

Exercise 2

National Output and National Income

1. Is the following a stock or flow variable?

2.1 Inventories **stock variable**

2.2 Change in Inventories **flow variable**

2.3 Money Supply **stock variable**

2.4 Change in Money Supply **flow variable**

2.5 National Income **flow variable**

2.6 Expenditure **flow variable**

2.7 Wealth **stock variable**

2.8 Population **stock variable**

2.9 Capital **stock variable**

2.10 Interest **flow variable**

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** is the total value of all final goods & services produced within a given period by factor of production **located within a country**

→ **GNP** is the total value of all final goods & services produced within a given period by factor of production **owned by a country's citizens**, regardless of where the output is produced

→ China have higher GNP than US because China has more population than the US

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

GDP of canned apple = 22

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

- Transfer payments is cash payments made by the government to people who do not supply goods, services, or labor in exchange for these payments e.g. social security benefits
- It is not included in GDP because it is the transactions in which money change hands but no new goods & services are produced.

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

We interested in Real GDP because it adjusted for price change (inflation / deflation) and allow us to compare the real standard of living

example. if in 2020 $P = 10$ $Q = 15$
and 2021 $P = 20$ $Q = 8$

→ $\text{Nominal GDP}_{2020} = 10 \times 15 = 150$
 $\text{Real GDP}_{2020} = 150$ (2020 is base year)

→ $\text{Nominal GDP}_{2021} = 20 \times 8 = 160$
 $\text{Real GDP}_{2021} = 10 \times 8 = 80$

} Based on Nominal GDP 2021 is better than 2020, but 2020 is actually better standard of living than 2021 if we compare the value of Real GDP

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

As 2018 is the base year, Real GDP and Nominal GDP of 2018 will be equal, and GDP deflator of 2018 will equal to 100

7. Explain three limitations of the GDP concept.

1. Inequality - GDP not mentioned about the distribution of output among individuals in society
2. Informal Economy - GDP does not count the unreported income generated in the hidden part of the economy
3. Externality - GDP does not take into account the costs or benefits on the third party, as a result of production

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

- The **citizens** bought 8 new cars, each worth 50\$.

Consumption (C) , $GDP = 8 \times 50 = 400 \$$

- The citizens bought 4 new **houses**, each worth 150\$.

Investment (I) , $GDP = 4 \times 150 = 600 \$$

- The citizens grew rice **for their own consumption**. The rice was worth 500\$.

Not counted in GDP

- The firms bought 6 **used machines**, each worth 50\$.

Not counted in GDP

- The firms bought 8 **car parts**, each worth 25\$.

Not counted in GDP

- The **government** bought 4 new computers, each worth 50\$.

Government Spending (G) , $GDP = 4 \times 50 = 200 \$$

- The **government** paid 1000\$ to the poor as **welfare payment**.

Not counted in GDP

- The citizens **bought 10 imported ships**, each worth 100\$.

Imports (I) , $GDP = 10 \times 100 = 1000 \$$

- The firms **sold 4 planes abroad**, each worth 200\$.

Exports (E) , $GDP = 4 \times 200 = 800 \$$

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

Year	Nominal GDP	Real GDP	GDP Deflator
2012	$3 + 6 + 9 = 18$	$3 + 6 + 9 = 18$	$\frac{18}{18} \times 100 = 100$
2013	$3 + 8 + 4 = 15$	$1 + 4 + 12 = 17$	$\frac{15}{17} \times 100 = 88.24$
2014	$4 + 12 + 2 = 18$	$2 + 8 + 3 = 13$	$\frac{18}{13} \times 100 = 138.46$
2015	$16 + 1 + 8 = 25$	$4 + 2 + 6 = 12$	$\frac{25}{12} \times 100 = 208.3$

$$\text{Nominal GDP} = \text{Price} \times \text{Quantity}$$

$$\text{Real GDP} = \text{Price}_{\text{base year}} \times \text{Quantity}$$

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

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

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

$$\begin{aligned}\text{GNP} &= \text{GDP} + \text{Net Foreign Factor Income (NFFI)} \\ &= 8000 + (250 - 300) \\ &= 8000 - 50 \\ &= 7950\end{aligned}$$

$$\begin{aligned}\text{NNP} &= \text{GNP} - \text{Depreciation} \\ &= 7950 - 900 \\ &= 7050\end{aligned}$$

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

11.3 National Income, using the income approach

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

Table 6.5

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

Gross domestic investment

Net investment = Gross investment - depreciation

Gross investment = Net investment + depreciation
= 784 + 168
= 952

GDP = C + I + G + (X - M)
= 2203.2 + 952 + 716.8 + (212.8 - 235.2)
= 3849.6

GNP = GDP + Net Foreign Factor Income (NFFI)
= 3849.6 + (35.2 - 68.8)
= 3816

NNP = GNP - Depreciation
= 3816 - 168
= 3648

National Income

↳ Income approach = compensation of employees + proprietors' income + rental income + corporate profits + net interest + (indirect tax - subsidies)
= 1407.7 + 173.9 + 34.1 + 257.6 + 182.2 + (593.6 - 44.8)
= 2604.3

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

Consumption	9500	
Investment	3000	
Depreciation	1750	
Profits	2400	} $\oplus = NI$
Exports	850	
Compensation of employees	11500	
Government purchases	3200	
Direct taxes	1200	
Saving	1600	
Imports	900	

$$\begin{aligned}
 GDP &= C + I + G + (X - M) \\
 &= 9500 + 3000 + 3200 + (850 - 900) \\
 &= 15650
 \end{aligned}$$

$$NI = NNP$$

$$NNP + \text{Depreciation} = GNP$$

$$11500 + 2400 + 1750 = 15650$$

$$* \quad GNP = GDP + \text{Net Foreign Factor Income (NFFI)}$$

$$\text{So } GNP = GDP \text{ when } NFFI = 0$$