

Homework I
(Submission date: March 13 2025)
(Late submissions will not be evaluated)

1) Suppose the following data applies to the Turkey for the year 2020 (all figures are in billions of TL).

Net income of nonfarm unincorporated business and rent	62
Indirect taxes less subsidies	71
Change in inventories	15
Government current expenditures on goods and services	115
Net income of farm operators from farm production	68
Personal consumption expenditures	385
Export of goods and services	180
Interest and miscellaneous investment income	73
Gross fixed capital investment	120
Personal income tax	75
Income generated by Microsoft in Turkey	130
Social Security contributions	55
Total corporation profits before taxes	80
Undistributed corporation profits after taxes	8
Imports of goods and services	210
Government transfer and indirect payments to individuals	76
Wages, salaries and supplementary labor income	431
Capital consumption allowances (Depreciation)	40
Corporate taxes	35
Income generated by Koç Holding in Russia	350

Using the information given above, compute the following macroeconomic figures. Assume that the items that are not given above are equal to zero. (Show all your work and formulas)

a) GDP from the expenditure approach (at market prices)

GDP = Personal consumption expenditures (385) + Gross Fixed Capital Investment (120) + Change in Inventories (15) + Government current expenditure on goods and services (115) + Export of goods and services (180) – Imports of goods and services (210) = 605 billions of TL

b) GNP from the expenditure approach (at market prices)

GNP = GDP + Net Factor Incomes from abroad

NFI = Income generated by Koç Holding in Russia (350) – Income generated by Microsoft in Turkey (130) = 220.

GNP = 605 + 220 = 825 billions of TL

c) GNP from the income approach (at market prices)

GNP = Wages, salaries and supplementary labor income (431) + Total corporation profits before taxes (80) + Interest and miscellaneous investment income (73) + Net income of nonfarm unincorporated business and rent (62) + Net income of farm operators from farm production (68) + Indirect taxes less subsidies (71) + Capital consumption allowances (depreciation) (40) = 825 billions of TL

d) National Income

It is equal to Net National Product

NNP = GNP at market prices (825) – Capital consumption allowances (depreciation) (40) = 785 billions of TL

e) Personal Income

Personal Income = National Income (785) – Indirect taxes less subsidies (71) – Corporate taxes (35) – Social Security Contributions (55) – Undistributed corporation profits after taxes (8) + Government transfer and indirect payments to individuals (76) = 692 billions of TL

f) Disposable Income

Disposable Income = Personal income (692) – Personal income tax (75) = 617 billions of TL

2) Econland is a country in which only three final goods are produced: wheat, meat and computer. Information on population, nominal prices and total output for each good in years 2003 and 2010 are given below.

	2003		2010	
	per unit Price (\$)	Output (in millions)	per unit Price (\$)	Output (in millions)
Wheat	4.00	2	6.00	5
Meat	5.50	8	9.00	10
Computer	3.00	11	3.50	13

Note: The population of Econland for years 2003 and 2010 are 15,000 and 20,000; respectively.

a) Calculate nominal GDP for 2003.

Nominal GDP in 2003 = $4.00 \times 2 + 5.50 \times 8 + 3.00 \times 11 = 85$ Million \$

b) Calculate nominal GDP for 2010.

Nominal GDP in 2010 = $6.00 \times 5 + 9.00 \times 10 + 3.50 \times 13 = 165.5$ Million \$

c) Calculate real GDP for 2003 and 2010 if the base year is 2003.

Real GDP in 2003 (2003=100) = $4.00 \times 2 + 5.50 \times 8 + 3.00 \times 11 = 85$ Million \$

Real GDP in 2010 (2003=100) = $4.00 \times 5 + 5.50 \times 10 + 3.00 \times 13 = 114$ Million \$

d) Calculate the growth rate of real GDP between 2003 and 2010 (using 2003 prices).

Growth rate = $\left(\frac{X_{t+1} - X_t}{X_t} \right) \times 100 = \left(\frac{114 - 85}{85} \right) \times 100 = 34.1\%$

e) Has the standard of living increased or decreased since 2003?

Real per Capita GDP in 2003 = $85 \text{ Million \$} / 15,000 = 5,666.66$ \$

Real per Capita GDP in 2010 = $114 \text{ Million \$} / 20,000 = 5,700$ \$

Standard of living has slightly increased.

f) Calculate real GDP for 2003 and 2010 if the base year is 2010.

Real GDP in 2003 (2010=100) = $6.00 \times 2 + 9.00 \times 8 + 3.50 \times 11 = 122.5$ Million \$

Real GDP in 2010 (2010=100) = $6.00 \times 5 + 9.00 \times 10 + 3.50 \times 13 = 165.5$ Million \$

g) Calculate the growth rate of real GDP between 2003 and 2010 (using 2010 prices).

Growth rate = $\left(\frac{X_{t+1} - X_t}{X_t} \right) \times 100 = \left(\frac{165.5 - 122.5}{122.5} \right) \times 100 = 35.1\%$

h) What is the implicit GDP deflator for 2003 and for 2010? (Use 2003 as the base year.)

Implicit GDP Deflator in 2003 (2003=100) = $(85 / 85) * 100 = 100$
Implicit GDP Deflator in 2010 (2003=100) = $(165.5 / 114) * 100 = 145.18$

i) What is the implicit GDP deflator for 2003 and for 2010? (Use 2010 as the base year.)

Implicit GDP Deflator in 2003 (2010=100) = $(85 / 122.5) * 100 = 69.39$

Implicit GDP Deflator in 2010 (2010=100) = $(165.5 / 165.5) * 100 = 100$

j) By what percent has the price level increased between 2003 and 2010? (Use GDP deflators with base year 2003).

Inflation = $[(\text{deflator}_{2010} - \text{deflator}_{2003}) / \text{deflator}_{2003}] * 100 = [(145.18 - 100) / 100] * 100 = 45.18 \%$

k) Besides GDP deflator what other price indices are used in measuring inflation?

GDP Deflator: Gives the average price of output (the final goods produced in the economy)

CPI (Consumer Price Index): Average price of consumption goods people consume

PPI (Producer Price Index): Prices of domestically produced goods in manufacturing, mining, agriculture, fishing, forestry, and electric utility industries.

3) Assume that nominal GDPs in 1990, 2000, and 2010 are 1,600 TL, 2,400 TL and 3,500 TL, respectively. If prices have gone up by 25% from 1990 to 2000, and have gone up by 15% from 2000 to 2010, what are the GDP values of 2010 in terms of 2000 and 1990 prices, respectively?

Assume that there is only one final good produced and its value is equal to GDP. The nominal GDPs in 1990, 2000 and 2010 are calculated as follows:

$\text{GDP}_{1990} = P_{1990} * Q_{1990}$; $\text{GDP}_{2000} = P_{2000} * Q_{2000}$; $\text{GDP}_{2010} = P_{2010} * Q_{2010}$

Since the inflation rate between 1990 and 2000 is given as 25%; and between 2000 and 2010 is given as 15%; these three price levels can be expressed as follows:

$P_{2000} = 1.25 * P_{1990}$; $P_{2010} = 1.15 * P_{2000}$; and then, $P_{2010} = 1.15 * 1.25 * P_{1990}$

OR

$P_{1990} = 0.8 * P_{2000}$; $P_{2000} = 0.87 * P_{2010}$; and then, $P_{1990} = 0.8 * 0.87 * P_{2010}$

The real GDP in 2010 in 2000 prices;

From the price levels derived above

Since $\text{GDP}_{2010} = P_{2010} * Q_{2010} = 3,500$;

$\text{Real GDP}_{2010} = P_{2000} * Q_{2010}$

$\gggg \quad = 0.87 * P_{2010} * Q_{2010}$

$\gggg \quad = 0.87 * 3,500 = 3,045$

Real GDP in 2010 is 3,045 TL in 2000 prices.

The real GDP in 2010 in 1990 prices;

From the price levels derived above

Since $\text{GDP}_{2010} = P_{2010} * Q_{2010} = 3,500$;

$\text{Real GDP}_{2010} = P_{1990} * Q_{2010}$

$\gggg \quad = 0.8 * 0.87 * P_{2010} * Q_{2010}$

$\gggg \quad = 0.8 * 0.87 * 3,500 = 2,436$

Real GDP in 2010 is 2,436 TL in 1990 prices.

4) The following values describe the yearly Consumer Price Index (CPI) in a hypothetical economy.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPI	45	65	80	100	116	132	149	166	173

a) What is the rate of inflation in 2002?

Since we don't have the CPI value of 2001, we can't compute it.

b) What are the rates of inflation for the years 2003 and 2010?

Inflation in 2003 = $[(\text{CPI } 2003 - \text{CPI } 2002) / \text{CPI } 2002] * 100 = [(65 - 45) / 45] * 100 = 44.4 \%$

Inflation in 2010 = $[(\text{CPI } 2010 - \text{CPI } 2009) / \text{CPI } 2009] * 100 = [(173 - 166) / 166] * 100 = 4.22 \%$

c) Can you determine which year is the base year?

Since the CPI is equal to 100 for 2005, we can say that 2005 is the base year.

d) Change the base year of the index to 2007=100 and compute the index values for years 2003 and 2010 accordingly.

CPI 2003 (2007=100) = (CPI 2003 / CPI 2007) * 100 = (65 / 132)*100= 49.24

CPI 2010 (2007=100) = (CPI 2010 / CPI 2007) * 100 = (173 / 132)*100= 131.06

e) Is the inflation rate affected when you change the base year?

Inflation in 2003 (2007=100) = [(49.24 – 34.09) / 34.09] * 100= 44.44%

Changing the base year has no effect on inflation rate

f) Suppose your disposable income was \$4,000 in 2004 and \$ 7,850 in 2010. How would you determine which year was the better?

Inflation from 2004 to 2010 = [(173 – 80) / 80] * 100= 116.25 %

Then, 4,000 + 1.1625*4,000 = 8,650

If disposable income was \$8,650 in 2010; 2004 and 2010 have same purchasing power. Since disposable income in 2010 is \$ 7,850; we can say that 2004 is better than 2010.

5) Using the below table, calculate the value added at each stage of the production process.

Production of Bread (in terms of 1000 TL)			Production of Coffee (in terms of 1000 TL)		
Stage of Production	Value of Sales	Value Added	Stage of Production	Value of Sales	Value Added
Wheat farmer	10	10	Coffee grower	15	15
Miller	25	15	Roaster	35	20
Baker	85	60	Shipper and wholesaler	60	25
Grocer	95	10	Starbucks Coffee in Xland	120	60
		total: 95			total: 120

6) Label the following as either being a final or intermediate good.

Best-seller books purchased by a bookseller	Intermediate good
Tires purchased by individuals to replace used tires	Final good
Tires purchased by a factory to install on a new car	Intermediate good
Two kilos of tomato purchased by a greengrocer for a dinner	Final good
Dough bought by a housewife to bake a cake for her daughter's birthday	Final good
Dough bought by a chef to bake a cake at his restaurant	Intermediate good
An architect builds a scale model of a house he has designed	Intermediate good
Recycled steel purchased by a steel manufacturer	Intermediate good
A book written by your favorite author purchased by you	Final good