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Exercise 2

National Output and National Income

1. Is the following a stock or flow variable?
 - 2.1 Inventories
 - 2.2 Change in Inventories
 - 2.3 Money Supply
 - 2.4 Change in Money Supply
 - 2.5 National Income
 - 2.6 Expenditure
 - 2.7 Wealth
 - 2.8 Population
 - 2.9 Capital
 - 2.10 Interest
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?
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
Pickling	15
Canning	18
Shipping	20
Retail Sale	22

4. What is Transfer Payment? Why is it not included in GDP?
5. Why are we interested in Real GDP? Explain with examples. Is there a problem associated with Real GDP?
6. Suppose 2018 is the base year. What can we say about Real GDP, Nominal GDP, and GDP Deflator of 2018?
7. Explain three limitations of the GDP concept.

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\$. **Consumption**
 - The citizens grew rice for their own consumption. The rice was worth 500\$. **Not included in GDP.**
 - The firms bought 6 used machines, each worth 50\$. **Not included in GDP**
 - The firms bought 8 car parts, each worth 25\$. **Not included in GDP**
 - The government bought 4 new computers, each worth 50\$. **Govt**
 - The government paid 1000\$ to the poor as welfare payment **Not included**
 - The citizens bought 10 imported ships, each worth 100\$. **Import**
 - The firms sold 4 planes abroad, each worth 200\$. **Export**
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	18	18	100
2013	15	17	88.23
2014	18	13	138.46
2015	26	12	208.33

the annual inflation rate from 2014 to 2015 = $\frac{208.33 - 138.46}{138.46}$
= 0.504 = 50.4%

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

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

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
Exports	850
Compensation of employees	11500
Government purchases	3200
Direct taxes	1200
Saving	1600
Imports	900

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Solution

1.
 - 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. Difference between GDP and GNP is that:
 - GDP is the total value of all final G&S, within a country's border while GNP is consider produced by a country, within the borders and outside the border.
 - Consider US & China
US: $GNP > GDP$ while China $GDP > GNP$ because US usually invest in other countries while China produced domestic.

3. Find the value add of each stage of GDP:

G.A :	12	→ V.A:	12
Pick :	15	→ V.A:	3
Can :	18	→ V.A:	3
Ship :	20	→ V.A:	2
R.S :	22	→ V.A:	2
Total. V.A:			22

Thus; $GDP = 22$

4. Transfer payment is government's payment to individual such as social security. It is not included in GDP because they do not represent production.

5. Real GDP can determine the better version than nominal GDP.

Ex: Assume Country Z produce 1 good in 2020; 2021

2021: P = 25 & Q = 6	→ Nominal GDP = 150
2020: P = 6 & Q = 19	→ Nominal GDP = 114

Base on N.GDP; 2021 is better than 2020; but it is not true.
R.GDP₂₀₂₁ = 36 while R.GDP₂₀₂₀ = 114 → 2020 is better than 2021.

6. If 2018 is the base year, $Real\ GDP_{2018} = \frac{Nominal\ GDP}{GDP\ deflator_{2018}} = 100$

7. Limitations of GDP concepts:
 - The exclusion of non-market transaction & domestic activities.
 - Informal Economy: unreported income generated. e.g. illegal G&S.
 - Externality: e.g. pollution; Military..
 - Inequality: the failure to account the degree of income inequality in society.

$$8. \text{ GDP} = C + I + G + (X - M)$$

$$. C = (8 \times 50) + (4 \times 150) = 1000 \$$$

$$. G = 4 \times 50 = 200 \$$$

$$. X = 4 \times 200 = 800 \$$$

$$. M = 10 \times 100 = 1000 \$$$

$$\Rightarrow \text{GDP} = 1000 + 200 + (800 - 1000) = 1000 \$$$

10. Calculate GNP & NNP

$$. \text{GNP} = \text{GDP} - \text{NFFI}$$

$$\Rightarrow \text{GNP} = 8000 + 250 - 300 \\ = 7950 \text{ B. \$}$$

$$. \text{NNP} = \text{GNP} - \text{Depreciation} \\ = 7950 - 900 \\ = 7050 \text{ B. \$}$$

$$11. 11.1. \text{Gross domestic investment} = \text{NPD1} - \text{CCA (depreciation)} \\ = 784.0 - 168.0 \\ = 616.0$$

$$11.2. \text{GDP} = C + I + G + (E - M) \text{ (Expenditure approach)} \\ = 2203.2 + 616 + 716.8 + (212.8 - 235.2) \\ = 3513.6$$

$$11.3. \text{GNP} = \text{GDP} - \text{NFFI} \\ = 3513.6 + 35.2 - 69.8 \\ = 3480$$

$$11.4. \text{NNP} = \text{GNP} - \text{Depreciation} \\ = 3480 - 168 \\ = 3312$$

$$11.5. \text{NI (Income approach)} \\ \text{NDP} = 1407.7 + 257.6 + 112.0 + 173.9 + 34.1 \\ = 1985.3 \\ \Rightarrow \text{NI} = \text{NNP} = 1985.3 + 35.2 - 68.8 \\ = 1951.7$$

12. Calculate GDP

$$\text{GDP} = C + I + G + (X - M) \text{ (Expenditure approach)} \\ = 9500 + 3000 + 3200 + (850 - 900) \\ = 15650$$

$$\text{NFFI} = 0 \Rightarrow \text{GDP} = \text{GNP} \\ \Rightarrow \text{NI} = \text{NNP} = 15650 - 1750 \\ = 13900$$

$$\text{Income Approach: } \text{NDP} = 2400 + 11500 \\ = 13900$$

$$\text{NI} = \text{NMP} = 13900 + 0$$

Thus, the expenditure app. & the income app. add up to the same figure