

ISSN 1974-4110 (on line edition)
ISSN 1594-7645 (print edition)



WP-EMS

***Working Papers Series in
Economics, Mathematics and Statistics***

“LABOR SHARE IS FALLING DOWN, BUT WHICH ONE?”

- Alessandro Bellocchi (Department of Economics, Society and Politics, University of Urbino)

WP-EMS # 2020/01

Labor share is falling down, but which one?

Alessandro Bellocchi¹

Abstract

Economic theory frequently assumes constant factor shares and relegates the functional distribution of income to a secondary role. Although there are several reasons behind this, one of them is certainly related to their complex nature. Factors shares are conceptually difficult to define and even more difficult to measure. Indeed, the labor share of income is computed as a ratio between labor compensation to aggregate income, however, several adjustments are required. For what concerns its denominator taxes on production and imports (minus subsidies) must be subtracted from gross value added at market prices, while capital income needs to be calculated net of capital consumption, as this is the relevant measure when discussing inequalities. Finally, turning to the numerator, the total compensation of employees needs to be adjusted for the income of the self-employed. In this case the most common correction increases the compensation of employees with part of income from other categories of workers, assuming that they earn a salary which is equal to the average salary of the employees. To sum up, all these choices carry with them a degree of arbitrariness that inevitably leads to different estimates for the labor share. Exploring how the labor share is constructed, considering the approaches used to adjust it and doing a comparison with existing measures is the aim of this paper. We employ multilevel U.S. national account data and find that while the unadjusted labor share remained almost constant, the adjusted labor share decreased more or less markedly depending on the method employed for the adjustments and the choice of denominators. Further, the virtual stability hides a significant composition effect that is ultimately detrimental to labor.

Keywords: factor shares, income distribution.

¹ DESP - Department of Economics, Society and Politics; University of Urbino Carlo Bo, Italy. e-mail: alessandro.bellocchi@uniurb.it.

1. Introduction

The most recent empirical contributions on the functional distribution of income indicate that significant structural changes have occurred in both advanced and developing economies over the last 40 years (Karabarbounis and Neiman 2014). The decline of the labor income share is a phenomenon frequently witnessed in recent years around the world and contradicts the long run stability of functional distribution as a "stylized fact of economic growth" (Kaldor 1961). Authors put forward several explanations for the observed downward trends which range from rapid technological progress (Bentolila and Saint-Paul, 2003) and the liberalization of trade and capital (Guscina, 2006) to product and labor market institutions (Blanchard and Giavazzi, 2003). Someone also wondered whether the apparent decline could be due to measurement issues. Recent studies have shown that the apportionment of self-employment income, as well as different adjustments made to correctly account for indirect taxes and capital depreciation have a significant effect on factor shares (Bernanke and Gürkaynak 2001; Rognlie 2016; Bridgman 2018 and Guerriero 2019). However, also due to the difficulty of finding data for a sufficiently long period of time and a significant number of countries, to our knowledge, few attempts have been made to address this issue. The calculation of the labor share employing different techniques of measurement and corrections methods and the analysis of how these impact on its general trend is exactly the gap that this paper wants to fill. The remainder of the document is organized as follows. Section 2 offers a detailed overview on how income is recorded in national accounts; Section 3 presents all the alternative data sources; Section 4 operates a decomposition and analyzes how different components of national income have changed over time; Section 5 shows 7 alternative methods commonly employed by the literature to apportion the income of self-employed and derives a strong measure for the labor share in the U.S.; Section 6 check the robustness of the estimates and provides some comparisons. The results offer evidence against the idea that the share of labor in the United States has been stable over time. Finally, Section 7 concludes with some suggestions for possible further extensions of the research.

2. National accounts

National statistical offices or the departments of commerce of different states shall publish reports which include elements of aggregate income such as wages, benefits, proprietors' (or mixed) income,² interest, rents and corporate profits and therefore there is no such a clear separation between wages, profits and rents as we use to have in economic models. Indeed, at least since Gollin (2002) and Gomme and Rupert (2004) has been clear that the measurement of the labor share from macro data is not as simple as one might think. This means that basically, not all the different types of income can be easily ascribed to either capital or labor and a proper attribution is crucial to provide an accurate assessment of the shifts that have taken place in the distribution of income. Secondly, it is equally important to define the terms as accurately as possible. Indeed, there is often some confusion surrounding these concepts, such as for instance referring to a "wage share" while having in mind what is actually more a "labor share". Therefore, in order to avoid potential sources of misunderstanding these issues will be addressed from the beginning. Let start by remembering that a share, in this case an income share, depends on both its numerator and its denominator. The denominator employed is typically the GDP (Gross Domestic Product), GDI (Gross Domestic Income), NNI (Net National Income) or GVA (Gross Value Added).³ In order to make a meaningful comparison, the shares should always be expressed in the same aggregate. From this point forward - unless explicitly stated - we will always refer to the GDP measured at factor cost, which can be defined as "the sum of net value added by all the producers in the domestic territory of the country and consumption of fixed capital during an accounting year". According to Guerriero (2019) the latter measure is more meaningful in computing the labor share, since taxes do not represent any kind of return to property or capital, and hence cannot be considered as a non-labor income. On the other hand, subsidies are instead retained (Glyn, 2009). Gross value added at factor cost is not a concept used explicitly in the system of national account (SNA, 2008).⁴ Nonetheless, it can be easily derived from each of the measures of gross value added (i.e. at basic current prices or at producer's prices)

² From the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce, the macroeconomic aggregate called "proprietors' income" includes current-production income of sole proprietorships, partnerships, and tax-exempt cooperatives, while it excludes dividends, monetary interest received by nonfinancial business, and rental income received by persons not primarily engaged in the real estate.

³ The standard definition of capital income implies the measurement net of capital consumption. Therefore, consumption of fixed capital should be subtracted from the measure of value added, to obtain a net measure (Kuznets, 1959).

⁴ The biggest difficulty in the construction of the GVA (or the GDP) at factor cost is that there is not a set of observable prices that can be employed to obtain it directly by multiplying prices by the total quantities of production. By definition, other taxes or subsidies on production are not items like taxes or subsidies on products that can be removed from producer/input prices. Thus, despite its traditional name, GVA at factor cost is not strictly a measure of output but is essentially a measure of income. Indeed, it represents the amount of income to be distributed from GVA after payment of all taxes on production and net of all subsidies (SNA2008).

by subtracting the value of taxes on production of any kind, less subsidies on production - payable out of gross value added as defined.⁵ Actually, the only taxes on production remaining to be paid out of gross value added at basic prices consist of “other taxes on production” - D.29) which are not charged per unit. These consist mostly of current taxes (or subsidies) on the labor or capital employed in the enterprise, such as payroll taxes or current taxes on vehicles or buildings.

$$\begin{aligned} \text{GDP at Factor Cost} &= \sum \text{of all GVA at factor cost} = \\ &\text{GDP at market price} - \text{Taxes on products and production} + \text{Subsidies} \end{aligned}$$

Alternatively, another way of calculating the GDP at factor cost is by summing the total of compensation of employees' in an accounting year and depreciation of fixed capital (capital consumption). In this way we obtain the Gross Domestic Income - GDI (following the so-called income approach to GDP). Net Domestic Product (NDP) - which excludes depreciation⁶ - is also called Net Domestic Income (NDI).

$$\begin{aligned} \text{GDP at Factor Cost} &= \\ &\text{Net Domestic Product at factor cost} + \text{Indirect taxes minus subsidies} + \text{Depreciation} \end{aligned}$$

The income approach to GDP is based on the accounting reality that all expenditures within the boundaries of an economy should equal the total income generated by the production of all economic goods and services - i.e. every dollar of income must ultimately be earned either by the factors employed in production (capital and labor), or be retained by government. Therefore, by adding all the sources of income together, a quick estimate can be made of the total productive value of economic activity over a certain time period. Then, additional adjustments are necessary for taxes, depreciation, and foreign factor payments. Actually, aggregate production is the result of the joint work of several factors involved in the production process. In exchange for their

⁵ Taxes on products are taxes which are proportionally connected to the quantity or value of goods and services produced, sold or imported by residents. They include (among others) value added tax, taxes on sales and purchases, taxes on services, taxes on exports and imports, etc. Subsidies are uncompensated (and unrequired) current payments due by the government to firms in connection with their production activities.

⁶ Depreciation is the loss of value of an ageing asset. It represents a deduction from income in order to account for the loss of capital value due to the use of capital goods in production. "Consumption of fixed assets" was used as a synonym for "Depreciation" in the SNA 1993. However, unlike "depreciation" in business accounting, CFC in national accounts is not a method of allocation for the costs of past expenses for fixed assets in subsequent accounting periods. Rather, it is the decrease in future benefits of the assets due to its employment in the production process.

contribution, they receive a remuneration in the form of rent, wages, interest and profit. Total national income is exactly equal to the sum of all wages plus rents plus interest and profits.⁷ These payments to factors are called production cost or factor cost. From the point of view of the company, they are costs and from the point of view of the factors, it is their income.

Gross value added (GVA) = <i>Compensation of employees</i> + <i>Gross operating surplus</i> + <i>Mixed income</i> + <i>Other taxes less subsidies on production</i>	Gross value added (GVA) = <i>Compensation of Employees</i> + <i>Corporate Profits</i> + <i>Rental Income</i> + <i>Net Interest Income</i> + <i>Proprietor's income</i> + <i>Indirect taxes less subsidies</i> + <i>Depreciation</i>
---	--

Whilst the concept of value added is initially found in the *Production account*⁸ of the national accounts, it is the *Primary distribution of income account* which shows how the gross value added generated in the economy is distributed back to labor, capital, government and, where necessary, flows to and from the rest of the world. Indeed, in compliance with the specifications of the SNA, the Primary distribution of income account is never presented as a single account but always as two sub-accounts. The first of these is the *Generation of Income Account* (Table 1) in which value added is distributed to labor (in the form of compensation of employees), capital and government (taxes on production and imports less subsidies as far as they are included in the evaluation of output). The distribution to capital appears in the balancing item as operating surplus or mixed income (1). On the other hand, the *Allocation of primary Income Account* (Table 2) shows the remaining part of the primary distribution of income. It contains operating surplus or mixed income as a resource and records, for each sector, property income receivable and payable, and compensation of employees

⁷ All final goods and services are produced using factors of production, therefore, by summing up the payments to factors we can estimate the value of GDP: (i) Compensation of employees includes wages, salaries, fringe benefits, contributions to social security, health care and retirement plans. (ii) Rent is the income of the property owners. (iii) Interest is the income of the suppliers of money capital. (iv) Proprietor's Income is the income of incorporated business, sole proprietorships, and partnerships. (v) Corporate Profits is the income of the corporations' stockholders whether paid to stockholders or reinvested.

⁸ The production account is explicitly built to show value added as one of the main balancing items of the system. As a consequence, it does not cover all the transactions connected with the production processes, but only the result of production (output) and consumption of goods and services for producing it (intermediate consumption). Intermediate consumption of goods does not include the progressive wear and tear of fixed capital which is recorded as a separate transaction (consumption of fixed capital) and constitute the difference between the gross and net balancing items. All the institutional sectors have a production account.

and taxes, less subsidies, on production and imports receivable by households and government. Since transactions of this kind may appear in the *Rest of the world account*, these must be included as well. As can be seen, the balancing item of the Allocation of primary income account (and of the complete primary distribution of income account) is the balance of primary income (2).

Generation of income account	
<i>Uses</i>	<i>Resources</i>
Compensation of employees	Value added (VA)
Taxes on production and imports	
Subsidies (-)	
Operating surplus, net (1)	
Mixed income, net (1)	

Table 1 - The Generation of income account (Primary distribution of income) of the national accounts.

Source: The system of national accounts, 2008.

Allocation of primary income account	
<i>Uses</i>	<i>Resources</i>
	Operating surplus, net
	Mixed income, net
	Compensation of employees
	Taxes on production and imports
	Subsidies (-)
Property income	Property income
Balance of primary incomes (2)	

Table 2 - The Allocation of primary income account (Primary distribution of income) of the national accounts.

Source: The system of national accounts, 2008.

The *Secondary distribution of income account* (Table 3) deals with the redistribution of income through current transfers other than social transfers in kind made by government and other non-profit institutions serving households (NPISHs) to households. As resources, it records, in addition to the balance of primary incomes, current taxes on income, wealth, etc. and other current transfers except social transfers in kind. On the uses side, the same kinds of transfers are also recorded. Since these transfers are resources for some sectors and uses for others, their exact content varies from one sector to another. Although employers normally pay social contributions on behalf of their employees directly to the social insurance schemes, in the SNA these payments are treated as if they were made to employees who then make payments to social insurance schemes. In terms of the accounts, this means that they first appear as a component of compensation of employees in the use side of the generation of income account of employers and the resource side of the Allocation of primary income account of households (adjusted for external flows in compensation of employees). They are then recorded as uses in the secondary distribution of income account of households, and as resources for the sectors managing social insurance schemes. The balancing item of the Secondary distribution of income account is disposable income (3). For households, this is the income that can be used for final consumption expenditure and saving. For non-financial and financial corporations, disposable income is income not distributed to owners of equity remaining after taxes on income are paid.

Secondary distribution of income account	
<i>Uses</i>	<i>Resources</i>
	Balance of primary incomes
Current transfers	Current transfers
Current taxes on income, wealth, etc.	Current taxes on income, wealth, etc.
Net social contributions	Net social contributions
Social benefits other than social transfers in kind	Social benefits other than social transfers in kind
Other current transfers	Other current transfers
Disposable income (3)	

Table 3 - The Secondary distribution of income account of the national accounts.

Source: The system of national accounts, 2008.

Understanding how national accounts work and in particular how different types of income are recorded turns out to be crucial in addressing another problem closely related to the calculation of the labor share, namely, estimating the impact of the self-employed. Usually the labor share is calculated first, while the capital share as a residual. Therefore, although it is considered elementary to be determined from a theoretical point of view, some problems may emerge from its measurement. Actually, for what concerns the numerator, we can distinguish between:

- The *wage share* (i.e. share of wages on a chosen measure of income);
- The *compensation share* (i.e. sum of wages and benefits on a chosen measure of income);
- The *labor share* (i.e. sum of wages, benefits and an estimate of the labor component of mixed income on a chosen measure of income).

Hence, depending on the choice of numerator and denominator, a wide range of labor shares can be calculated, and they do not necessarily tell the same story. The first two measures are generally easy to obtain; the labor share is trickier. Likewise, one should pay attention to what he is meaning when referring to the complement to unity of the labor share. “Capital share” may be an equally misleading term in applied research, and the term "profit share" refers only to corporate profits. According to national accounting practices, the complement to unity of the labor share can be simply called "non-labor share of income”.

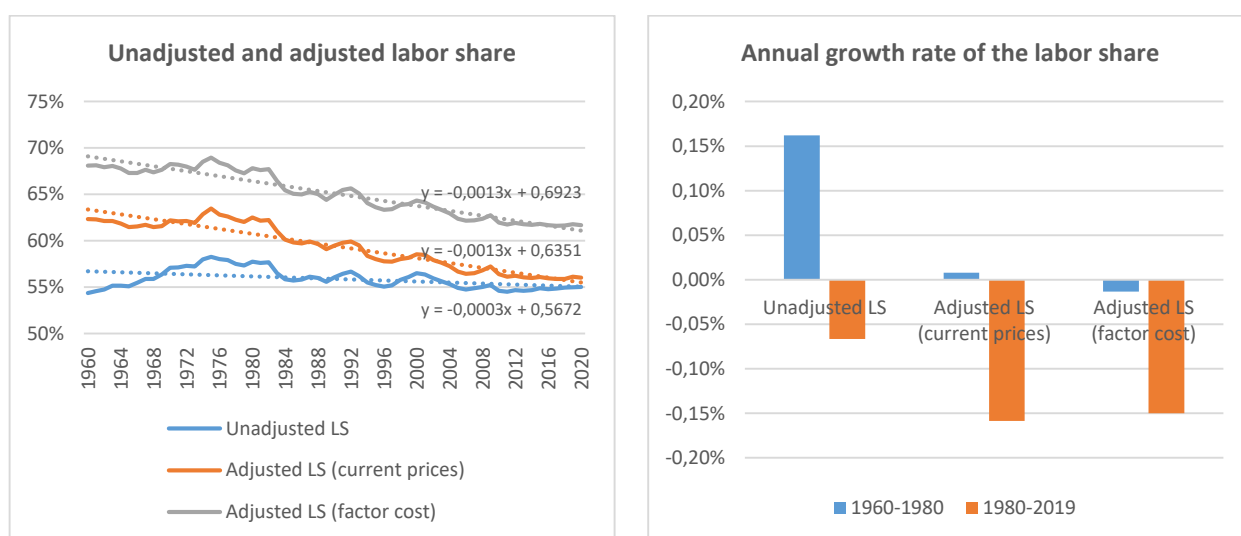


Figure 1 - Unadjusted and adjusted (global) labor share of income and average annual growth rate.

Note: Weighted average for developed countries. *Source:* Author's calculation on AMECO.

Figure 1 - panel a, presents the official AMECO data for the adjusted labor share in a sample of advanced economies.⁹ The latter is defined as the ratio of labor compensation and GDP at factor cost at each and every time t :

$$LS_t = \frac{W_t}{Y_t} = \frac{w_t L_t}{P_t Y_t} \quad (1)$$

Where:

- LS_t is the labor share for the aggregate economy;
- W_t is total labor income (total compensation of employees);
- Y_t is the GDP at factor cost;
- w_t is the nominal rate of labor income (the nominal wage rate or nominal compensation);
- L_t is the level of employment (persons employed);
- P_t is the overall price level.

The hourly basis for compensation and labor productivity is practical because it directly accounts for every change in the duration of work.¹⁰ However the availability of data is in some cases limited. The compensation share is calculated from the national accounts by dividing total compensations in the economy for aggregate GDP (either at basic prices or factor cost as in the version we employed) and sometimes is also called *unadjusted labor share*. The measure of compensation is generally considered a better measure than the simple “wages and salaries”, because it takes also into account of some other forms of non-wage compensation - such as for instance bonuses, family allowances, employers’ contributions to social security, health and other pension schemes. The definition of the U.S. Bureau of Economic Analysis in compiling these data includes for instance realized stock options and all the taxable fringe benefits which are not part of the pay package of a typical worker (Krueger, 1999).

In contrast to the unadjusted labor share, the *adjusted labor share* increases the unadjusted labor share to correct this latter for the level of self-employed since, as explained in

⁹ The countries included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom and the United States. Weighted average by using Gross domestic product at current factor cost (Mrd PPS).

¹⁰ Employment in persons counts all persons involved in the production activities. Employment in hours worked refers to all the hours worked, whether paid or not. However, data on annual hours worked have been incorporated into national accounts only recently for many countries. Actually, the integration of labor accounts into national accounts has turned out to be a long and complicated process. Where available, employment data in NA cover employees and self-employed persons working in domestic production units.

Krueger (1999) and Gollin (2002), this indicator has very strong limits. Actually, by including only direct payments to workers, we are implicitly classifying all the income of the self-employed as capital income, hence underestimating the real real labor share and potentially introducing a bias in international comparisons.¹¹ Published and unpublished data have been employed by the literature and different international organizations to derive an adjusted version of the measure. Data on the compensation of employees is usually readily available for the US, EU member states and advanced economies of the world.¹² However, data on the labor income of the self-employed has to be estimated since the national accounts record labor income of self-employed together with capital income of corporations and quasi-corporations. Given the limitations in both measuring mixed income as well as allocating a “fair” share of it to labor, in order to obtain comparable series for a large number of countries, AMECO overcome the problem by means of a correction which does not rely on mixed income data. The adjusted labor share is then calculated by AMECO as:

$$LS^{adj}_t = \frac{\frac{\text{compensation of employees}}{\text{number of employees}} \cdot \text{total employment}}{\text{gross domestic employment at factor cost}} \times 100 \quad (2)$$

The resulting measure is readily available in the Commission’s AMECO database as variable ALCD2.¹³ However, it is worth noting that that such an adjustment is implicitly based on the assumption that the share of self-employed in the workforce remains constant over time, and that the self-employed workers earn exactly the same as employees. However, this is not necessary the case. For instance, it is plausible that in the 1960s a higher percentage of self-employed workers worked in the agricultural sector than today where most of the self-employed are employed in the liberal professions and services (e.g. lawyers, consultants, doctors, etc.). Data on self-employment collected by the BLS as part of the Current Population Survey for the U.S. show that while in 1960 33.5% of all the self-employed were working in agriculture (2.776.000), in 2019, with 741.000 employees, agricultural workers represented only 7.8% percent of the total (Figure 2).

¹¹ The income earned by the self-employed represents both returns to work and returns to capital. Especially in developing countries, the self-employed and the people working in family businesses account for a consistent share of the total workforce.

¹² Compensation of employees shall include all the wages and salaries - both in cash and in kind - paid to workers in return for their labor and the social contributions paid by employers, which comprises pension contributions and non-pension contributions such as social security payments or other insurance forms.

¹³ This measure of the labor share will be an unbiased indicator of the labor income share as long as, on average, the self-employed earn the same labor compensation as employees.

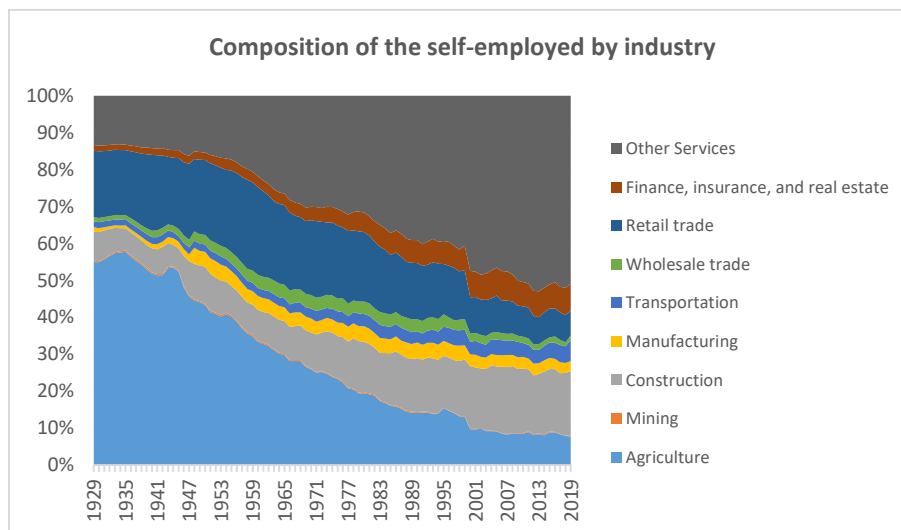


Figure 2 - Composition of the self-employed by industry in the U.S. (1929-2019).

Source: Author's calculation on BEA.¹⁴

Nevertheless, there is a wealth of information that can be obtained from a deeper investigation. At first glance, since compensation of employees is unequivocally labor income and corporate profits, rental income, net interests and depreciation are unequivocally capital income, deriving respectively the labor and capital shares seems to be an easy and straightforward exercise. The total income earned by factors can be split into what is earned from working activities into wages, salaries and benefits, and what is earned from the employment of capital into profits and interest payments. However, the line between the two categories may be rather blurry; for instance, should the income earned by someone who runs his own business be accounted as "labor" income received for the hours worked, or as "capital" income received from ownership of the business itself, or a combination of both? As mentioned earlier, we should be very careful when calculating the labor share, as there is a problem concerning the allocation of proprietors' income - the so-called apportionment of proprietors' (or mixed) income problem.¹⁵ In addition, the more one deepens his knowledge of the national income and product accounts, the more he becomes aware that simple calculation are often inappropriate. For this reason, some important considerations should be done

¹⁴ Bureau of Economic Analysis (BEA). National Income and Product Accounts - Table 2.1 Employment by Major Industry Sector. Self-employed consists of proprietors or partners who devote the majority of their working hours to their unincorporated businesses.

¹⁵ From the glossary of the U.S. Bureau of Economic Analysis (BEA): Proprietors' income = current production income of sole proprietorships, partnerships, and tax-exempt cooperatives. It excludes dividends, monetary interest received by nonfinancial business, and rental income received by persons not primarily engaged in the real estate. Some other countries call proprietor's income "mixed income", as it includes both effort of the proprietor as a worker and indirect income through the ownership.

in order to have clear in mind all the various biases that could affect our measurement of the labor share:

- (i) *Consideration n.1:* How should the allocation of proprietors' (or mixed) income between labor and capital be done? Since proprietors' income has components of both labor and capital income, it should (ideally) be allocated between labor and capital. As we will see, there are different techniques to do that and the choice of a method rather than another necessary leaves room for a certain arbitrariness.
- (ii) *Consideration n.2:* How should the public sector's lack of capital income be address? In the government sector, there is no capital income and all the value added generated is composed of wage and salary plus consumption of fixed capital. Therefore, including the public sector is likely to bias the measured labor share upward.¹⁶
- (iii) *Consideration n.3:* How should the housing sector's lack of labor income be addressed? The national income account imputes rents as capital income to owner-occupied housing but does not impute any labor income. This omission in the labor income component of owners-opposed housing is expected to bias the estimated labor share downward.
- (iv) *Consideration n.4:* How should indirect taxes less subsidies be addressed? If government is excluded from the measurement of national income, as discussed above, for logical consistency indirect taxes less subsidies should be apportioned to both capital and labor.
- (v) *Consideration n.5:* Should income be measured on a gross or a net basis? In other words, should depreciation be included or excluded from the measurement of output? Usually, in macroeconomic applications, gross value added is preferred because it measures the total production of a sector. However, the latter has the advantage of avoiding allocating amortization across the different shares of capital income, and hence may be preferable for analysis on the capital side.

¹⁶ Compensation of employees is the only form of income in the government sector. There are no interest, rents, proprietors' income or profits reported for this part of the economy which however constitutes 20% of the total VA. In the system of national accounts, the labor share of the public sector is, by definition, 100%, since public production is valued at its labor input. As a consequence, an expansion of the size of the state in the economy including it in the calculation always raises the labor share. Nevertheless, what emerges by focusing on the private sector is similar to the results obtained for the whole economy (OECD, 2015).

In the following pages, we will show that all these decisions regarding the use of gross rather than net value added (i.e. the denominator) as well as the choice of what sectors include in the calculation and the methods used to apportion mixed incomes (and then the numerator) affect in a significant and not trivial way the level of the estimated labor share of income. As already stated, some measures of the labor share consider only the non-farm business sector of the economy (i.e. they exclude the general government, non-profit institutions, paid employees of private households, and the rental value of homes occupied by the owners). According to BLS data (2019), together, all these items excluded from the calculation are worth approximately 23% of national income in the United States. Similarly, by looking at Eurostat data, agriculture and the public administration together account for about 20,5% of the total GVA in Europe.¹⁷ One of the reasons for the exclusion of these sectors lies in the abovementioned difficulty of measuring their value added. Including them in the calculation is likely to affect the labor share positively. Measures of the labor share published by different statistical agencies differ principally with regards to decisions made on these items, and the lack of transparency behind the methodology followed is made worst by the fact that in many cases publications consist of highly aggregated data. The lack of information makes extremely hard if not impossible to break down the time series and understand how they are constructed, as well as under what assumptions. As we will see, even if the available data does not allow the addressment of all the aspects we have discussed - especially in order to have comparable data for a large number of countries - it is still possible to disentangle and, in many ways, improve the basic measures of the labor share provided by international statistical agencies.

3. Data sources

There are a number of reasons why it is important to derive and compare alternative series for the labor share. Recently, three datasets have been made available to the public by respectively the Organisation for Economic Co-operation and Development (OECD), the European Commission (EC) and the United Nations (UN), increasing the availability of data for international comparisons:

- *AMECO*: The Annual Macro-ECONomic (AMECO) database of the European Commission's, offers data on the adjusted labor share on an annual basis for 40 advanced OECD economies.

¹⁷ BLS: Table B-1. Employees on non-farm payrolls by industry sector and selected industry detail; Eurostat: Gross value added and income by A*10 industry breakdowns [nama_10_a10].

The starting date of the series varies but most of them start in 1960. The labor share of income share is computed as the compensation of employees over the GDP multiplied by total employment.

- *OECD*: The system of unit labor costs Indicators of the Organization for Economic Cooperation and Development (OECD) provides annual data on the labor share for 46 countries and different economic areas. These are developed by the OECD and data is extracted from the system of national accounts of members countries with some harmonization in order to increase the international comparability.
- *UNSNA*: The United Nations System of National Accounts (USNA) presents a detailed collection of data on national accounts of participating countries and adjust them in order to make the series comparable. More exactly these are part of the UN national accounts statistics, a database prepared by the statistics division of the department for economic and social affairs and consisting of analytical tables for 178 countries from 1946 onwards. For the majority of the countries, it provides yearly data on the main national aggregates, which were collected using the SNA 1993 and later updated following the SNA 2008. It is maintained and updated on the basis of annual collections and supplemented with estimates for those years and countries with incomplete information.¹⁸
- *ILO*: The International Labor Organization (ILO) publishes both an adjusted and an unadjusted measure of the labor share, each of which is produced starting from national accounts data of the UN. The period covered by the series is shorter than the one in AMECO, however the sample is larger.

Only for the U.S. the most accurate raw data come from primary sources, i.e. the National Income and Product Accounts (NIPA) and are then elaborated by the Bureau of Labor Statistics BLS to extract the labor share.

- The National Income and Product Accounts (NIPA), produced by the Bureau of economic analysis (Department of commerce). Data are available on a quarterly basis since 1947 and

¹⁸ However, some comparability issues are still present in the data (see Hartwig, 2006).

on an annual basis from 1929. This incredible availability of long-term, high-frequency data makes the United States the country with the best data coverage in the world.

- The Bureau of Labor Statistics (BLS) of the Department of labor, calculates a labor share of income in two of its databases: one relative to “labor productivity and costs” (from 1947, quarterly) and one relative to “multifactor productivity” (from 1987, annually). In both cases the series include the private nonfarm business and manufacturing sectors.

4. Shares of gross domestic income

Macroeconomists usually calculate factor shares not by relying on firm-level data but starting from economic aggregates.¹⁹ Indeed, a broadly used strategy is to estimate the labor share of income at starting from the share of employee’s compensation in GDP. Such aggregates are available for many advanced countries. For instance UN data on the allocation of primary income account (gross operating surplus, gross mixed income, compensation of employees and property income) are available for a number of advanced countries of the world, including the United States, France, Italy, the United Kingdom, Germany and Spain.²⁰ However, outside the U.S. the covered time period is variable and in many cases limited, with the first observation respectively in 1950, 1980, 1987, 1991 and 1995. Nevertheless, for some of them, like for instance the U.S., the great availability of highly disaggregated macro data for a longer time period allows us to do an in-depth analysis. Table 1.11 of the National Income and Product Accounts (NIPA) and BEA Table 1.10, present a detailed decomposition of all the percentage shares that make up the aggregate Gross Domestic Income (with yearly observations from 1929 to 2018).

¹⁹ A few studies have recently proposed some methods for the estimation of the labor share using micro-level data. The methodology consists basically on using repeated cross-sectional household survey data representative at the national level which contain an exhaustive classification of income by source. They then estimate the labor share using different estimators. As a result, there are large differences in the factor’s share obtained using NIPA’s data and those obtained using household survey data (Adler and Schmid, 2012; Wolff and Zacharias, 2013; Steffen, 2013; Schlenker and Schmid, 2014; Tansever, 2017). However, authors also mention some limits of these approaches.

²⁰ The complete list of countries consists of: Australia (1959-2017), Austria (1995-2017), Belgium (1985-2017), Canada (1970-2017), Denmark (1981-2018), Finland (1975-2017), France (1950-2017), Germany (1991-2017), Greece (1995-2017), Hungary (1995-2017), Iceland (1995-2014), Italy (1980-2017), Japan (1980-2017), Latvia (1995-2017), Liechtenstein (1998-2016), Luxembourg (1995-2017), Mexico (1993-2017), Netherlands (1980-2017), New Zealand (1986-2016), Norway (1978-2018), Poland (1991-2017), Portugal (1995-2018), Republic of Korea (1975-2017), Slovakia (1992-2017), Spain (1995-2017), Sweden (1993-2018), Switzerland (1990-2017), Turkey (2009-2015), United Kingdom (1987-2017), United States (1970-2017).

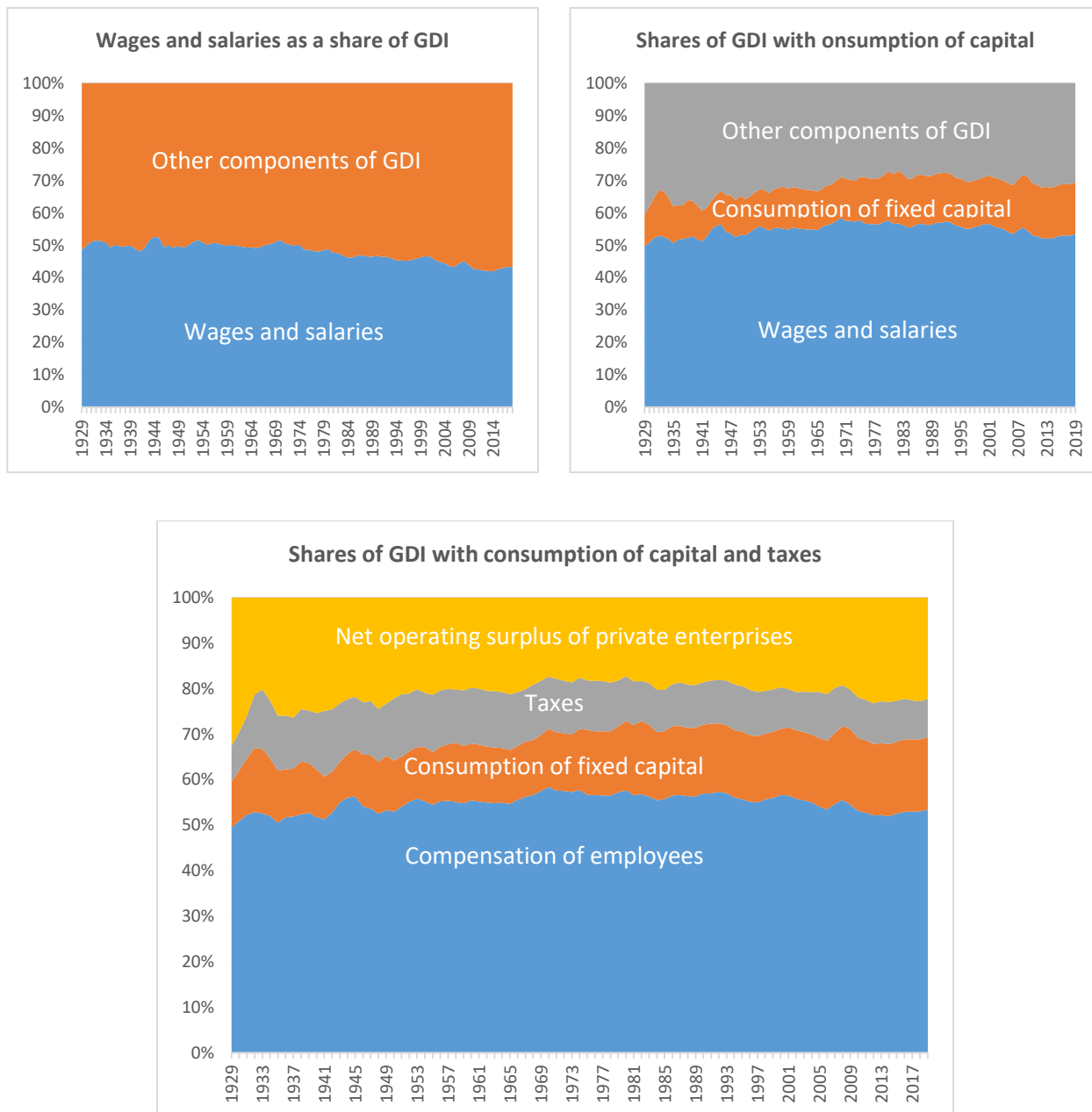


Figure 3 - Wages and salaries, consumption of fixed capital and taxes as shares of GDP (1929-2018).

Source: Author's calculation on data from NIPA Table 1.11.

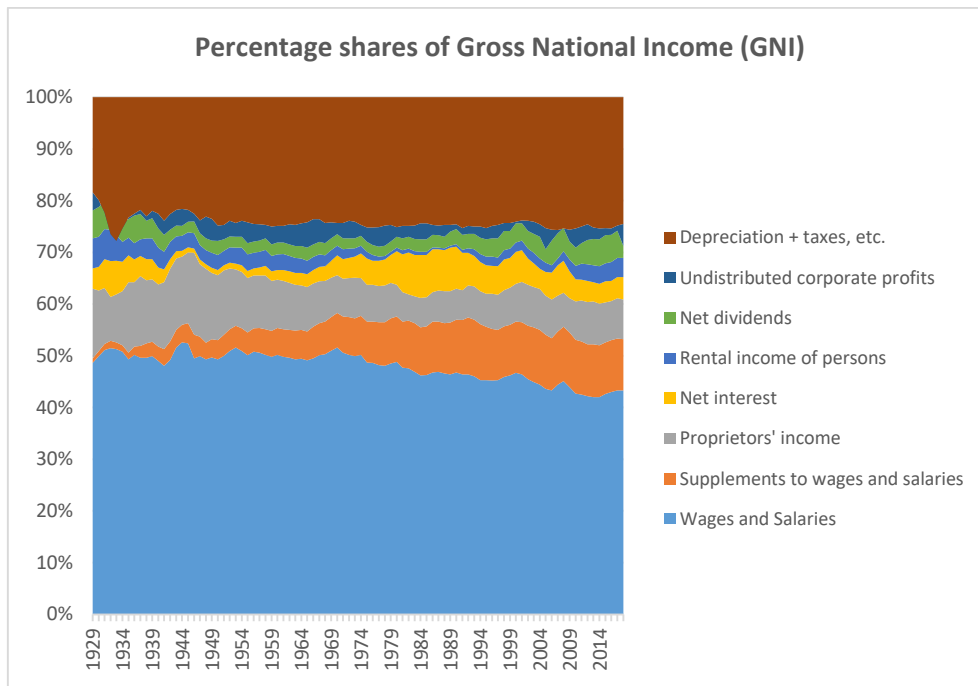


Figure 4 - Percentage shares of Gross National Income (1929-2018).

Source: Author's calculation on data from NIPA Table 1.11.

While the GDP measures what is purchased, GDI measures who is paid. Figure 3 shows all the incomes realized in the United States since 1929. Instead of showing the overall increase in wages and salaries (from 50 billion of dollars in 1929 to 9.3 trillion in 2019), the graph shows wages and salaries as a share of the total. This result - in scale - is similar to an analysis of personal income as reported on tax records.²¹ What emerges is that the largest component of GDI in the U.S. (similarly to other advanced countries) is represented by wages and salaries. Historically, about half of all national income went to workers in this form. Figure 3 - panel a, highlights the well-known secular trend: wages and salaries are decreasing as a share of total income. After remaining stable at around 50% before 1970, the wage share has now dropped to 43% in 2018. We can take a step forward by decomposing all the components of the GDI, as shown in Figure 4. What immediately stands out is that the share of depreciation, taxes, business current transfer payments and subsidies did not change much over the last 90 years (between 1930 and 2018) and hence it is as if changes in taxes have been offset by those in depreciation and amortization - see the capital consumption share in Figure 3, panel b). Further, given the virtual stability of this share in GDI, it is possible exclude it from the total. For this reason, it is not uncommon to talk about relative labor share in Net National Income (NNI). Indeed, in some cases the net labor share - where consumption of fixed capital is

²¹ Wages and salaries are also the largest form of taxable income (Cole, 2015).

subtracted from the operating surplus of corporations and unincorporated businesses, in both the numerator and the denominator - may be more significant, because depreciation is not consumed (Blanchet and Chancel, 2016; Rognlie, 2016).²² Similarly, Figure 3 - panel c separates the effects of both depreciation and public administration and show that the share of taxes charged on enterprises (obtained by clustering together taxes on production and imports with taxes on corporate income)²³ has decreased over time from 13.7% of GDI in 1950 to 8.3% of GDI in 2019, remaining however constant over the last 30 years. The residual part of income is income that private company actually distributes to individuals. Most of this income is composed of labor compensation (at the bottom of the graph), but a minority of it is constituted by other types of income, clustered together as the net operating surplus of private businesses (represented at the top). At this point one may wonder why the part of income consisting of individual taxes on wages, salaries and investments has been excluded from the analysis. The problem with including this share is that taxes affect different types of income in different ways and what we observe is just the aggregate result of a complex taxation process. Therefore, it is impossible to distribute individual income taxes in an accurate way. Instead, we focus on the part income that people receive from businesses before paying tax on these different types of individual income. This amount is approximated by the combination of labor compensation and net operating surplus in Figure 3.

In Figure 5, we subtract both depreciation and taxes and apply a simple allocation technique for mixed income. For instance, Bridgeman (2018) of the BEA concluded that once depreciation and production taxes are subtracted, “recent net labor share is within its historical range whereas gross share is at its lowest level.” In other words, he argues that the historic low in labor share can be attributed to taxes and depreciation.²⁴

²² Part of national income do not accrue to either individuals, firms or even the government. Some income is just lost as goods wear and tear out. Machines, plants and building break down, while computers and software becomes obsolete. These things require replacement, which costs money. In this sense, depreciation represents the income that individuals, businesses and governments set aside to replace capital.

²³ The former category (i.e. taxes on production and imports) comprises state and local taxes that businesses pay, as well as federal duties. The latter (i.e. taxes on corporate income) is the sum of all corporate income taxes paid. These two categories do not include taxes on personal income of individuals, but just those out of business profits.

²⁴ Bridgeman excluded production taxes and depreciation from net income, but not corporate income taxes. He includes proprietors' income in the capital share, while acknowledging that some of that income was actually labor income.

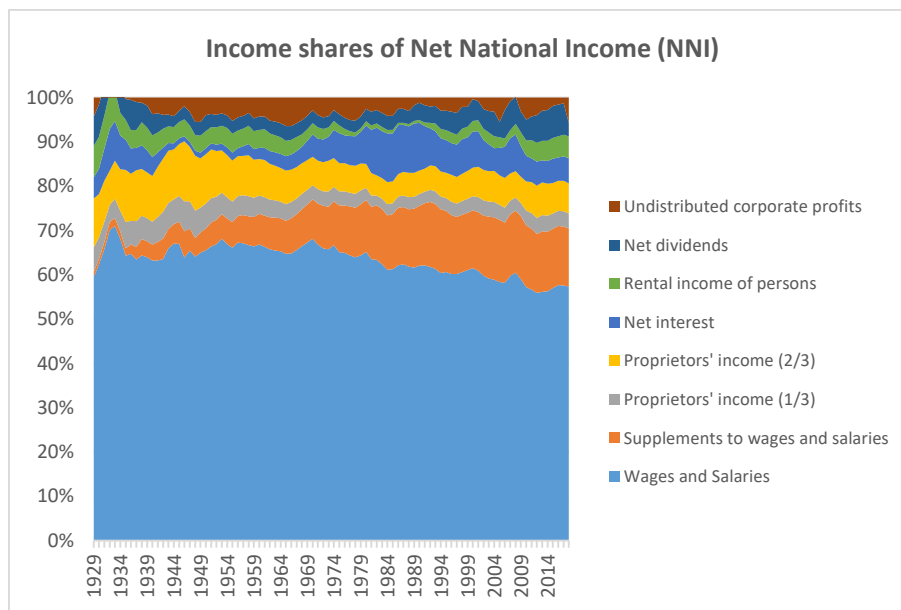


Figure 5 - Percentage shares of Net National Income (NNI).

Source: Annual data from NIPA Table 1.11.

Figure 5 reveals an important composition effect. While the compensation share (i.e. wages and salaries plus supplements) has remained roughly constant from the early 70s (oscillating between 69 and 77% of NDI), as already noticed the share of wages has been falling since then (-10 percentage points, or a total loss for labor of roughly 0.002% a year). Therefore, the overall stability of the compensation share has been obtained thanks to an opposite and equal increase in the part of compensation that does not take the form of wages or salaries. This consists mainly of pension contributions (including Social Security - with Medicare and Medicaid²⁵ or COLAs)²⁶ and insurance premiums (such as health insurance) paid by employers following the expansion of the welfare state (see Figure 6 below where we decompose this specific invoice). From an economic point of view, they are costs for firms, while, on the other hand represent a compensation for workers. However, it should be noted that given the mixed nature of the benefits, this part of income it is not as flexible as wages and salaries are. The “non-labor” share of compensation has grown dramatically in the last century. It was a negligible part of net national income in 1929 (around 1%), it now exceeds 13% of NNI. There are several reasons that can explain the marked increase of this component over the

²⁵ Medicare and Medicaid are two different, government-run programs. They are funded by different parts of the government budget and serve different groups. (i) Medicare is a federal program that provides health coverage for everyone over the age of 65 or under who has a disability, regardless of its income.; (ii) Medicaid is a state and federal program that provides health coverage to citizens with a very low income.

²⁶ Legislation enacted in 1973 provides for cost-of-living adjustments, or COLAs. With COLAs, Social Security and Supplemental Security Income (SSI) benefits keep pace with inflation.

years and probably a leading role has been played by the growth of the health sector. Quality of healthcare has improved at an incredible rate over the last century, but the cost of employing qualified doctors has led to higher insurance costs. In the United States, insurance premiums are often paid by employers on behalf of workers, so they have become an increasingly large part of standard compensation packages. Another factor driving the growth of wage and salary supplements is the increase in payroll taxes to finance social security and healthcare. Indeed, as in other advanced economies, the costs of these programs have increased following the aging of U.S. population. Both these phenomena, which go in the direction of lowering the GDI and NDI's wage and salary shares, are the result of specific policies that excludes insurance premiums from taxable income to encourage companies to offer benefit-compensation packages instead of wages and salaries (Forman, 1992). Therefore, while employers' compensation has remained relatively stable as a share of national income, an increasing share of workers' earnings is being redirected to benefits rather than wages and salaries - NIPA Table 7.8.

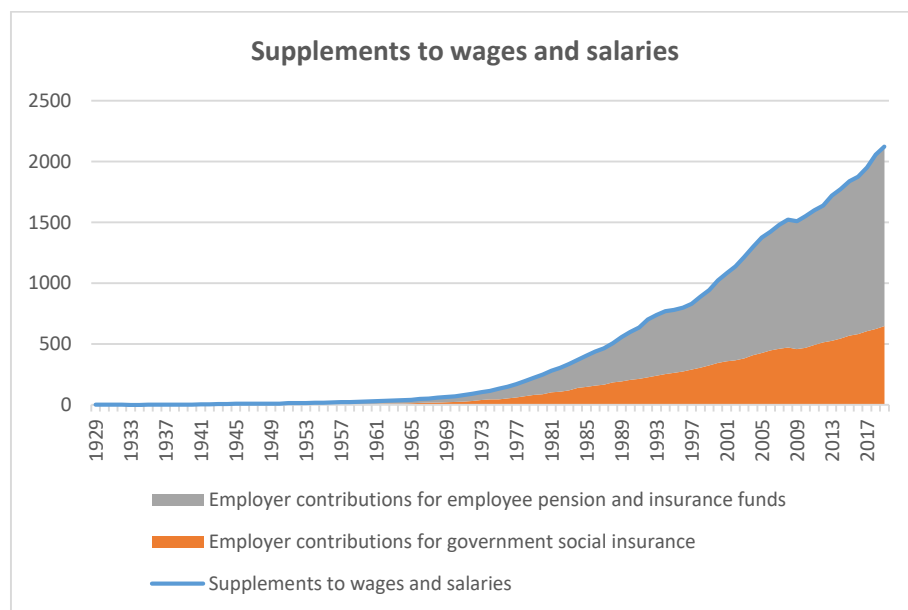


Figure 6 - Supplements to wages and salaries (decomposition).

Source: Annual data from NIPA Table 7.8.

There are mainly four different types of non-compensation income after firm-level taxes and depreciation are subtracted from GDI and hence the result of the productive activity of businesses is distributed to individuals - before the payment of individual taxes. (i) The first of these categories is rental income, i.e. the added value generated by homes to the owners after accounting for the money needed for their maintenance and the payment of interests. It includes all houses, whether they are rented or not and reflects some actual income received by the owners, but also measures the advantage of having a place to live. This amounted to roughly 4.8% of NDI in 2019. (ii) Then there are net corporate profits (after-tax) of corporations. These can take the form of either capital gains, dividends, but also pension funds or retirement accounts. Corporate profits were about 10.5% of NDI in 2019. (iii) The third one represents net interests, which represents money paid to stockholders by companies and was approximately 5% of NDI in 2019.²⁷ (iv) Finally, there is proprietors' income (i.e. net income of unincorporated businesses) generated by the activity of partnerships and sole proprietorships. Noncorporate businesses are becoming increasingly popular, in part because of tax policies, and in 2019 accounted for 10% of the NDI (Pomerleau, 2015).

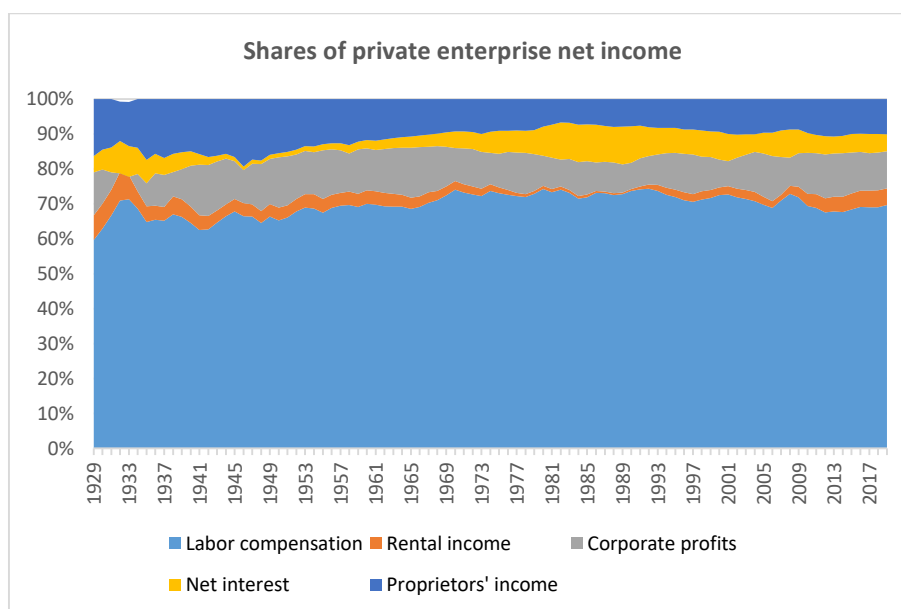


Figure 7 - Share of private enterprise net income.

Source: Author's calculation on BEA Table 1.10.

²⁷ Interest on mortgages is included. Since enterprises can either receive interests or pay them, the BEA publishes the net value.

Figure 7 shows the shares of national income excluding depreciation and government taxes - i.e. the shares of NDI. The labor compensation share is the same as in previous charts, while the remaining shares are the individual components of the net operating surplus of private enterprises in Figure 3. Figure 7 is useful as it removes extraneous parts of NDI, hence focusing on income actually received by individuals. The labor share of income includes compensation of employees and a portion of proprietor's income, similarly the capital share of income includes rental income, profits, interest, and a portion of proprietor's income. As anticipated in the previous paragraph, one issue strictly connected with proprietorships and partnerships is that the split between labor and capital cannot be determined, since the owner (or the partner) is compensated for both his work and investment in the activity.²⁸ Therefore, the exact value of the labor and capital share depends on the extent to which proprietors' income accounts to labor or capital. A common convention since the work of Johnson (1954) has been to allocate 2/3 of the proprietors' income to labor earnings, and 1/3 to capital (Figure 8). With this method, as we have already seen also in Figure 5, the labor share of income in the U.S. has remained stable. Nevertheless, Johnson is not the only way to apportion mixed incomes and a greater number of methodologies (as well as their implications) will be discussed in the following section.

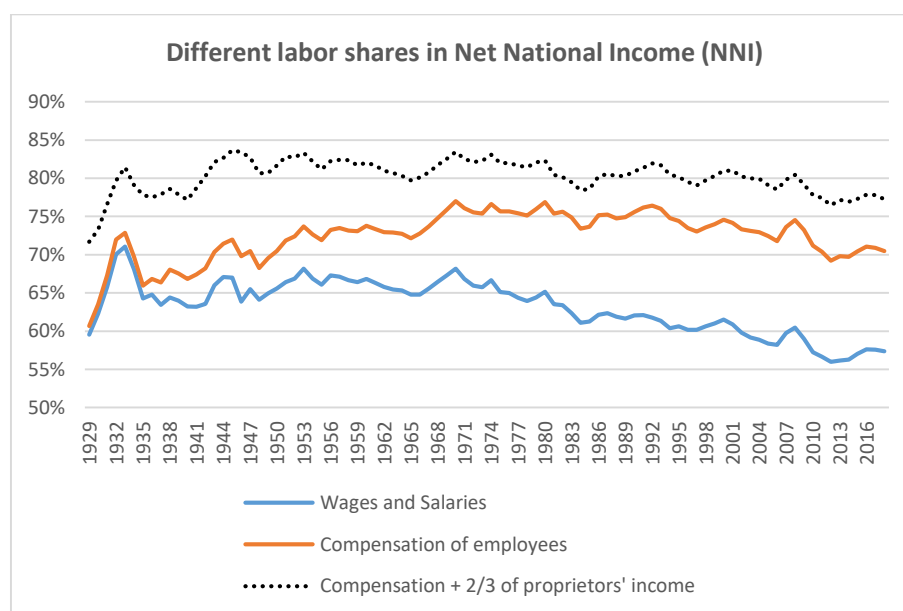


Figure 8 - Different labor shares in Net National Income (NNI).

Source: Author's calculation on NIPA data.

²⁸ This issue is also present when working with individual tax records in the attribution of "business income" to labor or investment.

5. Alternative methods for the allocation of mixed income

Given that the compensation of employees as registered in the system of national accounts ignores the self-employed, the unadjusted labor income share will be a downwards-biased estimation of the effective one.²⁹ The reason is that GDP (and other related measures) include income of the self-employed. As discussed above, part of the income generated by self-employed individuals is likely to be labor income, while the rest accrues to capital. Therefore, as long as there is a positive share of self-employed income that accrues to labor the unadjusted labor income share lies below the real labor share. This circumstance is very relevant at the empirical level and the necessity to adjust this biased measure is widely recognized in the literature (Gollin, 2002; Guerriero, 2019). A necessity which turns out to be even more important in low- and middle-income countries. These two facts should not surprise, according to the ILO (2019) the average global prevalence of self-employment during the last 20 years is close to 50% and in low income countries, around 80% of the workforce is self-employed. On the other hand, in high income countries the same rate is approximately 10% (see Figure 9 below). Thus, the calculation of the labor share and its distribution gets more complicated, requiring data on the labor income of the self-employed. From a theoretical point of view, income of the self-employed contains both labor and capital income. From an empirical one, however, there is not a completely satisfactory way to estimate it, which has led to multiple proxy approaches in the literature. Many studies follow the strategy of estimating a fair share of self-employment labor income based on the mixed income aggregate of the national accounts system. According to the United Nations Statistics Division (UNSD), mixed income is the magnitude accrued from production of noncorporate businesses owned by households. As such, it implicitly contains unpaid labor inputs provided by the owner or other family members. Indeed, the SNA framework recognizes that the remuneration of labor may dominate the overall value of mixed income. Unfortunately, there is no easy way to fix the problem. For almost all the countries analyzed, with the notable exception of the U.S. and a couple of other advanced countries in the world there is no data on the total income produced by self-employed workers, and even less information can be retrieved on how to allocate this income between labor and capital. What we actually know is just that the rate of self-employment differs greatly across countries. Nevertheless, even if the recent

²⁹ The definition of self-employed varies among different offices for labor statistics, however the category of self-employed generally include independent contractors, sole proprietors and partnerships. They are not standard employees and this means that, in accordance with the UN System of National Accounts, adopted by all the UN member states since 1953, the income produced by the self-employed must not be accounted as “compensation of employees” in the income account (Gollin, 2001). This kind of income, which is usually composed by a mix of labor and capital income, is actually treated as a form of business income.

changing patterns that are taking place in modern economies led to a reduction in the number of the self-employed in almost all the countries considered (except the UK and France – see Figure 9), the share of self-employed in total employment is still consistent, especially in Italy, Spain and the UK thus making the allocation of this part of income very important (Gindling and Newhouse, 2012).

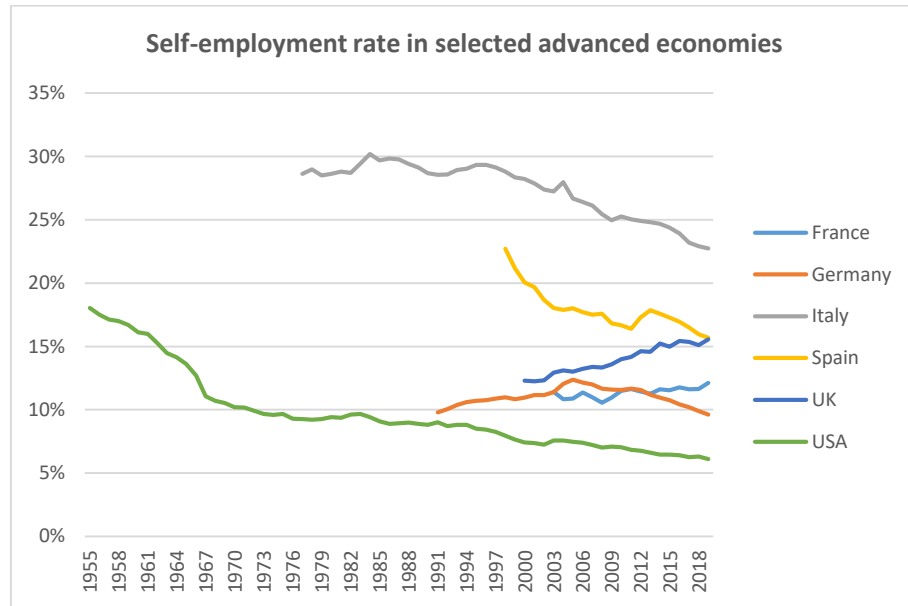


Figure 9 - Self-employment rate (% of total employment), 1955-2019 ³⁰

Source: Author's calculation on OECD.

How should we treat mixed income if it accrues to both labor and capital? We employ detailed data on multiple levels of income in the U.S. (mainly from the NIPA and the BL) to assess the impact of self-employment income in estimating the labor share. We discuss 7 alternative approaches used for the apportionment of mixed income. Then we compare the obtained measure with the one estimated by AMECO (ALCD2) and finally undertake an international comparison. The blue line in Figure 10 shows the unadjusted labor share.

³⁰ Data for the USA start in 1955, Italy in 1977, Germany in 1991, Spain in 1998, the UK in 2000 and France in 2003.

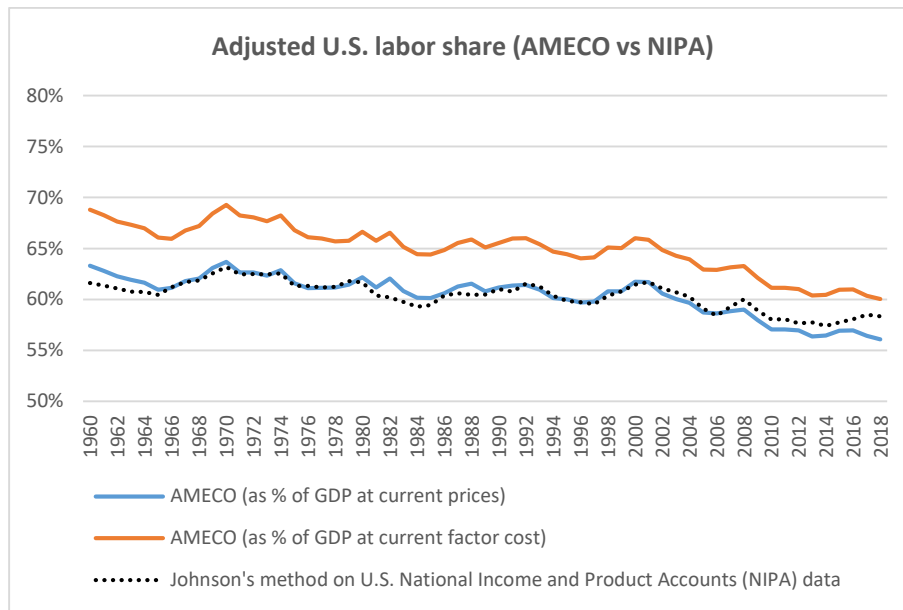


Figure 10 - U.S. labor share, adjusted for mixed income (AMECO vs NIPA).

Source: AMECO and author's calculations on NIPA's data.

AMECO adjust this measure in the way we have seen in paragraph 1.2.1 (i.e. by employing the Gollin's method) which roughly correspond to the measure obtained by apportioning 2/3 of proprietor's income to labor compensation (dotted line in Figure 10). Short-term movements in the labor share are driven by the business cycle. Actually, while wages and salaries paid to workers usually tend to be more stable and adjust slowly in response to changes in the level of economic activity, on the other hand, the returns to capital tend to be more volatile. This is well known to the literature and makes the labor share highly countercyclical (OECD, 2015) Further, in addition to these short-term movements, there are visible longer-term trends even after adjustments are made. In the U.S., where the national labor share appears - from a first analysis - to be rather stable, we can say that it actually started to fall between the late-70s and the mid-90s. Then recovered a little in the late-90s and early 2000 to decrease again since then. A last and barely noticeable increase (following the abovementioned countercyclical properties of the latter) occurred during the years of the great recession. The data suggest that, between the late-70s and the late-90s, in the U.S. the share of national income accruing to workers fell from around 62% to roughly 58% of the NDI (for a total loss of 4 percentage points) or from 82.5 to 77% of GDI (-5.5 percentage points). This means that in recent years, a smaller and smaller fraction of the fruits of economic growth has been returned to labor.

The breakdown of the total income produced by the self-employed into a labor and capital component is a complex process, and most of the difficulties are due to lack of data.³¹ This is why, to avoid the difficulty of matching micro-data records at national levels, usually, macroeconomic studies concentrate their research efforts on the compensation share (Karabarbounis and Neiman, 2014; Rognlie, 2016; Cho et al., 2017). There are several different ways used to apportion this part of “entrepreneurial income” and here we will explore seven of the most widely employed by the literature:

- (i) *LS1*. The first method presented by Johnson (1954) is called the “2/3rds rule”. This is a fixed-weight rule of thumb which solve the problem by allocating two-thirds of proprietor’s income as a return to labor and a third as a return to capital. The labor share adjusted in this way presents a change in its level, but the overall trend remains unchanged and is driven by changes in compensation of employees, which represents the biggest share on overall income. The method is therefore relatively simple, however, given that the division of income is constant over time, it ignores potential drivers which may shift the mixed income labor and capital shares over time.

$$LS_1 = \frac{\text{Compensation of Employees} + 2/3 \cdot \text{Mixed Income GDP}}{\text{Net National Income (NNI)}} \quad (3)$$

- (ii) *LS2*. Kravis (1959) proposed the attribution of all mixed income as a return to labor. His justification refers to the fact that in developing countries the share of income produced by the self-employed is mainly related to the supply of labor. However, in more advanced and industrialized economies things are likely to be different, as the self-employed are known to employ also capital (either human and intellectual) in the production of goods and services.

$$LS_2 = \frac{\text{Compensation of Employees} + \text{Mixed Income GDP}}{\text{Net National Income (NNI)}} \quad (4)$$

- (iii) *LS3*. Following Atkinson (1975), another strategy is that of considering income produced by the self-employed as composed of the same combination of labor and capital present in the

³¹ The SNA 1993 breaks down value added into: compensation of employees, operating surplus (from rent and capital) and mixed income from the self-employed. The U.N. National Accounts Statistics provide information on mixed income for a large number of countries. See the discussion in Paragraph 3.

rest of the economy. In this case, the labor share can be increased by a factor that considers the self-employed, to whom a salary equal to the average salary of the employees is attributed:

$$LS_3 = \frac{\text{Compensation of Employees}}{\text{Net National Income (NNI)} - \text{Mixed income}} \quad (5)$$

This adjustment implicitly assumes that the distribution of income is roughly the same in unincorporated private businesses and large corporation. However, these different types of business usually operate in sectors that are very different from each other, in terms of size of firms, market structure and labor intensity. Further, there are also strong differences from one country to another. However, even taking these problems into account, this technique is more reasonable than the previous one, because it allows the self-employed to generate part of the capital income. Moreover, being quite simple to implement, it has already been widely employed in literature (Harrison, 2005).

The main problem with these three methods (LS1, LS2 and LS3) is that they require specific data on self-employment income. As mentioned above, these tables are available as part of the UN national account statistics and show the value of "mixed income" or gross operating surplus of private unincorporated businesses. Unfortunately, these aggregates are not available for a large number of countries and, more importantly, sufficiently backwards in time.

(iv) *LS4*. More recently, Gollin (2002) presented an alternative method which does not require data on mixed incomes. In fact, it is very likely that even when we do not have such income information, we may still obtain data on the composition of the workforce. Therefore, he assumes that the self-employed earn the same wage of an average employee and as a consequence assigns the average wage to each and every worker independently from his status (i.e. employee or self-employed).

$$LS_4 = \frac{\text{Compensation of Employees} \cdot \left(\frac{\text{Total workforce}}{\text{Numer of employees}} \right)}{\text{Net National Income (NNI)}} \quad (6)$$

It is clear that the labor share obtained in this way is likely to be a lower bound of the real one, for the presence among the self-employed of professionals such as doctors, lawyers, consultants and entrepreneurs whose income is more likely to be above the market average than below. However, it is also true that tax records show that in most countries the average self-employed usually earn a lower income than his employed counterpart, consistently with a lot of studies which have shown how the self-employed tend to underreport their income (Hurst et al., 2010). This method has been widely employed in the literature and is the one applied by the OECD and the EC in their calculations.

- (v) *LS5*. One problem of Gollin is that it tends to overestimate the labor share. Thus, it is possible that considering the workforce net of employers is a better choice. Indeed, employers receive an amount of labor income which is not comparable to what earned by the employees or other self-employed. Therefore, Guerriero (2012) proposed an alternative measurement which completely removes the income earned by the “employers” from the adjusted numerator and hence attributes the average wage of employees to all those workers who are self-employed but not “employers”.

$$LS_5 = \frac{\frac{\text{Compensation of Employees}}{\text{Numer of employees}} \cdot (\text{Total workforce} - \text{Employers})}{\text{Net National Income (NNI)}} \quad (7)$$

- (vi) *LS6*. Another method to apportion ambiguous income between capital and labor is that developed by Gomme and Rupert (2004). They start by recognizing that there are some incomes which are either unequivocal labor (i.e. compensation of employees) or capital (i.e. corporate profits, rental income, net interest and depreciation). Then, they assume that the labor share within these “not clearly defined” incomes (i.e. proprietors’ income and indirect taxes less subsidies) is the same as in the rest of the economy. The labor share can thus be obtained in the following way:

$$LS_6 = \frac{Y_L}{Y_L + Y_K} \quad (8)$$

Where:

- Y_L are the compensation of employees (unambiguous labor income);

- Y_K are corporate profits, rental income, net interest and depreciation (unambiguous capital income).

In other words, the share of “not clearly defined” income is allocated to labor or capital in the same proportion as for unambiguous income.

- (vii) *LS7*. Finally, a standard regression of proprietors’ income on other types of incomes can also be run. We did the exercise for the U.S. and there is no significant breaking point in the data. Therefore, there is no reason to expect the 75-25% percentage to have changed much throughout the sample. The regression states that proprietors’ income is much more related to compensation, with a highly significant and large coefficient (0.70, t-stat 2.85), whereas the property coefficient is small (0.19, t-stat 1.30). Results from the regression confirm those of the literature which attribute a greater share of proprietors’ income to labor.

While Johnson (1954) and Kravis (1959) approaches are based on fixed-weight rules (i.e. they assume that the division of income remains constant over time), Gollin (2002), Gomme and Rupert (2004) and Guerriero (2012) are variable-weights methods, i.e. they account for changings in the structural composition of the economy over time. Finally, it must be said that also other approaches have been suggested by the literature. However, they are usually very demanding in terms of data, requiring detailed information on the structure of income which are difficult to obtain for a large number of countries. Glyn (2009), for instance, proposed to assign the average wage in agricultural to the labor income component of self-employment. The logic behind all this lies in the fact that in developing countries the self-employed are mainly concentrated in agriculture, where average wages are very low with respect to the national average. A natural extension of this approach has been that of assessing the value of labor and capital services based on the prevailing returns in each sector of the economy (instead of considering the economy as a whole like in Gollin). In this way - within a specific sector - self-employed are remunerated with the same average wage that they would receive by working as paid employees. This captures in the most effective way the potential variations in the share of labor in the various industrial sectors. Giovannoni (2014) suggest an original method which consists in using cluster analysis to split proprietors’ income based on the affinity between different variables. Young (1995), on the other hand, developed a micro matching approach and constructed his estimates of the labor share by assigning an implicit wage to self-employed based on their occupation, gender, age and education, hence assuming that they earn an

implicit wage equal to the hourly wage of employees (with similar characteristics) in the same industry. This approach, which is now established in the literature is extremely accurate, but unfortunately also very demanding in terms of data. Finally, some scholars have attempted to reduce the issues surrounding self-employment by excluding agriculture and focusing on the labor share of the manufacturing sector (Elsby et al., 2013; Armenter, 2015; Grossman et al., 2017). However, this approach, which does not solve the problem, can be particularly problematic in those countries with a high rate of self-employed workers in low-wage sectors. Depending on the structural characteristics of the economy, its workforce and its institutions, these different measures of labor share will be more or less similar to its real value.

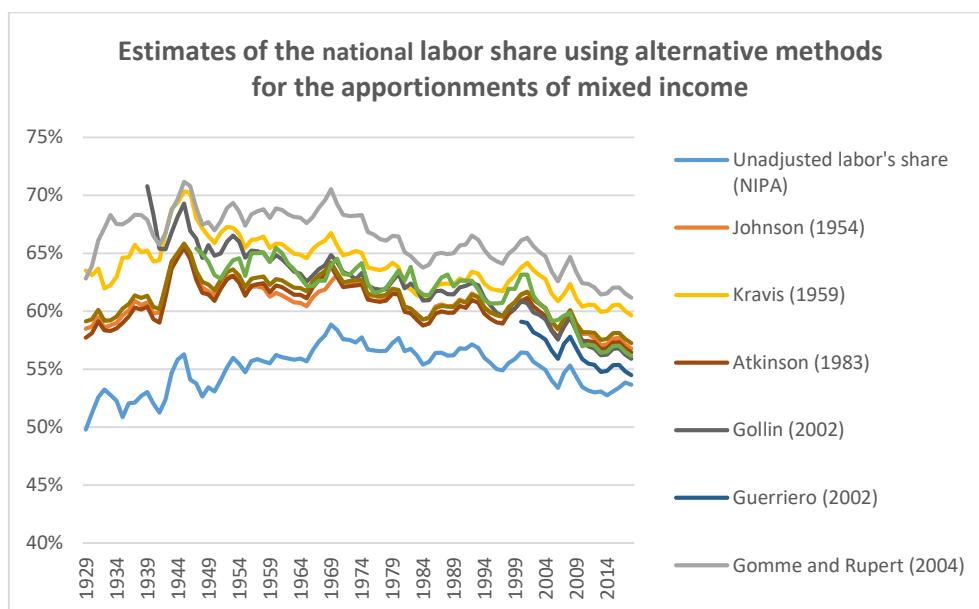


Figure 11 - U.S. national labor share estimates using alternative methods for the allocation of mixed incomes.³²

Source: author's calculations based on NIPA's data.

³² Guerriero (2012) starts in 2000 due the availability of data on "employers" as classified by the UN following the International Classification of Status in Employment ICSE-1993. Status in employment - ILO modelled estimates from ILOSTAT.

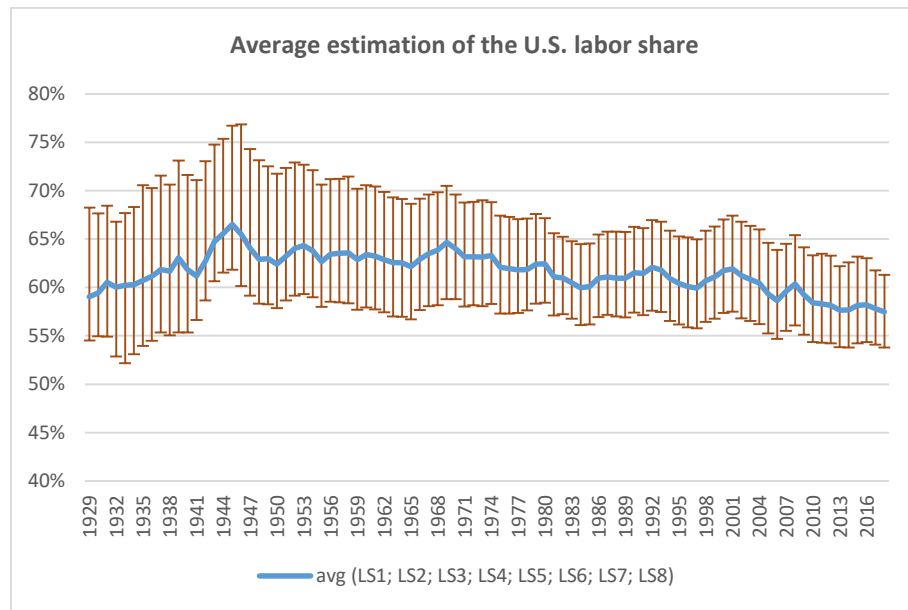


Figure 12 - Average estimation of the U.S. labor share based on NIPA's data (1929-2018).

Source: Author's calculations on NIPA.

Figure 11 summarize all the different estimations of the labor share following the alternative methods for the allocation of mixed income described above and Figure 12 present the average value and the bands with maximums and minimums obtained by using the different apportionment techniques.³³ As it is possible to see and consistently with the fact that the part of mixed income to be redistributed has been decreasing over time (see the proprietor's income share in Figure 4), the bands are larger at the beginning of the series and then decrease over time. There were up to 9 percentage points of difference depending on the method employed in 1929, in 2018 this difference does not exceed 3.8 percentage points. Further, while some methods like for instance Gomme and Rupert, Kravis and Gollin tend to systematically overestimate the labor share, others, like Johnson, Guerriero and Atkinson estimate values that fall below its real value.

³³ This measure of the labor share can be calculated from 1929 with an annual frequency and from 1947 also with a quarterly one.

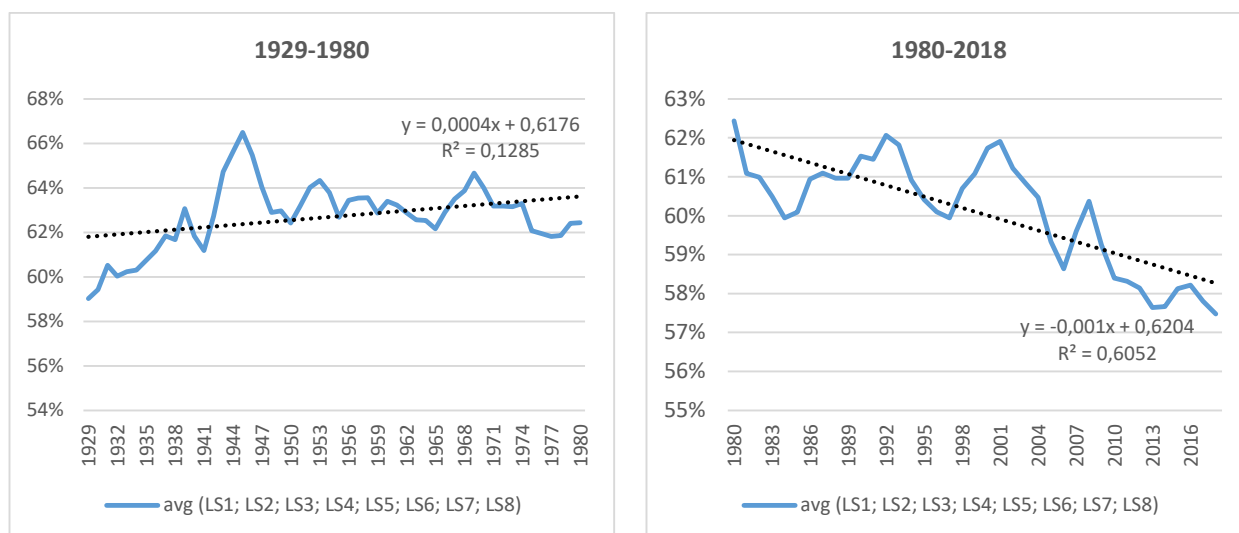


Figure 13 - The labor share of income in the United States before and after 1980.

Source: author's calculations on NIPA's data.

Figure 13 obtained as an average of the 7 methods used for the allocation of mixed income clearly show a labor share that has increased before 1940, been remarkably constant at about 63 of GDP in the period between 1940 and 1980 and declining since then, with a total loss for labor, of about 6 percentage points (roughly 0.0016% a year). Our measure of the labor share as an average of LS1-7 report a value which for 2018 is about 57.4% of the GDP, while it was 63.4% in 1980.

6. Robustness check

The distribution of national income between labor and capital has gained a level of attention higher than ever before in recent years. This was also due to overwhelming empirical evidence of a persistent decline in labor share common to all the most developed economies in the world. Hence, international comparability between data turns out to be crucial in order to understand the different economic reasons behind this secular fall. Ideally, this requires a coherent logical framework and a rigorous methodology to be followed in each country to ensure a certain degree of comparability and eliminate as much as possible discretion in the choices that are made to obtain this indicator. However, as we have seen there are significant (and often not reconcilable) differences in the way income of the self-employed workers is recorded in national accounts. More specifically, the treatment of unincorporated businesses in the household or business sector can differ greatly from one country to another. So far, our investigation has been conducted with a focus

on the U.S. economy. Now we place our findings for the U.S. into the international context and compare the results with alternative data sources for robustness. To provide a meaningful comparison we will use the AMECO dataset.

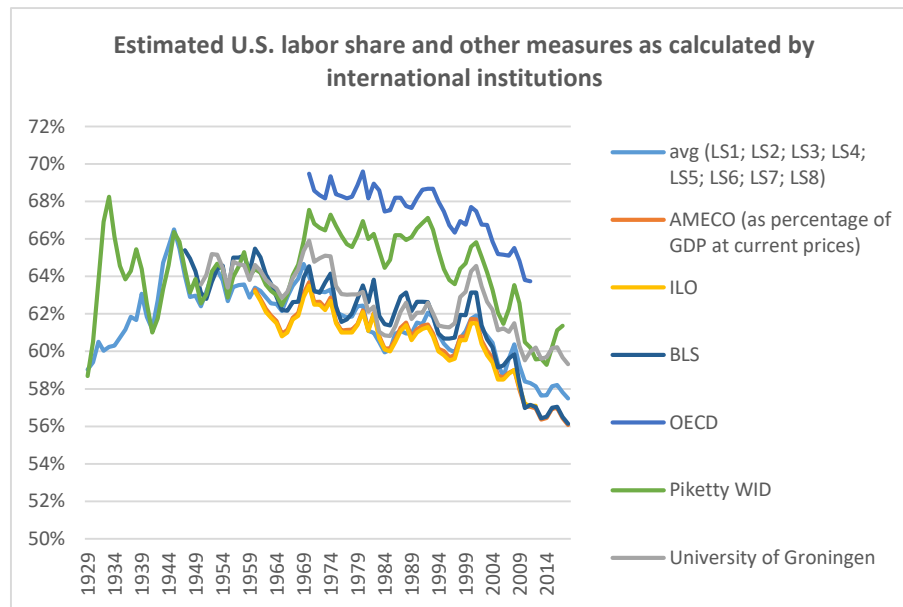


Figure 14 - Comparison of alternative data sources for the U.S. labor share.

Source: Author's calculations based on NIPA, BLS, AMECO, OECD, ILO and the University of Groningen data.

Figure 14 presents a comparison between our estimate of the U.S. labor share (average of Atkinson, Gollin, Gomme and Rupert, Guerriero, Johnson and Kravis), and the ones provided respectively by the BLS, AMECO, OECD, ILO, Piketty WID and the University of Groningen (Penn World Tables). For the period where the two series are comparable (i.e. from 1960 onwards) our measure is in line with all the other measures both in terms of the form that in terms of general trend. Note that the unadjusted labor share is lower than that calculated with any other method, as it excludes the mixed income received by the self-employed. On the other hand, by apportioning all the mixed income as a return to labor (Kravis), the labor share is, on average, 9 percentage points higher than the unadjusted one, and 3.2 percentage points higher than the adjusted labor share using Johnsons. Gollin closely tracks the labor share estimated using Kravis between 1980 and 1990. While Gomme and Rupert is the most similar to the adjusted labor share estimated by AMECO. On average the difference between the maximum and minimum value estimated at each point is 5.5%.

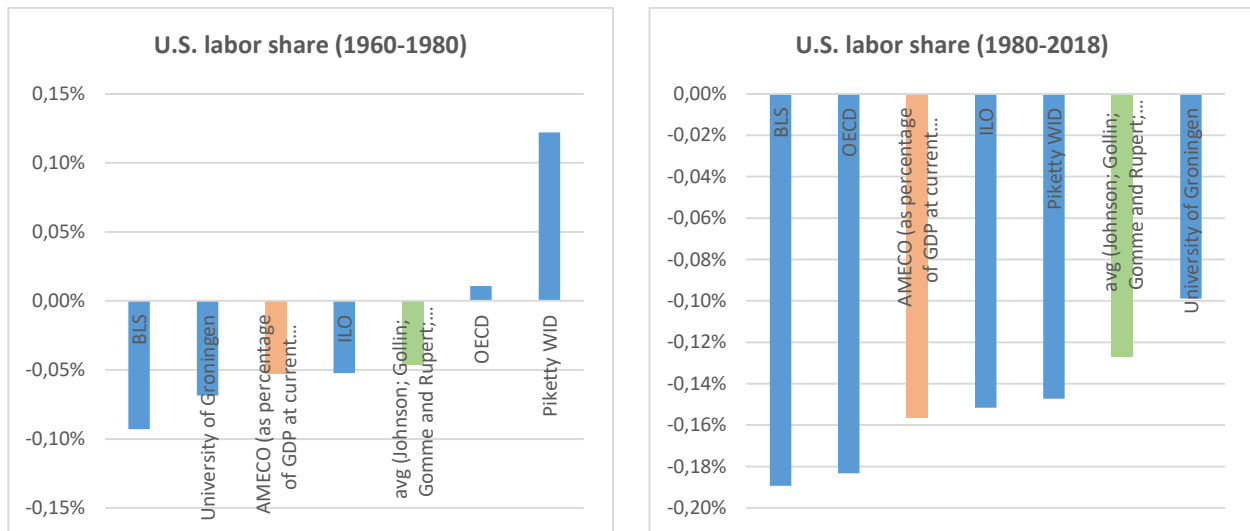


Figure 15 - Average annual growth rate of the U.S. labor share before and after 1980. ³⁴

Source: author's calculations based on NIPA, BLS, AMECO, OECD, ILO and the University of Groningen data.

Figure 15 confirms the picture and shows that the most similar measure to our estimate is the one provided by AMECO, with an average difference of just 0.63 percentage points over the period in which they are comparable. It follows the ILO's labor share, which on average tends to overestimate the labor share by 0.65 percentage points. Each of these series has been available starting from the 1960. Then we have the labor income shares calculated by respectively the BLS and the University of Groningen, with the former which starts in the 1947 and differs (downwards) with our average of LS1-7 by only 0.40 percentage points and the latter which starts in 1950 but tend to underestimate the measure by about 1.26%. Finally, there is the measure from the WID database of Piketty which - especially after the 1970 - underestimates the labor share by roughly 2.6 percentage points and the OECD which is only available between 1970 and 2012 and has an average difference above 6%. However, what is more interesting to note from our point of view is that all the series tell the same story of a not-constant labor share, declining between of 2.7 and 9.2 percentage points over the last 60 years (Figure 15 - panel b). The correlation between our estimate and alternative existing datasets (over the period 1929-2018, except for the one with AMECO for which available data start in 1960, the BLS from the 1947, the University of Groningen from the 1950 and the OECD with the first observation in 1970) is very high, ranging from the 0.83 with OECD, to 0.95 with AMECO (as reported in Table 4 below).

³⁴ The periods for which data is available and the labor share is estimated vary: AMECO: 1960-2018, Penn World Table - University of Groningen: 1950-2018, ILO: 1960-2012, OECD: 1970-2011, Piketty WID: 1929-2017, BLS: 1947-2018.

Measure	Corr.
avg (LS1; LS2; LS3; LS4; LS5; LS6; LS7)	1.000
AMECO (as percentage of GDP at current factor cost)	0.953
University of Groningen	0.948
ILO	0.929
BLS	0.879
OECD	0.844
Piketty WID	0.512

Table 4 - Matrix of correlations between different measure of the U.S. labor share.

Source: author's calculations based on NIPA, BLS, AMECO, OECD, ILO and the University of Groningen data.

7. Conclusions and further research

Empirical studies on the functional distribution of income are influenced and potentially biased by measurement issues. The nature of income aggregates in national accounts do not reflect the needs of economic models but is rather determined by the legal and institutional settings of different countries (Kravis, 1959). One of the main problems concerns the allocation of income produced by self-employed workers. Therefore, this paper analyzes how national incomes are registered in national accounts and explores different adjustment methods for the allocation of mixed income as well as the most common methodologies of estimation suggested by the literature. Then, by taking advantage of all the available data, we compute a strong and reliable measure for the labor share in the U.S. that has several advantages over existing ones and can be calculated with annual frequency starting from 1929. The results of our analysis offer an argument on the importance of a correct measurement and provide additional evidence against the assumption of stable labor shares (Kaldor 1961). Actually, contrary to some recent findings that long run changes in factor shares must be attributed to the lack of adequate adjustment for self-employment income, indirect taxes and capital depreciation, we show that these factors determine (at most) only the strength of a significant downward trend. The labor share in the United States has constantly decreased over time starting from the 1980s. In addition, the overall negative effect has been mitigated by a strong growth in the share of supplements to wages and salaries. This trend is likely to accentuate the perception that workers do not receive a "fair" share of the income produced and as a consequence may weaken social, political and economic stability (Atkinson 2009). Finally, from a macroeconomic perspective the risk is that of compromising the sustainability of future economic growth by curbing

household consumption and is even more relevant in light of the health crisis triggered by COVID-19. Our findings are relevant for a number of economic and political subjects, including policy makers who may be interested in supporting economic growth or reducing inequalities with policies more favorable to labor and wages, but also economists who must be aware of the biases produced by the use of different techniques. We have in mind some specific developments of the work. In particular, a natural extension aims at replicating the methodology for the calculation of the labor share in other countries. For European and some other advanced economies this is possible starting from 1995.

References

- Adler, M., and Schmid, K. (2012). Factor Shares and Income Inequality - Empirical Evidence from Germany 2002-2008.
- Armenter, R. (2015). ArmenterA bit of a miracle no more: the decline of the labor share. *Business Review Q3* , 1-9.

- Atkinson, A. B. (1975). *The economics of inequality*. Oxford: Clarendon Press.
- Atkinson, A. B. (2009). Factor shares: the principal problem of political economy? *Oxford Review of economic policy*, 3-16.
- Bentolila, S., and Saint-Paul, G. (2003). Explaining movements in the labor share. *The BE Journal of Macroeconomics* 3.1.
- Bernanke, B.S., and Gürkaynak, R.S. (2001). Is growth exogenous? taking mankiw, romer, and weil seriously. *NBER macroeconomics annual* 16: 11-57.
- Blanchard, O., and Giavazzi, F. (2003). Macroeconomic effects of regulation and deregulation in goods and labor markets. *The Quarterly journal of economics* 118.3: 879-907.
- Blanchet, T., and Chancel, L. (2016). *National Accounts Series Methodology*.
- Bridgman, B. (2018). Is labor's loss capital's gain? Gross versus net labor shares. *Macroeconomic Dynamics* 22.8: 2070-2087.
- Cho, T., Hwang, S., and Schreyer, P. (2017). Has the labour share declined?: It depends.
- Cole, A. (2015). Sources of Personal Income, Update. *Economist* 492.
- Elsby, M. W., Hobijn, B., and Şahin, A. (2013). The decline of the US labor share. *Brookings Papers on Economic Activity* 2013.2, 1-63.
- Forman, J.B. (1992). The Income Tax Treatment of Social Welfare Benefits. *U. Mich. JL Reform* 26: 785.
- Gindling, T. H., and Newhouse, D. (2012). Self-employment in the developing world. *The World Bank*.
- Giovannoni, O.G. (2014). What do we know about the labor share and the profit share? Part III: Measures and structural factors. *Levy Economics Institute, Working Paper* 805 (2014).
- Glyn, A. (2009). *Functional distribution and inequality*. *The Oxford handbook of economic inequality*.
- Gollin, D. (2002). Getting income shares right. *Journal of political Economy* 110.2.
- Gomme, P., and Rupert, P. (2004). Measuring labor's share of income. *FRB of Cleveland Policy Discussion Paper* 7.
- Grossman, G. M., et al. (2017). The productivity slowdown and the declining labor share: A neoclassical exploration. No. w23853. *National Bureau of Economic Research*.
- Guerriero, M. (2019). The Labour Share of Income around the World. *ADB Working Paper Series*.
- Guerriero, M., and Sen, K. (2012). What determines the share of labour in national income? A cross-country analysis. *IZA Discussion Papers* 6643. *Institute for the Study of Labor (IZA)*.
- Guscina, A. (2006). *Effects of globalization on labor's share in national income*. *International Monetary Fund (IMF)*.
- Harrison, A. (2005). Has Globalization Eroded Labor's Share? Some Cross-Country Evidence. *Munich Personal RePEc Archive*.
- Hartwig, J. (2006). On spurious differences in growth performance and on the misuse of National Accounts data for governance purposes. *Review of International Political Economy* 13.4, 535-558.
- Hurst, E., Li, G., and Pugsley, B. (2010). Are household surveys like tax forms. Evidence from income underreporting of the self-employed. *Cambridge, Mass.: National Bureau of Economic Research*.
- ILO. (2019). The Global Labor Income Share and Distribution. *Data Production and Analysis Unit, ILO Department of Statistics*.
- ILO, and OECD. (2015). The labour share in G20 economies. Report prepared for the G20 Employment Working Group, Antalya.

- Johnson, D. G. (1954). The functional distribution of income in the United States, 1850-1952. *The Review of Economics and Statistics*, 175-182.
- Kaldor, N. (1961). Capital accumulation and economic growth. *The theory of capital*. Palgrave Macmillan, London, 177-222.
- Karabarbounis, L., and Neiman, B. (2014). The global decline of the labor share. *The Quarterly journal of economics* 129.1, 61-103.
- Kravis, I. B. (1959). Relative income shares in fact and theory. *The American Economic Review* 49.5, 917-949.
- Krueger, A. B. (1999). Measuring labor's share. *American Economic Review* 89.2, 45-51.
- Kuznets, S. (1959). Quantitative aspects of the economic growth of nations: IV. Distribution of national income by factor shares. *Economic Development and Cultural Change* 7.3, Part 2, 1-100.
- OECD. (2012). The Labour Share in G20 Economies. *OECD Employment Outlook*.
- Pomerleau, K. (2015). An Overview of Pass-through Businesses in the United States. *Economist* 227.
- Rognlie, M. (2016). Deciphering the fall and rise in the net capital share: accumulation or scarcity? *Brookings papers on economic activity* 2015.1, 1-69.
- Schlenker, E., and Schmid, K.D. (2014). Capital income shares and income inequality in the European Union. No. 80-2013. *FZID Discussion Paper*.
- Steffen, P. E.J. (2013). *The Real Income Shares of Labor, Human and Physical Capital from Micro-and Macro-Data*. No. 9/2013. *DEP (Socioeconomics) Discussion Papers, Macroeconomics and Finance Series*.
- Tansever, S.S. (2017). Labor income share consequences of global financial crisis: Evidence from Turkey. *International Journal of Business and Economic Sciences Applied Research (IJBESAR)* 10.2: 73-84.
- Wolff, E. N., and Zachari, A. (2013). Class structure and economic inequality. *Cambridge Journal of Economics* 37.6, 1381-1406.
- Young, A. (1995). The tyranny of numbers: confronting the statistical realities of the East Asian growth experience. *The Quarterly Journal of Economics* 110.3: 641-680.