Quantitative Macro – Homework 1

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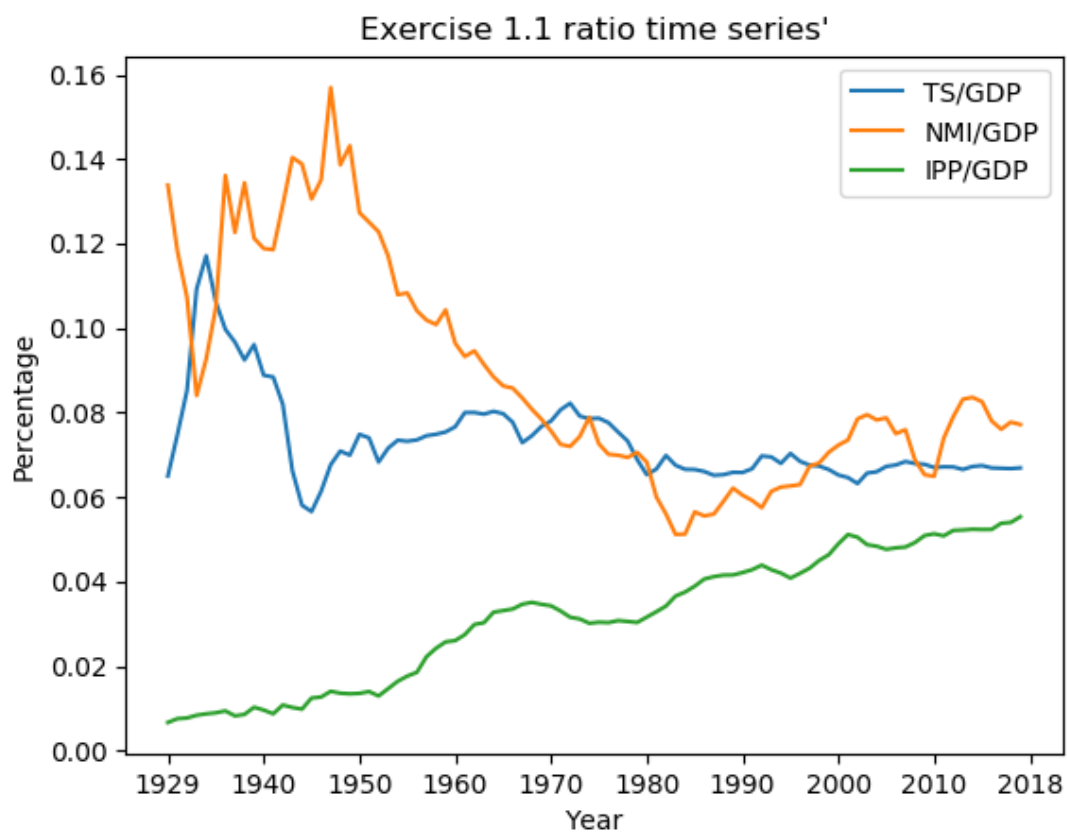September 23, 2019

Question 1

Question 1.1

Figure 1: Evolution of key ratios

Figure 1 shows that, while at the beginning of the period that we analyze the three series appear to diverge significantly, it can be observed that all three converge to a similar level towards the end (roughly between 0.04 and 0.08). There is a visible upward trend since the beginning in IPP, whereas both NMI/GDP and TS/GDP ratios seem to move in opposite directions around the period of the second World War. While the tax ratio stabilizes post-war, NMI exhibits a steady decline. One can speculate that SMEs over time made way for larger conglomerates, and hence NMI/GDP declined.
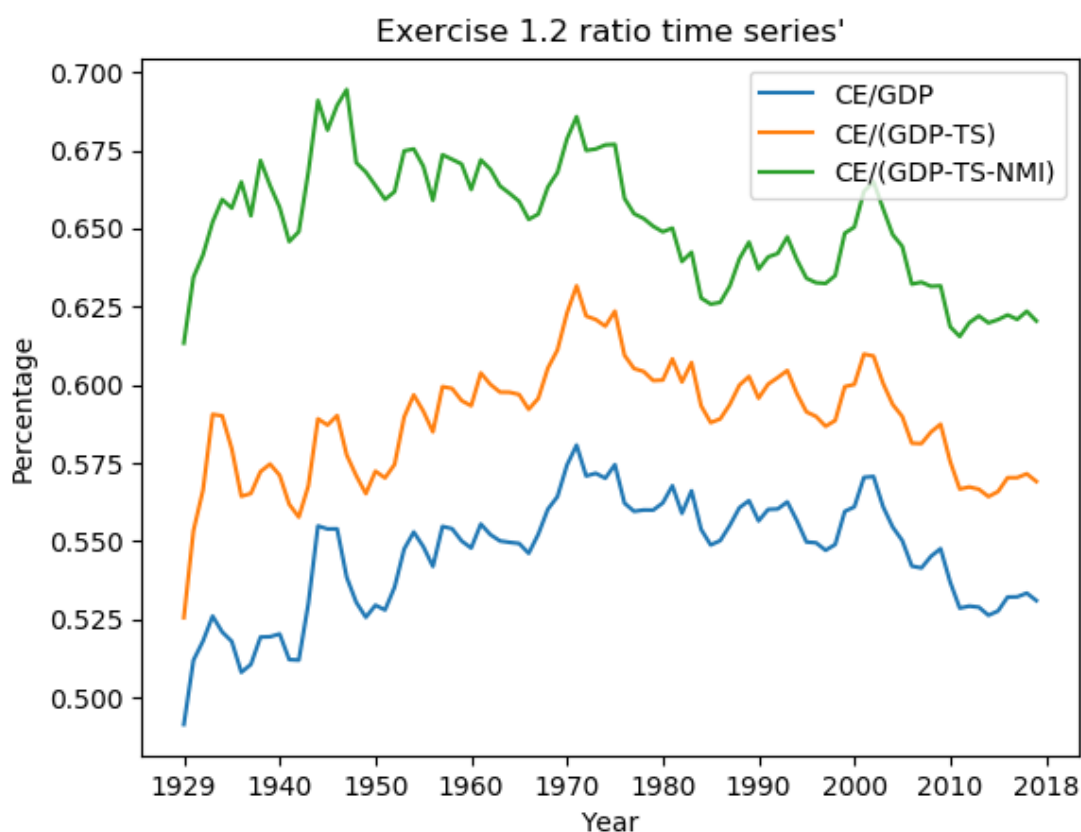
Question 1.2

Figure 2: Evolution of key ratios for labor shares

For exercise 1.2 I calculate three different measures for the Labor Share according to the specifications given. Figure 2 shows that the pattern for all three measures is roughly the same across the period of observation, with a slight difference during the 1930s where we observe a different peak for the corrected measures as compared to the naive one. According to all three labor's share in GDP peaked after WW2, the early 1970s and early

2000s and has since been in steady decline. Currently the share is at levels between 53% and 63% depending on the chosen metric.
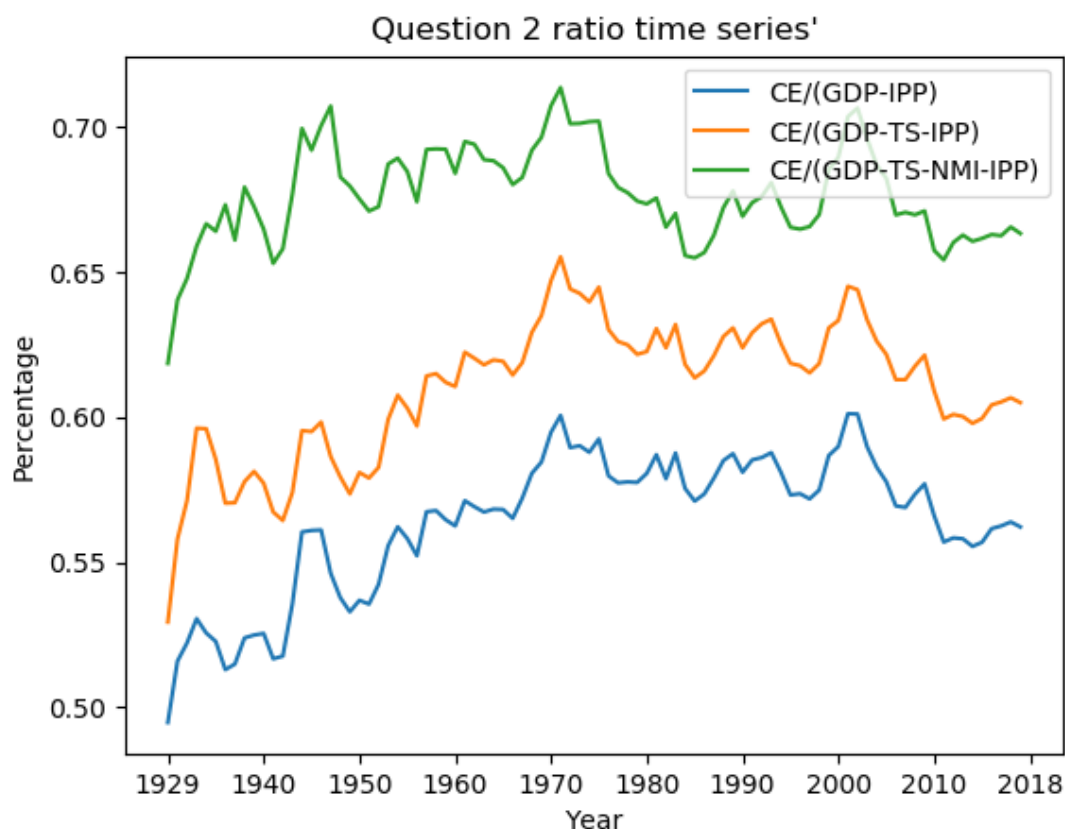
Question 2

Figure 3: Evolution of key ratios for labor shares SNA1993

Figure 3 shows the same statistics as in part 1.2 but with a correction for IPP in order to proxy the accounting standard of 1993. It emerges that using the old standard would yield somewhat higher labor shares in GDP. The overall pattern stays the same, however. The range for the last observation is between 57% and 68% depending on the chosen metric.

Question 3

Figures 4 and 5 display the ratios for the labor share using data only for the corporate sector. Our measures yield much higher labor shares as compared to the overall economy
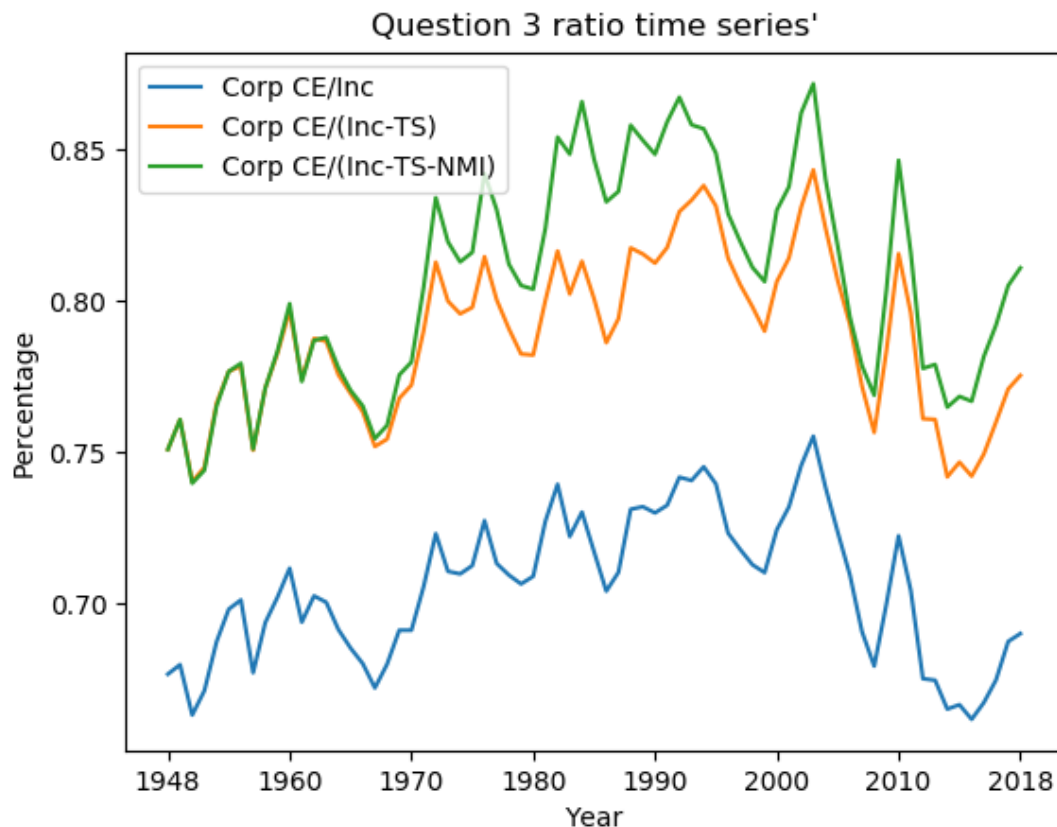
Figure 4: Evolution of key ratios for labor shares only corporate sector

and a visible upward trend. This may be attributed to the growing share of the services sector which is labor intensive, whereas the agricultural sector (and to some extent manufacturing) require a lower share of labor in comparison. The series which is not corrected for IPP is somewhat more volatile than the SNA 1993 proxy, yet both exhibit similar patterns. Peaks are visible in the early 2000s around the dotcom bubble with a slump following the global crisis of 2007/2008. Towards the end we observe an upward movement, possibly indicative for the economic recovery in recent years. At the beginning of the period of observation the two corrected shares are practically at the same level suggesting that corporate NMI must have been very small. This may, however, be due to the series of data that I chose to mimic proprietors' income at corporate level which may distort the result (as we saw in part 1, NMI/GDP is quite large in the period in question). Moreover, due to a lack of better data, I chose private IPP as a proxy for corporate IPP (which was missing in the NIPA tables). This, however, clearly also includes households and small firms and may therefore be too large.
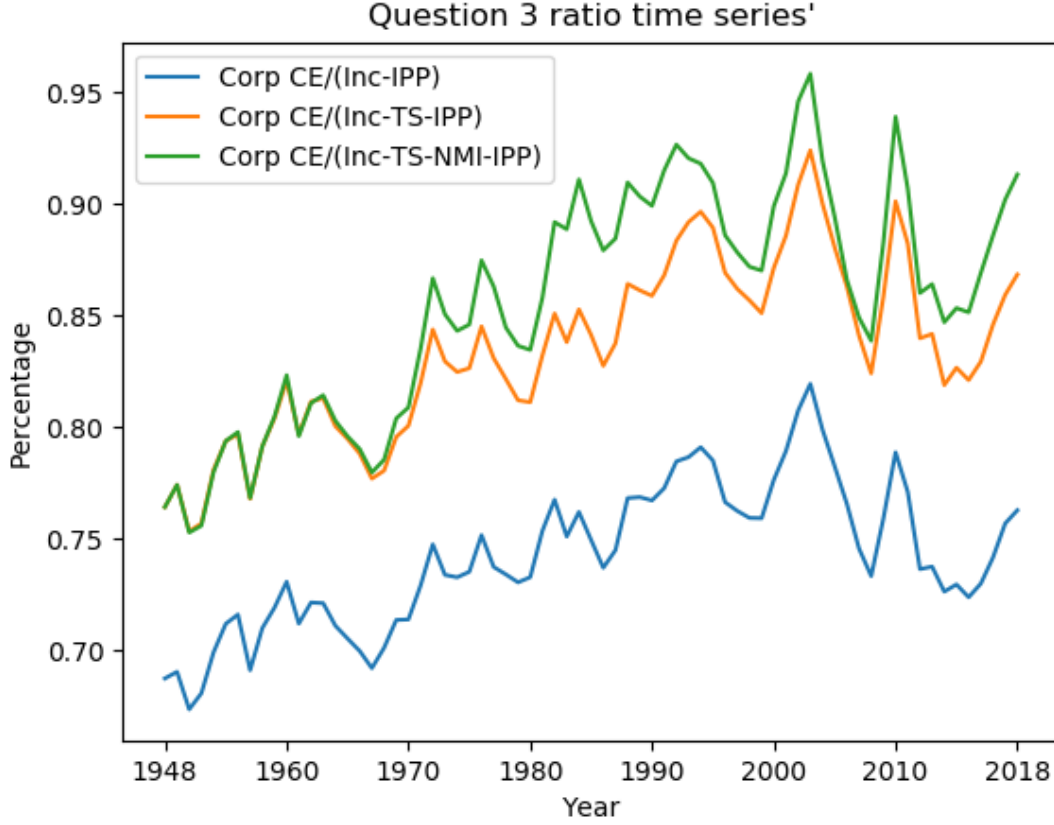
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Figure 5: Evolution of key ratios for labor shares only corporate sector

Question 4

I follow *Gomme et al.* (2017)[1] in their procedure. I use time series data on Net Fixed Assets a a proxy for the capital stock, Proprietors' Income and Net Operating Surplus. The rate of return is calculated as follows:

$$R_t = \frac{\text{Pre-tax Capital Income}}{\text{Net Fixed Assets}} \tag{1}$$

I focus on pre-tax capital income as the construction of the after-tax measure is essentially the same (with a few items subtracted). It is given by

$$\text{Pre-tax Capital Income} = \text{Net Operating Surplus} - \alpha * \text{proprietors' income} \tag{2}$$

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[1]Paul Gomme and B. Ravikumar and Peter Rupert,*The Return to Capital and the Business Cycle*, Review of Economic Dynamics, 2011, 14(2), *262–278.*

Labor's share in income α is calculated as LS_i for $i = 1, 2, 3, 4, 5, 6$ according to the ratios found in questions 1.2 and 2 and I subtract labor's share in proprietors' income as is done in the paper as well.
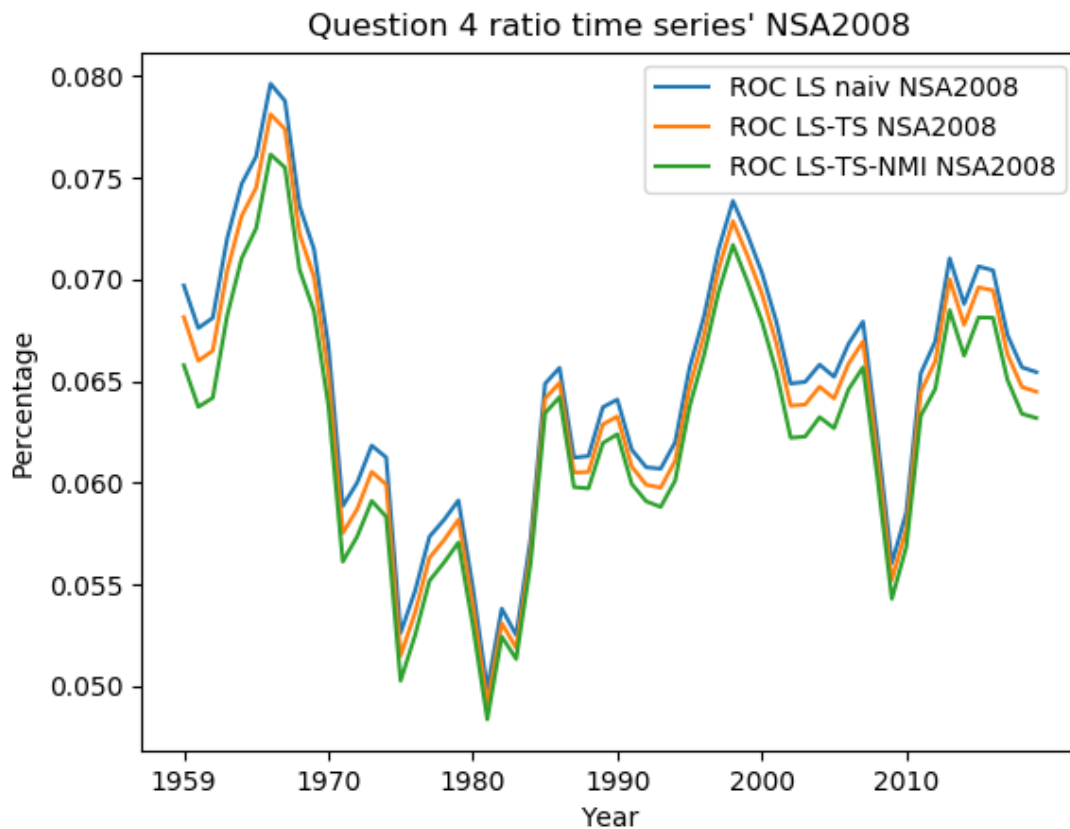

Figure 6: Rate of return on capital SNA2008

The time series' for this measure of the return on capital in figures 6 and 7 show a peak in the mid-1960s which is followed by a deep slump possibly linked to the consecutive oil crises. another peak is visible for the late 1990s during the first boom of the internet which was offset in the global financial crisis (slump aroun 2009). In recent years the return on capital is aroun 7%. Both SNA2008 and the SNA1993 proxy produce very similar series' with the SNA2008 giving minimally higher percentages than SNA1993.
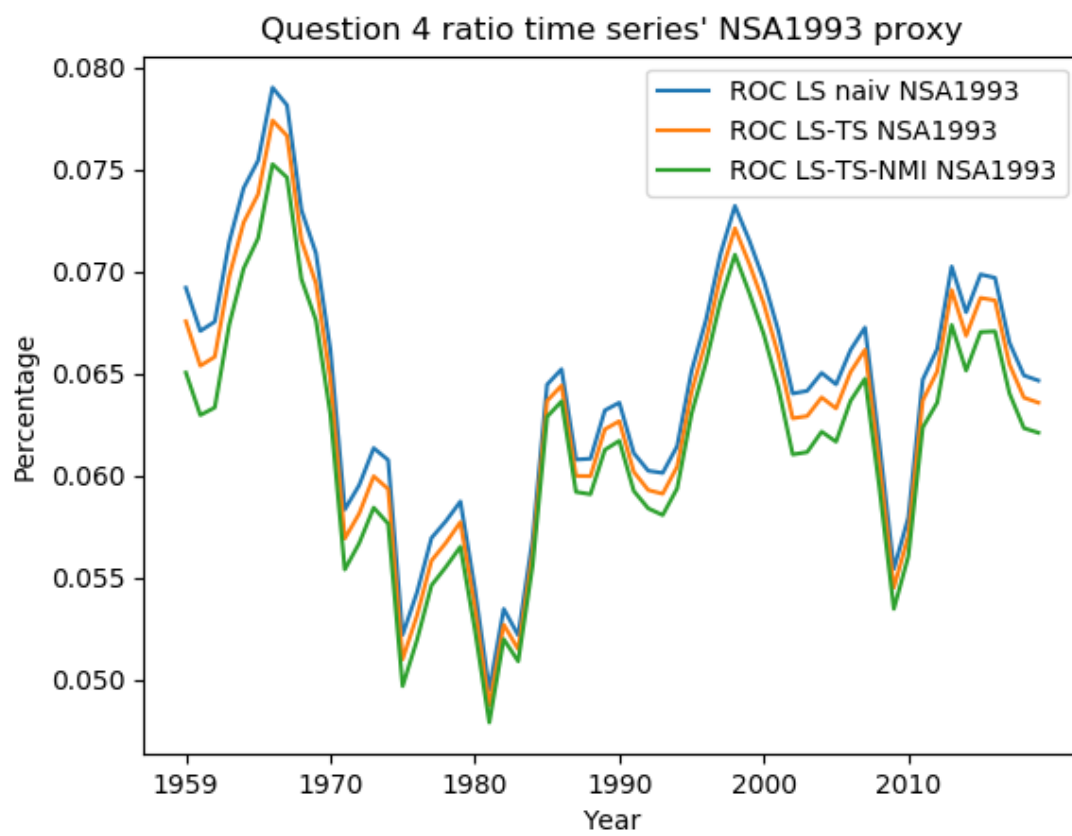
Figure 7: Rate of return on capital SNA1993