

EE212 Principles of Macroeconomics, 2/2015 (Sec. 046401)

Problem Sets 1 :

Chapter 2. National Income and National Product Solution

1. In your country, which would you want to be bigger, GDP, or GNP? Why? Explain the difference between GDP and GNP. Give one plausible reason why GNP may exceed GDP and one plausible reason why GDP may exceed GNP.

Solution “The difference between GDP and GNP is given by the Net factor income from abroad. $GNP = GDP + \text{Net Factor Income from abroad}$ Therefore: $GNP - GDP = \text{net factor income from abroad}$. Net factor income from abroad = factor payments from abroad – factor payments to abroad. GNP is greater than GDP if Net Factor Income from Abroad are positive. For example, in Mexico, GNP is 1.8% smaller than GDP. This sounds like a tiny number, but it means that about 2% of all the income generated in Mexico is taken away and paid to foreigners (Net Facot Income from Abroad negative).

In Panama, about 7% of the value of domestic production is paid to foreigners. In the Phillipines, GNP is 9.2% bigger than its GDP. This means that the income earned by the citizens of the Phillipines is 9.2% larger than the value of production occurring within the country’s borders (GDP). Reasons why GNP may exceed GDP: - Country has done a lot of lending or investment overseas and is earning lots of income from these foreign investments (income on nationally-owned capital located abroad). - A significant number of citizens have left the country to work overseas (their income is counted in GNP, not GDP). This is probably true for Phillipines.

Reasons why GDP may exceed GNP:

- Country has done a lot of borrowing from abroad, or foreigners have done a lot of investment in the country (income earned by foreign-owned domestically-located capital). This is most likely why Mexico and Argentina’s $GDP > GNP$.
- Country has a large immigrant labor force.

In your country, which would you want to be bigger, GDP, or GNP?

- There is not a unique answer to that question. However, a possible good answer could be: it’s better to have $GNP > GDP$, because it means our nation’s income is greater than the value of what we are producing domestically. If, instead, $GDP > GNP$, then a portion of the income generated in our country is going to people in other countries, so there’s less income left over for us to enjoy.”

2. Define GDP and explain why the value of production, income, and expenditure are the same for an economy.

Solution. “**Gross Domestic Product, GDP, is the market value of all the final goods and services produced within a country in a given time period.** Only final goods and services are included in GDP; intermediate goods and services are not included.

According to the Production approach, $Y = \sum_i P_i Q_i$ = the sum of value of final goods and services produced with in a country in a given time period. P_i is the price of final goods or service i and Q_i is the quantity of final goods and service i. In practice, many goods can be used as both final goods and intermediate goods. Including intermediate goods in calculating GDP will result in double-counting. To avoid double counting problem, we may calculate GDP by using value added approach; where Y = the sum of value added in each state of production.

Expenditures are consumption expenditure (C), investment (I), government expenditure on goods and services (G), and net exports of goods and services (NX). In- vestment is the purchase of new capital goods and additions to inventories. Total expenditure is equal to $C + I + G + NX$.

Firms pay out the revenue they receive to households as payment for labor, capital, land, and entrepreneurship. On the income side, $Y = \text{Compensation of employees} + \text{Net interes} + \text{Rental income} + \text{Corporate profits}$

+Proprietors' income +depreciation + Indirect Taxes - Subsidies. These payments are households' income. We call total income, Y .

Theoretically, the value of output is equal to expenditure spent on it and is equal to total income of factor of production used in producing it. The circular flow shows that the value of final goods and services is equal to total expenditure and is equal to total income of the household.”

3. One may summarize the three firms in a little table;

	A	B	C
1. Sales; (value of goods produced)	600	2,000	400
2. Wages, Interest, Rent	440	1,200	260
3. Value of Intermediate inputs	0	600	0
Profit	160	200	140

(a) Define and calculate value added by each firm A, B and C.

Solution. Value Added = Value of goods produced - Value of Intermediate Input = Wages, Interest, Rent + Profit

i. Value Added = Sales - Value of Intermediate Input

	A	B	C
Sales; (value of goods produced)	600	2,000	400
MINUS Value of Intermediate inputs	0	600	0
Value Added	600	1,400	400

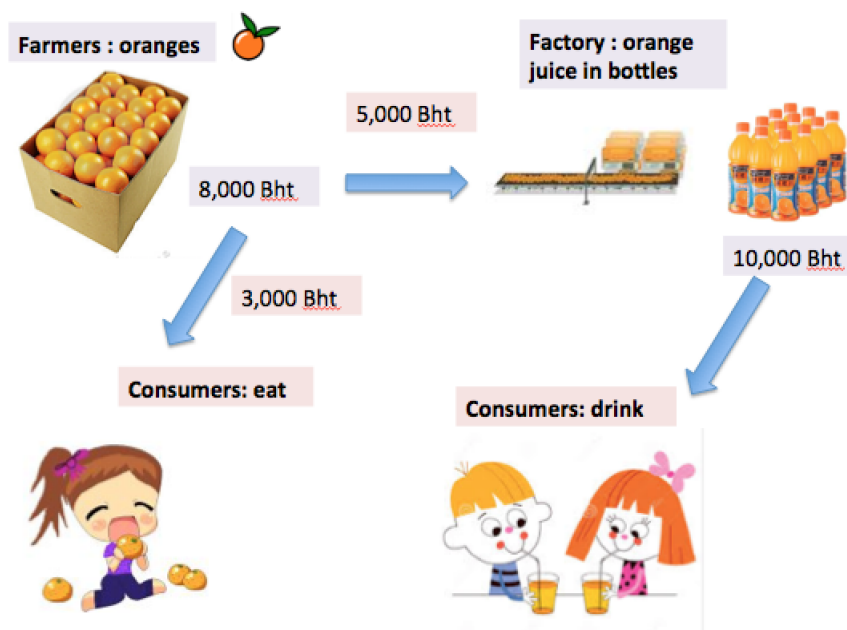
ii. Alternatively, Value Added = Wages, Interest, Rent + Profit

	A	B	C
Wages, Interest, Rent	440	1,200	260
PLUS Profit	160	200	140
Value Added	600	1,400	400

(b) Calculate GDP of this economy.

Solution. GDP = the sum of value added = $600 + 1,400 + 400 = 2,400$.-

4. Calculate GDP of this economy by using (1) Product Approach (2 methods - 1.1 final goods and services, 1.2 value added) and (2) expenditure approach.



Solution.

(a) Product Approach :

i. Total value of final goods and services

There are two types of final goods in the economy : oranges and orange joice in bottles

Value of oranges used as final goods 3,000.- Bht

Value of orange juice in bottles 10,000.-Bht

Total Value of Final Goods 13,000.- Bht

GDP is equal to 13,000.- Bht. We do not count 5,000.- value of oranges since it is used as intermediate goods.

ii. Total value added in all production processes

There are two steps of production; oranges and orange juice factory.

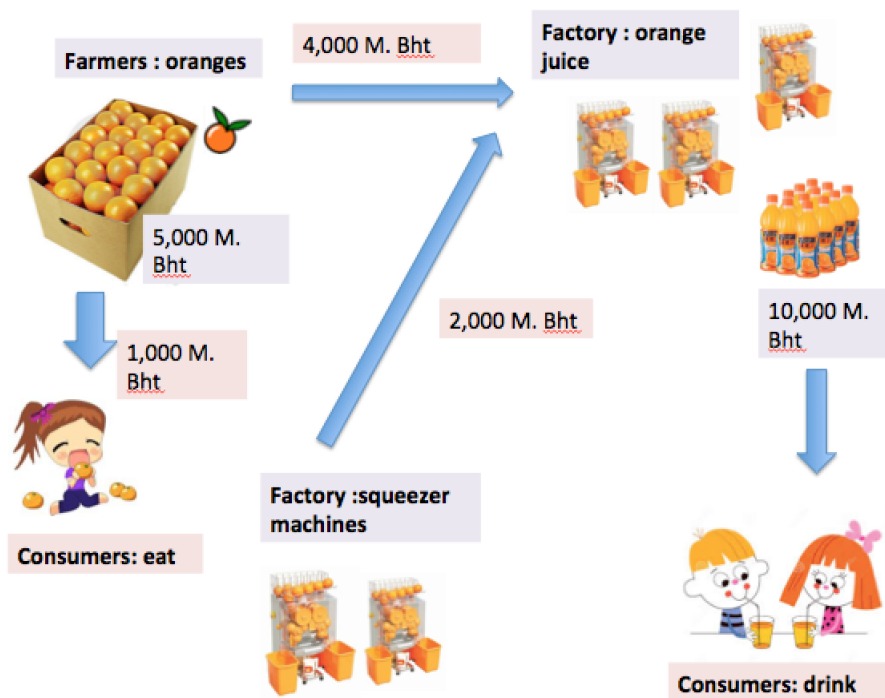
	Oranges	Orange Juice Factory
Value of output	8,000.- Bht	10,000.- Bht
Minus Value of intermediate goods	0.-Bht	5,000.- Bht
Value Added	8,000.- Bht	5,000.- Bht,

GDP is equal to the sum of value added = 8,000 + 5,000 = 13,000.- Bht.

(b) Expenditure Approach :

In this economy, there is only consumers who buy final goods. $Y = C = \text{Consumption Expenditure} = 3,000 + 10,000 = 13,000.- \text{ Bht.}$

5. Calculate GDP of this economy by using (1) Product Approach (2 methods - 1.1 final goods and services, 1.2 value added) and (2) expenditure approach.



(a) Product Approach

- i. Total value of final goods and services

There are three types of final goods in the economy : oranges, orange juice in bottles and squeezer machine

Value of oranges used as final goods	1,000.- Bht
Value of Squeezer machine	2,000.-Bht
Value of orange juice in bottles	10,000.-Bht
Total Value of Final Goods	13,000.- Bht

GDP is equal to 13,000.- Bht. We do not count 4,000.- value of oranges since it is used as intermediate goods. Squeezer machine is one type of goods produced in the economy. It is capital goods.

- ii. Total value added in all production processes

There are three firms; oranges, orange juice factory and squeezer machine factory.

	Oranges	Orange Juice Factory	Squeezer Machine Factory
Value of output	5,000.- Bht	10,000.- Bht	2,000.- Bht
Minus Value of intermediate goods	0.-Bht	4,000.- Bht	0.-Bht
Value Added	5,000.- Bht	6,000.- Bht,	2,000.- Bht

GDP is equal to the sum of value added = 5,000 + 6,000+ 2,000 = 13,000.- Bht.

(b) Expenditure Approach :

In this economy, there are consumers and firms who buy final goods. Consumers buy oranges and orange juice in bottles. The orange juice firm buy squeezer machine.

$$Y = C + I = \text{Consumption Expenditure} + \text{Investment Expenditure} = (10,000 + 1,000) + 2,000 = 13,000.- \text{ Bht.}$$

Note that consumption expenditure is equal to 10,000 + 1,000 = 11,000.- Bht. (Consumers pay 11,000.- for final goods.)

Investment expenditure is equal to 2,000.- Bht. (The firm pays 2,000.- to buy the new machines.)

6. Consider the following economy that is producing only goods A (apples) and goods B (bananas). Prices and quantities for 2005 and 2015 are displayed in the following table:

Goods	2005			2015		
	P	Q	$P_t Q_t$	P	Q	$P_t Q_t$
A (Apples)	40	125	5,000	60	100	6,000
B(Bananas)	100	50	5,000	80	75	6,000
total			10,000			12,000

(a) Calculate the Nominal GDP, the Real GDP (using 2005 prices) and the GDP deflator in each year;

2005 = base year

$$\begin{aligned}
 rGDP^{2005} &= \sum_i P_i^{2005} Q_i^{2005} \\
 &= (.40 \times .125) + (.100 \times .50) \\
 &= \dots 10,000 \dots
 \end{aligned}$$

$$\begin{aligned}
 rGDP^{2013} &= \sum_i P_i^{2005} Q_i^{2015} \\
 &= (.40 \times 100) + (100 \times 75) \\
 &= \dots 11,500 \dots
 \end{aligned}$$

$$\begin{aligned}
 GDP \text{ deflator}_{2005} &= \frac{GDP_{2005}}{\text{real GDP}_{2005}} \times 100 \\
 &= \dots 100 \dots
 \end{aligned}$$

$$\begin{aligned}
 GDP \text{ deflator}_{2013} &= \frac{GDP_{2015}}{\text{real GDP}_{2015}} \times 100 \\
 &= \dots 104.35 \dots
 \end{aligned}$$

(b) Calculate the Nominal GDP, the Real GDP (using 2013 prices) and the GDP deflator in each year;

2013 = base year

$$\begin{aligned}
 rGDP^{2005} &= \sum_i P_i^{2013} Q_i^{2005} \\
 &= (.60 \times .125) + (.80 \times .50) \\
 &= \dots 11,500 \dots
 \end{aligned}$$

$$\begin{aligned}
 rGDP^{2013} &= \sum_i P_i^{2013} Q_i^{2015} \\
 &= (.60 \times 100) + (.80 \times 75) \\
 &= \dots 12,000 \dots
 \end{aligned}$$

$$\begin{aligned}
 GDP \text{ deflator}_{2005} &= \frac{GDP_{2005}}{\text{real GDP}_{2005}} \times 100 \\
 &= \dots 86.96 \dots
 \end{aligned}$$

$$\begin{aligned}
 GDP \text{ deflator}_{2013} &= \frac{GDP_{2015}}{\text{real GDP}_{2015}} \times 100 \\
 &= \dots 100 \dots
 \end{aligned}$$

7. The data of a country is given as follows.

Transfer Payments	\$54
Interest Income	\$150
Depreciation	\$36
Wages	\$67
Gross Private Investment	\$124
Business Profits	\$200
Indirect Business Taxes	\$74
Rental Income	\$75
Net Exports	\$18
Government Purchases	\$156
Household Consumption	\$304

(a) Calculate GDP using Expenditure Approach.

Solution.

$$\begin{aligned}
 Y &= C + I + G + (X - M) \\
 &= 304 + 124 + 156 + 18 \\
 &= 602
 \end{aligned}$$

GDP = \$602.

(b) Calculate GDP using Income Approach

Solution.

$$\begin{aligned}
 Y &= \text{Wages} + \text{Interest Income} + \text{Business Profit} + \text{Rental Income} + \text{Depreciation} + \text{Indirect Business Tax} \\
 &= 67 + 150 + 200 + 75 + 36 + 74 \\
 &= 602
 \end{aligned}$$

GDP = \$602.

8. Explain why two countries with the same level of GDP per capita are likely to have different standards of living. Suppose GDP per capita increases in both countries, explain why the standard of living in both countries might fall.

Solution. (sketch)

“There are a number of reasons why GNP (or GDP) **does not correspond to welfare**. National income measures the value in pounds or dollars of traded goods and therefore omits the value to people of:

- Crime
- Leisure
- Income distribution
- Pollution
- Underground economy
- Nonmarket activities: such as household production, voluntary work

Even if two countries the same per capita GNP their living standards may differ for these reasons. Low income countries might not be quite as poor as they look if a smaller proportion of their productive activity is captured in GNP.

We normally associate increases living standards with increases in GNP per capita, assuming that these other elements of living standards stay the same. But they may not.

Note that: If the price level increases then **nominal GNP** will increase by more than **real GNP**. The change in living standards is better approximated by the change in income measured at constant prices.”