QUANTITATIVE MACROECONOMICS: Homework 1

Q1: Secular behaviour of the labour share:

1. Plotted in figure 1 are the time series of the following ratios: taxes minus subsidies on production over GDP (*T-S*), Net Mixed Income over GDP (*NMI)* and Intellectual Property Products over GDP (*IPP*). This is data from the USA ranging from 1929 to 2018, obtained from the Bureau of Economic Analysis, specifically from the NIPA tables.

Figure 1
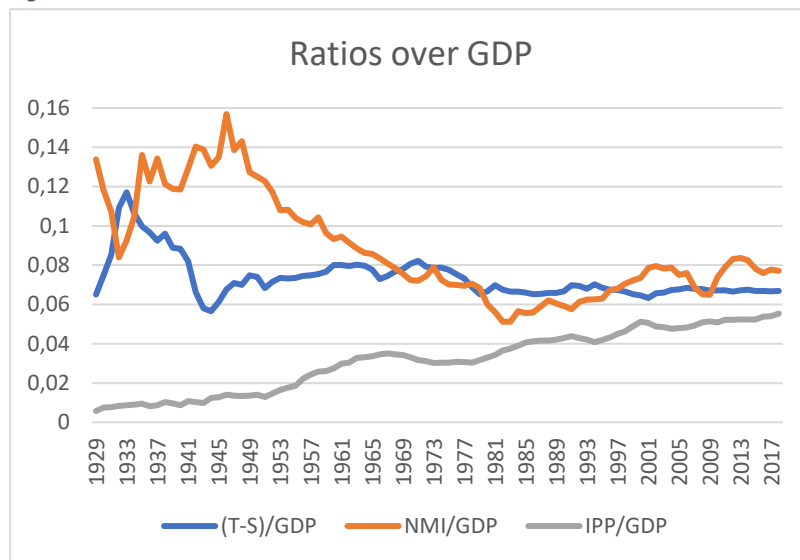
The share of taxes minus subsidies on production and imports over GDP can be seen to have been very large right after 1929 and then was sharply reduced until 1945. This fall can probably be attributed to the reduced amount of production and imports resulting from the second world war. From 1950 on it remained relatively constant at between 6-8% of GDP.

The share of Net Mixed Income (or Proprietors' income) represents the share of income arising from small businesses. It had a large decrease of almost 6% after the 1929 crash but went back to high values after the mid-1930s, showing growth in this sector. Its' share steadily decreased from 1948 until the beginning of the 80s. Since then it has trended upwards at a slow rate, fluctuating around 7% of GDP in the last decade.

The share of Intellectual Property Products over GDP represents the investment in R&D, artistic originals and software as a share of total GDP. It has shown a slowly increasing trend over the whole time series, going from around 1% of GDP to almost 6% in 2018. This increase can partly be attributed to technological improvement.

2. I computed three different labour income shares of GDP: the naive labour share is simply defined as the compensation of employees over the total GDP, while the other two labour shares are adjusted for taxes minus subsidies and NMI by subtracting those from the GDP. We adjust those as we do not know to which proportion they are part of labour or capital income. The resulting measures can be observed in Figure 2.

As expected from the definitions of each of the labour shares, the Naive one is the one with lowest values while the one adjusted for both TS and NMI has the highest ones, because the same amount of Compensation to Employees is divided by a smaller GDP. It can be seen on the

plot that they all follow the same trends: an increasing trend up until 1970 and a slightly decreasing one after that. Since 2000 the labour share has decreased by around 3%, but it has remained relatively stable since 2010 at between 53% to 62% depending on the measure used.

Figure 2
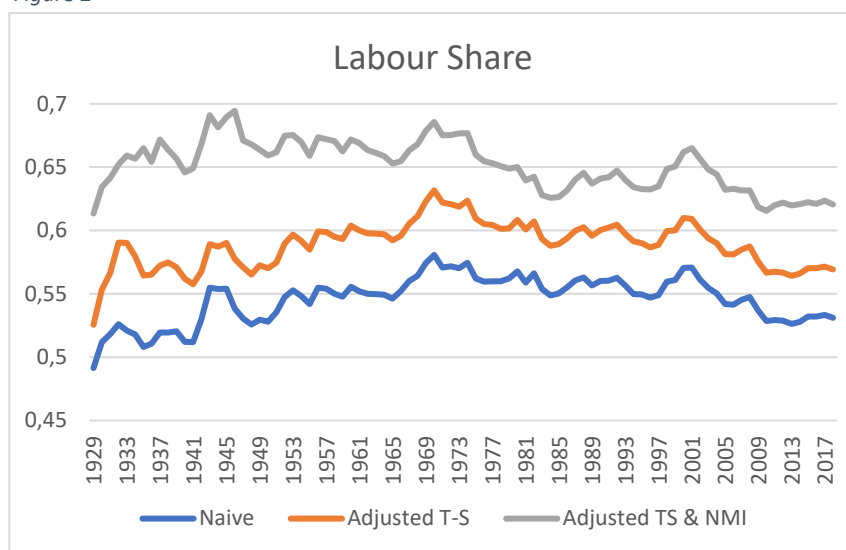
Q2. Effect of IPP capitalization:

In this section I recomputed the labour shares but with the 1993 SNA instead of the 2008 SNA. The main difference between these two systems of national accounts is that before 1993 IPP was not considered an investment but an intermediate expense, so it wasn't accounted for in GDP. The data available at the BEA is only in the 2008 SNA, but we can proxy the pre-1993 data by subtracting the IPP from the GDP.

Figure 3 follows similar trends to those observed in the previous cases. It can be noted that the labour shares in this case are larger in all three measures here than they were in the previous question, the one adjusted for both taxes and NMI achieving over 70% of the GDP at its' highest point. It is also noticeable that the labour shares remain more stable from the 70s on in figure 4, due to the increased share of IPP which is not present in GDP in this case.

Figure 3
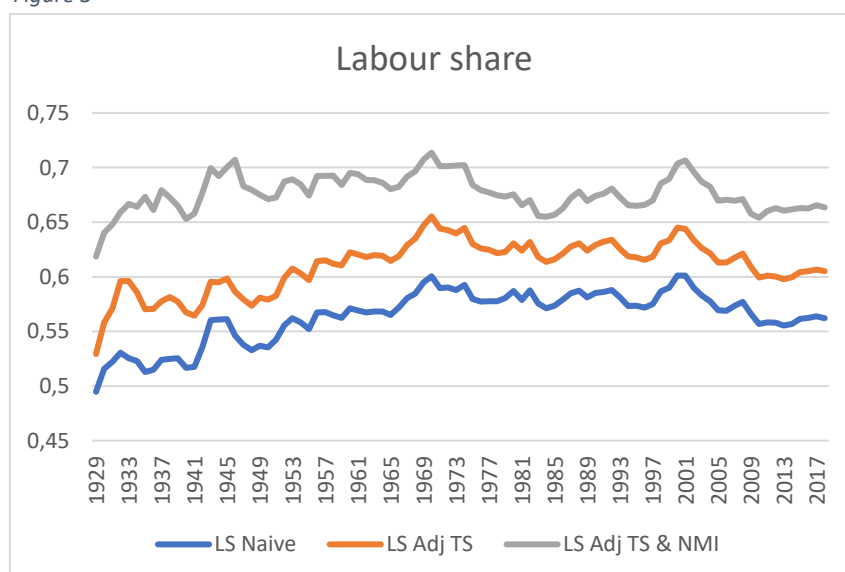
Q3. Corporate labour share:

Here I computed the two of labour shares with data for the corporate sector only. This means I got the data of corporate business' compensation to employees and divided it by the income of the corporate business sector. I did the same for the labour share adjusted for taxes minus subsidies using also the corporate business data. However, because by definition corporate businesses do not have net mixed income, I did not compute the latter labour share measure, as I would not be able to adjust for NMI only for the corporate business sector. Note also that in this case we only have data from 1948, a shorter period than in the previous questions.

Regarding the actual results observed in the figure 4: as expected, the adjusted labour share is larger than the naive labour share; and overall the share of labour over corporate income is larger than in the overall economy in both of our measures. They both followed an increasing trend until the nineties and have since fallen to values similar to those at the beginning of the series. This seems to diverge from what I observed in the previous two cases: this sector has larger labour shares by around 20%, which implies they provide larger compensation to employees than the overall economy does.

Figure 4
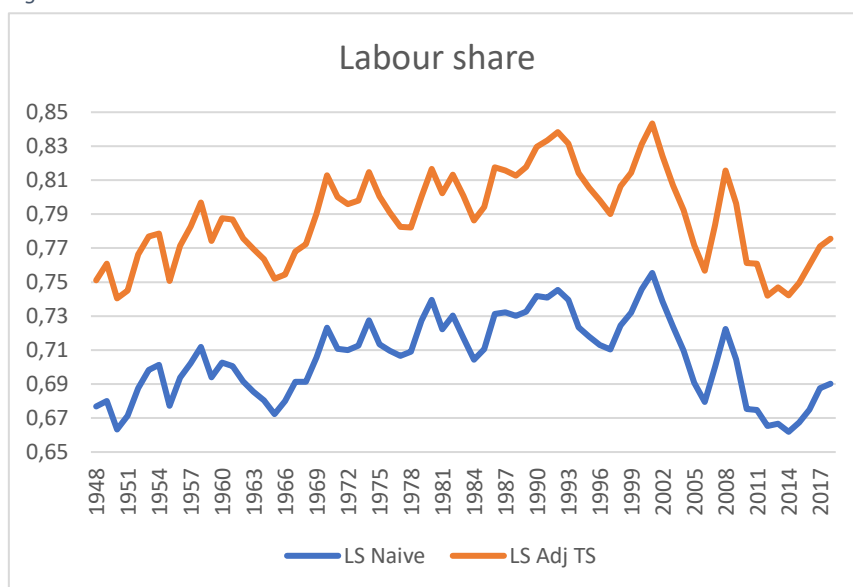
Q4. Rate of return to capital:

To finish, I compute the rate of return to capital. It is defined as $r = \frac{rk}{k}$, where the numerator refers to the capital income and the denominator to the total capital in the economy.

To calculate the capital income I multiplied the Real GDP (obtained using the GDP deflator) by the capital share of GDP (one minus the labour share). I used the labour share adjusted for both T-S and NMI in this case. As a measure of total capital in the economy I used data on fixed assets and turned it to real terms by using the deflators corresponding to the private and public fixed assets. Finally, I divided both of these to obtain the rate of return.

As can be seen on the graph, I did this both for the 2008 SNA data (available at BEA) and the pre-1993 proxy which I computed in question 2. The only difference is the measure used for GDP, which does not include IPP in the pre-93 SNA (and therefore has a smaller numerator). This also results in different capital shares of income. Both measures show an increase up until 1944, where it reaches its peak, followed by a sharp fall and another peak in 1966. The rate of return

gradually decreased until 1980 and has remained stable since. Both of my measures had very similar values at the beginning of the series, which grow apart after 1945, remaining at around a 3% difference from then on.

Figure 5

Rate of return