

**NANYANG TECHNOLOGICAL UNIVERSITY**

**SCHOOL OF SOCIAL SCIENCES**

**SEMESTER 1 AY25-26**

**HE1002 MACROECONOMICS I**

**PROBLEM SET 2**

**2-1**

Subscribing to the theory that life is indeed a beach, the residents of La Playa spend all of their money on three things: Every year, they collectively buy 250 bathing suits, 600 tubes of sunscreen, and 400 beach towels. Using the data in Table 8P-1, calculate the following.

- a. The total cost of this basket each year from 2021 through 2024.
- b. How much the price of this basket has changed from year to year in percentage terms?

Table 8P-1

| Item (amount purchased) | Price 2021 (\$) | Price 2022 (\$) | Price 2023 (\$) | Price 2024 (\$) |
|-------------------------|-----------------|-----------------|-----------------|-----------------|
| Bathing suits (250)     | 10.00           | 12.00           | 15.00           | 18.00           |
| Sunscreen (600)         | 4.00            | 5.00            | 5.00            | 6.00            |
| Beach towels (400)      | 5.00            | 5.50            | 7.00            | 9.00            |

**2-2**

Suppose a typical American consumer purchases three goods, creatively named good A, good B, and good C. The prices of these goods are listed in Table 8P-2.

Table 8P-2

| Good | Price in 2023 (\$) | Price in 2024 (\$) |
|------|--------------------|--------------------|
| A    | 10                 | 15                 |
| B    | 6                  | 5                  |
| C    | 2                  | 3                  |

- a. If the typical consumer purchases two units of each good, what was the percentage increase in the price paid by the consumer for this basket between 2023 and 2024?
- b. If the typical consumer purchases 10 units of good B and 2 units of both good A and good C, what was the percentage increase in the price paid by the consumer for this basket?
- c. Given your answers to parts a and b, what is the relationship between the market basket and the percentage price change?

**2-3**

Using the data in Table 8P-3, calculate the CPI in each year, using 2019 as a base year.

Table 8P-3

| Year | Price of basket (\$) | CPI | Inflation rate |
|------|----------------------|-----|----------------|
| 2019 | 20,000               | 100 | —              |
| 2020 | 21,400               |     |                |
| 2021 | 22,800               |     |                |
| 2022 | 26,150               |     |                |
| 2023 | 28,840               |     |                |
| 2024 | 32,600               |     |                |

**2-4**

Table 8P-4 lists the prices and quantities consumed of three different goods from 2022–2024.

Table 8P-4

| Good | 2022       |          | 2023       |          | 2024       |          |
|------|------------|----------|------------|----------|------------|----------|
|      | Price (\$) | Quantity | Price (\$) | Quantity | Price (\$) | Quantity |
| A    | 10         | 10       | 16         | 8        | 18         | 5        |
| B    | 5          | 18       | 3          | 30       | 4          | 25       |
| C    | 1          | 10       | 2          | 5        | 5          | 10       |

- For 2022, 2023, and 2024, determine the amount that a typical consumer pays each year to purchase the quantities listed in the table.
- Using the amounts you found in part a, calculate the percentage change in the amount the consumer paid from 2022 to 2023, and from 2023 to 2024.
- Why is it problematic to use your answers to part b as a measure of inflation?
- Suppose we take 2022 as the base year, which implies that the market basket is fixed at the 2022 consumption levels. Using 2022 consumption levels, now find the rate of inflation from 2022 to 2023 and from 2023 to 2024. (Hint: First calculate the cost of the 2022 market basket using each year's prices and then find the percentage change in the cost of the basket.)
- Repeat the exercise from part d, now assuming that the base year is 2023.
- Why were your answers from parts d and e different?

**2-5**

Which of the following goods have likely required hedonic quality adjustment over time if they were included in the Consumer Price Index (CPI)?

- Laptop computers.
- Cellphones.
- Salt.
- Televisions.
- Housing.
- Tennis rackets.

**2-6**

Use Table 8P-5 to calculate core and headline inflation in each time frame relative to the base year, assuming that each category is weighted equally in the calculation of headline inflation.

Table 8P-5

|      | <b>Food and energy</b> | <b>Other goods and services</b> |
|------|------------------------|---------------------------------|
| 2020 | 116                    | 102                             |
| 2024 | 105                    | 107                             |

- 2020 to a base year.
- 2024 to a base year.
- 2020 to 2024.

**2-7**

Table 8P-6 shows the GDP deflator and CPI over five recent years for Vortexia. How much did prices change between years in each measure? By what percent did prices change between years for each measure? Calculate the annual inflation rate and then the inflation rate across the entire time period.

Table 8P-6

| <b>Year</b> | <b>GDP deflator</b> | <b>Change in GDP deflator</b> | <b>CPI</b> | <b>Change in CPI</b> |
|-------------|---------------------|-------------------------------|------------|----------------------|
| 2020        | 100                 |                               | 100        |                      |
| 2021        | 105                 |                               | 104        |                      |
| 2022        | 112                 |                               | 110        |                      |
| 2023        | 123                 |                               | 113        |                      |
| 2024        | 127                 |                               | 120        |                      |
| 2020–2024   | –                   |                               |            |                      |

**2-8**

The median American household earned \$12,051 in 1973 and \$88,590 in 2021. During that time, though, the CPI rose from 44.4 to 271.

- a. Calculate the total growth rate in nominal median household income from 1973 to 2021.
- b. Calculate the total growth rate in real median household income from 1973 to 2021.

**2-9**

Using Table 8P-7, find the real value of a \$1,200 payment to be received each year given the following CPI values. Next, find the amount that this \$1,200 should be adjusted to, in order to keep its real value at \$1,200.

Table 8P-7

| Year | CPI | Real value of \$1,200<br>(in \$2021) | Cost of living<br>adjusted payment |
|------|-----|--------------------------------------|------------------------------------|
| 2021 | 100 | 1,200                                | 1,200                              |
| 2022 | 103 |                                      |                                    |
| 2023 | 105 |                                      |                                    |
| 2024 | 110 |                                      |                                    |

**2-10**

Suppose General Electric paid its line workers \$10 per hour in 2023 when the Consumer Price Index was 100. Suppose that deflation occurred and the aggregate price level fell to 80 in 2024.

- a. What must GE pay its workers in 2024 in order to keep the real wage fixed?
- b. What did GE need to pay its workers in 2024 if it wanted to increase the real wage by 10 percent?
- c. If GE kept the wage fixed at \$10 per hour in 2024, in real terms, what percentage increase in real wages did its workers get?

**2-11**

Table 8P-8 shows the prices of a tall Starbucks latte in countries around the world. Using the data, and the fact that a latte costs \$3 in the United States, calculate how much a country's currency is under- or overvalued according to purchasing power. First, calculate the implied exchange rate for each country. Next, calculate the "latte index" for each country using the Big Mac index formula from the chapter.

Table 8P-8

| Country        | Price    | Official exchange rate |
|----------------|----------|------------------------|
| Thailand       | 60 baht  | 30 baht/dollar         |
| Argentina      | 15 pesos | 6 pesos/dollar         |
| United Kingdom | 2 pounds | 0.5 pound/dollar       |
| Japan          | 450 yen  | 80 yen/dollar          |

**2-12**

An employee asks her boss whether she can transfer offices so that she can work in a different part of the country. The boss responds positively and says that the employee can choose to work in Cleveland, Miami, or New York City. The boss then hands the employee a list, as shown in Table 8P-9, of the salaries that she would earn in the different cities and the average price levels in those same cities.

Table 8P-9

| Office location | Salary (\$) | CPI |
|-----------------|-------------|-----|
| Cleveland       | 85,000      | 100 |
| Miami           | 125,000     | 160 |
| New York City   | 165,000     | 205 |

- From a standpoint of maximizing the employee's consumption possibilities, which office should she choose?
- What would be the minimum salary in New York City the boss could offer the employee to make the employee indifferent between moving to Cleveland and to New York City?

**2-13**

Calculate the PPP-adjusted GDP for each of four countries, using the information found in Table 8P-10.

Table 8P-10

| Country | GDP (\$) | Price-level adjustment |
|---------|----------|------------------------|
| Ona     | 10,000   | -0.06                  |
| Rye     | 12,700   | 0.27                   |
| Zolfo   | 14,100   | 0.10                   |
| Avon    | 23,400   | -0.20                  |