \$(100 + 100) \\ &= \$200 \end{aligned} \tag{2}$$

$$\begin{aligned} RGDP^{2003} &= \text{value of the 2003 quantities at 2002 prices} \\ &= \$(P^{2002}_{apples} * Q^{2003}_{apples} + P^{2002}_{oranges} * Q^{2003}_{oranges}) \\ &= \$(1 * 160 + 0.50 * 220) \\ &= \$(160 + 110) \\ &= \$270 \end{aligned} \tag{3}$$

5.2 New Method of Calculating Real GDP

You have to go through the following to compute real GDP using the new method.

(i) compute GDP in 2002 and 2003 using 2002 prices (as in the traditional method).

(ii) compute the change (increase or decrease) in GDP between the two years.

(iii) compute GDP in 2002 and 2003 using 2003 prices.

(iv) compute the change (increase or decrease) in GDP between the two years.

(v) average the changes obtained in step (ii) and step (iv)

(vi) add the average change obtained in step (v) to the real GDP in 2002 as obtained in step (i) to get real GDP for 2003.

I will go over each step as in the above using the data on GDP for years 2002 and 2003 as shown on the top of this page.

Step (i): Use the traditional method to compute GDP

Step (ii): This calculation is shown below:

$$\frac{\$(270-200)}{\$200} * 100 = 35\% \tag{4}$$

Step (iii): This calculation is shown below - i.e. we are calculating GDP 2002 in terms of 2003 prices

$$\begin{aligned} &= \$(P^{2003}_{apples} * Q^{2002}_{apples} + P^{2003}_{oranges} * Q^{2002}_{oranges}) \\ &= \$(0.50 * 100 + 2.25 * 200) \\ &= \$(50 + 450) \\ &= \$500 \end{aligned} \tag{5}$$

Next we will calculate GDP 2003 in terms of 2003 prices. This is shown below:

$$\begin{aligned} &= \$(P^{2003}_{apples} * Q^{2003}_{apples} + P^{2003}_{oranges} * Q^{2003}_{oranges}) \\ &= \$(0.50 * 160 + 2.25 * 220) \\ &= \$(80 + 495) \\ &= \$575 \end{aligned} \tag{6}$$

Step (iv): This calculation is shown below:

$$\frac{\$(575-500)}{\$500} * 100 = 15\% \tag{7}$$

Step (v): This calculation is shown below:

$$\frac{(35+15)}{2}\% = \frac{50}{2}\% = 25\% \tag{8}$$

Step (vi): This calculation is shown below:

$$\$\left(200 + \frac{25}{100} * 200\right) = \left(\frac{125}{100} * 200\right) = \$250 \tag{9}$$