

## Exercise 2

### National Output and National Income

1. Is the following a stock or flow variable?
  - 2.1 Inventories - Stock
  - 2.2 Change in Inventories - flow
  - 2.3 Money Supply - Stock
  - 2.4 Change in Money Supply - flow
  - 2.5 National Income - flow
  - 2.6 Expenditure - flow
  - 2.7 Wealth - Stock
  - 2.8 Population - Stock
  - 2.9 Capital - Stock
  - 2.10 Interest - flow

2. What is the difference between GDP and GNP? When looking at the US and China, which country do you expect to have higher GNP? Why?

GDP - Measure the value of goods and services produced within a country's borders, by citizens and non-citizens.

GNP - Measure the value of goods and services produced by only a country's citizens but both domestically and abroad

US has higher GNP than China because US had earned income from overseas countries such as production activities by U.S. citizens in overseas countries.

3. The canned apple has 5 stages of production as follows. Find the value added of each stage and the GDP value of the canned apple.

Stages of Production Value of Sales Value Added

Growing Apple	12	12
Pickling	15	3
Canning	18	3
Shipping	20	2
Retail Sale	22	2

Total value added = 22 = GDP

4. What is Transfer Payment? Why is it not included in GDP?

- A payment made or income received in which no goods or services are being paid for, such as a benefit payment or subsidy.

- Because they do not represent production.

5. Why are we interested in Real GDP? Explain with examples. Is there a problem associated with Real GDP?

- Because real GDP number allows us to measure growth more accurately.
- Let's say an economy has a nominal GDP of \$1 million, also assume that the economy has experienced 2% inflation over the course of the year. So we would calculate Real GDP as:  $1 \text{ million} / 1.02 = 980,392.16 \text{ dollars}$ .
- There is uncertainty in Real GDP, because prices change year to year. And in each base year will generate a different measure of Real GDP.

6. Suppose 2018 is the base year. What can we say about Real GDP, Nominal GDP, and GDP Deflator of 2018?

- In the base year,  $\text{Nominal GDP} = \text{Real GDP}$ ,  $\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$

7. Explain three limitations of the GDP concept.

- Inequality: Goods and Services that people make by themselves. Ex. mowing lawns.
- Informal Economy: GDP doesn't count the unreported/illegal. Ex. black market.
- Externality: Unintended economic side effects. Ex. Pollution, environment costs.

8. In 2018, Kingdom Asgard made the following transactions. Using the expenditure approach, identify which component of GDP is affected by each transaction, and calculate the 2018 GDP.

- The citizens bought 8 new cars, each worth 50\$. **Consumption**
- The citizens bought 4 new houses, each worth 150\$. **Investment**
- The citizens **grew** rice for **their own** consumption. The rice was worth 500\$. **Consumption**
- The firms bought 6 **used machines**, each worth 50\$. **Investment**
- The firms bought 8 **car parts**, each worth 25\$. **Investment**
- The government bought 4 new computers, each worth 50\$. **Government Purchases.**

- The government paid 1000\$ to the poor as welfare payment. - Government Purchases.
- The citizens bought 10 imported ships, each worth 100\$. - Net Exports (M)
- The firms sold 4 planes abroad, each worth 200\$. - Net Exports (X)

calculate the 2018 GDP.

$$\begin{aligned}
 \text{GDP} &= C + I + G + (X - M) \\
 &= 400 + 600 + 200 + (800 - 1000) \\
 &= 1000
 \end{aligned}$$

$$\text{Real GDP} = P_0 \times Q_t$$

9. Suppose that there are three goods in the economy – goods A, B, and C. Calculate Nominal GDP, Real GDP, and GDP Deflator when 2012 is the base year. Also, calculate the annual inflation rate from 2014 to 2015.

Year	Price of A	Quantity of A	Price of B	Quantity of B	Price of C	Quantity of C
2012	1	3	2	3	3	3
2013	3	1	4	2	1	4
2014	2	2	3	4	2	1
2015	4	4	1	1	4	2

**Nominal GDP**

$$\begin{aligned}
 2012 &: 3 + 6 + 9 = 12 \\
 2013 &: 3 + 8 + 4 = 15 \\
 2014 &: 4 + 10 + 2 = 16 \\
 2015 &: 8 + 1 + 8 = 17
 \end{aligned}$$

**Real GDP**

$$\begin{aligned}
 2012 &: 3 + 6 + 9 = 12 \\
 2013 &: 9 + 12 + 3 = 24 \\
 2014 &: 6 + 9 + 6 = 21 \\
 2015 &: 12 + 3 + 12 = 27
 \end{aligned}$$

Year	Nominal GDP	Real GDP
2012	12	12
2013	15	24
2014	16	21
2015	17	27

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

$$\begin{aligned}
 \frac{12}{12} \times 100 &= 100 \\
 \frac{15}{24} \times 100 &= 3.6 \\
 \frac{16}{21} \times 100 &= 3.36 \\
 \frac{17}{27} \times 100 &= 4.59
 \end{aligned}$$

**Annual inflation rate** = % change in GDP deflator.

$$\frac{4.59 - 3.36}{3.36} \times 100 = 36.61\%$$

↑ GDP + (X - M)      GNP - Depreciation

10. Using the table below, calculate GNP and NNP.

$$\text{GNP} = C + I + G + X + Z$$

Billions of Dollars

GDP	8000
Receipts of factor income from the rest of the world X	250
Payments of factor income to the rest of the world M	300
Depreciation I	900
Indirect taxes minus subsidies in NNP	500
Corporate profits minus dividends C	500
Social insurance payments X	700
Personal interest income received from the government and consumers G	300
Transfer payments to persons X	1100
Personal taxes C	1000

$$\begin{aligned}
 \text{GNP} &= 8000 + 900 + 500 + 500 + 300 + 1000 \\
 &= 11,200 + (250 - 300) = 11,150
 \end{aligned}$$

$$\begin{aligned}
 \text{NNP} &= 11,150 - 900 \\
 &= 10,690
 \end{aligned}$$

11. Using the table below, Calculate the following items.

11.1 Gross domestic investment

11.2 GDP, using the expenditure approach

11.3 GNP

11.4 NNP  $NI = (GDP + NFFI) - \text{Depreciation}$

11.3 National Income, using the income approach

(Do not worry if NNP and NI differ greatly.)

Gross domestic investment = 2,617.3

GDP = 6,993.3

GNP = 6,897.3

NNP = 6,729.3

NI = 6,921.3

Table 6.5

Depreciation <b>I</b>	-168.0	168.0
Compensation of employees <b>I</b>	1,407.7	1407.7
Corporate profits <b>I</b>	257.6	257.6
Dividends <b>C</b>	78.4	78.4
Exports <b>X</b>	212.8	794.0
Government purchases <b>G</b>	716.8	2617.3
Imports <b>M</b>	235.2	
Indirect taxes <b>C</b>	593.6	
Net interest income <b>X</b>	182.2	
Net private domestic investment <b>I</b>	784.0	
Personal consumption expenditures <b>C</b>	2,203.2	
Personal interest income <b>X</b>	112.0	
Receipts of factor income from the rest of the world <b>X</b>	35.2	
Personal taxes <b>C</b>	627.2	
Proprietor's income <b>C</b>	173.9	
Payments of factor income to the rest of the world <b>M</b>	68.8	
Rental income <b>C</b>	34.1	
Social insurance payments <b>X</b>	380.8	
Subsidies <b>G</b>	44.8	
Transfer payments <b>X</b>	504.0	

7,099.3  
 + (249 - 304)  
 = 6,993.3  
 - 96  
 = 6,897.3

12. In a simple economy, suppose that all income is either compensation of employees or profits. Suppose also that there are no indirect taxes. Calculate GDP from the table below. Show that

the expenditure approach and the income approach add up to the same figure.

(Hints: (1)  $NNP + \text{Depreciation} = \text{GNP}$ , (2)  $NFFI = 0$ , and (3)  $NI = NNP$ )

Consumption	9500
Investment	3000
Depreciation <b>I</b>	1750
Profits	2400
Exports	850
Compensation of employees	11500
Government purchases	3200
Direct taxes	1200
Saving <b>X</b>	1600
Imports	900

$GDP = C + I + G + (X - M)$

$9500 + 3000 + 1750 + 2400 + 11500 + 3200 + 1200 = 32550 + (850 - 900)$

$GDP = 32500 \#$

1750

diff btw GDP & GNP