

The purpose of this homework is to give you some experience working with price indexes, converting nominal series to real series, and calculating growth rates. Download the Excel dataset “HW 2 Data.xlsx” from the class website. There are two tabs in this workbook. The “DSPI” tab has monthly data on Disposable Personal Income (nominal) over the period Jan. 1959 – Dec. 2023. The “PCE” tab has monthly data on the Personal Consumption Expenditures price index over the period Jan. 1959 – Dec. 2023. The PCE index is ‘centered’ on 2017 = 100. You will need the “ggplot2,” “readxl,” and “fpp2” libraries in R for this exercise.

1. Read the DSPI and PCE variables into R as monthly time series objects. Using the average of the PCE variable over Jan. – Dec. 2023, recenter the PCE index to 2023=100. Report the value of the recentered index for Dec. 2023 – this should be observation #780.
2. Using the recentered PCE index, calculate real DSPI in 2023 dollars. Subset this real series to Jan. 2000 – Dec. 2023 (the window() command will be useful here). How does real DSPI in Jan. 2000 compare to that in Dec. 2023? Report the two monthly values and the total growth in real DSPI calculated as:

$$Growth = \frac{realDSPI_{Dec2023}}{realDSPI_{Jan2000}} - 1$$

3. Provide a time series plot of the subset real DSPI series.
4. Using the 2000 – 2023 real DSPI series, calculate monthly growth rates as log-differences. Provide a time series plot of this growth rate series. Report the simple average of this log-difference series as a measure of the average monthly growth rate of real DSPI. Based on this average monthly growth rate, what is the average annual growth rate for real DSPI. (Note: I am not asking for the average *compound* annual growth rate here, that’s next.)
5. Using the 2000 – 2023 real DSPI series, calculate the average compound annual growth rate. How does this compare to the annual growth rate you calculated in part 4?

Organize your answers in a Word or similar document to upload to Canvas.