

Problem Set 2

Quantitative Macro

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1 Labor Share' puzzles

How the national income is distributed among social groups was a core question for classical economists. That was because they thought in a primitive model of heterogeneous agents, in which capitalists had a higher propensity to save (meaning, actually, to invest) and then the higher the capital share, the higher the investment and thus, the growth and the welfare. This is a sketch of the Ricardian distribution-growth model. Later, factors shares have been used as a proxy for inequality, based on the idea of the very high concentration of capital property. Anyway, factorial distribution is always a hot topic in macroeconomics.

However, how we measure factors share is a non-trivial issue. Regarding the labor share, although in principle seems a simple ratio (labor compensation over total income) a number of questions have been raised: what should be included in the numerator? (e.g. Is a Wall Street CEO a worker? What about pensions? Are the stock options of the of corporate officers labor income? Etc.); what should be included in the denominator (e.g. How to deal with the lack of labor income in the housing sector? How to manage the lack of capital income in the government sector? How should treat production taxes and subsidies? Etc.) (for these issues, see traditional works as Krueger (1999) or Gomme and Ruppert (2004)). Among all these open questions, in this homework we will mainly focus on one of the most delicate issues: how to impute the self-employed income either to capital or to labor income.

To deal with measurement problem, we will raised 7 different methods to get the gross labor share. We include a brief explanation and apply them to the US and Spain over the long run.

Method 1: Naive LS

$$LS_1 = \frac{CE}{GNP} \quad (1)$$

where CE is the compensation of employees and GNP the gross national product. The idea is that all self-employed income are kind of capital income (at the end of the day, self-employees own their own means of production).

Method 2: Extended LS

$$LS_2 = \frac{CE + PI}{GNP} \quad (2)$$

where PI is the proprietors income (meaning the self-employed income). This makes the opposite assumption than 1: self-employees are nothing but workers, all their income they get is due to their own effort.

Method 3: Naively adjusted LS

First trial for dividing the self-employed income between capital and labor. The algorithm is as follows:

- First, get the labor share of the economy excluding PI:

$$LS_a = \frac{CE}{GNP-PI}$$

- Second, apply this labor share to PI to get the labor income of self-employed:

$$LS_a PI = \frac{CE}{GNP-PI} PI$$

- Finally, add the labor income of self-employed to the labor income of workers and get the labor share:

$$LS_a PI + CE = (CE * PI + CE * GNP - CE * PI) \frac{1}{GNP-PI} = CE * GNP \frac{1}{GNP-PI}$$

Now, divide by the GNP and get the indicator:

$$LS_3 = \frac{CE}{GNP - PI} = LS_a \quad (3)$$

Then, what this third indicator does is just to subtract self-employed income from the denominator (we should stop at the very first step!).

Method 4: Factor income

It consists of a system of two equations (proposed by Gomme and Rupert (2004):

$$Y_L = CE + LS(PI + T)$$

$$Y_L = LS(CE + KI + PI + T)$$

where T are taxes and KI are capital income (rental income, corporate profits, net interest, current surplus of government enterprise); PI + T stands for ambiguous income (dealing also with the problem of imputation of taxes, to get factors shares that sum up to one). Solving the system, we get the following indicator:

$$LS_4 = \frac{CE}{CE + KI} \quad (4)$$

Method 5: Average wage

An alternative method, which is the one that is used by Ameco, and also by Gomme and Rupert to replicate BLS results, is to get the average wage-earners wage and apply it to the whole employee population (which is made of wage-earners and self-employees).

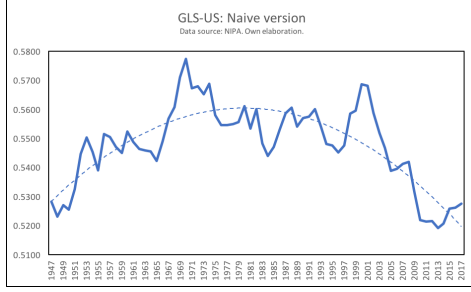
$$LS_5 = \frac{\frac{CE}{W} E}{GNP} \quad (5)$$

where W are the number of wage-earners and E the total number of employees.

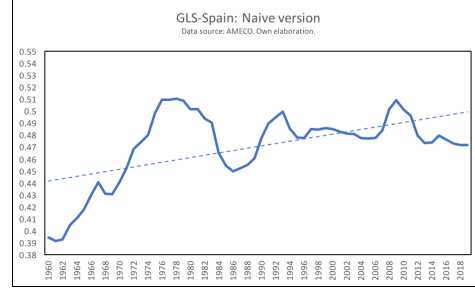
Method 6: Corporate LS

A different alternative is try to infer the economywide LS by getting it from a sector without self-employed income problem. Indeed, the non-financial corporate business sector does not include neither proprietors' income nor rental income, avoiding the issues of self-employees (and also the problem of accounting for labor income in the housing sector). We use two indicators:

$$LS_6 = \frac{CE}{GNP} \quad (6)$$



(a) Graph 1.



(b) Graph 2.

where CE stands for the compensation of employees of the corporate sector, and Y for the sectorial income.

$$LS_7 = \frac{CE}{CE + KI} \quad (7)$$

where KI are corporate profits and net payment of interests (following the idea of method 4).

Method 7: Complement of CS This method was raised by Koh, Santaaulàlia-Llopis and Zheng (2016). The basic idea is to get an adjusted capital share and get the labor share as its complement. To get the capital share they follow an approach that mimics the one suggested by Gomme and Rupert (2004): get the capital share of the unambiguous capital income (UCI); apply it to the ambiguous income to get the ambiguous capital income; add it to UCI to get the total capital income; divide it by the GNP to get the capital share; the labor share is the complement.

2 The secular GLS trend in the US and Spain

Now, we will apply the previous indicator to the United States and Spain. For the US, the data comes from both the NIPA and the Labor Force Statistics from the CPS (from the Bureau of Labor Statistics (BLS)). For Spain, the data comes from Ameco (longer series than in the INE). The data is not fully equivalent; the problem with Spanish data is that the self-employed income is not reported. Instead, they reported an adjusted labor share using the method 5. We have replicated their results (graph 4).

Graph 1 and 2 show the naive measure of the GLS for the US and Spain. Pictures look rather different: the US' shows a U-inverted shape while the Spanish' a slightly increasing trend.

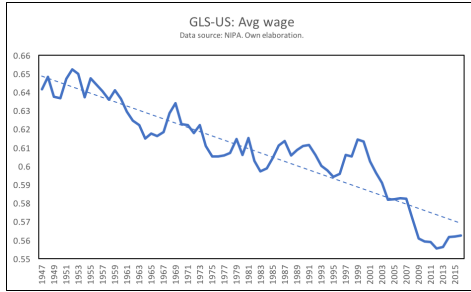
Graph 3 and 4 show the GLS measure according to method 5. Here the conclusion is very clear: the long-run trend of the GLS is strongly decreasing in both countries. Then, it modifies the previous findings quite a lot.

Graph 5 and 6 show the Corporate GLS. They are not fully comparable, because while the GLS-US is based on the non-financial corporate sector, the Spanish one uses the whole corporate sector. Note that Spanish data starts from 1995. For the last 20 years it seems that both countries exhibit a decreasing trend. For the rest of time, the American Corporate GLS is rather constant.

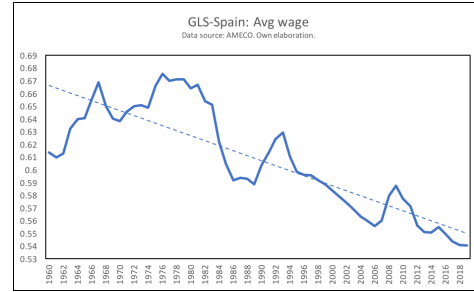
Graph 7 and 8 are exclusively for the US (due to the lack of Spanish data). Graph 7 plots the measures according to method 2 and 3. Graph 8 replicates Koh, Santaaulàlia-Llopis and Zheng findings. In both cases, the GLS shows a clear decreasing trend, no matter what adjustment method we choose.

3 Conclusions

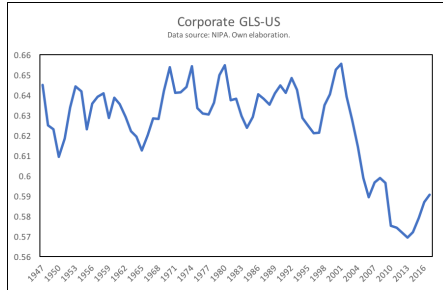
Now, we can make some comments on the long-run trend of the GLS:



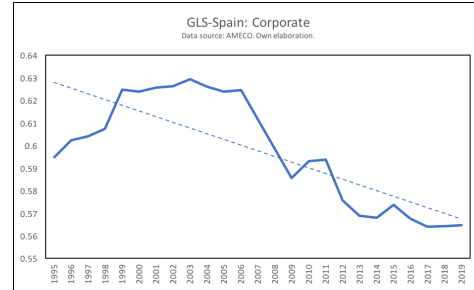
(a) Graph 3.



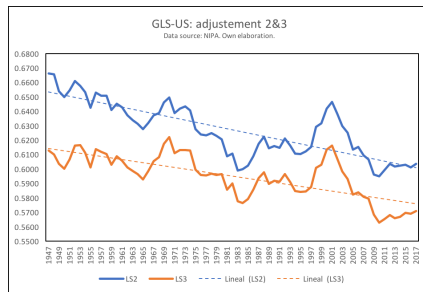
(b) Graph 4.



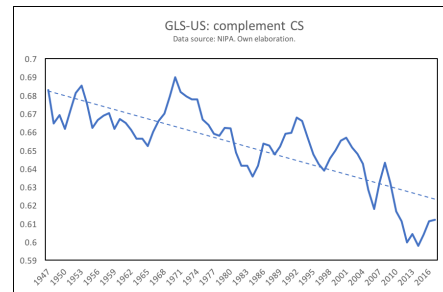
(a) Graph 5.



(b) Graph 6.



(a) Graph 7.



(b) Graph 8.

- The allegedly stability of the GLS is a myth. GLS is a variable that keeps moving through time. Understanding their causes and effects is a non-deniable task for macroeconomists.
- The decline in the GLS is a fact, consistent across different measures. When it starts is a matter of debate.
- The measure of the GLS is full of a number of sensible assumptions (e.g. we still assume a constant depreciation rate!). There is no satisfactory method yet. More work is needed!