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Quantitative Macro - PS2

1. *Construct the nationwide accounting LS for the United States (1947-2017) the way we discussed in class.*

In this part we show the evolution of labour share from the period 1947-2020 in the United States. The labour share is defined as the part of the economic output that represents the compensation to employees due to their work.

In order to compute it, we need to decompose the national income (NI) in different subsections. Then, we have:

$$Y = CE + PI + RI + CP + NI + T - S$$

Where:

Acronym	Meaning	Acronym	Meaning
CE	Compensation to employees	CP	Corporate profits
PI	Proprietors income	NI	Net interest
RI	Rental Income	T-S	Taxes-Subsidies

In this sense, RI+CP+NI+T-S are included in the "capital" share of the national income. CE is included in the "labor" part of the economy. However, is not clear in which section PI should be included. This is because CE does not include mixed income, i.e., the ambiguous income earned by the self-employed, which cannot be directly ascribed to capital or labor. Depending on that, our labor share ratio will vary. Then we are going to create 3 different ratios:

1. In the "naive" case, we have assumed that only the compensation to employees forms part of the labor share. As a result, it could be easily biased downward. This ratio will be defined in the following way:

$$LS = CE/NI$$

2. In the LS_1 we consider that both CE and PI should be included completely in the labor share. The key assumption used in this adjustment is that labor compensation is equal on average for both self-employed and employees. As a result, the LS ratio can be calculated as:

$$LS_1 = (CE + PI)/NI$$

3. In the LS_2 we take an intermediate point between the two previous cases. Then, we are going to obtain a share of PI that will be included in the labor share ratio. In order to do that we first define a ratio "α" that represents the profit share without taking into account PI:

$$α = RI/(NI - PI)$$

Then, the labor share would be:

$$LS_2 = (PI * (1 - α) + CE)/NI$$

In the next plot we have represented the three graphs together:
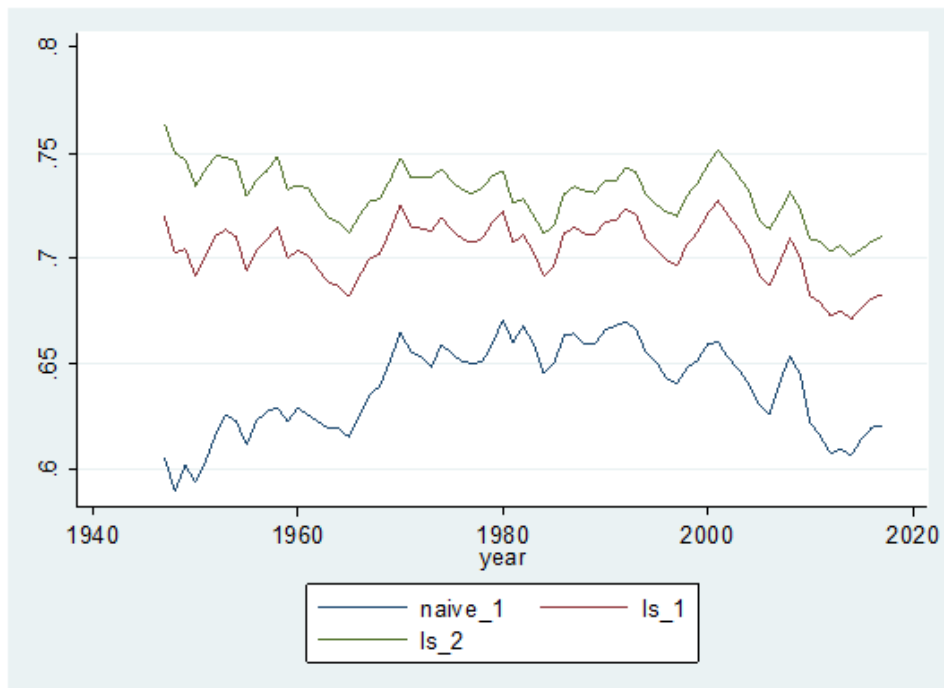
Until early-to-mid 20th century, economists interpreted that it was relatively stable. However, in U.S., as we can observe, at the end of the 20th century it began to decrease. This could be explained largely by the technological change and trade integration. It means that in industries with a higher level of occupations based on routines and higher competition from imports. Then, companies started to invest more in capital and technology than in human capital. Furthermore, it helps to explain the wage gap between the growth in labor productivity and real hourly compensation.

We can observe that the "naive" ratio is the lowest one since only includes CE. On the other hand LS_2 is the highest one since it includes both CE and PI. Finally, LS_2 would be in the

middle since it includes CE and a percentage of PI. In all cases, the labor share is higher than 50% of the total national income.

2. *Construct the accounting LS for the corporate sector for the United States (1947-2017)*

The labor share can be also calculated by sectors of the economy. In this part of the Problem Set, we will calculate the labor share for the corporate sector of the United States. That is, we will only take into account the data associated to the economic activity that involves private companies.

Given that, the income taken into account in this part is the one associated to the part of the corporate sector, from which we don't need to eliminate proprietors income as in the previous part. Therefore, the labor share that we calculate here is the "naive" share, which can be calculated in two different ways:

$$LS = CE/CB$$

$$LS = 1 - (CP + NI + T)/CB$$

The data used for this calculations are only taking into account the corporate part of the economic activity, which corresponds to the Corporate Business (CB), the Compensation of Employees (CE), the Corporate Profits (CP), net interests (NI) and taxes (T).

The results are shown in the following graph, where are plotted the two labor shares in order to show that the reported values are closely the same:
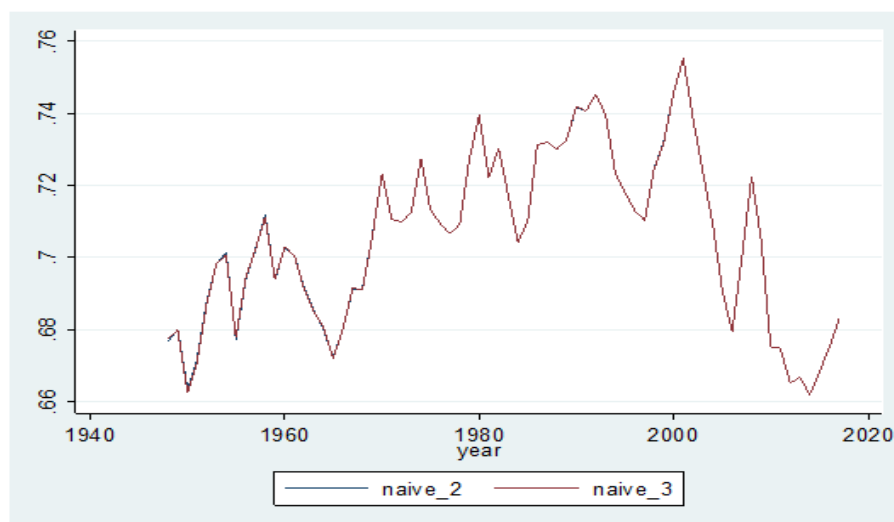
What we can see in the graph is that, until the end of the 90s, the corporate sector labor share was presenting a positive trend, but this trend have declined since 2000. Karabarbounis, L., and Neiman, B., (2012) remark that the decline in labor share was due to a higher shift in the savings supply from households to companies. These authors point out that, whereas during the 80s the majority of investment was funded by household savings, in the recent years the vast majority of investment is based on corporate saving.

Moreover, these authors show a model that explain how the trends of corporate saving (and therefore labor share) respond positively to declines in the relative price of investment goods.

Given that, we are interested in compare the labor shares of the first exercise and this one, in order to see how affects the fact of taking only into account the corporate sector of the economy.
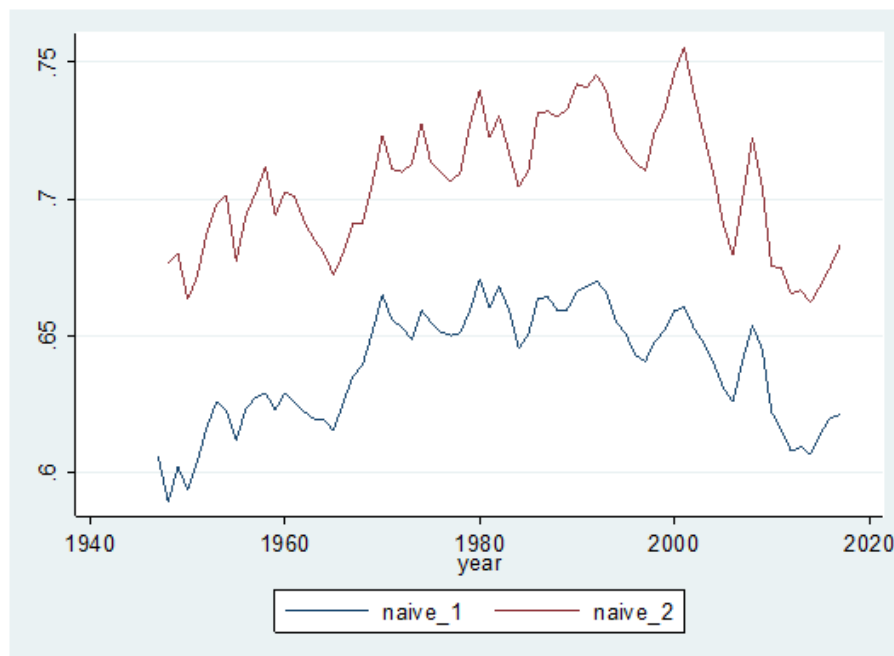
We can see labor share calculated for the corporate sector is bigger than the one that takes into account all the sectors of the economy. Moreover, the negative trend presented in the last part of the analyzed period is more accused for this second approach, what can be explained, for instance, by the fact that private companies introduced more technology progress in their productive processes.

3. *Labor share of spanish income:*

In this section we will display two graphics, one that shows spanish labor share of income behavior and another that shows the same but only for the corporate sector.
Besides we will explain both how we compute the indicators and the intuitions behind their shapes.

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First of all the main problem that we face is that spanish database is relatively poor for national income main aggregates, we were just able to get data from 1995 to 2017.

To compute LS for the whole economy we got the number of total workers, the number of workers that are self-employers, total income of the economy and the total amount of wage compensations. We were not able to get the same kind of data that we got for U.S.A, so we had to play with these variables.

To compute the most undervalued LS (the one that PI is supposed to be capital income, we called it Naive) we just computed $LS = CE/NI$, where we are assuming that all the amount of PI is capital income.

To compute the one where we split PI into a wage income part and a capital income part (LS_3 in the graphic), we find an approximation of the amount of PI income that is wage income, to do so we divided wage compensation by total number of workers that are not self-employees, and after this we multiply this number by the number of self-employees. With this we are supposing that wages of self-employees would have the same equilibrium wages than the normal employees in a market context. Mathematically:

$$LS = CE * (1 + SE/(OC - SE))/Y$$

where SE is self-employed people, OC is total number of workers, and CE is wage compensation as usual.

To compute the third labour share (LS_4) we just assumed that all the amount of PI is wage, so to so we used the following expression:

$$LS = [CE + NI * (SE/(OC - SE))]/NI$$

Now we are just estimating what is the total amount of PI supposing that income per capita of self-employees is exactly the same than the normal ones.
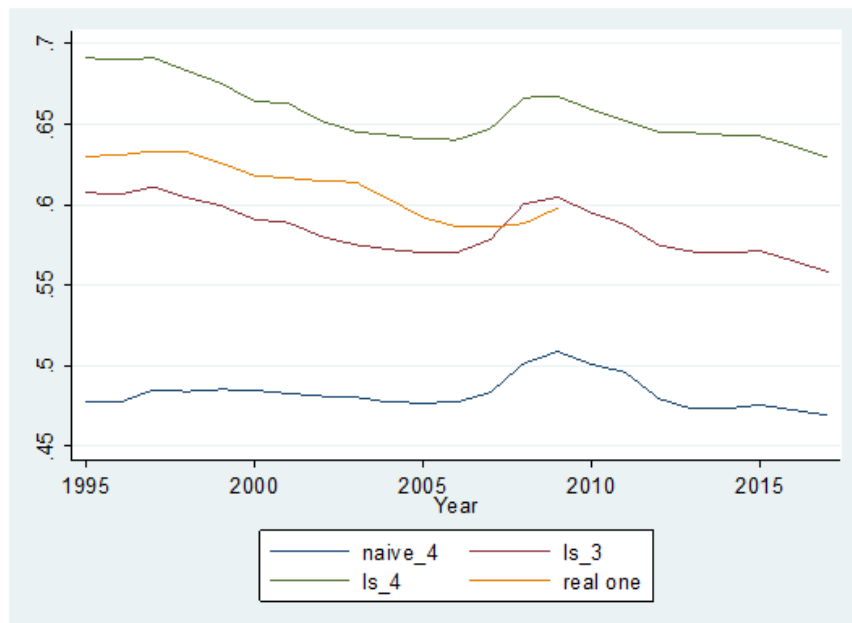
In this graphic we can see that the Naive one is around 47, and the other ones are closer each other around 60 - 70, all the three labor shares are fairly similar in behaviour, unfortunately 12 years are not enough at all to gather a trend effect, so we cannot say really much about what is going on the mechanism behind the creation of the labour share.

Nevertheless, during the big economic expansion (middle 90's and 2008) LB seems losing weight, this could be due to the big growth of the construction sector which likely is more capital intensive than the average of the economy. Or simply because incorporation of technology intensive in capital such as computers, telecommunications nets and so on.

The orange line we can see is another estimate of labor share made by OCDE, this estimate is using PI as our second LB estimator, and we can see they both are quite similar.

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To make LS for the corporate sector we followed OCDE methodology and we gathered data from total amount of labor cost of the business sector less agrarian sector, and we divide it by the total output of these sectors. This graph although looks a little bit more volatile than the whole economy one, once again we cannot say much about the trend, but we could say that LS corporate behaves similar than the global one, going down on when investment on construction were really high.