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We warmly thank our INSEE and WIL colleagues for their contribution to common earlier works on distributional accounts, with particular mention to Aliocha ACCARDO, Sylvain BILLOT, Didier BLANCHET, Thomas BLANCHET, Lucas CHANCEL, Yaëlle HAUSEUX and Henri MARTIN. We are also grateful to Fanch MORVAN for the great and valuable research assistance. We also thank participants at the Insee Department of Economic Studies seminar, Insee National accounts workshop, Paris School of economics seminar and all contributors of the DNA experts group at Insee.

Approche élargie des inégalités et de la redistribution en France : enseignements du rôle des transferts et de la valorisation des services publics

Qui bénéficie des transferts publics après avoir payé les impôts ? Cet article développe une approche élargie de la redistribution, allouant 100 % du revenu national et des transferts entre différentes catégories de ménages. Nous complétons Piketty, Saez, Zucman (2018) avec une nouvelle méthode microfondée pour monétiser et allouer les transferts en nature et les services publics collectifs en France. Nous constatons que 60 % des ménages sont des bénéficiaires nets de la redistribution étendue. L'impact de la redistribution sur l'atténuation des inégalités est deux fois plus important qu'avec l'approche monétaire habituelle, avec un rôle majeur pour la santé et l'éducation. Une analyse par tranches d'âge met en évidence que 90 % des individus de plus de 60 ans perçoivent plus qu'ils ne contribuent, principalement via la retraite et la santé, contre moins de 50 % pour les moins de 60 ans. Des analyses en plusieurs catégories de ménages (genre, zone géographique ou classe sociale), confirment l'importance de l'approche élargie pour bien évaluer la redistribution.

Mots-clés : Inégalités, Redistribution, Comptes nationaux distributionnels, Santé, Éducation

‘Do I get my money back?’: A Broader Approach to Inequality and Redistribution in France With a Monetary Valuation of Public Services

Who benefits from public transfers after paying taxes? This paper develops an extended approach of redistribution, allocating 100% of national income and transfers between various categories of households. We complete Piketty, Saez, Zucman (2018) with a new micro-founded methods to monetize and allocate in-kind transfers and collective public services in France. We find that 60% of households are net beneficiaries of extended redistribution. The impact of redistribution on attenuation of inequalities is two times larger than with the usual monetary approach, with a major role for health and education. An analysis over age groups highlights a “tragedy of horizons”: 90% of individuals over the age of 60 receive more than they pay, mainly via retirement pensions and health, versus less than 50% for those under the age of 60. Other types of analysis, such as family, gender, geographic area or social class, confirm the importance of the extended approach to properly assessing redistribution.

Keywords: Inequality, Redistribution, Distributional National Account, Health, Education.

Classification JEL : E01, D63, O57

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I. Introduction

Motivation. Do I have a fair return on my taxes? The question is simple, but giving a proper answer turns out to be a complicated task. The usual monetary approach, which consists of making the difference between the money received (cash benefits) and direct income taxes, is not satisfactory, or partial at best. On the levies side, it omits value added tax or excise duties, whose anti-redistributive effects are well-documented in the literature. It also ignores the benefits derived from public services (in-kind and collective), which are a major counterpart of the tax.

Including all public transfers, monetary, in-kind and collective, is a major technical challenge. Yet, it is a methodological necessity. Incomplete coverage leads to a biased analysis of the redistribution and misleading international comparisons of redistribution as well as living standards inequalities. Firstly, within a specific country, taxes finance public services: forgetting some part of public spending is a partial picture of their impact on inequality. Secondly, given the very different scope of public action between countries, we need a proper way to assess the redistributive role of all taxation counterparts in international comparisons. For example, ignoring public education and health services can wrongly lead to classifying middle-class individuals receiving small public cash allowances as contributors, or to unduly classify a country with a high level of public services, but low tax progressivity, as not very redistributive.

Any tax ultimately benefits households, directly or indirectly, in the form of public benefits or services and collective goods. We define and measure redistribution by adopting the broadest possible perspective, including all types of public transfers, paid or received by households, firms and public authorities. This exhaustive approach is conceptually essential, but implies assumptions and imputations to allocate all transfers. In particular, we need to assign a value to transfers not directly measured by a unique and integrated dataset.

This “extended redistribution” approach is very important for France given the characteristics of its tax and benefits system. In France, transfers received by households, as defined in the national accounts, account for more than double the amount of monetary transfers. Indeed, benefits in-kind and collective consumption represent 35% of base price net national income (NNI, national income minus consumption of fixed capital), while benefits in cash represent 26%. Another important difference compared to other countries (the United States, for example) concerns pensions, which are mutualized in France, and therefore counted as social

benefits: they represent two-thirds of the benefits (and 15% of NNI). On the fiscal side, taxes account for 55% of NNI, while this share is only 13% in the monetary approach without social security contributions (SSC), 38% if included. Indeed, a particular feature in France is the importance of SSC and taxation of product and production, whose weight in the NNI has increased sharply since 1980 (to reach 17% and 23% of NNI, respectively, in 2019; see Figure A1 in Appendix 2).

Contributions. The need to extend the basic notions of income has long been recognized in the study of inequalities and redistribution (see II), but interest in the area resurged with the work by Piketty, Saez and Zucman (2018). They argue that a proper understanding of inequality should be based on the distribution of the whole national income among individuals or households.

Following on from the pioneering work of INSEE in the 1990s (reviewed in Accardo, 2020) and the seminal contribution of Piketty, Saez and Zucman, we built an extended approach whereby the micro-economic data are adjusted to ensure that, when aggregated, they correspond to the amounts reflected in the national accounts. By distributing the entire NNI among households residing in France, we allocated them all incomes and all transfers from government and non-profit institutions serving households. This allows us to compare before and after transfers income and thus describe how the various transfers in the exhaustive field of redistribution affect households.

Our main contribution to the literature is fourfold: (i) to take into account all public transfers, based on national accounts, to have a balanced and exhaustive approach to redistribution, (ii) provide a careful valuation of the public services and taxes on product impacts on standard of living, (iii) to identify net beneficiaries and contributors to redistribution at micro level, by comparing their primary income and their extended standard of living, (iv) to explore inequality and redistribution through socio-demographic dimensions (namely diploma, age, family type, gender, geographic area) dimensions, whereas usual Distributed National Accounts (DNA) or related works generally focus on analysis by income group.

Data and Methodology. The core data are the French representative survey *Enquête Revenus Fiscaux et Sociaux (ERFS)*, a match between fiscal records, social administrative data, and the labour force survey (LFS), covering 130,000 people each year. We match this database with data on consumption, wealth, education and local amenities. We use administrative data covering health expenditure. Compulsory health insurance reimbursements are matched with a survey taking into account supplementary contracts (*mutuelles*) to break down and distribute health expenditure to households based on micro information. As for primary, secondary and

higher education, we use the ages of children and young adults to assign a per-child cost of education to each household, taking the average public expenditure of each educational level. For collective consumption that can be "localizable" such as police forces, we use a micro-founded method to monetize public services according to their geographical accessibility. The purely national administrations, such as defence or foreign affairs, are treated as a lump sum. The granularity and diversity of information included in our data, and especially those from the LFS, make it possible to: (i) create a highly-detailed simulation of the social benefits, taxes and contributions that depend on many variables, using a microsimulation model (the open-source INES model); (ii) display results according to other variables than income.

Results. Taking into account public services leads to a very different assessment of inequality and redistribution. Redistribution appears almost twice as broad than with the usual monetary approach, mainly due to benefits in-kind, especially education and health. Benefits in-kind represent 50% of overall inequality attenuation, as measured by Gini index decomposition methods. Benefits in cash account for a one-third reduction of inequality. Income and capital taxes are progressive but the overall tax profile is not progressive and resembles a tilde curve, even slightly regressive at the extremity of the income distribution, due to savings effects and the high level of VAT in France.

For each household, we estimate its net public transfers, adding benefits, allowances and public expenditures and subtracting taxes and contributions. While 60% of all individuals are net beneficiaries in the extended redistribution framework, i.e. have a standard of living higher than their primary income, the proportion of net beneficiaries drops to 32% in strictly monetary terms, i.e. for which the difference between their cash benefits and their income taxes is positive.

What makes inequalities in France lower than in the USA (Piketty, Saez, & Zucman, 2018) (Bozio et al., 2020) is the combination of less unequally distributed primary incomes with a higher redistribution. The latter is not due to the tax profile itself, since transfers paid by households are roughly proportional to income in both countries. However, the overall tax rate is much higher in France (55% of NNI); taking into consideration that transfers received by households have roughly a lump sum profile, the net redistribution is much higher in France than in the USA.

While the middle-income group benefit more on average from extended redistribution, we highlight a disparity of situations within the same strata of income for the middle-income group. These disparities are driven by differences of living areas or family configurations that have an effect on the redistribution of public services. Moreover, it is only by giving monetary value to

the public services that the redistribution appears to benefit a majority of the middle-income group. Because access to public services is essential for accepting the tax, when this access is reduced, little used, or not considered, some middle-income households could consider themselves net contributors from redistribution, resulting in a feeling of excessive fiscal burden relative to the benefits from their contribution. This may have contributed to the explanation of the fiscal aspect of the yellow vests protests in France in 2018–2019.

Our results by age cohort also highlight static "intergenerational" transfers, from the working-age population to retirees (a "tragedy of horizons"). Less than half of under 60-year-olds gains from net enlarged redistribution (and 30% between 50- and 60-year-olds), whereas that number is more than 90% for people over 65. This is mainly due to pensions and the public health system, with 75% of health expenditures going to individuals aged 60 and over. In terms of monetary redistribution, only 15% of those under 60 receive more monetary benefits than they pay directly in taxes. Confidence in the sustainability of the pension system and the quality and accessibility of the health system thus play a key role for tax consent among working-age generations. Further, we develop an analysis of inequalities and redistribution by age cohort and diploma. We show for instance, that among individuals with at least a bachelor's degree, primary income is 2.5 times higher in the 50–64 age bracket than in the 18–29 bracket. Monetary transfers reduce this gap: disposable income (equivalized) is two times higher for the 50–64 age group than for the 18–29 group. Adding non-monetary transfers further reduce the gap to "only" 50% higher in the older age category. Transfers, and in particular monetary transfers, reduce the primary income differential between older and younger individuals with no diploma than for individuals with at least a bachelor's degree. For individuals without a diploma, primary income, disposable income and extended standard of living are respectively 2.3 times, 50% and 25% higher in the 50–64 age bracket than in the 18–29 bracket. For holders of a bachelor's degree, the gap is less reduced: from 2.5 times before transfers to 50% higher after transfers.

The DNA broken down by family type and gender reveal that, despite primary incomes 45% lower for couples with three or more children than for couples without children (under the age of 65), their extended living standard turns out to be slightly higher, highlighting large redistributive effects for families, at least from a statistical point of view.[4] The main contributors to inter-family redistribution are childless couples while the main beneficiary families are single people with children. On average across all age groups, the primary income of single parents is

[4] From a dynamic point of view, it turns out that it is much more complex: children will financially contribute to pensions for the elderly when they are active, but reciprocally, they will also be the ones who will receive pensions when they retire.

two-thirds higher for men than for women. Monetary redistribution reduces this single parent gender gap, which still remains impressively high (45% on average, peaking at 60% in the 18–29 age bracket).

Regarding spatial specificities, incomes are lower in mid-sized cities than in the rest of the country, with the exception of the 18–29 age group (minimum in large cities) and the 50–64 age group (minimum in rural areas). Households living in the Paris area receive 50% more primary income than those in mid-sized cities; this gap reduces to 30% in terms of disposable income and 20% in terms of extended standard of living. In the end, considering the higher cost of living and notably larger housing expenditures, the outcome is likely to be significantly reduced. Finally, DNA by socio-professional categories show that the ratio between executives (managers or business owners) over employees or manual workers shrink from 3 for the primary income to 2 for the disposable income and 1.7 for the extended standard of living. The extended standard of living for retired people stands at 9% below that of people in employment (-11% in terms of disposable income).

II. Related Works and Literature

Ongoing work to improve the measurement of inequalities and redistribution has been intense from the academic world, statistical institutes and international institutions. This paper is grounded in older work, while belonging to a rapidly growing research field. This branch of literature has three main objectives, to: i) improve comparability over time and between countries by harmonizing definitions and concepts of income and transfers, ii) complete the usual measurement of redistribution and inequality, for example by adding a monetary valuation of individualizable public services, and iii) reconcile microeconomic data and the system of national accounts macro framework.

International Harmonization. The *Luxembourg Income Study* (LIS), launched in 1983 was the first large-scale initiative aimed at harmonizing micro-data on income. The project covered around 50 countries over five decades. The *Canberra Group*, initiated in 1996 by the Australian Bureau of Statistics, was set to define common methods within the statistical institutes and, in 2001, resulted in a set of recommendations gathered in *The Canberra Group Handbook* (2001) adopted by the International Labour Organization in 2003 (ILO, 2003), and updated together with the Conference of European Statisticians and the United Nations Economic Commission for Europe (The Canberra Group, 2011). A similar initiative, the *OECD Expert Group on Micro Statistics on Income, Consumption and Wealth* (EG ICW) published two guides in 2013 (Guidelines for Micro Statistics on Household Wealth, 2013) (OECD Framework for Statistics

on the Distribution of Household Income, 2013), and initiated the *Income Distribution Database*. Several statistical institutes produced experimental statistics on this subject (*Statistics Netherlands* (2014), *Eurostat* (2018); *Statistics Canada* (2018); *Australian Bureau of Statistics* (2019)). The majority of these statistics are based on surveys and only cover a part of national income.

Broadening Concept of Income and Redistribution. Several studies adopted a microeconomic approach, i.e. based on household data. For France, several studies broadened the concept of disposable income by including different types of public transfers. Hugounenq (1998) and the French Council for Employment, Income and Social Cohesion (Cerc, 2003) chose to concentrate on education. Other studies focused more specifically on the redistributive effects of the public health system, following on from Caussat *et al.* (2005). Amar *et al.* (2008) added the public services of health, education and housing to the scope of monetary redistribution. The French Ministry of Health developed a specific model (Lardellier *et al.*) (2011) to study the redistributive effects of the health system, which was used for several subsequent studies such as Duval and Lardellier (2012), Jusot *et al.* (2016), Fouquet and Pollack (2022).

Guillaud, Olckers and Zemmour (2019) proposed an analytical framework to study the reduction of inequality by tax and benefit systems. Based on the breakdown of household disposable income according to data from the LIS survey (22 OECD countries between 1999 and 2016), they measure to which extent mandatory deductions and in-kind benefits reduce inequality. According to their results, structure and level of taxation, as well as the form and volume of social security benefits, are levies to reduce inequality. They demonstrate that the level of public transfers, more than the progressivity of taxes, determines the degree of social redistribution. Amoureux, Guillaud and Zemmour (2018), and Ben Jelloul *et al.* (2019) highlighted complementarity between income tax and social security contributions (SSC) in France, the progressivity of the former tending to be compensated by the regressivity of the latter.

Distributional Accounts by Category. Many studies carried out within official statistics have sought to complement the microeconomic approach to monetary redistribution by breaking down the national accounts. Accardo (2020) provide a historical overview of these for France. In the 1980s, INSEE published an annual income account for several dozen types of households based on their socio-demographic characteristics (Accardo *et al.* (2009) and Bellamy *et al.* (2009)). These authors proposed a methodology to break down disposable income and consumption in the national accounts according to four socio-economic criteria: standard of

living, household composition, age and socio-professional category of the reference person. This makes it possible to infer the saving rate for each of these various characteristics. This was the approach taken by Le Laidier (2009) and, more recently, by Billot and Bourgeois (2019), to compare the annual changes in the accounts for each household category and specifying the various concepts relating to the perception of household income. Accardo, Billot and Buron (2017) applied the methodology over the 2011–2015 period.

At transnational level, the OECD *Expert Group on Disparities in National Accounts* (EG DNA) enhanced a set of simplified distributional accounts based on the notion of adjusted disposable income, adding benefits in-kind, such as education or health, to usual disposable income. Still experimental, they may integrate, as satellite accounts, the next generation of Statistical National Accounts planned by the UN Statistical Commission in 2024, following the recommendation of the ad-hoc working group tasked to make propositions to be submitted to member states. In the same spirit, Albis and Moosa (2015) developed National Transfer Accounts[5] by age for France (see section V).

Distributional National Accounts (DINA). In recent years, the academic literature has made increasing use of comprehensive administrative data to complement survey data for studying inequalities. This strand began with the work of Piketty (2003) in France, and the seminal work of Piketty and Saez (2003) in the United States. This major academic field provided an update to the work by Kuznets (1953) and Atkinson and Harrison (1978) to analyse the development of high incomes over the very long term. Their methodology has been extended to many countries by several researchers, whose studies have been collated in two works, edited by Atkinson and Piketty (2010). Those estimates were used as the basis for the *World Top Income Database* (WTID) in 2011 – later renamed the *World Inequality Database* (WID) – providing historical depth thanks to the existence of tax sources dating back more than a hundred years in many countries and covering very high incomes, which surveys have difficulty capturing. The database is now developed by the *World Inequality Lab (WIL)* following a common methodology published in Alvaredo *et al.* (2016). This Distributional National Accounts (DINA) handbook established rules to distribute national income in its entirety among groups of individuals and was updated in Alvaredo *et al.* (2020). DINA was published for the United States by Piketty, Saez and Zucman (2018). Several other countries in both developed and emerging economies carried out similar DINA studies. The *World Inequality Lab* also produces continental inequality or world estimates of DINA methodology: empirical findings are

5 https://ntaccounts.org/web/nta/show/

summarized in Alvaredo *et al.* (2020). For France, the DINA methodology led to publications by Garbinti *et al*. (2018) and Bozio *et al.* (2020). Blanchet, Chancel and Gethin (2022) also use the DINA method to compare inequality and redistribution across European countries.

Reconciling Categories Accounts and Distributional Accounts. Despite using administrative data in order to be precise at the top of the distribution in France, those works used datasets lacking information on in-kind transfers and local public expenditure and, therefore, had to rely on normative assumptions for their distributions. A major contribution of our paper is to micro-found the distribution of these essential drivers of inequality attenuation. In addition, while there are similarities and complementarities between all these approaches, the different works mentioned above have significant methodological, sources, and conceptual differences needing clarification. Facing those disparities, INSEE also brought its contribution to the harmonization effort by initiating a broad national group of experts, bringing together key academic and government teams working on inequality. They issued a set of recommendations, which we adhere to in our paper, relative to the measure of inequality and redistribution: those including a comprehensive micro-founded method to effectively distribute the whole national accounts between households, detailed in section III (See Germain, André and Blanchet (2021)).

Redistribution and Political Acceptability. A series of recent papers explore the political acceptability of redistribution or fiscal reforms ((Bierbrauer, Boyer, & Peichl., 2021), (Blesse, et al., 2022), (Douenne & Fabre, 2022) Fabre (2022)). They highlight that desired redistribution depends on the knowledge of the tax and benefit system and the actual beneficiary or contributor of the redistribution. We contribute to this literature by more precisely identifying the net contributors (resp. beneficiaries) of redistribution in the sense of receiving less (resp. more) than they pay, depending on whether or not non-monetary benefits are taken into account.

III. Methods and Data

This section presents the comprehensive methodology to distribute the whole national income and its various components between groups of individuals or households.

A. Primary Income and Redistribution

This section sets out our main concepts. *Before transfer income* is the first building block and gathers all primary income in a broader concept than the usual factor income of households. The sum of monetary transfers including direct taxation of households and monetary allowances leads to the usual approach of redistribution (*monetary redistribution*). Including all transfers, especially in-kind, constitutes *extended redistribution*. Finally, *after transfer*

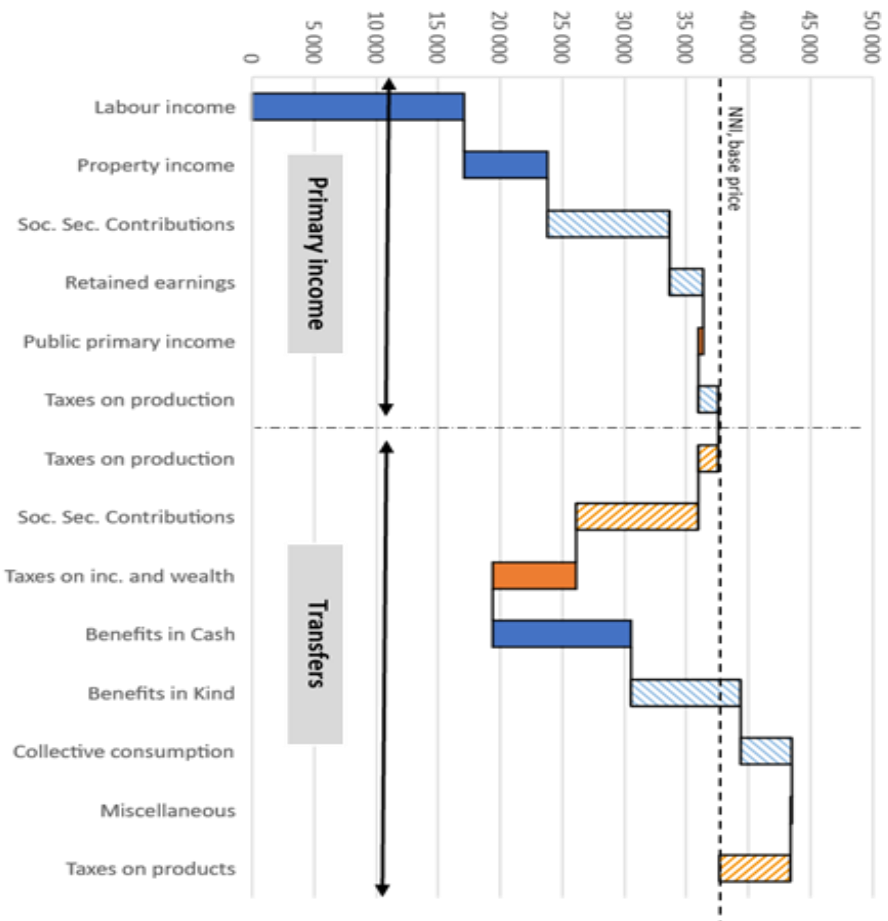
income is simply derived by adding extended redistribution to before transfer income (see Figure 1 and Table 1 below).

Before Transfer Income

The DNA summary table starts with the distribution of all primary income. This before transfer income includes labour and capital income paid by the public or private sector, wages of civil servants and mixed-income small business owners. This can be interpreted as what people earn before paying taxes and receiving benefits from public administration. In particular, wages include both employee and employer contributions.

Distributing 100% of national net income requires adding a few other types of income (see Technical Appendix for details), retained earnings of companies, and products and production taxes being the most important. Indeed, retained earnings are considered *as if* they had been distributed to households and reinvested in the same companies. In the national account framework which builds the NNI, production taxes are also part of primary income.

Figure 1. National accounts: primary income and transfers, 2019



Note: amounts in euros per capita equivalized. Plain bars represent income and transfers accounted for in the usual approach, dashed bars correspond to extended income and redistribution. The national income per capita equivalized was €38000 in 2018 (at base price) broken down as follows: €17250 of net wages, €6800 of property income, €10500 of social contributions, €2750 of retained earnings and €1200 of taxes on production.
Sources: INSEE, Distributional National Accounts, 2019. Authors' Calculations

Those operations change the nature of primary income from what is actually perceived by households to what they could have received without transfers. This is the reason to qualify the outcome as "before transfer income".[6]

Disposable Income and Monetary Redistribution

Usual computation of redistribution consists of the balance between household levies on income and wealth and benefits in cash. When these taxes are subtracted and monetary allowances added to the before transfer income, it leads to the disposable income concept (see Table 1).

Extended Redistribution

To get a complete picture of redistribution, we added non-monetary transfers to the monetary redistribution: (i) on the taxation side, social contributions, taxes on benefits and taxes on production and products (ii) and, on the benefits side, a monetary valuation of free public services which are constituted, in national accounts terminology, of benefits in-kind (education, health, housing, etc.) and benefits from collective consumption. The idea was to distribute the different components of these transfers among the households that pay them (on the taxation side) and/or benefit from them.

After Transfer Income

The fourth core concept of distributional accounts is the "*after transfer income*" simply obtained by adding the extended redistributed transfers to the *before transfer income* of households. It can also be defined departing from the usual notion of household disposable income by adding net retained earnings and the value of free public services (in-kind transfers and collective consumption). To retrace the idea, we advocate using the terminology of extended standard of living when after transfer income is computed per capita equivalized.

Having clarified the sequence and the terminology, and affected all companies and public authority incomes to households, it is necessary for distributional accounts to distribute the different sources of income to each household. Section III details the imputation or simulation methods when direct information is not available. Aggregated statistics can then be computed for various types of household categories (income fractile, age, diploma, etc.), depending on the variables available in the micro data sources.

[6] Although an identical concept, the term was preferred by the aforementioned expert group to the WIL concept of "pre-tax income" since transfers also include benefits served by public administration, and not only taxation.

To illustrate the results of the whole process at this stage, from the estimation of the before transfer income to the standard of living (we will comment on the results in greater detail later), Table 1 reproduces the sum-up table of DNA for 5 categories of households defined with respect to their standard of living: poor (<60% of the median standard of living), modest (between 60% and 90% of the median), median (between 90% and 120%), upper middle (120% to 180%) and better-off (more than 180%).[7] The Tables of Integrated Distributional Accounts (TIDAs) discussed later in this working paper are more detailed (around 50 income and transfer items and up to 25 household categories).

Table 1. Table of Integrated Distributional Accounts by Income Group (2019)

	Figures in euros per capita equivalized	All	Poor	Modest	Median	Upper Middle	Betteroff	Betteroff / Poor
Household structure	***Individual (thousands)***	***67 150***	***9 050***	***18 050***	***17 450***	***15 750***	***6 850***	-
	% children	*21%*	*31%*	*23%*	*20%*	*17%*	*16%*	-
	% retired	*23%*	*12%*	*26%*	*25%*	*25%*	*22%*	-
	% dependant workers	*41%*	*21%*	*35%*	*45%*	*49%*	*50%*	-
	Inc. before transfers (market price, paid VAT)	**43 800**	**9 550**	**21 200**	**36 400**	**55 300**	**139 100**	**15**
	Inc. before transfers (market price ; produced VAT)	*43 800*	*7 790*	*28 906*	*39 727*	*56 589*	*142 318*	*18*
Primary income	**Income before transfers (1)**	**38 000**	**5 900**	**16 700**	**30 800**	**48 350**	**129 500**	**22**
	Factor income	**36 850**	**5 800**	**16 250**	**29 800**	**46 800**	**125 650**	**22**
	Labour income (gross)	27 300	4 000	13 300	25 200	38 550	73 700	18
	Labour income (net)	*17 250*	*2 600*	*8 750*	*16 150*	*24 000*	*45 750*	*18*
	Mixed income	2 450	450	700	950	2 150	13 900	31
	Property income	4 350	1 250	2 050	3 300	5 100	15 200	12
	Retained earnings (gross)	2 750	50	150	350	950	22 900	458
	Taxes on production	**1 550**	**350**	**750**	**1 350**	**2 000**	**4 650**	**13**
	Public primary income	**-400**	**-250**	**-300**	**-350**	**-450**	**-800**	**-**
Monetary transfers	**Monetary transfers (2)**	**-13 000**	**1 100**	**-1 500**	**-9 050**	**-18 200**	**-59 550**	**-**
	Taxes and contributions	**-24 150**	**-6 100**	**-11 500**	**-19 950**	**-31 200**	**-74 850**	**12**
	Taxes on products and production	-7 350	-4 000	-5 250	-6 950	-8 950	-14 250	3,6
	Taxes on income and wealth	-6 750	-700	-1 700	-3 950	-7 750	-32 650	47
	Social Security Contributions	-10 050	-1 400	-4 550	-9 050	-14 500	-27 950	20
	Benefits in Cash	**11 250**	**7 100**	**9 950**	**10 950**	**13 200**	**16 050**	**2,3**
	Other current transfers	-100	100	50	-50	-200	-750	-
Non monetary transfers	**Non monetary transfers (3)**	**13 000**	**17 600**	**14 500**	**12 350**	**11 100**	**9 450**	**0,5**
	Benefits in Kind	8 950	12 950	10 200	8 200	7 250	6 650	0,5
	Benefits from collective services	4 200	4 350	4 150	4 200	4 200	4 200	1,0
	Other adjusted disp. inc. (RoW)	950	950	950	950	950	950	1,0
	Net saving of public authorities	-1 100	-650	-800	-1 000	-1 300	-2 350	3,6
Stand. of living	**Income after transfers (1)+(2)+(3)**	**38 000**	**24 600**	**29 700**	**34 100**	**41 250**	**79 400**	**3,2**
	Disposable income (1)+(2)	30 800	10 650	19 700	27 350	37 100	79 550	7,5
	Usual standard of living (*)	27 500	11 000	18 600	25 150	34 000	62 850	5,7
	Inc. after transfers (market price, produced VAT)	*43 800*	*26 490*	*41 906*	*43 027*	*49 489*	*92 218*	*3,5*
	Income after transfers (market price, paid VAT)	**43 800**	**28 200**	**34 150**	**39 750**	**48 250**	**89 050**	**3,2**

Notes: Amounts in euros per capita equivalized (pceq). Reading Note: the income before transfer of the poor is €5,900 pceq while the income after transfer reaches €24,600. They are net beneficiaries of the redistribution to the tune of €18,700, including €7,100 received in cash, €17,600 of non-monetary transfers minus €6,100 of taxes of all kinds. The better-off/poor income ratio is 22 before transfer and 3.2 after transfer, compared to 5.7 in the usual standard of living approach.
Sources: INSEE, Distributional National Accounts, 2019. Authors' Calculations

7 For France, the two first categories represent around 40% of the population and refer to "popular" households. The median and upper-middle groups represent around 50% of the households and represent the middle class, and the better-off group is close to the usual top 10%.

We compute these incomes at base or market prices, depending on the treatment of tax on products. In this paper, we mainly comment on incomes at base price (meaning, where indirect tax is not included in income before transfers). The main reason is that indirect taxation is a "fictive" sector in the national account (not part of the household, business or government sector). It is much more straightforward and understandable to start the redistribution operations from what households actually receive from employers as wages or property income, than an abstract concept including what additional income they would perceive in the absence of taxes on products.

However, two options may be considered in this case. The first is to add taxes on products actually paid by households ("paid VAT convention") to factor income; the second option would be to add taxes on products, or at least VAT, proportionally to factor income ("produced VAT convention"). While the before transfers and after transfers inequalities are higher in the "produced VAT" than in the "paid VAT" convention, redistribution (in euros) is equal in euros in both options (see Table 1, and Figure A1 in Appendix 2).

Income before and after transfer is close to the "pre-tax" and "post tax" income concepts of the WIL and DINA project. One of the main differences lies in the way to distribute household incomes within individuals. DINA allocates all income to parents, usually equally, excluding children. As usual for INSEE or OECD works, we used an equivalence scale. We divided the household total income by a parameter for each individual of the household, children included. This coefficient allows us to take into account the size of the household (1 for the first adult, 0.5 for other persons aged 14 or over and 0.3 for children under 14). Another difference is that we primarily consider these incomes in base price in our paper, while DINA took the market price approach into consideration.[8]

Because all the transfers paid balance all the transfers received, modulo the deficit (which is itself distributed, see below), allocating all incomes to individuals leads to a fundamental accounting equality at the aggregate national level: the sum of incomes before transfers (IBT) equals the sum of incomes after transfers (IAT), which equals the national net income. This equality does not hold at individual or group of individual level, as can be seen in Table 1. That is the key point of our broader approach to redistribution: studying the gap between before and

8 Other differences with DINA's "pre-tax income" is related to how we distributed some components of the primary income, mainly indirect taxation (where we presented primary income in market price in the paper, for instance in Table 1). We distributed VAT as households pay it, meaning in function of consumption. DINA guidelines assume that VAT is neutral in primary income and depends on consumption in the before-after tax framework. We did not retain this hypothesis in our main analysis because it distorted the distribution of factor income and disposable income, which would no longer coincide with the distribution observed at the microeconomic level. However, for sensibility purposes, we tested this assumption of VAT distributed as primary income in Appendix 1, Figure A1.

after transfer income gives a comprehensive assessment of the redistribution of transfer systems.

B. Data

Our macro data come from national accounts, mainly the TIEA, issued by the French National Institute for Statistics and Economic Studies (INSEE) following the conventions of the System of National Accounts (SNA). Additional sources come from satellite accounts. We also derive average educational costs data from the Minister of Education satellite account.

Many of our micro data come from the INSEE Tax and Social Revenue Survey (ERFS), which matches socio-demographic information from the Labour Force Survey, administrative fiscal records of income declared to the tax authorities, and information from organizations in charge of distributing social benefits.[9] The ERFS relies on a sample of approximately 50,000 households or 110,000 individuals, representative of the population living in ordinary housing in metropolitan France.

Table 2. Table of Integrated Distributional Accounts by Income Group (2019)

Income item	Data used	Distribution methodology
Net wages Self-employed income Unemployment benefits Pensions Taxed property income	ERFS	Directly observed data
Imputed rents and untaxed property income	ERFS	Imputation model, based on housing size and rental prices for imputed rents
Retained earnings Corporate tax	ERFS	Proportional to dividends
Indirect taxes and excise duties	ERFS and BdF	Microsimulation with Ines-Indirect taxes module
Land and built land taxes and registration rights	FIDELI	Microsimulation
Wealth tax and real estate wealth tax	ERFS/POTE/ISF	Microsimulation INES
Income tax Housing tax Social security contributions Minimum income and disable allowances Family allowances Housing allowances Other social allowances	ERFS	Microsimulation using regulation with INSES model
Education	ERFS/ENRJ/Education satellite account	Education cost per student and level of education with re-ranking of student according to parents' income
Health expenditures	ESPS + health insurance administrative data	Micro-simulation with INES-OMAR module
Collective expenditures	DADS and ERFS	Geographical repartition proportional to concerned civil servant payroll

9 From the Caisse nationale des allocations familiales (National Family Allowance Fund – CNAF), the Caisse nationale de l'assurance vieillesse (National Old-Age Pension Fund – CNAV) and the Caisse centrale de la mutualité sociale agricole (Central Agricultural Social Mutual Fund – CCMSA) which provided the social benefits paid.

Other databases complete (see Table 2) ERFS for the microsimulation of some transfers (see Appendix online for more details on each database), namely:

(i) INSEE Family Budget[10] (BdF), to distribute consumption as well as taxes on products from a detailed breakdown of consumption by item;

(ii) INSEE Housing Survey to impute and distribute rents;

(iii) INSEE Household Wealth Surveys to simulate the capital tax (*impôt sur la fortune* – ISF – and the *impôt sur la fortune immobilière* – IFI), complemented by specific fiscal files, recently made available by the Directorate-General of Public Finance (DGFiP), in order to better understand high wealth levels (Sicsic et al. (2019));

(iv) Health Care and Insurance Survey (ESPS) (IRDES, DREES) to distribute health expenditures, matched with administrative data regarding health insurance reimbursements (National Health Insurance Fund – CNAM –, National Health Data System – SNDS), to provide expenditure presented for reimbursement and AMO reimbursements;

(v) INSEE and Drees Survey On Youth Income (ENRJ) to account for non-recorded income transfers received by students who are not living with their parents;

(vi) DADS database ("Annual declaration of social data") which gives the wage bill of public employees to be able to distribute the collective public service.

(vii) Education satellite Account for cost per student by level

C. Distribution Methods of Income and Transfers

We use and adapt the INES microsimulation model[11] to distribute between household monetary income and compute transfers. The open-source INES model draws mainly upon ERFS data in order to micro simulate most French direct taxes and social contributions, indirect taxes such as VAT and social benefits (which are not, or are partly, included in administrative data). The model gathers different sources, imputes some missing variables, recalibrates the data to fit the correct year of microsimulation, and then simulates each transfer based on the legislative schedules (see Fredon and Sicsic (2020) for more details on the model). Information in ERFS is broader than in fiscal sources: it makes it possible to concisely simulate the social benefits, taxes and social contributions that depend on many variables such as family profile, labour market history, employment status, number of hours worked, type of job and business, disability status, etc. The information from ERFS makes it possible to produce analyses by different

[10] In this working paper, we used the indirect direct taxation module of INES based on 2011 survey.
11 See https://adullact.net/projects/ines-libre for the source code and detailed documentation of the model, including deviations from external targets, in terms of both the number of households affected and the total transfers simulated.

population groups, according to living standards (up to twentieth), diploma, age, localisation of the household, family configuration, sex of the single parent. We also distribute by crossing age with diploma, thus having 25 breakdowns (5x5). We tend to consider that breakdown with many more than 25 groups. With this in mind, the main source data should be regarded cautiously (50,000 households, which means 2,000 in each group for 25).

In our DNA tables, the ranking of households is the same whatever the line of the table, and is computed according to usual notion of disposable income per capita equivalized. This is particularly important to for primary incomes and how they are displayed. If this were not the case, retired people with high pensions would be ranked in the bottom group at the top of the table (income before transfers) and the switch to top income groups during the redistribution operations. Hence before/after transfers comparisons would be affected by re-ranking effects and then would virtually affect redistribution indicators. With our convention, the issue of whether or not pensions are included in primary income is less important (Germain et al., 2021) while, when the ranking is different according to type of income considered, the inclusion or not of pensions happens to radically change the results.

The following paragraphs address some specific issues about how we distribute transfers (see Appendix online for a more detailed method for the different transfers).

General Principles for Taxes. DNAs require imputation assumptions to distribute certain taxes. Following Saez and Zucman (2019), we impute *taxes proportionally to the tax base*. For example, social security contributions, whether they are nominally levied from employees or employers, are imputed to each household proportionally to perceived wages; VAT is imputed proportionally to the consumption of households. Taxes on tobacco or alcohol proportionally to tobacco or alcohol consumption estimates; taxes on property proportionally to imputed rents, and so on. This implied that we distributed taxes without modelling behaviours of economic agents. We interpreted our results as *ex-ante* measurements, without prejudging possible behavioural effects such as consumption/saving arbitrage or capital/labour substitution.

Taxes on Production. Following our imputation principle, employers' taxes or subsidies based on wages *(e.g. taxe sur les salaires, versement mobilité or credit d'impôt compétitivté emploi*) are micro-founded following legal rules. In absence of information to do better, other production taxes or subsidies follow the factor income profile.

Taxes on Products. According to the tax imputation principle, taxes on products – VAT, domestic duty on consumption of energy products, excise duty on tobacco and alcohol –are distributed proportionally to the consumption of each corresponding good with the indirect

taxation module of the INES model (André, Biotteau and Duval (2016)). The distribution[12] comes from consumption data taken from INSEE's Family Budget Survey, statistically matched to the ERFS data.[13] The household's property tax on built properties (*taxe foncière sur les propriétés bâties*) follows the distribution from André and Meslin (2021). Another option is to treat taxes on products as the taxes on production taxes and distribute them proportionally to factor income. However this would be contradictory to our tax imputation principle and set aside the main stream corresponding literature on consumption tax incidence.

Retained Earnings. For the reason mentioned in Section A, retained earnings of companies are treated as reinvested profit and, therefore, imputed in proportion to distributed profits, i.e. the dividends received by households in our micro data as in other publications (Piketty, Saez, & Zucman, 2018, for instance). Without making any claim that such an assumption is systematic at the individual level (or in a very granular decomposition), it provides a plausible distribution in our decomposition by twentieths of population, given that corporate ownership is highly concentrated in the top 5% group.[14] In a world that is ideally tailored to statisticians, it would be possible to link individuals' tax revenues with the accounts of the companies they own. However, it is not (yet) possible in France.[15]

Property Income of Public Authorities. This component is generally negative, as it includes the payment of interest on national debt. We distribute the corresponding national value among households proportionally to the sum of benefits and deductions. The idea here is that public deficits would have to be filled sooner or later through a mixture of tax increases and spending cuts whose composition cannot be prejudged. Therefore, we normatively distribute them as if half of the deficit would be refilled by a tax increase and half by a benefit reduction (as in Piketty, Saez, Zucman 2018), without modifying the structure within the transfers received as paid. Given the amounts generally involved, the impact of any particular assumption do not significantly change the results.

Health. As mentioned earlier, we add a valuation of public services to disposable income based on how much additional money would have been necessary to be able to pay for free services. The distribution of health expenditures is a major issue when studying the redistributive impact of public transfers. Health expenditures often involve very substantial amounts (around 9% of

12 They are distributed in this way for the constitution of primary income and as a transfer, in order to be able to find the distribution of disposable income from the microeconomic approach (Germain et al., 2021).

13 We distributed all VAT as household consumption, even VAT on investment and intermediate consumption of all institutional sectors. Distributing the latter separately form the former is a path of improvement for the future.

14 See also results in (Piketty, Saez, & Zucman, 2018).

15 This needs ambitious work on administrative data. An academic project has recently proposed a first attempt to do so (Bozio et al., 2022).

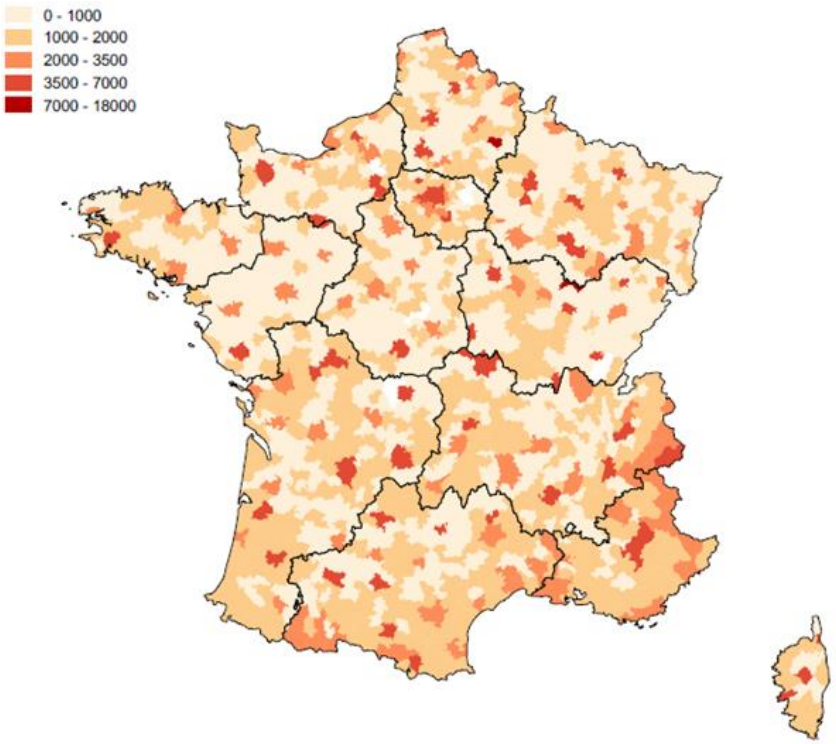
NNI in France), and the degree to which health care systems are public varies between countries. The French Health Insurance System has two parts: the compulsory health insurance (AMO, covering 78% of the consumption of medical care and products (CBSM)) and supplementary health insurances (AMC, 13% of CBSM). Contributions for compulsory health insurance follow income distribution, while the rate of reimbursement differs according to the type of care or the patient. In addition, assistance such as supplementary universal healthcare coverage (called *couverture de maladie universelle*) and a supplementary health insurance target poorest households. We use the INES-OMAR model of the French Health Ministry to break down health expenditures and distribute them to a homogenous category of households. This model is linked to the INES model mentioned above. Health expenditures are imputed thanks to the ESPS-EHIS 2014 data, and matched to exhaustive health insurance reimbursement records. Health expenditure covers the scope of individualizable services reimbursed in town medicine and healthcare establishments (public and private hospitals, in particular). The premiums and reimbursements for supplementary insurance are taken from the survey of the most popular contracts with supplementary health insurance organizations.

Education. The second main in-kind transfer is education expenditure (5% of NNI). For those over the age of 14, we distinguish between general and technological high schools, vocational high schools and higher technician sections (STS), preparatory classes for the French *grandes écoles* (CPGE) and university. For those under the age of 14, we use children's ages to impute education between kindergarten, primary and secondary school. We allocate to each pupil or student the average costs from education accounts (from the Ministry of Education). Two types of calculation are made, one for primary and secondary schooling and the other for higher education. For students in primary and secondary education, the average cost by age and type of schooling is assigned to each ERFS household with children. For higher education, we distinguish two types of students and specific types of education (higher technician sections, "preparatory classes" for the *grandes écoles* and university). If they are living with their parents, depending on the type of schooling (university, engineering school, etc.), the average cost is allocated to their household. If they are living alone according to the LFS, the corresponding average cost is allocated to their parents' household in order to account for sub-family transfers, measured by a specific survey linking administrative data on young adults and their parents. This survey reveals that it is inappropriate to consider them as separate households, otherwise they have no income, even though they receive private transfers from parents. Education expenditures by type of school tracked per tenth of usual standard of living are given in Table A2 in the Appendix online.

Collective Consumption Expenditures. Collective consumption expenditures are mainly comprised of defence, police, justice and general operations of the government and local authorities. The distribution of these expenditures raises more conceptual issues than that of individualizable consumption expenditures. Two polar normative assumptions are made by the literature: flat-rate distribution or distribution in proportion to income.[16] Our DNAs distribute collective consumption expenditures of national attribution such as defence, foreign affairs and activity of research on a lump-sum basis because they are supposed to equally benefit everyone in the country. Other collective consumption expenditures correspond to public services, although not individually identifiable, that can be considered "localizable". We distribute them among household according to their geographical accessibility. To do this, we rely on the local wage bill of the public employees concerned (excluding hospitals and education, because these are in-kind transfers) from the administrative database named, "Annual Declaration of Social Data". Public services are localized in the living area of each household of our representative survey (ERFS). The ratio between the wage bill of these civil servants and the number of inhabitants in each living area is assigned to each household in order to measure collective expenditure in its area. In the Paris region, this zoning is too large to estimate the distribution of collective spending, so a more restricted breakdown is used, that of urban catchment areas [Caenen et al., 2016]. The estimated distribution is close to the uniform distribution by tenths of living standards. The slightly U-shaped profile could be explained by the fact that urban areas with the greatest presence of local public services tend to be the most densely populated territories (Figure 2), where both the lowest and highest income households are most represented. Median households live in areas with slightly lower collective expenditures.

16 Flat rate distribution suggests that each individual benefits equally from collective consumption expenditure: therefore, it has a strong equalizing effect on income after transfer distribution. Conversely, proportional distribution considers public goods as neutral on inequalities. The latter approach means that service is a proportion of income. Taking this logic further, we can interpret the budget of the national police force as a mission to protect property and then distribute it as a proportion of wealth.

Figure 2. Localizable Collective Consumption Expenditures by area (EPCI)



Notes: Collective Consumption Expenditure in euros per capita. The territories on this map are the *établissement public de coopération intercommunale* (EPCI). The darker territories are better endowed with local non-individualizable public services.
Sources: DADS and ERFS 2017.

For robustness purposes, variants of geographic zones were tested and the results were not significantly modified: the U-shaped profile is unchanged and becomes more pronounced with a finer breakdown. More generally, alternative hypotheses on the distribution of transfers were tested, but this did not alter the main conclusions. For instance, by distributing the share of national collective expenditures proportionally to income after transfers (but excluding collective expenditures), collective expenditures would increase slightly with income up to the 9th decile and more strongly for the wealthiest 10%, but the main results of our analysis would not change.

IV. Results on Primary Inequality and Redistribution by Income Group

In this section, we group households by twentieth of standard of living and keep this ranking stable. Our results are for France in 2019.

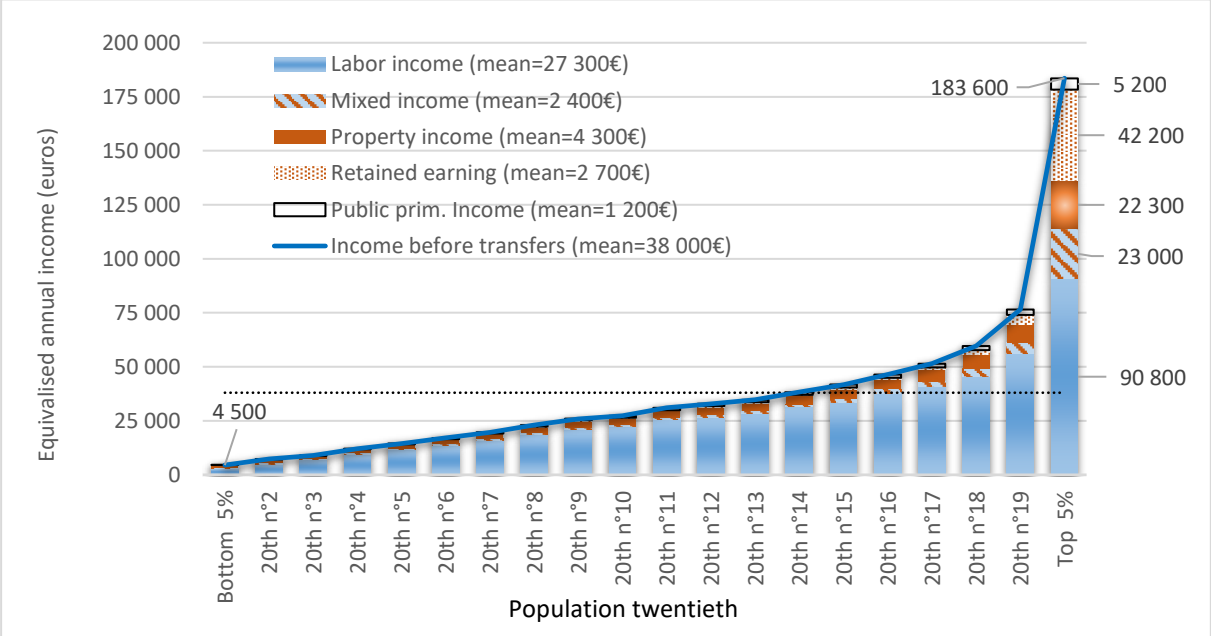
We first look at inequalities resulting from primary distribution of incomes, then see how they are attenuated by public transfers. Finally, we examine the contribution of the various public fiscal and social policies in greater detail.

A. Before Transfers Inequalities

Like in most other countries, primary incomes are unevenly distributed in France: the income of the wealthiest 5% is 40 times higher than that of the poorest 5%. In 2019, the annual primary income (at base prices, i.e. without including taxes on product primary income) amounted to 4,500 euros for the poorest 5% and 183,600 euros for the wealthiest 5% (Figure 3 below).[17] Before transfers, the latter earned a quarter of the national income (i.e. 430 billion euros).

This concentration at the top of the redistribution can partly be explained by expanded property income, concentrated on the wealthiest households. Those incomes come from revenues from assets and undistributed profits, which are assumed to be distributed as dividends. Based on this assumption, the wealthiest 5% receive 45% of this property income, i.e. an average annual amount of 65,000 euros per capita equivalized, compared to 3,800 euros for the rest of the population. Wages represent nearly 80% of primary income at the median level, against 50% for the wealthiest 5%. Wages are also the main driver of inequality (Figure A3).

Figure 3. Income before transfers by twentieth of income (France, 2019)



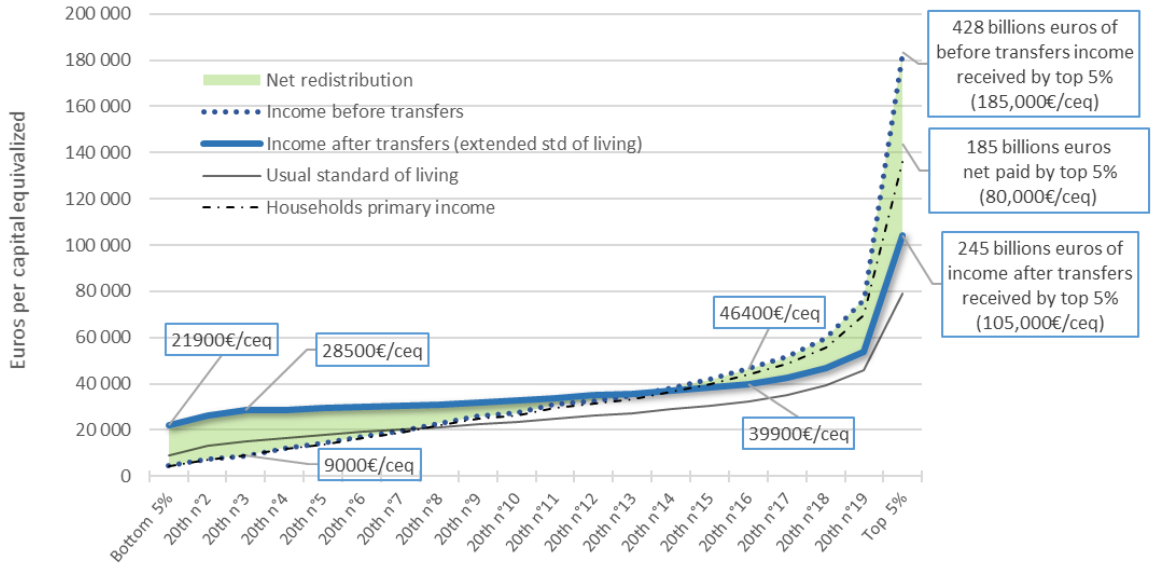
Notes: decomposition of income before transfers by type of income (mean=mean over the whole distribution)
Sources: INSEE, Distributional National Accounts, 2019. Authors' Calculations

[17] In Appendix 1, Figure A1, we presented primary inequality at market price using two assumptions for VAT distribution. In the first assumption, where VAT is distributed in function of consumption, primary inequalities are lower, while in the second assumptions where VAT is distributed as primary income, the primary inequality at market price is close to inequality measured at base price.

B. Extended Redistribution and After Transfer Income

The inequality picture becomes very different after redistribution occurs. The 5th richest income drops to €105,000/ceq (hereinafter '/ceq' will mean per capita equivalized) while those among the 5th poorest rises to a yearly €21,900/ceq (per capita equivalized with OECD equivalence scale), narrowing the top/bottom ratio from 40 to 4.75. The average net contributors are at the highest third of the scale of standards of living (Figure 4). In this extended framework, two-thirds of the households appear to be average net beneficiaries of extended redistribution,[18] versus a third from the usual monetary redistribution.[19] Redistribution significantly reduces the income gap between the 3rd and 17th twentieths: the extended standard of living gap between the former and the later falls from 400% before redistribution (€9,000/ceq and €46,400/ceq, respectively) to less than 50% (€28,500/ceq and €39,900/ceq, respectively).

Figure 4. Income before and after transfers by standard of living level (2019, France)



Sources: INSEE, Distributional National Accounts, 2019. Authors' Calculations

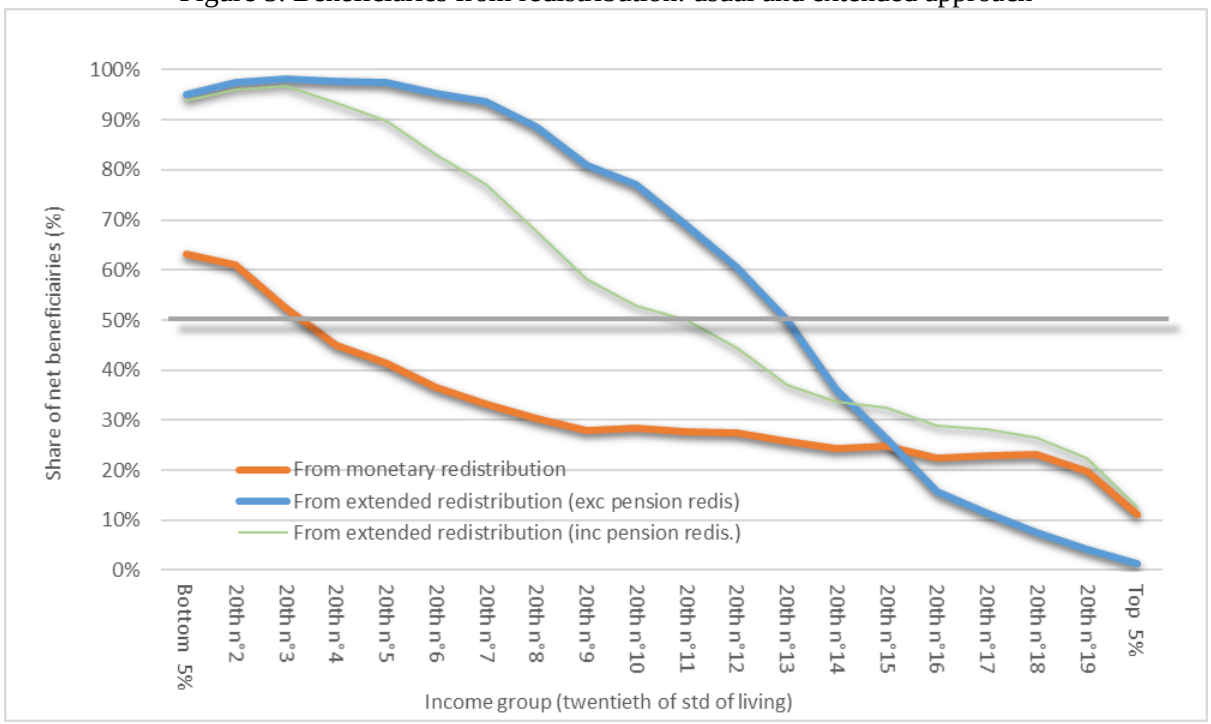
The net contributors of extended redistribution[20] pay a net total of 315 billion euros to the net receivers; this redistribution of net public transfers thus represent 18% of the net national income (base price). The 5% richest receive 428 billion euros as primary income (one-fourth of the net national income) and contribute to 185 billion euros to national solidarity (40% of their primary income). Obtaining the same income after transfers for all twentieths would

18 Indeed, twentieth n°13 (P60-65) is a net beneficiary (the income after transfers plain blue curve is above the income before transfers dotted blue curve), while twentieth n°14 (P65-70) is a net contributor.
19 With the usual approach, twentieth n°7 is a net beneficiary (the income after transfers plain black curve is above the income before transfers dotted black curve), while twentieth n°8 is a net contributor.
20 This extended redistribution is induced by public transfers. Its scope excludes private transfers between households.

require a net redistribution of 575 billion euros, the actual redistribution thus representing 55% of this amount.

This macro representation with a twentieth as a net contributor or beneficiary from redistribution can mask heterogeneous situations for the households belonging to that twentieth: for example, some households may be net contributors even though their twentieth on average is a net beneficiary (e.g. if there is no child, lack of public services in the neighbourhood, not eligible for social housing, etc.). The micro approach avoids this pitfall by showing the proportion of beneficiary and contributor within each standard of living group (Figure 5). More than 95% of poor and modest people are net beneficiaries of extended redistribution.[21] This proportion of beneficiary falls to 60% at the 12th twentieth, 50% at the 13th twentieth and 36% at the 14th twentieth which are middle class household groups. Overall, 60% of households are net beneficiaries.

Figure 5. Beneficiaries from redistribution: usual and extended approach



Notes: net pensions are counted as primary income for the blue curve and as redistribution for the grey and orange curve.
Sources: INSEE, Distributional National Accounts, 2019. Authors' Calculations

C. Taxes and Social Security Contributions (SSC)

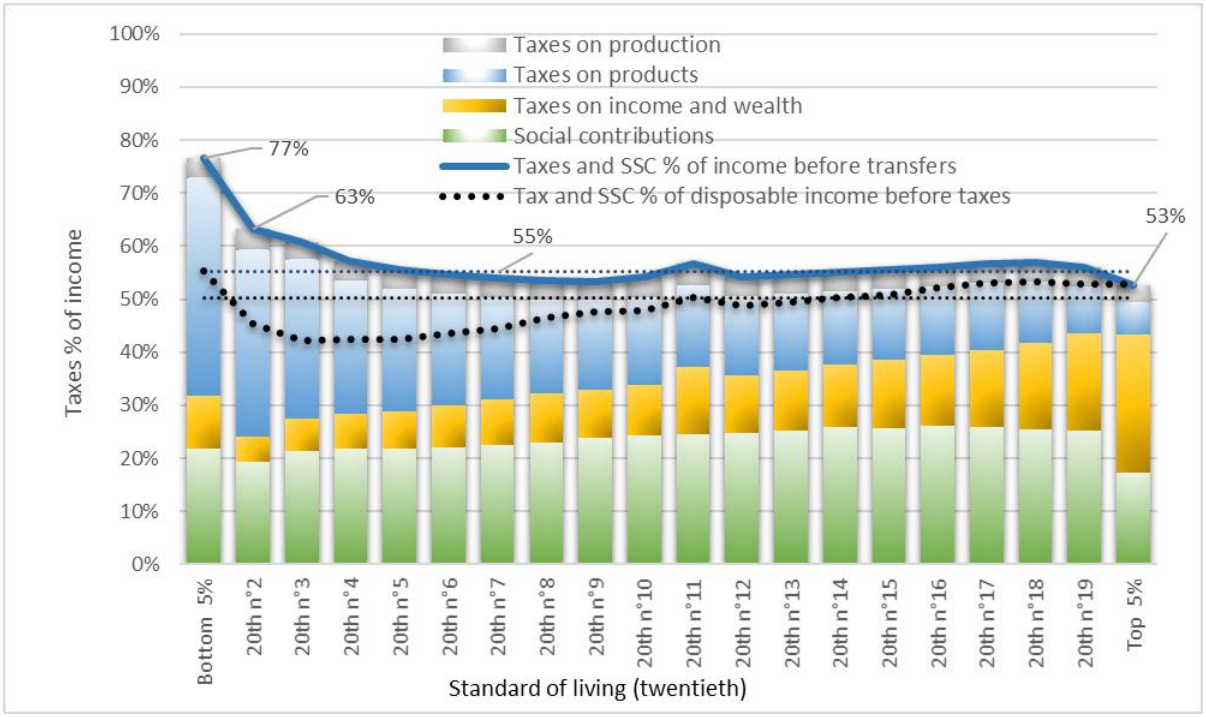
Taxes on income and wealth are progressive from a rate of 7.5% for the 10% poorest to 26% for the top 5% with an average of 15%. Nevertheless, this redistributive profile is more than

21 Pension redistribution is excluded here.

counterbalanced by taxes on products (VAT, taxes on alcohol, tobacco or energy) which weigh particularly heavily on the bottom of the distribution. These taxes on products represent 41% of income before transfers of the 5% poorest, compared to only 6% for the 5% better-off.

The shape of the overall French fiscal rate is regressive from the first to the fifth twentieth.[22] It then becomes flat around its average of 55% of income before transfers, before slightly dipping at the very end of the distribution at 53% for the 5% richest (Figure 6).

Figure 6. Overall tax rate by twentieth of standard of living



Note: Tax rates calculated in percentage of income before transfers with the exception of the dotted curve (% of disposable income before transfers).
Source: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

The slight decrease of the overall tax rate observed at the top of the distribution is mainly due to the fall in the share of SSC, explained by compositional effects. First, the share of labour income decreases for the top 5% and is replaced by capital income, which is less taxed in France. Second, individuals at the bottom of the distribution are older and receive more retirement pensions, excluded from SSC.[23] The decrease of the tax share in primary income at the top is consistent with other studies such as Garbinti et al. (2018) and could be more important with a more granular decomposition at the very top of the distribution.

[22] The level and the decrease of the tax rate is higher with the "VAT distributed" approach (when VAT is distributed proportionally to factor income in the income before transfers).
23 These results take into account two second-order mechanisms which can act in opposite directions on the distributive profile of contributions: on the one hand, exemptions on low wages play a progressive role and on the other hand, the capping of these contributions can accentuate the regressivity for the highest incomes.

Furthermore, because of a lower capacity to save, the poorest individuals face annual negative savings rates. On the contrary, the richest show high savings rates. These savings are part of their primary income but lead to intertemporal consumption and wealth accumulation. These amounts are not taxed when they are saved, but at a later time, when they yield revenues and are consumed. Our measure of the progressivity does not take into account these dynamic effects of savings and wealth.

In this extended approach, taxes, duties and SSC are related to primary income, regardless of their actual base. This corresponds to the idea that taxes are levied and then redistributed to households. A different approach would be to consider that public transfers are provided and the required taxes are then levied to balance the public accounts. If we calculate tax rates in percentage of income before taxes plus transfers received in cash (and not just income before transfers), we still obtain an "inverted tilde" curve (see Figure A2-a. in Appendix 2), but this time with some progressivity for households between the 3rd twentieth (apparent tax rate of 42%) and the 18th twentieth (53%). Taxes represent the highest share of total income before transfers for the bottom 5% (55%), compared to 50% overall. The slight regression at the top can only be seen at the very top (top 1%).

D. Public Transfers Received by Households

In cash, social transfers, such as poverty and housing allowances, play an important role in the reduction of poverty, representing for example €3,600/ceq for the poorest 5%, compared to the €4,500/ceq they receive as primary income (see Figure A4). Targeting the poorest, these decrease sharply as the income rises and only significantly pertain to people in the first third of the standards of living scale. They represent an average of €900/ceq. Family, disability and unemployment allowances, cumulated, concern all groups of households with an average of €3,300/ceq, ranging from €2,900 to €3,900. Overall, in cash transfers represent €7,500 for the poorest 5%, decreasing to around €3,000 for the richest 5%.

As far as they are concerned, pensions reach €12,700/ceq for the top 5% households compared to an average of €2,200/ceq for the poorest 15%. For all households above median income, pensions represent the first source of public monetary transfers (up to 50% for the richest 5%).

The valuation of social transfers in-kind is from around €11,000/ceq for the bottom 20% of households, to €6,000/ceq at the other end of the ladder. Non-individualizable public services represents an average of €4,200/ceq, within a €4,100–4,400/ceq bracket.

The overall profile of transfers received displays no strong correlation with income and is roughly flat at around €24,400/ceq. Excluding pensions, the profile decreases from €23 000/ceq for the poorest 15% to around €13 500/ceq at the top of the distribution.

E. Reduction of Income Inequalities by Extended Redistribution

To decompose the effect of the entire redistribution system on income inequalities, we apply the Kakwani method based on the Gini inequality index (Table 3, and see Figure A3 in Appendix for a visual decomposition). On a scale of 0 – no inequality – to 1 – all income detained by a single individual –, primary inequalities are 0.41. Almost 60% of these inequalities are due to labour income inequalities, mainly because wages are the biggest type of income in primary income. Capital and mixed income account for nearly one-third (addition of 18% of property and mixed income and 13% from retained earnings). Capital income inequalities are higher: the top 5% receive 25 times more capital income than the poorest 15%, and 500 times more retained earnings, compared to a 1 to 15 ratio for wages.

Table 3. Kakwani decomposition of inequality formation and attenuation (France, 2019)

	€ per capita equivalized	Inequality and decomposition*	Contribution
Labour income	27 300	0.246	59.5%
Property income	6 800	0.076	18.4%
Retained earnings	2 700	0.055	13.3%
Public primary income	7 000	0.034	8.4%
Primary income	**43 800**	**0.413**	**100.0%**
Taxes on products	-5 800	0.031	13.9%
Taxes on production	-1 600	0.001	0.3%
Taxes on income and wealth	-6 800	-0.029	-13.0%
Soc. Sec. Contributions	-10 100	0.004	1.9%
Benefits in Cash	11 200	-0.076	-33.6%
Benefits in-kind	9 000	-0.107	-47.0%
Collective consumption	4 200	-0.039	-17.2%
Miscellaneous	-100	-0.012	-5.2%
Extended Standard of Living	43 800	**0.186**	-
Usual Standard of Living	27 500	**0.281**	
Overall redistribution	**0**	**-0.227**	**100.0%**
Taxes	***-24 300***	0.003	*3.0%*
Benefits	*24 400*	-0.222	*-97.8%*
Miscellaneous	*-100*	-0.012	*-5.2%*
Health System		-0.042	*18.6%*
Pension System		-0.030	*13.2%*
Education System		-0.028	*12.3%*
Housing Subsidies		-0.013	*5.9%*
Poverty Subsidies		-0.012	*5.2%*

** pseudo gini decomposition.*
Sources: INSEE, Distributional National Accounts, 2019. Authors' calculations

The main drivers of inequality reduction are benefits in-kind (close to 50% of overall inequality attenuation) followed by benefits in cash (1/3 of inequality reduction). If we look deeper into

the decomposition, the health system appears to be the first contributor to inequality reduction, alone accounting for 19% of the reduction in inequality from the primary income to the extended standard of living. Other impacting transfers are the pensions system (13%), the education system (11%), housing allocations (6%) and poverty subsidies (5%). As already shown in Figure 6, the tax system is overall not redistributive: the progressivity of taxes on income and wealth contribute to lower inequality by 13%, but taxes on products have the opposite effects with a 14% contribution to increase market inequality, due to a decreasing consumption rate with primary income.

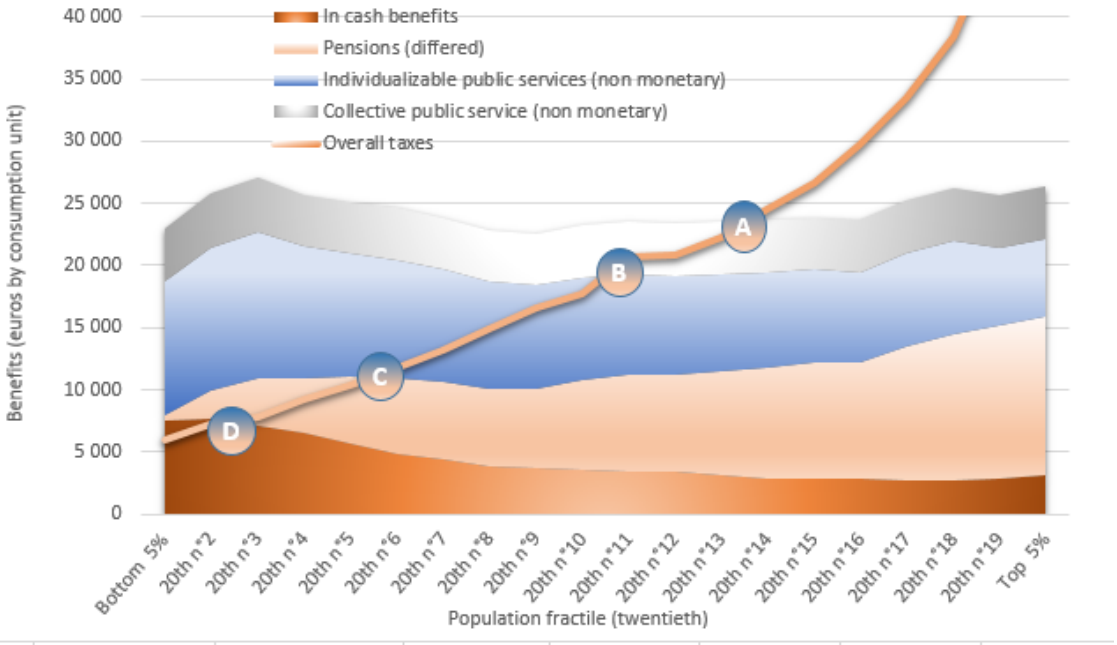
F. A Political Economy Comment on Extended Redistribution in France

According to Boyer *et al.* (2022), knowledge, trust and the perception of a good use of public money are strongly correlated with tax consent. The issue of tax justice also plays an important role, since the perception of a "fair" redistribution and a "fair" contribution of the different income levels relates with consent. Fiscal consent is based on how the population understands the tax and benefit system (Stantcheva, 2021). However, French citizens think that there are net contributors more often than in reality: a survey showed that 74% of respondents claim to contribute more than they benefit from the system,[24] while our study show that 60% of French people are net beneficiaries of the extended redistribution system.

A possible explanation for this paradox may come from the indirect or differed nature of the counterpart of taxes. Figure 7 below provides a decomposition of the transfers received per consumption unit. The first two categories include monetary benefits, current (in dark brown) or deferred (in light brown), i.e. retirement pensions. The next two are non-monetary and correspond to counterparties in-kind that can be individualized such as health or education (in blue) or collective, such as security or justice (in grey); the line in light brown corresponds to the total amount of taxes.

24 Ipsos Affair Survey, "Les français et l'impôt", October 2013.

Figure 7. Transfers received in cash or kind compared to taxes and SSC



Note: the areas represent the different strata of transfers received by households and the curve the total amount of taxes and duties. Points A, B, C and D designate the split between net beneficiaries and net contributors according to the type of transfers taken into account[25]
Sources: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

Households ranked below point A receive more from public transfers than they pay in taxes. However, if they don't see non-monetary public services as a tax counterpart, the balance paid/received moves to point C. Moreover, if they don't take into account pension in their appreciation of the balance paid/received, they would be even more numerous to see themselves as a net contributor (point D). Indeed, net beneficiaries from monetary redistribution only constitute 32% in the micro approach.

The situation of households within the 10th twentieth (just below median) illustrates the origin of the aforementioned paradox: against the €17,700 in taxes and contributions they pay, they receive €23,200 made up of €3,500 in cash, €8,300 in-kind and €7,200 in differed income (pensions). Depending on how people trust the sustainability of social systems, and the degree of projection throughout life, the assessment that they can draw from their situation ranges from -€14,200 (€3,500 – €17,700) to +€5,500 (€23,200 – €17,700) when including in-kind transfers.

In monetary terms, modest, median or upper middle-class households can thus feel that they do not have a fair return on their taxes. It is only by giving monetary value to the public services that the redistribution appears to benefit a majority of people. If, theoretically, net beneficiaries

[25] All for A, all except non-individualizable public services for B, also excluding individualizable public services for C; D retains only non-pension cash benefits).

lose confidence in the pension regimes and experience the closing of public services, such as a hospital or education facility, in their neighbourhood, there can exist the feeling of excessive fiscal burden relative to the benefits from their contribution, especially when taxes are increasing, such as the carbon tax which propelled the yellow vests' movement.

V. Results on Inequality and Redistribution by Age Groups

Previous sections analysed inequalities and redistribution along the standard of living dimension. We will now focus on issues between generations, through crossing DNA by age cohort (this section) and crossing cohorts by diploma (next section).

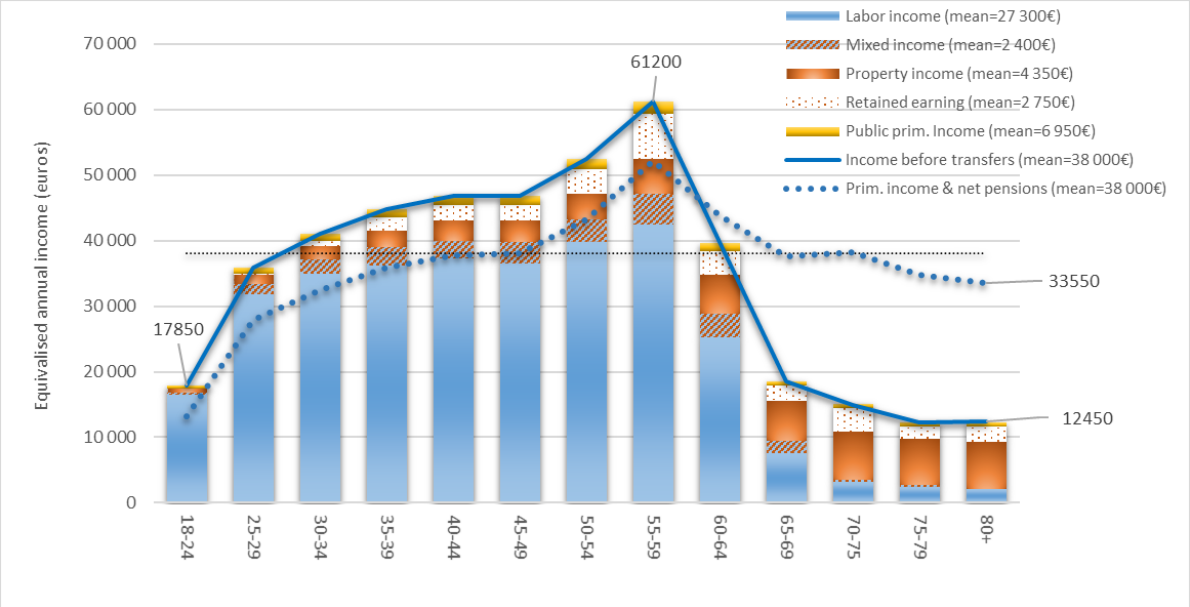
Ideally, examining lifelong issues would necessitate individualized panel data. Those datasets may exist in the future, but for the moment, panel datasets do not contain enough information to assess extended redistribution. Distributional accounts can, however, approach the notion of redistribution over generations by establishing distributional accounts by age cohorts. With our detailed data on socio-economic variables, we can estimate reallocation of transfers by age groups and diploma groups simultaneously.

We first conduct an analysis with the unique criterion of age according to 12 classes for the reference person of the household (5-year age groups, plus the 18–24-year-olds and a category of 75 years and over). In order to more accurately study transfers between generations, we then use broader age groups (5 groups) in order to be able to cross these with the level of education (5 groups).

A. Primary Incomes by Age

The age profile of primary income is particularly strong, starting from around €18,000/ceq for the 18–24 age group, peaking at €61,000/ceq for the 55–59 group and declining to €12,000/ceq for the oldest group (Figure 8 below). Unsurprisingly, non-labour income is almost zero for the youngest (8% including mixed income), increase with age and become dominant after 65 (more than 80% of primary income after 70). Including pensions in primary income (and deducting a portion of SSC and taxes from primary income to maintain balanced transfers overall) leads to a flatter age profile with most households lying between €30,000/ceq and €38,000/ceq of per capita eq. primary income, with two notable exceptions: the 18–24 group falling at €13,000/ceq and the 55–59 group peaking at €50,000/ceq.

Figure 8. Income before transfers by age of household reference person



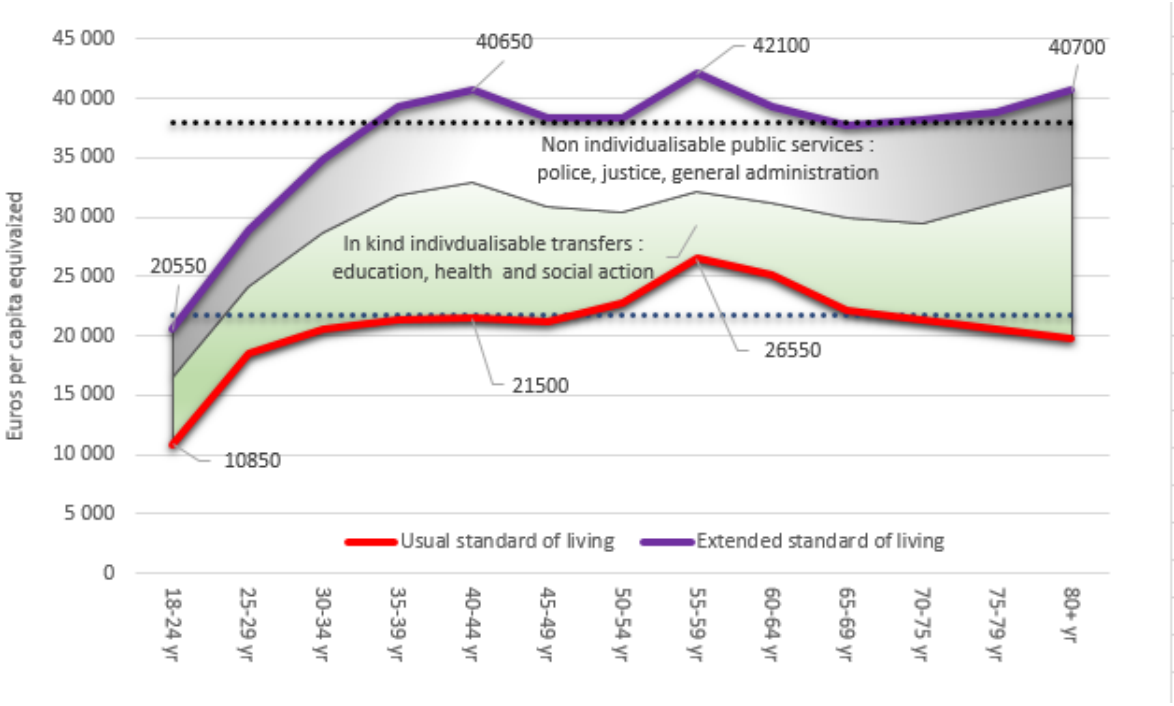
Notes: for the dotted blue line, net pensions (deducting a portion of SSC and taxes to maintain balanced transfers overall) are included in income before transfer.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

B. Income after Transfers

Income after transfers is more equal across age cohorts (See Figure 9). The extended standard of living profile significantly increases until age 40 and remains stable until 55; it experiences a slight peak around 55–59 years (€26,550/ceq). The usual standard of living (i.e. without in-kind transfers) follows the same pattern and then slightly decreases after 65, going from €22,000/ceq down to €20,000/ceq.

Given the profile of in-kind expenditures and, in particular, the very strong growth in health care with age, the extended standard of living increases after 65 from €38,000/ceq to €41,000/ceq. Therefore, the scope of the redistribution is then crucial to study reallocation of public transfers across age groups.

Figure 9. Usual and extended standard of living by age of household reference person



Notes: The dotted lines represent the average for the entire population.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

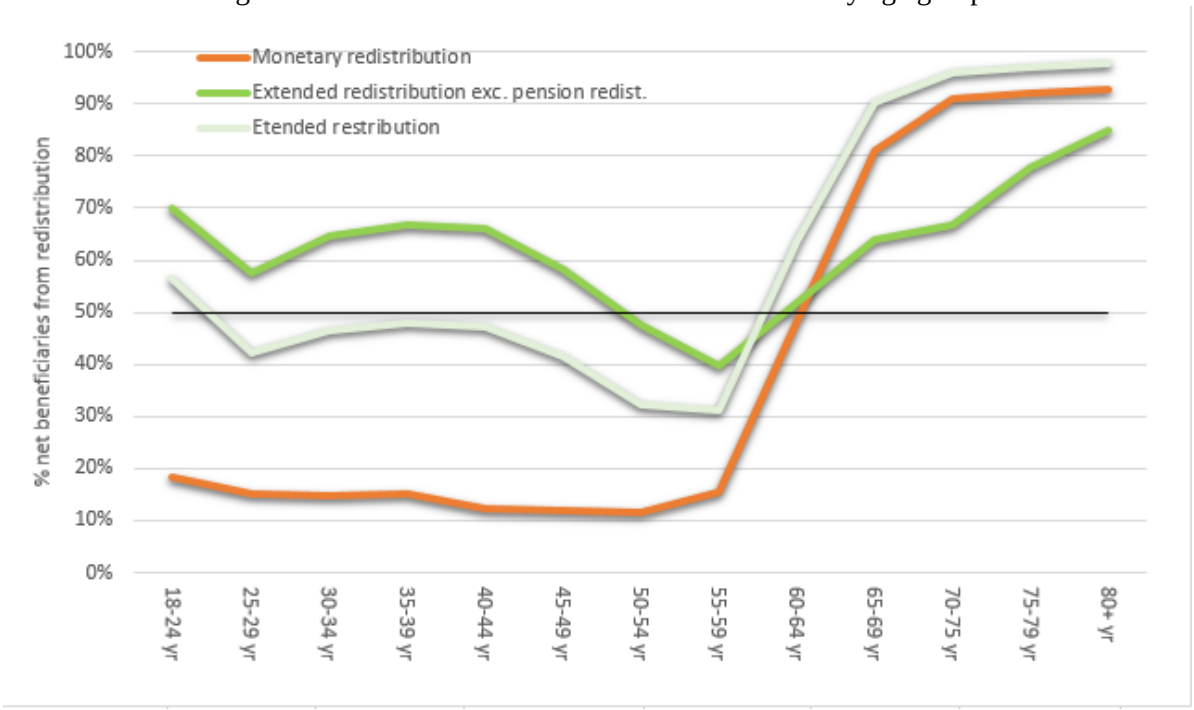
C. Net Beneficiary from Public Transfers at the Micro Level

As stated earlier, depending on their precise situations, within the same age group, households could be net contributors or net beneficiaries of our extended definition of redistribution. Considering the extended redistribution,[26] people are net beneficiaries after 65, mainly due to pensions and public health systems. More than 90% of people over 65 benefits from net enlarged redistribution, whereas this constitutes less than half for those under 60 (and 30% for those between 50 and 60 years old). In terms of monetary redistribution, it is only 15% of under 60-year-olds who receive more monetary benefit than they pay directly in taxes. The share of beneficiary is higher after the age of 65 in our approach than when we consider pensions as primary income. Conversely, the share of beneficiary is higher in the under 60s when we exclude net pensions (where a portion of SSC and taxes are deducted) from redistribution (see Figure 10, green and grey curves). However, when only considering the usual monetary redistribution (red curve), the net beneficiary rate is over 80% for the groups under the age of 60; after 65, 80% of the households are net beneficiaries. As mentioned earlier, the overall proportion of monetary net beneficiaries is 32% compared to 60% with the extended approach.

[26] That is to say, between income after transfers and before transfers: see Figure A5, before and after transfer income by age of household reference person.

This highlights a kind of "paradox of horizons" and shows how fundamental the credibility of the pension system is for a widespread willingness to pay taxes in France.

Figure 10. Share of Net Redistribution Beneficiaries by age group

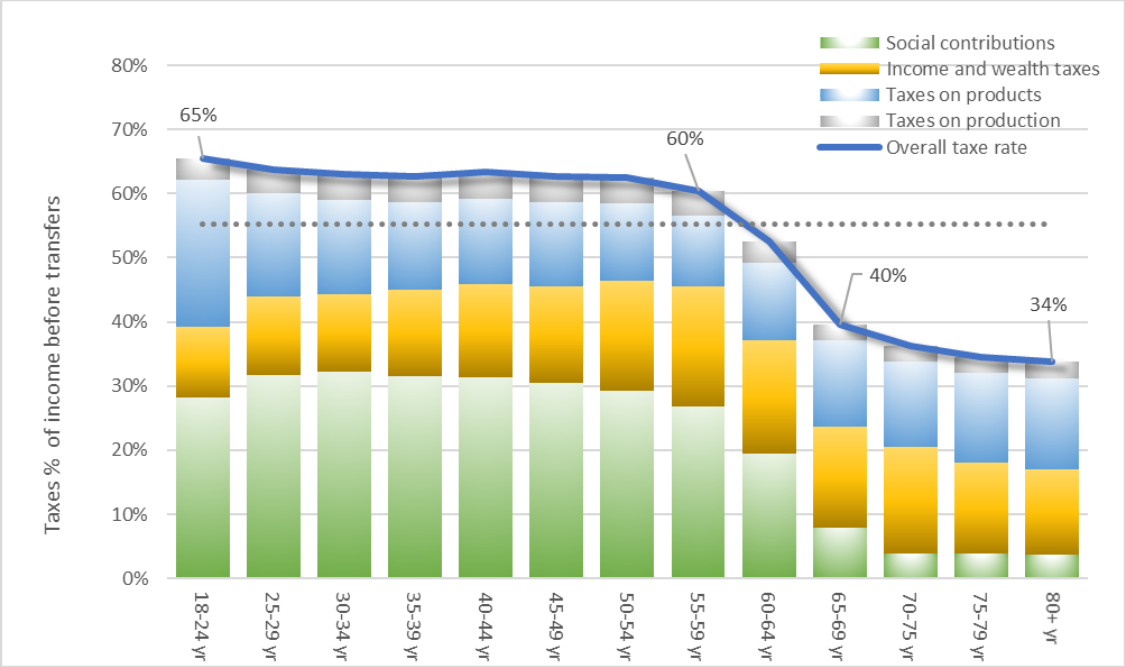


Notes: for the deep green line, pensions (deducting a portion of SSC and taxes to maintain balanced transfers overall) are included in income before transfers. For the light green line, the extended distribution is considered as in the baseline scenario, with pensions not included in income before transfers.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

D. Tax Rate and Structure by Age

The overall tax rate (including all taxes and SSC relative to income before transfers) decreases with age. The slope is small for the working age groups (from 65% for the 18–24-year-olds to 60% for the 55–59-year-olds) and accentuates afterwards (40% for the 65–69-year-olds, 34% for the over 80s) due to a fall in social security contributions (Figure 11). The elderly in France contribute much less to social security schemes and only through the so-called "general social contribution" (CSG) which is effectively an income tax, because it does not give any right to social security allowances. Excluding social security contributions, the profile is a flat curve with a small peak at younger ages (due to the saving effect): the rate of taxation is 37% for those under the age of 25; it falls to 31% in the 30–34 bracket; then rise to reach 34% for the 55–59-year-olds to then drop to 30% for +80-year-olds.

Figure 11. Tax rate by age of household reference person

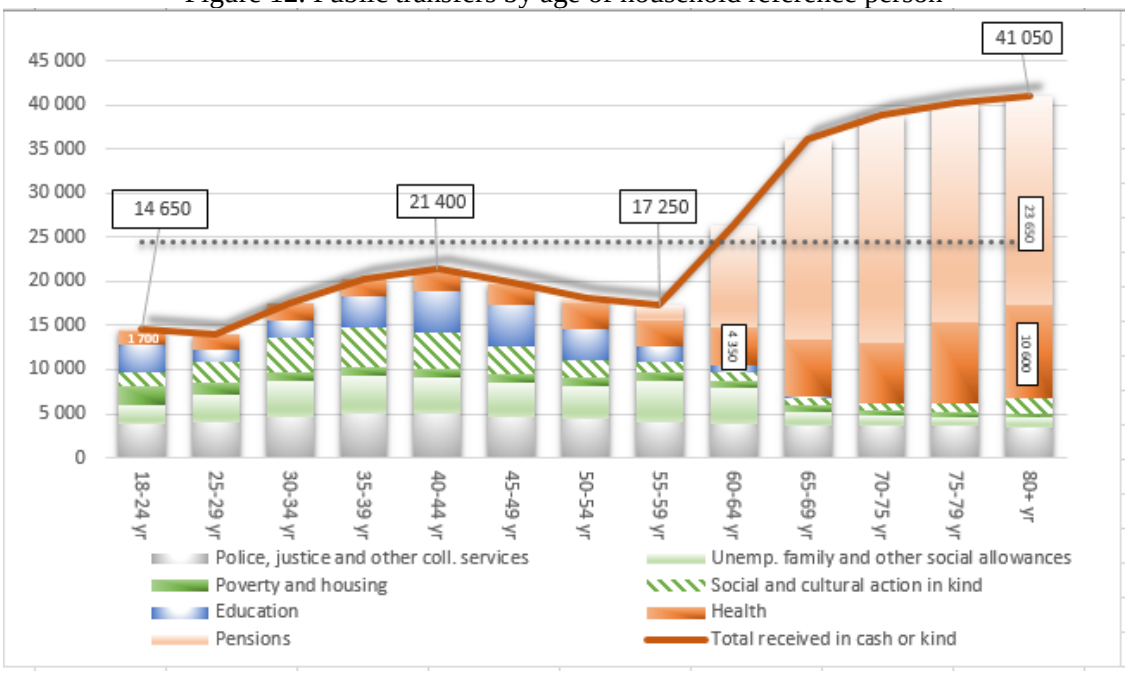


Notes: Tax rates calculated in % of income before transfers (including pensions)
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

E. Transfers Received by Age

Transfers received in cash or in-kind are more heterogeneous according to age than to income groups (Figure 12). They range from €14,600/ceq for those aged 18–24, who are the least well-off, to €41,000/ceq for those aged 80 and over. For the working-age classes, the profile is bumpy, with a peak for the 40–44-year-olds at €21,400/ceq and a trough at €17,000/ceq for the 55–59-year-olds.

Figure 12. Public transfers by age of household reference person



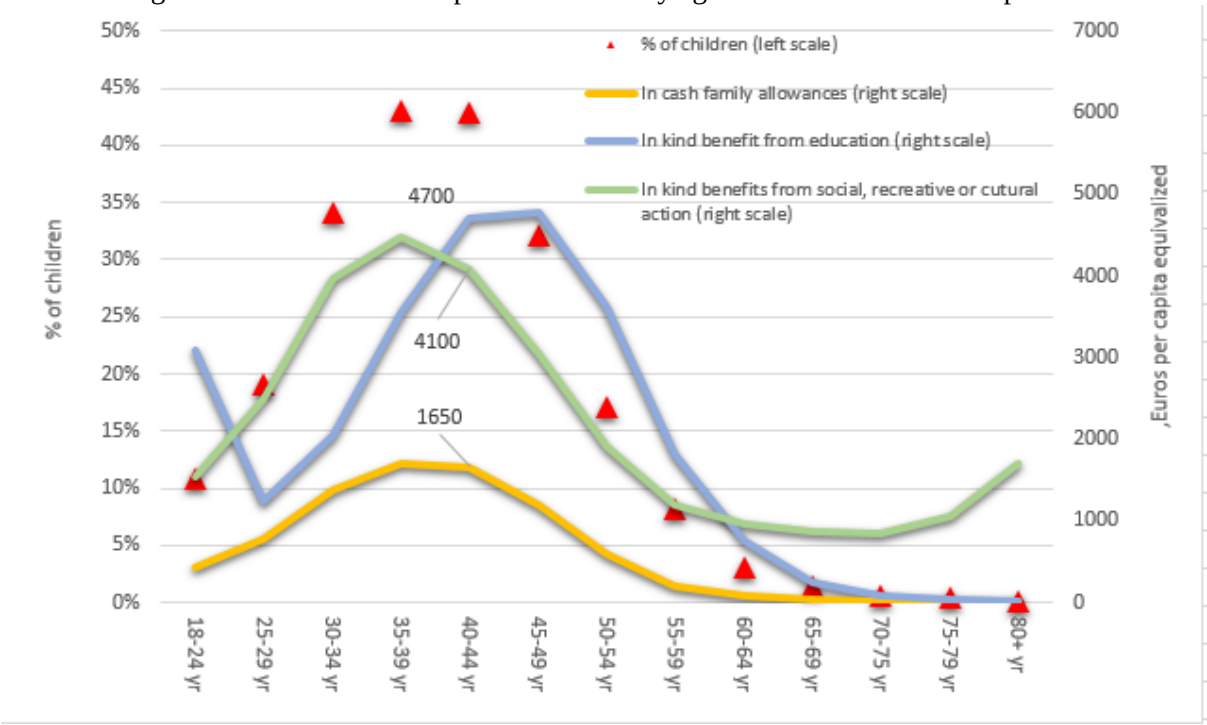
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Three characteristics of the French social system mainly explain this profile. First, working generations pay social contributions to the retirement pensions scheme (pay-as-you-go system), mechanically concentrated on the eldest. Public pensions represent nearly two-thirds of the income of retirees, the rest being made up of income from their savings, particularly real estate (real or imputed if they are owner-occupiers).

Second, the French public health system is the same for all, meaning that it does not depend on income or previous contributions. As health status depends on age, the cost of care increases with age and plays a major role in redistribution over age groups. Health reimbursements progress throughout life, starting at €1,700/ceq per year for the 18–25-year-olds, rising to €4,300/ceq for people aged 60–64 and up to €10,000/ceq for people aged 80 and over. 52% of health expenditures benefit the over 60s who represent 22% of the population; 30% of them benefit the over 70s, three times its share in the population (10%). Any rigorous study of the standard of living of retirees, from an inter-temporal perspective or with international comparisons, should then integrate a valuation of health expenditures.

Third, the small bump in the extended redistribution profile is due to educational and family policies and, therefore, to the presence and number of children in households. Parenthood peaks in France in the 30–50 age group (Figure 13). The age category with the highest in-kind benefits is the 40–44 years old. This group receives €4,700/ceq per consumption unit of educational expenditure, €4,100/ceq for other individualized in-kind benefits such as childcare, and €1,650/ceq in family allowances. In total, €10,400/ceq per consumption unit contribute to the standard of living of the 40–44 years old through these public parenting support policies, of which less than one-sixth is paid in cash.

Figure 13. Children-related public transfers by age of household reference person



Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

VI. Distributional Accounts for Age Crossed with Diploma Cohorts

Age and standard of living cover a great diversity of situations. Beyond these two dimensions, the level of education plays a major role in the inequalities across lifetime. While other key factors, such as inheritance or family networks, cannot be easily studied due to a lack of data, educational achievement is recorded in the LFS data, with the major advantage that, with rare exceptions, it remains fixed for life.

Because of a reduced sample size, we grouped age cohorts into five categories (18–29, 30–39, 40–49, 50–64, and 65 and over) and introduced five levels of education according to the highest diploma obtained by the household reference person: junior high school (no diploma), short professional track (*BEP* and *CAP*), high school diploma (*baccalauréat*), community college or two-year university (*DUT* or *BTS*), and bachelor's degree or more (master's, PhD, etc.). This results in 25 groups, 5 age groups crossed with 5 diploma groups. Because we provide a breakdown for one year, without any panel dimension, the comparisons between age and level of diploma groups should be interpreted with caution. Among the households with a given diploma, the 50–64-year-olds and 18–29-year-olds may differ in other dimensions than just age, so that the situation of the 50–64-year-olds cannot rigorously be taken as the future situation of the 18–29 years old.

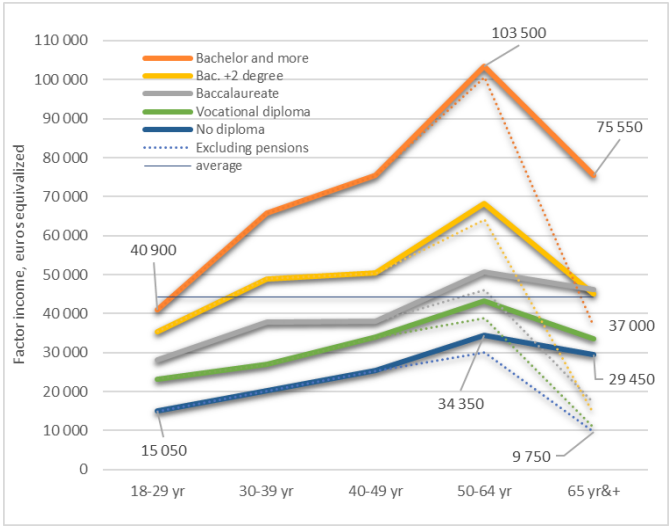
A. Income before Transfers by Age x Diploma

Primary income grows with age group for working people in all qualification categories but with various slopes (see Figure 14a, and Table A4). For non-graduates, primary income goes from €15,000/ceq in the 18–29 age group to €34,000 for the 50–64 bracket; the income from labour and property for the group with a bachelor's degree or higher increases from €41,000 for the 18–29 bracket to reach €100,000 within the 50–64 age group.

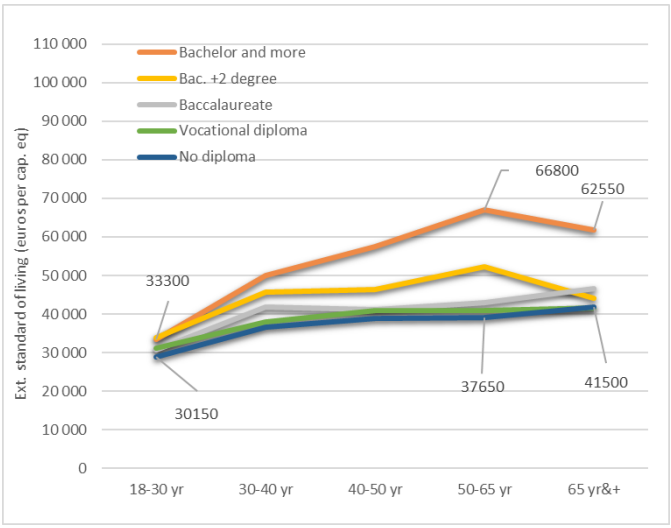
Diploma inequalities tend to increase with age: the group with a bachelor's degree or higher receives 3.5 times more primary income than non-graduates in the 50–64 age bracket, compared to a ratio of 1 to 2.5 in the 18–30 age bracket. Between the other categories, the gaps narrow slightly after 65. Inequalities widen with age for the most graduates only. The 11% gap among the 18–29-year-olds between the bachelor's degree or higher and the Bac+2 degree groups continues to grow with age to reach 60% for those aged 50–64 (and 14% in the age group 65 and over if we consider pensions as primary income). By contrast, the 2.4 ratio among the 18–29-year-olds between the Bac+2 degree and the no diploma groups remains roughly similar for older age groups, and even decreases slightly to 1.5 for those 65 and over. In other words, this apparent (static) return to education increases more with age for the group with at least a bachelor's degree. In this group, primary income is 2.5 times higher in the 50–64 age bracket than in the 18–29 group. The corresponding ratio 1.8 for non-graduates, 1.6 for the groups with vocational diplomas or a Bac+2 degree, and 1.5 for the holders of a baccalaureate who arrive at the back of the peloton in terms of progression over ages. This widening of inequalities from the most graduates at a higher age is essentially due to non-wage income.

Figure 14. Factor income (left) and after transfer income (right) by age and level of education

a. Factor income



b. After transfer income



Notes: the dotted lines represent factor income when pensions are excluded (i.e. as in the first part of the paper) and the solid lines are when pensions are included in factor income. *Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.*

B. Standard of Living by Age and Diploma

After redistribution, the income range across diploma and age groups is much narrower (Figure 14b and Table 4). In terms of usual standard of living, the ratio between the bachelor's degree and higher, and the non-qualified groups is 1.5 in the age group of 18–24 years (€25,000 and €16,000 per capita eq., respectively) against 2.5 for primary income; in the 50–64 age group, the corresponding ratios are 2 for the standard of living (€47,000 and €24,000, respectively), against 3.5 for the factor income. The balance sheet of redistribution operations is positive for people with a baccalaureate or lower and negative for other people.

Table 4. Extended redistribution by age and diploma

	18–29 yrs	30–39 yrs	40–49 yrs	50–64 yrs	65 yrs&+	Mean	Weighed Sum*
No diploma							
Pens = prim (in € eq.)	13 500	16 200	13 550	5 100	9 700	9 700	720 000
Pens = trans (in € eq.)	9 400	11 350	8 150	3 000	26 750	15 800	858 450
Pens = prim (in bill €)	6	19	22	17	56	120	
Pens = trans (in bill €)	5	13	13	10	155	196	
Population (thousands)	741	1 991	2 614	4 639	6 967	741	
Vocational diploma							
Pens = prim (in € eq.)	8 100	11 350	7 500	-1 400	4 650	4 250	360 000
Pens = trans (in € eq.)	2 600	5 250	600	-4 950	24 700	4 900	518 200
Pens = prim (in bill €)	6	19	19	-6	13	51	
Pens = trans (in bill €)	2	9	2	-21	67	58	
Population (thousands)	1 063	2 910	4 136	5 859	3 378		
Baccalaureate							
Pens = prim (in € eq.)	3 550	5 000	4 550	-6 350	-3 750	650	-40 000
Pens = trans (in € eq.)	-3 100	-2 800	-3 350	-10 800	22 400	-400	219 400
Pens = prim (in bill €)	3	8	8	-10	-5	5	
Pens = trans (in bill €)	-3	-5	-6	-17	28	-3	
Population (thousands)	1 215	2 773	2 967	2 247	1 510		
Bac. +2 degree							
Pens = prim (in € eq.)	-100	-900	-1 900	-13 400	-5 250	-5 000	-340 000
Pens = trans (in € eq.)	-7 800	-10 900	-11 750	-20 800	22 550	-9 050	-160 950
Pens = prim (in bill €)	-0	-1	-3	-19	-4	-27	
Pens = trans (in bill €)	-4	-12	-19	-29	16	-48	
Population (thousands)	616	1 875	2 678	1 998	867		
Bachelor's and higher							
Pens = prim (in € eq.)	-4 450	-11 000	-13 150	-31 200	-19 000	-16 800	-1 190 000
Pens = trans (in € eq.)	-14 150	-24 400	-27 450	-44 850	15 500	-22 800	-1 014 200
Pens = prim (in bill €)	-5	-22	-31	-65	-25	-148	
Pens = trans (in bill €)	-14	-50	-65	-94	21	-202	
Population (thousands)	1 256	3 233	3 974	3 048	1 681		
All							
Pens = prim (in € eq.)	2 950	2 950	1 500	-6 500	2 950	0	
Pens = trans (in € eq.)	-4 050	-5 850	-7 500	-11 800	24 250	0	
Pens = prim (in bill €)	11	23	15	-84	35	0	
Pens = trans (in bill €)	-15	-45	-75	-152	288	0	
Population (thousands)	4 891	12 782	16 368	17 790	14 403		

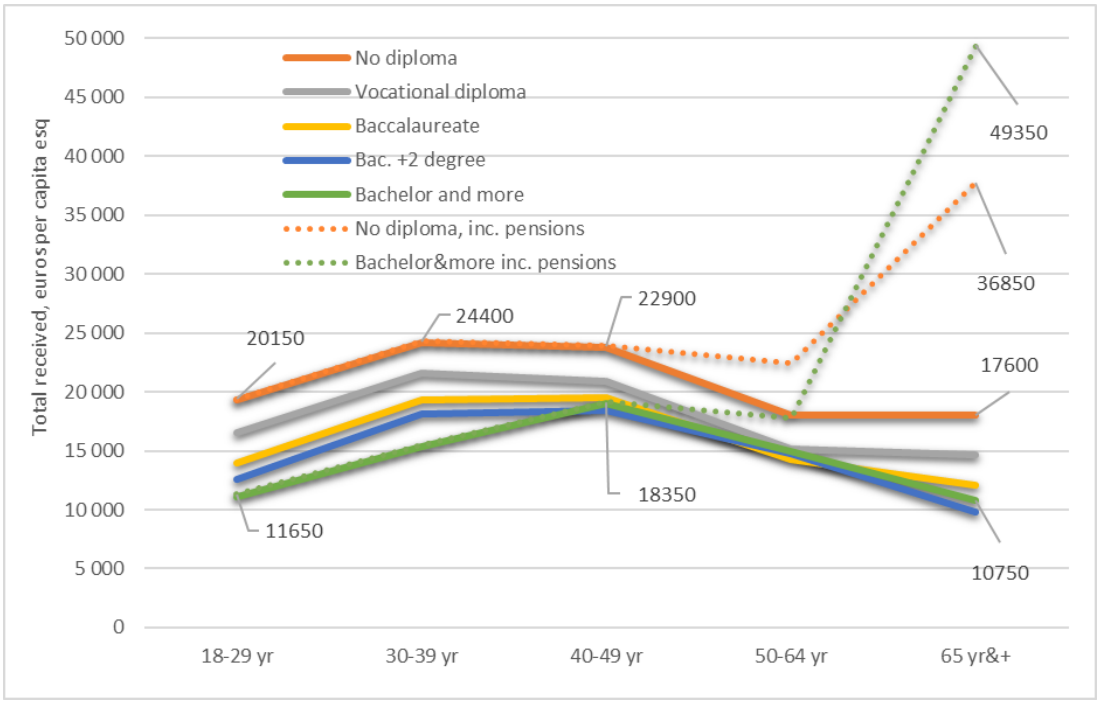
**Weighted sum : average amount x duration of the time period with life expectancy by diploma for 65 yrs&+*
Notes: We distinguish in this table the case where the net pensions (where a portion of SSC and taxes are deducted) are primary income ("Pens=prim") from the case where they are transfers ("Pens=trans"), and we present results both in € per capita equivalized ("€ eq") and in € billion. There are thus 4 different lines according to the type of diploma, plus one line indicating the number of people in each category.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

C. Taxes, SSC and Benefits by Age x Diploma

The public transfers paid by households ranges from €11,150 for the 18–29-year-olds without a diploma to €57,800 for the 50–64-year-olds with a bachelor's degree or higher (Table A5).

All benefits in cash or in-kind combined, the transfers paid to households display an inverted U-shaped profile for all levels of qualification if we consider pensions as a primary income; the curves take on a tilde shape if we consider pensions as a transfer (Figure 15). Pensions account for 80% of the benefits in cash and in-kind received by the most educated over 65; for non-graduates, the proportion is 55%.

Figure 15. Transfers received by age and diploma



Notes: the dotted lines represent transfers when pensions (net of SSC) are included (and thus excluded from income before transfers, i.e. as in the first part of the paper) and the solid lines are when pensions are excluded from transfers.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

As already shown, the health system makes a powerful contribution to reducing inequalities in a given year. This appears even more strongly with the age profile (Table 5 and Table A7 in Appendix). Not only is health expenditure highly concentrated on the oldest age groups, but it also varies considerably within an age category. Healthcare reimbursements are 70% higher for people with no diploma than for the most qualified, and even 115% higher for those aged 65 and over where they reach €10,600 per year and per capita equivalized for people with no diploma (Table 5). Of the 184 billion euros in health expenditure in 2019, one-third benefited the single category of the non-graduates over 65 years old. This share reaches 60% if we include those over 50 without a diploma or with a vocational diploma.

This monetary valuation measures the redistribution carried out in-kind by the health system, but also points to health inequalities before transfers; it is possible that the non-graduates use the health care system more because they have poorer health. This is also the reason why the monetary valuation of sickness expenditure in assessments of the standard of living is difficult to discuss. It only finds its place in a broader approach to income and it means that in the absence of free care, health expenditure would erode disposable income.

Table 5. Benefits in-kind from the health system by age and diploma (euros per capita eq., billion €)

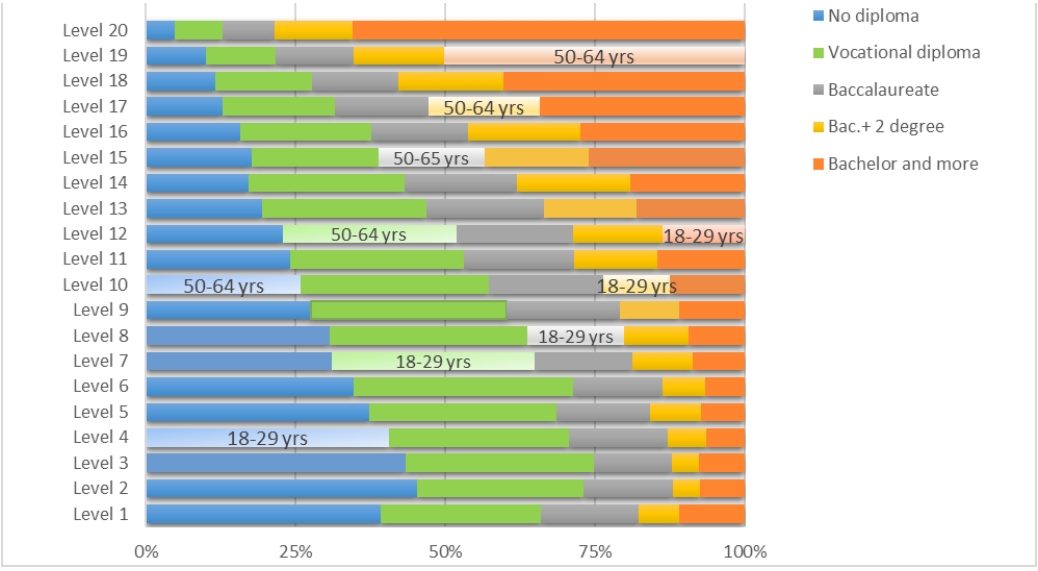
	18–29 yrs	30–39 yrs	40–49 yrs	50–64 yrs	65 yrs&+	**Mean**	**Weighed Sum***
No diploma	2 300	2 500	3 300	4 600	10 600	6 900	350 000
Billion €	1.1	2.8	5.3	15.5	61.4	86.2	
Vocational diploma	1 800	1 800	2 800	3 000	7 900	3 800	270 000
Billion €	1.3	3.0	7.3	12.6	21.3	45.4	
Baccalaureate	1 800	1 900	2 000	2 900	5 900	2 800	230 000
Billion €	1.6	3.1	3.5	4.7	7.4	20.4	
Bac. +2 degree	1 700	2 300	1 800	3 000	3 500	2 400	180 000
Billion €	0.8	2.6	2.9	4.3	2.5	13.1	
Bachelor and more	1 500	1 400	1 900	2 700	4 400	2 300	190 000
Billion €	1.5	2.9	4.4	5.7	5.8	20.4	
All	1 700	1 900	2 300	3 300	8 300	4 000	280 000
Billion €	6.3	14.5	23.4	42.8	98.4	185.4	

**Weighted sum: average amount x duration of the time period with life expectancy by diploma for 65 yrs&+*
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations

D. Standard of Living Decomposition by Diploma and Age

On a scale of 1 to 20 corresponding to the usual standard of living, non-graduates would be, on average, at level 4 at the "start of their career" (18–29 years) and would reach level 10 at the "end of their career" (Figure 16). On the other hand, the reference person of the household with at least a bachelor's degree would begin directly at level 12, and end in the 50–64 bracket at level 19.

Figure 16. Position on the social ladder by age and diploma



Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Between these two extremes, the reference person of the household with a vocational diploma could move from level 7 to level 12, with a baccalaureate from level 8 to level 15, and with a Bac+2 diploma from level 10 to level 17. Among those who reach level 20, we find that 64% had a bachelor's or higher and only 5% were non-graduates.

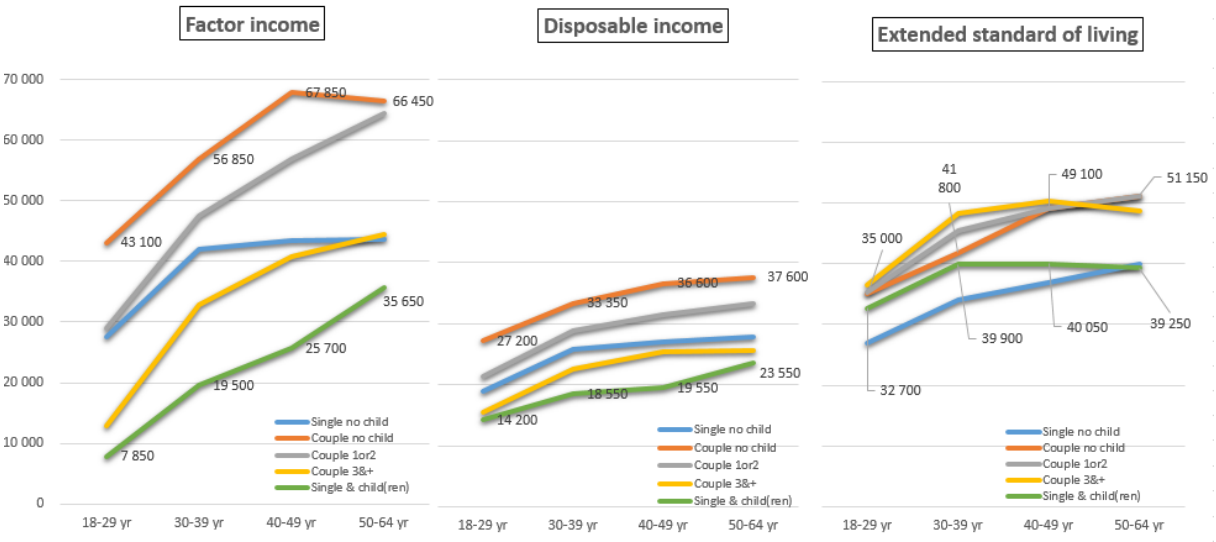
VII. Other Dimensions of Market Inequalities and Redistribution

A. Family Structure

The expanded redistribution has other dimensions than income, age or diploma; there are many types of transfers, such as education or family allowances, or the income tax change with family structure. This family structure evolves with age and plays a key role in inequalities. This section breaks down the 2019 distributional accounts according to age and family structure. We distinguish between six types of households: single people without children, couples without children, couples with one or two children, couples with three children or more, complex households (e.g. presence of three adults) and single people with children.

At age 40–49, the poorest households in terms of primary income per capita equivalized are single people with children (€26,000/ceq), followed by couples with three or more children (€41,000/ceq); the best-off are couples without children (€68,000/ceq, see Figure 17). The gap between the couples without children and the single parents tends to reduce with the age of the household reference person, with the ratio of their primary income decreasing from 6 at age 18–24 to 1.9 at age 50–64.

Figure 17. Primary income and extended standard of living by household type



Notes: pensions included in factor income.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

As with other representations, public transfers largely reduce primary inequalities. The extended living standards of couples are very similar regardless of the number of children and the age category. While the primary incomes of couples without children are 40% higher than those of couples with three or more children, the extended living standards are very close. The single people without children, despite factor income and disposable income around the average, fall behind the other groups in terms of extended standard of living. Non-monetary transfers contribute very strongly to this spectacular convergence of living standards.[27] When looking at the usual standard of living, integrating only monetary redistribution, the hierarchies of market inequalities remain unchanged, with differences, nevertheless, significantly reduced.

Table 6. Extended redistribution by household type (billions of euros, pensions as prim. inc.)

	Without child		With child(ren)				**All**
	Single no child	Couple no child	Couple 1or2	Couple 3&+	Complex families	Single & child(ren)	
18–29 yrs	1.9	-6.0	4.9	2.0	2.1	5.9	**10.9**
30–39 yrs	-5.0	-8.5	0.5	16.3	1.2	18.1	**22.6**
40–49 yrs	-3.6	-8.2	-20.5	20.6	1.5	25.5	**15.2**
50–64 yrs	-5.3	-49.5	-39.4	4.6	0.7	5.4	**-83.6**
65 yrs &+	31.7	-4.1	1.0	0.8	2.6	2.8	**34.8**
All	19.6	-76.3	-53.6	44.3	8.2	57.8	**0.0**

Notes: *redistribution* computed at macro level between the 25 categories of households. Net pensions (of SSC) included in primary income.
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

The first contributors to inter-family redistribution are childless couples (See Table 6). They pay 76 billion euros more in taxes than the benefits they receive in-kind or in cash, two-thirds of which for the 50–64-year-olds category alone. Couples with one or two children over the age of 40 are also net contributors (60 billion euros), as are single people without children between the ages of 30 and 64 are also net contributors (14 billion euros). The main beneficiary families are single people with children (58 billion euros net taxes received) and couples with three or more children (44 billion euros net taxes received).

B. Gender Issues

A complete analysis of inequality and redistribution between women and men is out of the scope of the paper because it would have required the individual allocation of all types of income within couples. Our data does not contain individualized capital income. In the French system, some of the benefits and taxes, such as progressive income tax, are shared at the household level, and thus not individualized without detailed assumption or additional information (see André and Sireyjol (2019) for a study on the French income tax). For the

[27] For instance, the value of education-related transfers is near 14,000 euros per child for single people with child(ren).

purposes of this paper, we limit ourselves to single adult individuals, for whom the issue of distributing income within the couple does not arise.

Among childless singles, disposable income is 7% higher for men, when primary income is 15% higher. For singles without children, primary incomes are quite close in the 18–29 age group: factor income (labour, mixed and capital) is €28,900 for men and €26,650 for women, i.e. an 8% difference (See Table 7). This gap increases to 20% in the 50–64 age group. This could be due to a generational effect: women and men of younger generations may perform more similar jobs.

For single people with children, the gap in primary income is significant: single women with children (90% of single people with children) receive on average only €7,500 in factor income at age 18–29 (see Figure A7 of Appendix 2), compared to €25,500 for men, i.e. a ratio of 1 to 3.5. This gap between women and men among single persons with children decreases with age but remains high at around 45% in the 50–64 age group.

On average across all age groups, the primary income of single men with children is 68% higher than that of women. Monetary redistribution very substantially reduces this gap, to 46%. This gap narrows even more for the younger generations: single men with children have a factor income 240% higher than that of single women with children in the 18–29 age bracket, but 60% higher for disposable income, and around 40% higher among the 50–64 years old (Figure A8).

Table 7. Male/female income ratio by age group for singles with or without child

	Singles without children		Single parent with child(ren)	
	Factor income	Disposable income	Factor income	Disposable income
18–29 yrs	108%	109%	341%	161%
30–39 yrs	101%	104%	223%	162%
40–49 yrs	106%	108%	161%	145%
50–64 yrs	120%	116%	143%	137%
65 yrs &+	119%	114%	100%	106%
All	115%	107%	168%	146%

Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

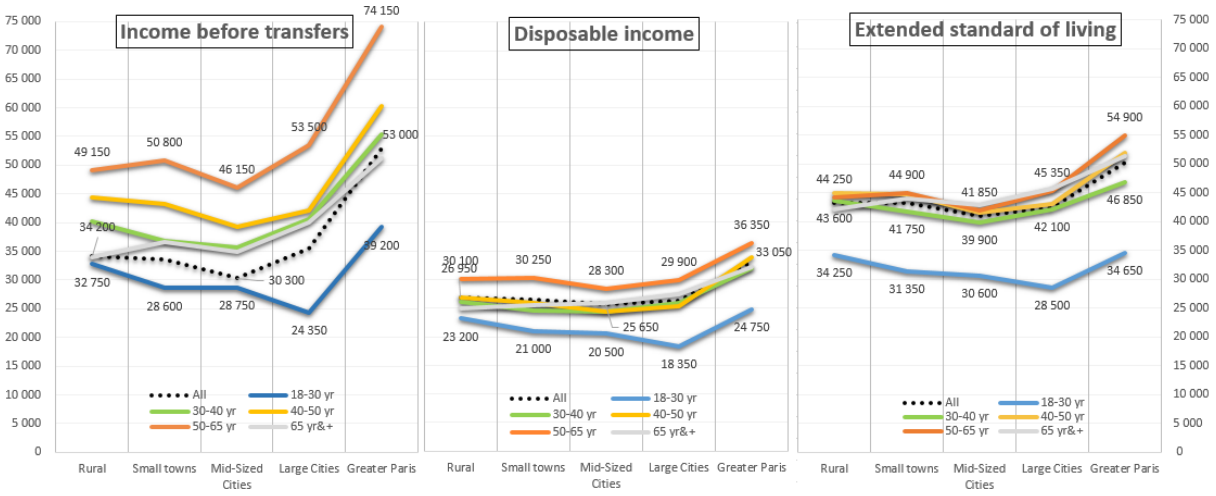
C. Area of Residence

The yellow vests crisis has sometimes been characterized as a "revolt" of the inhabitants of medium-sized cities—some of the "victims of globalization"—against those of the large metropolises who would be the "winners of globalization". In this section, we document the issue on the income aspect, by examining how primary incomes and redistribution relate to the size of the municipality of residence. In summary, it appears that incomes are lower in medium-sized towns, outside urban units or large cities for all age categories between 30 and 64 years, without the differences being significant. The main gap is with inhabitants of Greater Paris,

especially in primary income in the 40–64 age bracket. Public transfers greatly smooth out these differences, not to mention the well-known rent differentials. Taking into consideration different costs of living, and especially housing expenditures, could lead to these results being mitigated.

In what follows, “small towns” refers to municipalities with fewer than 20,000 inhabitants, mid-sized cities to agglomerations of 20,000 to 200,000 inhabitants, large cities to areas with more than 200,000, and "Greater Paris" to the urban area of the Paris region. “Outside urban unit” refers to municipalities outside of an urban unit (a previous definition of some rural cities).

Figure 18. Income before transfers and disposable income by size of area of residence and age



Notes: pensions included in primary income.
Sources: INSEE, National Distributional Accounts, 2019. Authors’ Calculations.

All three measures of incomes (before transfers, disposable income and extended standard of living) turn out to be the lowest in medium-sized cities, although the differences between the different areas – except Greater Paris – appear quite small (see Figure 18 and Table 8). The average disposable income is €25,650 per capita equivalized in mid-sized cities, €26,350/ceq in large cities, €26,450/ceq in small towns and €26,950/ceq in outside urban unit municipalities. In primary income, the differences are slightly larger: €30,300 for mid-sized cities, €41,500 for small towns, €41,650 for rural areas and €42,450 for large cities. This U-shaped profile is found in all age categories, with the exception of the 18–29-year-olds for whom the standard of living is minimal in large cities, and retirees whose standard of living increases with the size of their municipality of residence.

Households residing in Greater Paris receive 54% more primary income than those in mid-sized cities (see Table A8). The gap is greatest in the 50–64 age group where it reaches 61%. Redistribution narrows this range by almost half, with the usual standard of living of Greater Paris residents standing at 29% (+23% in extended standard of living) above that of the

inhabitants of mid-sized cities (€33,050/ceq against €25,650, respectively). The difference is greatest in the 40–49 age group: it reaches 39% (€33,900 against €24,400).

Considering the age of the individuals, (see Figure A10 in Appendix online), large cities, and Greater Paris to a lesser extent, are over-represented among young people who pursued their studies there. This is also an explanation for the fall in disposable income and standard of living that we mentioned above for 18–29-year-olds in this category of municipality. Conversely, young people are under-represented in outside urban unit municipalities and small towns. The structure is reversed for those aged 65 and over: they are strongly under-represented in Greater Paris and to a lesser degree in the large cities, to the benefit of cheaper and less-dense areas. In between, mid-sized cities had a U-shaped age profile, with a dip in the 30–50 age bracket. This is the only category where this age group is under-represented. Retirees tend to reside in mid-sized cities. These cities have two retirees for every three working people, compared to one retiree for every three working people in Greater Paris.

D. Social Class

Lastly, we separate the population into six socio-professional groups for workers and one category for retired people (see Table 6). Primary income is far higher for managers and business owners and lower for manual workers and employees. For these manual workers and employees, income after transfers is very close to before transfers: the redistribution is close to zero for them, the (monetary and non-monetary) benefits almost exactly compensates for the taxes. Logically, income after transfers are lower for the other categories, except retired people (as we saw in the previous analysis).

Table 8: Inequality and Redistribution by Different Groups of Households

INCOME GROUP	Poor	Modest	Median	Upper Middle	Better-off	All
Income before transfers	**6 600**	**17 000**	**30 700**	**48 000**	**128 900**	**38 000**
Taxes and contributions	-6 900	-11 800	-19 900	-30 900	-74 300	-24 200
Benefits in Cash	8 000	10 200	10 900	12 800	15 400	11 200
Non-monetary transfers	17 200	14 300	12 400	11 800	10 600	13 200
Extended Std of Living	**25 300**	**29 900**	**34 000**	**41 200**	**78 500**	**38 000**
Usual standard of living	*10 100*	*16 500*	*22 700*	*31 300*	*58 700*	*25 100*

AGE	18–30 yrs	30–40 yrs	40–50 yrs	50–65 yrs	65 yrs &+	All
Income before transfers	**30 300**	**43 100**	**46 800**	**51 600**	**14 800**	**38 000**
Taxes and contributions	-18 100	-25 100	-27 500	-31 000	-15 200	-24 200
Benefits in Cash	3 700	4 800	4 800	8 900	25 800	11 200
Non-monetary transfers	10 500	14 600	15 600	10 900	13 600	13 200
Extended Std of Living	**26 300**	**37 300**	**39 400**	**39 800**	**38 900**	**38 000**
Usual standard of living	*19 500*	*23 600*	*24 600*	*27 900*	*25 300*	*25 100*

DIPLOMA	No diploma	Vocational diploma	Baccalaureate	Bac. +2 degree	Bachelor's and higher	All
Income before transfers	**19 000**	**29 600**	**36 000**	**49 200**	**71 600**	**38 000**
Taxes and contributions	-14 100	-19 100	-22 600	-29 600	-43 500	-24 200
Benefits in Cash	14 500	11 000	9 900	8 800	10 000	11 200
Non-monetary transfers	15 400	13 100	12 600	12 200	11 700	13 200
Extended Std of Living	**34 800**	**34 500**	**35 600**	**40 100**	**48 800**	**38 000**
Usual standard of living	*19 800*	*21 800*	*24 000*	*28 000*	*36 300*	*25 100*

CITY SIZE	Outside urban unit	Small town	Mid-sized cities	Large cities	Greater Paris	All
Income before transfers	**35 300**	**34 700**	**31 200**	**36 400**	**54 800**	**38 000**
Taxes and contributions	-22 500	-22 100	-20 700	-23 300	-33 600	-24 200
Benefits in Cash	11 100	11 600	12 100	11 000	10 600	11 200
Non-monetary transfers	13 300	13 400	13 100	13 100	13 100	13 200
Extended Std of Living	**36 900**	**37 400**	**35 500**	**36 900**	**44 400**	**38 000**
Usual standard of living	*24 000*	*24 000*	*23 500*	*24 500*	*30 500*	*25 100*

FAMILY TYPE	Single parent	*Female*	*Male*	Single no child	Couple 3&+	Couple 1 or 2	Couple no child	All
Income before transfers	**25 900**	**23 100**	**39 800**	**27 600**	**39 700**	**54 700**	**37 100**	**38 000**
Taxes and contributions	-16 800	-15 500	-23 500	-19 400	-23 200	-31 600	-25 700	-24 200
Benefits in Cash	7 400	7 400	7 100	14 400	5 800	5 000	18 900	11 200
Non-monetary transfers	17 900	18 100	17 200	11 600	21 100	13 600	10 000	13 200
Extended Std of Living	**34 500**	**33 300**	**40 600**	**33 900**	**43 500**	**41 400**	**40 000**	**38 000**
Usual standard of living	*18 700*	*17 900*	*22 900*	*22 600*	*21 600*	*27 100*	*29 300*	*25 100*

SOCIAL GROUP	Employees	Manual worker	Intermediate profession	Managers	Business owner	Farmers	All employed	Retired
Income before transfers	**31 400**	**31 100**	**49 600**	**87 000**	**78 500**	**50 600**	**52 400**	**13 800**
Taxes and contributions	-19 500	-18 600	-29 100	-50 900	-41 200	-24 800	-30 500	-14 000
Benefits in Cash	5 100	5 100	4 100	4 700	5 700	4 300	4 800	23 700
Non-monetary transfers	13 700	14 200	12 800	12 300	13 800	12 700	13 300	13 200
Extended Std of Living	**30 800**	**31 900**	**37 200**	**52 100**	**56 100**	**42 700**	**39 800**	**36 600**
Usual standard of living	*19 500*	*19 800*	*25 600*	*38 600*	*29 800*	*23 100*	*26 200*	*23 500*

Notes: pension not included in income before transfers
Sources: INSEE, National Distributional Accounts, 2019. Authors' Calculations. Unit: euros per capita equivalized.

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Appendix 1. Methods and Data

In this appendix, we expose in details the method we used to distribute the entire national income. We start with some general principles and definitions and then present data and practical details. Redistribution measures are generally based on microeconomic data but only cover a part of income and transfers. Macroeconomic aggregates taken from national accounting are a way to construct the broadest scope and define a coherent and comprehensive measure of redistribution between countries. The distributional accounting is a method to reconcile these two fields: on the one hand, there is national accounting data, summarized in a "Table of Integrated Economic Accounts" (TIEA) to which are added further outflows from national accounting and, on the other hand, there are various sources of information that micro-found the distribution of income and transfers.

A. **Principles of Distributional Accounts**

Our goal is the distribution net national income among households grouped by categories, following the classical sequence of national income, starting from primary income, the accounting for redistribution to finally end to disposable income.

Net national income (NNI) is equal to GDP minus fixed capital consumption (i.e. capital depreciation) and adding net income from the rest of the world (i.e. the income produced in France but held abroad is subtracted and the income produced abroad but held in France is added). French GDP amounted to 2,426 billion euros in 2019, fixed capital consumption to 450 billion euros, and net income from the rest of the world to 50 billion euros, resulting in a NNI of 2,026 billion euros.

In practice, those Distributional National Accounts (DNA from now on) take the form of a table with groups of households in columns and lines following the usual sequence of economic accounts. We call this synthetic form of DNA the "Table of Integrated Distributional Accounts" (TIDA), by analogy with the "Table of Integrated Economic Accounts" (TIEA) of the international System of National Accounts (ONU, 2008).

Both tables describe flows of income received or paid by entities, between "institutional sectors" in the case of TIEA (households, corporations, public authorities, non-profit institutions, rest of the world), and between groups of households for TIDA. The SNA framework describes flows (uses and resources) between institutional sectors. In the distributional accounts framework, summarized by the TIDA, all income or transfers are affected to households.

Both tables have similar lines, from primary income to secondary income distribution after transfers, contributions and benefits in cash (Table A1). This leads to the core notion of disposable income. The bottom of both tables is dedicated to collective consumption, considered, in the TIDA as in-kind transfers and distributed to households in the form of public services, and the tables end with an extended disposable income which we call, when equivalized to account for family size, "extended standard of living" by extension of the usual notion of standard of living (disposable income equivalized).

Distributional accounts correspond to the operation of distributing each source of income to households at micro level and then aggregating them by household groups. This operation can be done for various types of household categories (income fractile, age, diploma, etc.), depending on the variables available in the micro data sources. All national income belongs to households.

Each of the rows in the TIEA is distributed among categories of household (see next section). The accounting operations can be repeated for various type of household category (quantile of income, age, diploma…). Since all income is allocated to households, and as all of the transfers paid balance all the transfers received, modulo the deficit, which is itself distributed (see above), there is accounting equality at the aggregate level of all households, the sum of NNIBT (NNI before transfers) = the sum of NNIAT (NNI after transfers) = NNI. The equality of NNIBT = NNIAT = NNI of course does not hold for each standard of living group, since these transfers take place between households, and it is by studying these very differences that the assessment of the redistribution of transfer systems emerges.

Table A1: From the Table of Integrated Economic Accounts to a Table of Integrated Distributional Accounts

Table of integrated economic accounts								Table of integrated distributional accounts						
	Uses			Ressources			Net	Households						
	Companies	Households	Public auth.	Companies	Households	Public autho.	All inst. sectors	All households	Poor	Median	Middle	Up-Middle	Best-off
Production and Allocation of Primary Income Accounts								**Primary Income = Income Before Transfers**						
Labor, property and public								Labor, property and public						
Secondary Distribution of Income Account								**Monetary redistribution**						
Benefits in cash - taxes								Benefits in cash - taxes						
Disposable income								*Diposable income -> usual standard of living*						
Use of Income Account								**Non monetary redistribution**						
Collective consumption								Benefits from pub. services						
								Income After Transfer -> Extended Standard of Living						

Note: TIDA is here written by standard of living groups, other categories of households are possible.
Source: authors

B. **Data Sources**

We use two main sources in order to distribute national income, macro and micro date.

Macro. The TIEA used is from French national institute of statistics and based on the system of national accounts (SNA), the official international framework of conventions. Additional sources are derived from national accounting satellite accounts, and taken from the initial sources used to establish the TIEA. In this paper, we also make use of the distribution operations identified in the SNA letter D (for example D1 for employee remuneration) and the rows referring to balances associated with the SNA letter B (such as B5n for NNI, which is equal to the balance of net primary income for the various sectors).

Micro. We use different dataset but mainly the INSEE Tax and Social Revenue Survey (ERFS), which brings together socio-demographic information from the Labor Force Survey, administrative fiscal record of income declared to the tax authorities, and information from organizations in charge of distributing social benefits.[28] The ERFS is based on a sample of approximately 50,000 households, which is equivalent to 110,000 individuals and representative of the population living in ordinary housing in metropolitan France. The ERFS is INSEE's preferred source for the analysis of living standards, and is linked to INES microsimulation model (see below). The wealth of information included in the ERFS and especially from the Labor Force Survey allows us to: (i) micro simulate all the transfers with INES model, and (ii) provide a breakdown of income and transfers according to many different variables.

Other databases are also used to complete ERFS and allow for the sound simulation of some transfers, namely:

(i) The INSEE Family Budget survey is used to impute the consumption data based on which the VAT paid by households is simulated in Ines. This survey has been carried out since 1979 on household consumption, with the objective being to measure not only the expenditure, but also the resources of households living in France (Metropolitan France and French overseas departments and territories) as accurately as possible. It covers all so-called "ordinary" households;

(ii) The INSEE Housing survey is used in Ines to impute rents, which are absent from the ERFS. The aim of the survey is to describe the housing conditions of households and their housing

28 From the Caisse nationale des allocations familiales (National Family Allowance Fund – CNAF), the Caisse nationale de l'assurance vieillesse (National Old-Age Pension Fund – CNAV) and the Caisse centrale de la mutualité sociale agricole (Central Agricultural Social Mutual Fund – CCMSA) which provide the social benefits paid.

expenditure Therefore, it contains rents and charges for tenants, together with a lot of other information;

(iii) In order to simulate the capital tax (*impôt sur la fortune* –ISF- and the *impôt sur la fortune immobilière* -IFI), it is necessary to have information on the wealth of individuals. To that end, we use matching based on the INSEE Household Wealth surveys. These surveys describe real-estate, financial and professional assets of households and their debt, based on a sample drawn from housing tax files or other fiscal sources. In order to better understand high wealth levels, we also use files specific to the ISF and the IFI, recently made available by the Directorate-General of Public Finance (DGFiP) (Paquier *et al.*, 2019);

(iv) The Health Care and Insurance Survey (ESPS) (IRDES, DREES) to distribute health expenditures. This database provides a representative sample of households in ordinary housing in metropolitan France and contains socio-demographic information (income, health status and type of supplementary coverage). The survey is matched with administrative data regarding health insurance reimbursements (National Health Insurance Fund –CNAM-, National Health Data System –SNDS-), which provide expenditure presented for reimbursement and AMO reimbursements;

(v) The ENRJ (survey on youth income) survey by INSEE and DREES to know the income of student who are not cohabiting with their parent and to distribute education expenditures;

(vi) The DADS database from ("Annual declaration of social data") which gives the wage bill of the public employees to be able to distribute the collective public service expenditures.

C. **Microsimulated Distribution of Income and Transfers**

a. General methodology

The INES open-source[29] microsimulation model draws upon ERFS data in order to micro simulate French social and fiscal legislation. This model simulates the majority of direct social and fiscal taxes, indirect social and fiscal taxes and social benefits. The first part of the model gather different data, impute some variable, recalibrate and age the data, and the second part simulate each transfer based on the legislative schedules[30] (see Fredon and Sicsic, 2019 for more detail on the model).

29 See https://adullact.net/projects/ines-libre for the source code, and detailed documentation of the model, including in particular deviations from external targets, in terms of both the number of households affected and the total transfers simulated.
30 The INES model offers the advantage of producing more recent results than the administrative database thanks to recalibration and ageing. Indeed, INES makes use of the ERFS for a given year, N, and simulates the transfers for year N+2 by other sources, and by recalibrating the socio-demographic structure to that of year N+2 in order to reflect the structure and

The wealth of information included in the ERFS and especially from the Labor Force Survey makes it possible to finely simulate the social benefits, taxes and contributions that depend on many variables, which are not always present in fiscal sources alone: family profile, labour market history, employment status (public or private), number of hours worked, type of job and business, rents, place of residence, disability status, etc.

Thanks to its representativeness and the richness of the transfers that it is able to simulate, the INES model forms the basis for the exercise involving the distribution of national income and its components by stratum. Indeed, the information from ERFS makes it possible to produce analyses by dividing the population into different group, according to:

- **living standards**. All the income and transfers are distributed by ten or twenty groups of equal sizes according to their living standards that is its disposable income[31] divided by an equivalent scale accounting for household size (number of consumption units[32]). We rank household from the poorest to the wealthiest, and this ranking remains unchanged in order to distribute income and transfers to households in these tenths of living standards. The sampling does not allow for accurate results beyond the twentieth in the case of variables with a continuous basis, such as income or wealth. By exception, we will provided some results for the top 1% and only for data robust enough such as primary incomes or taxes, levies and contributions[33];
- **income "social" group**, that is, the usual poor category with equalized income of 60% of median income or less**,** but also for other categories: modest (income between 60 and 90% of median income), median (90 to 120%), upper middle (120 to 180%) and better-off (180%). For France, the two first category represent around 40% of the population and are often design in the literature as popular household. The median and upper-middle represent around 50% and could be seen as composition middle class, and our better-off group is close to the usual top 10%.
- **diploma** of the person of reference of the household, in 5 group: no diploma, vocational diploma, baccalaureate, bac+2 degree, bachelor and more;

incomes of the population in year N+2. In our paper, we mainly use 2017 data which are uprated (and some data of 2019) and the legislation of year 2019.

31 Declared income net of social security contributions, plus benefits and less direct deductions.

32 Consumption units are generally calculated according to the so-called modified OECD equivalence scale which assigns 1 CU to the first adult in the household, 0.5 CU to other persons aged 14 or over and 0.3 CU to children aged under 14 years old.

33 The concentration of which is very high in the uppermost bands: the estimated effect at the extremes is less robust than those estimated for each tenth and the sample size does not allow for more detail, such as per hundredth for example, unlike exhaustive sources.

- **employment status** of the person of reference of the household, in 4 groups: employed, unemployed, retired, self-employed;
- **age** of the person of reference of the household, in five groups: 18-29; 30-39, 40-49, 50-64 and 65 or more;
- **localisation of the household**, in five groups: "rural" areas, "small towns" that is county of less than 20,000 people, mid-sized cities (20,000-200,000), "larger cities" (urban area of 200,000or more inhabitants) and "Greater Paris".
- **family configuration**, in five groups: single people, couple without children, couple with one or two children, couple with more than three children, single parent. We also distinguish the sex of the parent for single parent for gender studies.
- **Social class** of the person of reference of the household, in six groups.

We also distribute by age cross diploma for age cohort computation, thus having 25 breakdowns; we use five years grouping starting from 25 or less and going to 75 or more.

Note that to distribute transfers, it is necessary to make tax incidence assumptions. Following Saez and Zucman (2019), we impute *taxes to the factor on which the amount of the tax depends*. Although employers' contributions are nominally paid by employers, the amount depends on the company's payroll. They are therefore allocated to the employees. Conversely, corporate tax depends on the profit of companies and is therefore paid on that profit.

A simple economic logic underlies this approach: if the aim is to model the decision of an agent with regard to the use of a resource (for the purposes of production or consumption), the only taxes that directly influence that decision are those that depend on the resource in question. Therefore, the analysis of the distribution of taxes provides data of relevance for the modelling of certain behaviors by agents, but does not comment on the behaviors themselves. They should be regarded as *ex-ante* measurements, without prejudging possible behavioral effects.

b. Distributing income before transfers

The distribution of income before transfers in the S14 (household) account is made up of three components.

Labor Income. The first part corresponds to the wage income of S14.D1, distributed according to the sum of gross wages (DNA.11, see annex for TIDA nomenclature and correspondence table with TIEA) and contributions (DNA.12). The information required in order to estimate the distribution can be found in the INES model from ERFS data. The net salary is taken from tax returns, which are one of the sources for the ERFS data. The earnings variables are reported by employers and are especially reliable since they are controlled by the fiscal administration

with frequent audits. Next, both employee and employer contributions (DNA.12) are finely simulated by the INES model using information available from the Labor Force Survey, another source used by the ERFS. They take account in particular of the characteristics involved in the calculation of exemptions (public/private, hours worked, remuneration amount, etc.). All of the different rates for old age, sickness, family and unemployment benefit contributions are well integrated in the INES model.

Mixed and property income. The second part consists of net mixed income and wealth (DNA.2, namely the sum of the net mixed income of self-employed persons, including self-employed (DNA.2.1), net property income (DNA.2.2) and actual rents paid and imputed by owners net of depreciation (DNA.2.3). All of these types of income are present in the INES model from ERFS data and are recovered within INES in the same way as labor income (administrative tax sources matched to ERFS households).

However, the capital income included in the ERFS is the income which is taxed, while some financial income are tax-exempt or only partially taxable, and therefore not well-known from tax sources. These income are calculated in the ERFS by applying rates of return to stocks of assets imputed to the households covered by the ERFS on the basis of the Wealth Survey (Baclet & Raynaud, 2008). Moreover, a specific module for the production of the ERFS allows for the estimation of imputed rents using regressions on the basis of actual rents (using imputation from the French housing survey) and dwelling characteristics (localization, number of rooms, type of dwelling, surface area, etc., from administrative data from local tax, matched with ERFS data).

We have so far detailed the primary income that the national accounts attribute directly to the household sector. This income does not cover national income in its entirety: the remaining fraction is assigned to the public authorities, to companies and to non-profit corporations. The distribution of income in the public authorities' sector is broken down into two stages. These resources are calculated within the scope of the TIEA distribution operations, within rows DNA.3 and DNA.4.

Corporate Income and Retained Earnings (DNA.3). As other studies on DNA and according to our methodological rule (that is: *the factor that pays a tax is the one on which the amount of the tax depends, previous section),* corporate income is attributed to shareholders (since they are the ones who control the company and who benefit from the capital gains derived from this income). While distribution of corporate income is relatively simple, retained Earnings is more complicated. In an ideal world, it would be possible to link individuals' tax revenues with the

accounts of the companies they own. However, it is not (yet) possible in France.[34] Thus, in practice, retained earnings are therefore imputed in proportion to distributed profits, i.e. the dividends received by households in the ERFS data of the INES model. Without making any claim that such an assumption is systematic at the individual level, it provides plausible distribution results. The main effect of this is that corporate ownership is highly concentrated, which results in these retained earnings making up a large share of the profits of the wealthiest people.

Tax on consumption and production (DNA.4.1). Following our incidence principle, taxes on products (VAT, domestic duty on consumption of energy products, excise duty) are allocated on the basis of consumption and are distributed with the indirect taxation module of the INES model (André, Biotteau and Duval (2016), André and Biotteau (2021)). The distribution is based on consumption data taken from INSEE's Family Budget Survey, which have been statistically matched to the ERFS data. Tax on production such as household's property tax on built properties (*taxe foncière sur les propriétés bâties*) is distributed according to André and Meslin 2021; the distribution of production taxes or subsidies based on wages is also micro-founded. Other production taxes adopt the normative profile factor income.

According to national accounting conventions, taxes on products and production are considered as primary income of public authorities. For taxes on production, we would systematically follow the convention. For product taxes, we take two alternative approaches. The first is to treat them like taxes on production and include them in income before transfers. We call this approach is called at "market prices", meaning the national income before transfers includes all taxes on products. The advantage is to stick to national accounting statistics: the sum of individual incomes is equal to net national income. One drawback is to impute to households an income that they do not effectively receive, to then withdraw it from them in transfer operations. This is crucial to study of exhaustive redistribution. Nonetheless, this refers to an abstract situation of income that would be received in the absence of transfers.

The other approach consists of considering, as income before transfers, only primary factor income, which is actually received by households or the businesses they hold, and the taxes on production that our method allocates in proportion to the income of factors, (with the exception fore-mentioned). Taxes on products are taken into account in redistribution operations, but by subtracting them from income after transfers, and not the before transfers primary income. We

34 This needs ambitious work on administrative data. An academic project has recently proposed a first attempt to do so (Bozio et al., 2022).

will then speak of income "at production prices" or the purchasing power of income. The disadvantage of this second way of proceeding is that by deducting taxes on products before they are consumed, we move away from the notion of net income actually received by households after redistribution operations.

The primary revenues of public authorities derived from levies on production appear a second time in TIDA (DNA.5.2), in secondary distribution transactions as taxes paid by households or the businesses they own. The same applies, where applicable, to taxes on products (DNA.5.1), according to the standard used for primary income (see above).

Other primary income (DNA.4.2). According to National Accounts rules, other component making up the primary income of the public authorities is property income of the public authorities. This component is generally negative, as it includes the payment of interest on national debt. This component of primary income is distributed as the average between benefits and deductions, in line of Piketty, Saez, Zucman (2018). The idea here is that the deficits would be filled one day or another by a mixture of tax increases and spending cuts whose composition cannot be prejudged and therefore normatively based on a 50/50 repartition, and without modification of the structure within the transfers received as paid. It can either be separated or distributed since identified with a specific TIDA line. Given the amounts involved, the impact of any particular assumption is small.

c. Distributing secondary income

Tax on income and wealth (DNA.6). They correspond to the D5 accounts of the TIEA for institutional sectors S11+S12+S14. Composed primarily of the Generalized Social Contribution (DNA.6.1), income tax (DNA.6.2) and housing tax (DNA.6.4), these deductions are distributed on the basis of the INES model and in accordance with the general logic of the table. Household income tax (D.6.2) is simulated within the INES model on the basis of the tax cells present in the ERFS, which are derived from administrative data.[35] The majority of tax credits and reductions are simulated in this way as the Generalized Social Contribution (CSG) and other social security tax [*prélèvements sociaux, DNA6.1 and DNA6.6]*.[36] Housing tax (DNA6.4) is not simulated, but is present within the ERFS data during matching with the tax data. As for tax

35 For 2018, if we compare the total tax paid by ordinary households in metropolitan France, as simulated by INES, with that obtained from the fiscal data (corrected to create coverage equivalent to that of the ERFS), it turns out that INES very slightly underestimates taxes (the difference is -1% for 2018).

36 This difference remains the same, regardless of whether or not the various flat-rate levies on capital income are included in the totals being compared. When including the flat-rate levies, the total simulated by INES for 2018 is 70.8 billion euros, compared with 71.2 billion according to the DGFiP data. If we exclude these levies, the total simulated by INES is 67.3 billion euros, compared with 68.2 billion according to the DGFiP data.

on wealth (ISF, D6.5), there is no database that provides us with all of the components used to calculate both standards of living and the capital tax among the same sample of households. We use the work of Paquier *et al.* (2019) who impute, within the ERFS, the amounts of different types of wealth held by households. This imputation was performed by combining several methodological approaches and several sources of data (INSEE's wealth survey and the wealth tax data provided by fiscal administration) in order to assign the most precise possible wealth amounts to the households in the ERFS.[37] According to the incidence principles (previous section), corporate income tax (DNA.6.3) is paid by all holders of capital, regardless of whether that holding is in the form of shares or bonds. Indeed, corporate tax is distributed in the same way as retained earnings in the absence of reconciliation between the data at the level of households and companies (see below).

Social Security Contribution (DNA.7). SSC correspond to account D61 in the TIEA for institutional sector S14. Their distribution also follows the overall logic of the table. As a result, pension contributions (DNA.7.1), sickness contributions (DNA.7.2), family contributions (DNA.7.3) and unemployment contributions (DNA.7.4) are based on the distribution obtained by the INES model thanks to the richness of the Labor Force Survey variables and, in particular, the reconstitution of an infra-annual employment calendar. They take account in particular of the characteristics involved in the calculation of exemptions (public/private, hours worked, remuneration amount, etc.). All of the different rates for old age, sickness, family and unemployment benefit contributions are well integrated in the INES model.

Monetary Benefits in Cash and Allowances (DNA.8). Likewise, the transfers of S14, D62 (DNA.8.1 to DNA.8.6) are obtained thanks to the INES model: retirement pensions, unemployment benefits, family benefits[38], minimum social security benefits[39], in-work benefit ("*Prime d'activité*"), personal housing benefits (APL, ALS…), and disability pensions. Deferred income from pensions, unemployment benefits and disability benefits is declared income, upstream of the INES model. This is not simulated, but obtained from the ERFS

37 The imputation method used ensures a good correlation between wealth on the one hand and standard of living and the socio-demographic variables of the ERFS on the other hand. In addition, it ensures that the findings are consistent with fiscal data. On the basis of the imputed wealth, an amount of wealth taxable under the ISF is deducted by applying the various deductions, and a tax on wealth is simulated by applying the legislation and taking account in particular of the discount, reductions and cap. This imputation allows INES to create a very precise simulation of the Tax on capital paid by households (Paquier *et al.*, 2019).

38 *i.e.* family benefits, family support allowance, educational allowance for disabled children, prime de naissance (a benefit following the birth of a child) and allocation de base de la *prestation d'accueil du jeune enfant* (an early childhood benefit), *complément familial* (a benefit for families with 3 or more dependent children*), allocation de rentrée scolaire* (a benefit for education expenses) and *complément libre choix d'activité* (a benefit to offset the cost of working less due to childcare).

39 i.e. *revenu de solidarité active* (a statutory minimum income), allocation de *l'adulte handicapé* (a benefit for disabled adults), *allocation supplémentaire d'invalidité* (a supplementary disability benefit), *allocation de solidarité aux personnes âgées* (a solidarity benefit for the elderly), *allocation de solidarité spécifique* (an additional unemployment benefit). It also includes the *garantie jeune* (a benefit for NEETs aged 16 to 25) since 2017. For some of these benefits, non-take-up is taken into account.

databases. Conversely, family benefits and minimum social security benefits are simulated on the basis of the socio-demographic characteristics, incomes and social scales within the legislation. Pending further calculations, daily allowances and compensation for accidents at work (CND.8.6) are distributed in the same way as other benefits.

d. Distributing tertiary income

Health (DNA.10.1). The distribution of health expenditure presents a significant challenge, due to the high level of reimbursement expenditure (around 9% of NNI) as well as the degree to which health care systems are public depending on the country in question. The French Health Insurance System is divided between compulsory health insurance (AMO, 78% of consumption of medical care and products (CBSM)) and supplementary health insurance (AMC, 13.4% of CBSM). Contributions for compulsory health insurance are based on income, while the rate of reimbursement differs according to the type of care or patient. In addition, assistance such as supplementary universal healthcare coverage (CMUC) and supplementary health insurance (ACS) are aimed at the poorest households.

The INES-OMAR model allows health expenditure to be broken down and finely distributed to households. Developed and maintained by DREES, it is based on the ESPS survey, matched with administrative data regarding health insurance reimbursements. The model is based on the survey regarding the most popular contracts with supplementary health insurance organizations (DREES), which provides cover broken down by type of care, as well as the amount of the premiums and the number of beneficiaries.

This provisional version of the INES-OMAR 2017 model is primarily based on the 2017 Statistics on Income and Living Conditions (SILC), a representative sample of households in ordinary housing in metropolitan France, which contains a great deal of socio-demographic information, including income and type of supplementary cover. Health expenditure is imputed on the basis of the ESPS-EHIS 2014 matched to administrative health data and covers the scope of individualizable services presented for reimbursement in the community and in healthcare establishments, excluding welfare. The premiums and reimbursements for supplementary insurance are taken from the survey of the most popular contracts taken out with supplementary insurers in 2016. This allows AMO expenditure and contributions and reimbursements from supplementary health care organizations, to be distributed according to standard of living or other variables.

Education (DNA.10.2). The other main type of individually identifiable transfers in kind is education expenditure (5% of NNI). The general principle applied for the distribution of

educational expenditure is to establish an educational benefit for each child within a household, the value of which is linked to the level and nature of the education they are receiving. Thanks to the Labor Force Survey matched in the ERFS, we know the educational training of each people above 14 years old. This makes it possible to distinguish between general and technological high schools, vocational high schools, higher technician sections (STS), preparatory classes for the *grandes écoles* (CPGE) and the university. Under the age of 14, we use children's ages to impute education (between kindergarten, primary, secondary). This involves using data on pupil and student numbers that are considered homogeneous in terms of educational costs and then multiplying them by the average costs found in the education accounts. Two types of calculation are made, one for primary and secondary schooling and the other for higher education.

As regards primary and secondary education, the training of the child, age and number of children in the ERFS data is used to assign a per-child cost to each household where applicable (taking the average cost per level – primary and secondary – according to the education account). This then allows costs to be distributed by standard of living tenth by aggregating the data for all households in each band.

Two different situations exist for students.

If they are cohabiting (i.e. living in the same household as their parents), higher education expenditure (with distinction between higher technician sections (STS), preparatory classes for the *grandes écoles* and the university) is allocated to the household to which they belong;

If they are not cohabiting, the usual scope of monetary redistribution excludes households in which the reference person is a student. Furthermore, the studies carried out on the basis of the ENRJ survey by INSEE and DREES have shown that it is inappropriate to consider them as separate households in their own right. They would then be considered as having no income, even though they receive private transfers and are mainly from the wealthiest households. Therefore, the population of non-cohabiting students and their related expenditure are distributed by standard of living tenth, as per the ENRJ survey.

Table A2 display the education expenditure per tenth of usual standard of living by training. The education-related transfer is highest for the poorest 10% (who receive 15% of the total transfer), and decreases until the 9th tenth, before increasing slightly at the top of the distribution. This is because more children are enrolled in primary and secondary education in low-income households, while children from better-off households are more likely to attend higher education, which is more expensive. The wealthiest 10 percent of households receive 12

percent of higher education expenses (24 percent for students not living with their parents), compared to 7 percent for undergraduate education. In addition, children from wealthy households are slightly more represented in general and technological high schools, and children from modest households opt more for vocational courses (19 percent of the expenditure for these courses is allocated to them), with a lower cost.

Table A2: education expenditure per tenth of usual standard of living by training

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Total (Mds euros)
Primary and secondary school	**14,6**	**13,6**	**11,7**	**10,9**	**10,0**	**8,7**	**8,2**	**7,9**	**7,0**	**7,4**	**81,9**
Kindergarden and elementary scool	14,0	13,5	10,8	10,1	10,0	9,3	8,7	8,1	7,5	7,9	34,2
Collège	14,3	13,2	11,5	11,1	10,5	8,8	8,0	7,7	6,9	7,9	27,2
Lycée général et technologique	11,8	12,0	12,0	10,7	8,1	8,4	9,3	9,2	9,0	9,5	9,3
Lycée professionnel	19,4	16,0	14,5	12,7	10,3	7,0	6,2	6,7	4,1	3,0	11,2
High school	**16,1**	**8,4**	**9,8**	**8,9**	**8,7**	**9,1**	**7,8**	**9,3**	**10,0**	**11,9**	**22,1**
cohabiting with parents	16,8	8,8	10,6	8,9	9,0	9,5	7,6	9,5	9,2	10,1	19,4
Non cohabiting	11,1	5,6	4,3	8,7	6,7	6,0	9,7	7,9	15,7	24,4	2,8
Total	**15,0**	**12,5**	**11,3**	**10,5**	**9,7**	**8,8**	**8,1**	**8,2**	**7,6**	**8,4**	**104,9**

Note: the figure gives the education expenditure per tenth of usual standard of living by training in 2019. The first ten column give the percentage of education expenditure of each tenth of usual standard of living (the sum equal to 100%). For instance, 14,6% of the education expenditure for kindergarden and elementary school goes to the bottom 10% of the population. The last column gives the total in billions of euros.
Source: INSEE, Distributional National Accounts, 2018. Authors' Calculations.

Social Welfare and Other Cultural and Associative Activities (DNA.10.3 and 10.4). These two entries in account D63 are less important and represent €63 billion (3% of NNI) and €38 billion (2% of NNI), respectively. The first, which includes in particular the care package received in retirement homes or long-term care units, the childcare supplement (CMG) and non-profit medico-social accommodation is distributed as a weighted average of the transfers simulated by INES in the absence of additional data, and the missing amounts are distributed as family benefits (with a redistributive profile). Non-profit cultural and associative activities, which include in particular sporting, creative, artistic and performing arts activities, are uniformly distributed (i.e. 10% for each tenth) as they are supposed to be universally accessible and because of lack of data.

Housing (DNA.10.5). The final type of individualizable social transfers in kind is housing expenditure (€16 billion, 1% of NNI). This relates to housing allowances paid to households that are renting their property and are dependent on household income, geographical area and partly on the cost of the rent. The amounts of the allowances are simulated in the INES model based on information present in the ERFS. Like the principle adopted for the other transfers in the table, accounting expenditure is distributed according to the simulated profile, which is heavily concentrated on the first standard of living tenths.

Collective Consumption Expenditure (DNA.11). The collective consumption expenditure are defense, police, justice and general operations of the government and local authorities. The

distribution of this expenditure raises more conceptual issues than that of individually identifiable consumption expenditure. Two polar normative assumptions are used in the literature: flat-rate distribution or distribution in proportion to income.[40] We distribute collective consumption expenditures of national attribution (such as defense, foreign affairs and the civil service of general government) on a lump-sum basis because they are supposed to benefit everyone. But for other collective consumption expenditures, known as "localizable" expenditures, we explore another option, using micro founded method to valuate public services according to their geographical accessibility. This innovation helps us to disentangle which assumptions is data driven. The territorial distribution of specific public services can be used for this purpose. Indeed, these parts of collective consumptions are distributed on the basis of the wage bill of the public employees concerned (excluding hospitals and education because these are in kind transfers). From the administrative database named “Annual declaration of social data”, public services are localized for each living area of each household. The ratio between the wage bill of these aggregated civil servants and the number of inhabitants in each catchment area is assigned to each household in the ERFS in order to measure collective expenditure in its area. In the Paris region, this zoning is too large to estimate the distribution of collective spending, so a more restricted breakdown was used, that of urban catchment areas. For robustness purposes, variants of geographic zonings were tested, the results are not significantly modified: the U-shaped profile is thus unchanged, and it is all the more marked the finer the breakdown. More generally, alternative hypotheses on the distribution of transfers were tested, but this did not alter the main conclusions.

40 Flat rate distribution suggests that each individual benefit equally from collective consumption expenditure: it therefore has a strong equalizing effect on the distribution of income after transfers. Conversely, proportional distribution considers public goods to be neutral from the point of view of distribution. The latter approach can be interpreted as a service rendered in proportion to income. Taking this logic further, a specific approach for some items of expenditure, such as for the national policing budget, one of the missions of which is to protect property, would consist of distributing them in proportion to the value of that property, i.e. to the wealth. That would have the effect of making such expenditure anti-redistributive. This goes beyond the scope of a distributional accounting exercise without substantially changing its overall results.

Table A3: table of integrated distribution accounts nomenclature

Table of integrated distributional accounts			Table of integrated economic accounts	
DNA	First level	Second level		
A	Net national income before transfers (1+2+3+4)		S1	B5n
1	Gross labor income	1.1 Net Wages 1.2 Social Contributions	S14	D1
2	Net mixed income and property income	2.1 Net mixed income 2.2 Net property income 2.3 Actual and fictitious rents, net of charges	S14 S14 net S14	B3n D4 B2n
3	Retained earnings and other corporate	3.1 Retained earnings net of corporate income tax 3.2 Corporate income tax 3.3 Other corporate transfers (fraud)	S11+S12+S15 S11+S12 S11+S12 net	B5n-D5-S7 D5 D6+D7
A.fac	Factor income (= 1+2+3)			
4	Primary income of the public authorities	4.1 Levies on production and consumption 4.2 Property inc. and net EBITDA (inc. interest paid)	S13 S13+S12 net	D2+D3, res. D4
	Monetary transfers (5.1+5.2+6+7+8+9)			
5.1	Taxes on products	5.1.1 VAT 5.1.2 Oil and energy taxes 5.1.3 Alcohol, tobacco and insurance 5.1.4 Registration and construction 5.1.5 Other net subventions on products	S13 S13 S13 S13 S13	D21N D21N D21N D21N D21N
5.2	Taxes on production	5.2.1 Corporate production taxes on wages 5.2.2 Corporate production tax on building 5.2.3 Household production tax (TFPB...) 5.2.4 Corporate subventions on wages (CICE)	S13+S2 S13+S2 S13+S2 S13+S2	D2-D3 D2-D3 D2-D3 D2-D3
6	Taxes on income and wealth	6.1 Generalized Social Contribution 6.2 Households income tax 6.3 Corporate income tax 6.4 Housing tax 6.5 Solidarity tax on wealth 6.6 Social debt repay. (CRDS), wealth inc. social tax	S14 S14 S11+S12 S14 S15 S14	D5 D5 D5 D5 D5 D5
7	Social contributions	7.1 Pensions 7.2 Health 7.3 Family 7.4 Unemployment 7.5 Specific welfare schemes	S14 S14 S14 S14 S14	D61 D61 D61 D61 D61
8	Benefits in cash	8.1 Pensions 8.2 Unemployment 8.3 Family 8.4 Disability 8.5 Mutual 8.6 Compensation for daily sickness or accident at work	S14 S14 S14 S14 S14 S14	D62 D62 D62 D62 D62 D62
9	Other secondary transfers	9.1 Other current transfers 9.2 Property income and net EBITDA	S14 S13 net	D7 D4+EBEn
B	Disposable income (1+2+3+4+5.1+5.2+6+7+8+9)		S14	B6n
B.micro	Disposable income (usual micro definition: 1.1+2.1+2.2+6 -6.5+8)			
	Non-monetary transfers (10+11+12+13)			
10	Benefits in kind (individualizable social security transfers in kind)	10.1 Health 10.2 Education 10.3 Social welfare 10.4 Cultural and associative activities 10.5 Housing allowances	S13 S13 S13 S13 S13	D63 D63 D63 D63 D63
11	Benefits from collective public services (collective expenditure)	11.1 General administration 11.2 Police, justice, defense 11.3 Other (of which dissemination of research)	S13 S13 S13	P32 net P32 net P32 net
12	Other (net adj. disp. inc. of pub. auth. and rest of the world)	12.1 Net adjusted disposable income of NPISH 12.2 Rest of the World Use-Resource balance (EU..)	S15 S2	B7n-B5n B6n-B5n
13	Net sav. of pub. auth. net of FCC	13.1 Net saving of public authorities net of FCC	S13	B8n
D	Income after transfers (B+10+11+12+13) –> Extended standard of Living		S1	B5n

Notes: A "DNA" (distributed national accounts) nomenclature has been established to facilitate comparisons, with a tow level distinction to be able to issue either simplified or detailed TIDA. The following tables collate the accounting rules that allow this initial contraction of the TIEA to be performed. The capital letters indicate the different income concepts: DNA.A is Net national income before transfers (NNIBT). DNA.A.fac is the labor and capital factor income, DNA.B is disposable income, DNA.C is adjusted disposable income and DNA.D is income after transfers (NNIAT), which has also been referred to as expanded income above.

The table A3 represents the rows in the table of integrated economic accounts in the order in which the economic accounts appear.

Income before transfers (NNIBT) is calculated by adding the primary income of the public authorities (DNA.4), which is primarily comprised of taxes on products and production, to **factor income** – remuneration for labor (DNA.1), property (DNA.2) and retained corporate income (DNA.3).

Since the key objective of this distributional accounting is to document the transfers performed by means of redistribution, the rows of the TIDA that relate to transfers are broken down into sub-headings, each identified by a second number (e.g. DNA.2.1 refers to the mixed income of the self-employed within the DNA.2 group).

As with the TIEA, the sequence of accounts in the TIDA continues, from the top to the bottom of the table with the secondary distribution of national income account. The taxes taken from income before transfers, i.e. taxes on income and wealth (DNA.6) and social security contributions (DNA.7) are subtracted. Since a single column is used to represent both resources and uses, where the amounts appearing here relate to transfers paid out, they include a minus symbol.

The sequence continues with the recording of transfers received, grouped into the "monetary benefits and allowances" (DNA.8) and other transfers (DNA.9) categories to arrive at net disposable income (DNA.B). This concept of net disposable income differs slightly from that of household disposable income in the national accounts, in so far as it includes retained company earnings. To insure DNA and micro comparisons, we also calculate a disposable income strictly corresponding to the micro-founded definition (DNA.B.micro).

We arrive at income after transfers by applying a monetary value to non-monetary services rendered by the public authorities, which fall under the use of income account as collective consumption expenditure in the TIEA:

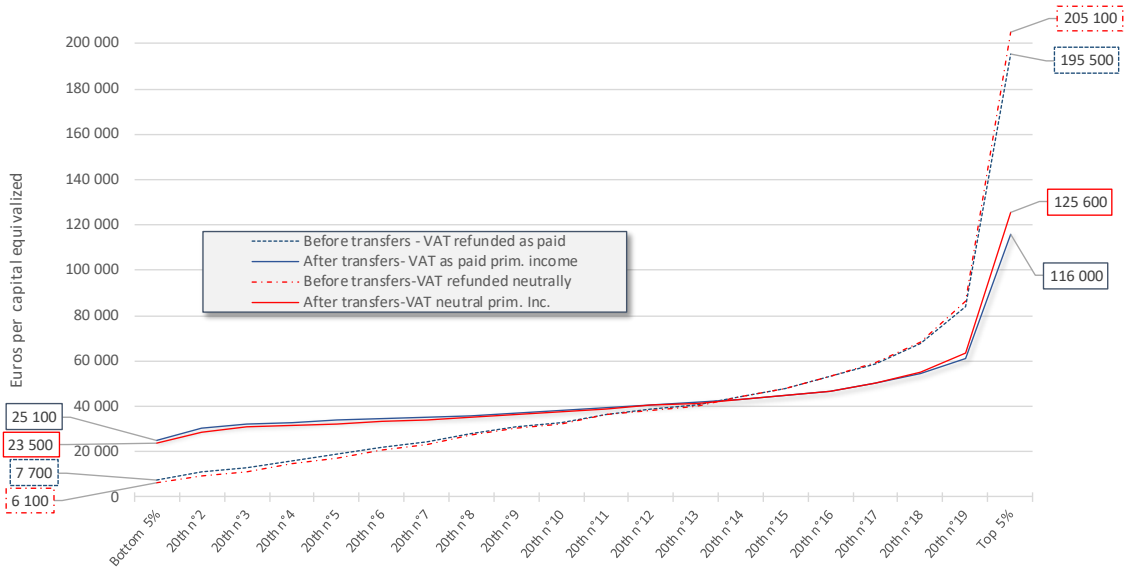
- individually identifiable public services, such as health, education and social welfare in particular, grouped together in the national accounts in the category of "individualizable social security transfers in kind" (DNA.10);
- other services provided by means of public policy, described in non-individualizable national accounts as security, justice, national defense and general administration expenditure in particular (DNA.11).

The first of these two steps results in the concept of net adjusted disposable income, which is well known to national accountants (in this case DNA.C or DNA.C.sna depending on whether

or not retained earnings are included). The allocation of collective expenditure to households, together with the net adjusted disposable income of other sectors (DNA.12), gives the net national income after transfers (DNA.D), also called latter, extended standard of living.

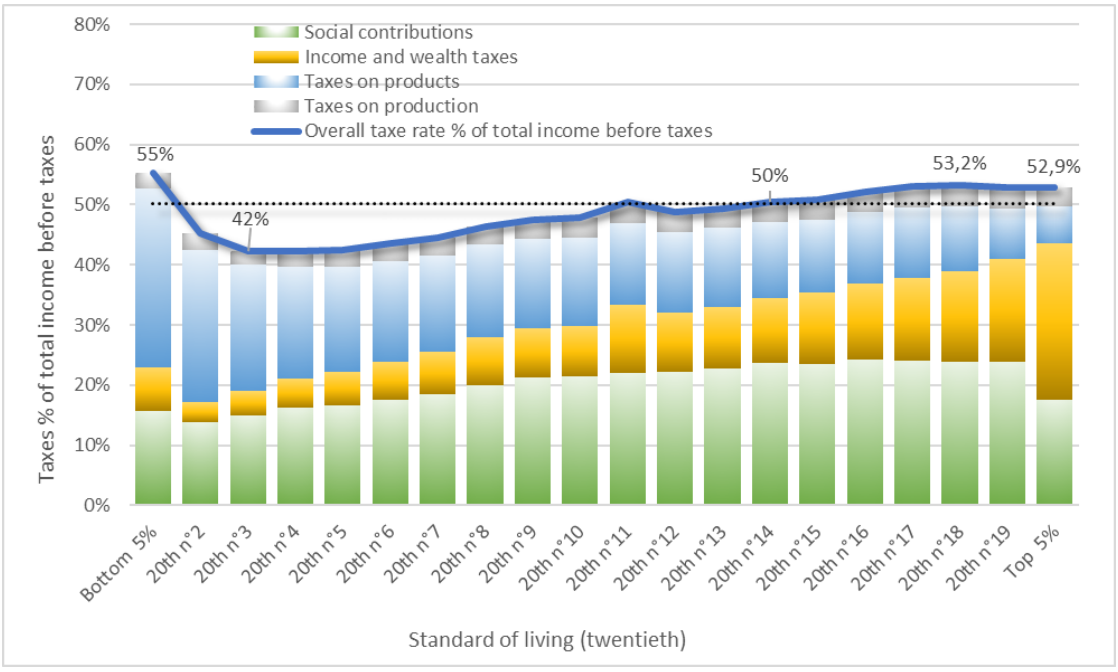
Appendix 2. Additional figures

Figure A1. Extended Redistribution at market price with different assumption for VAT distribution



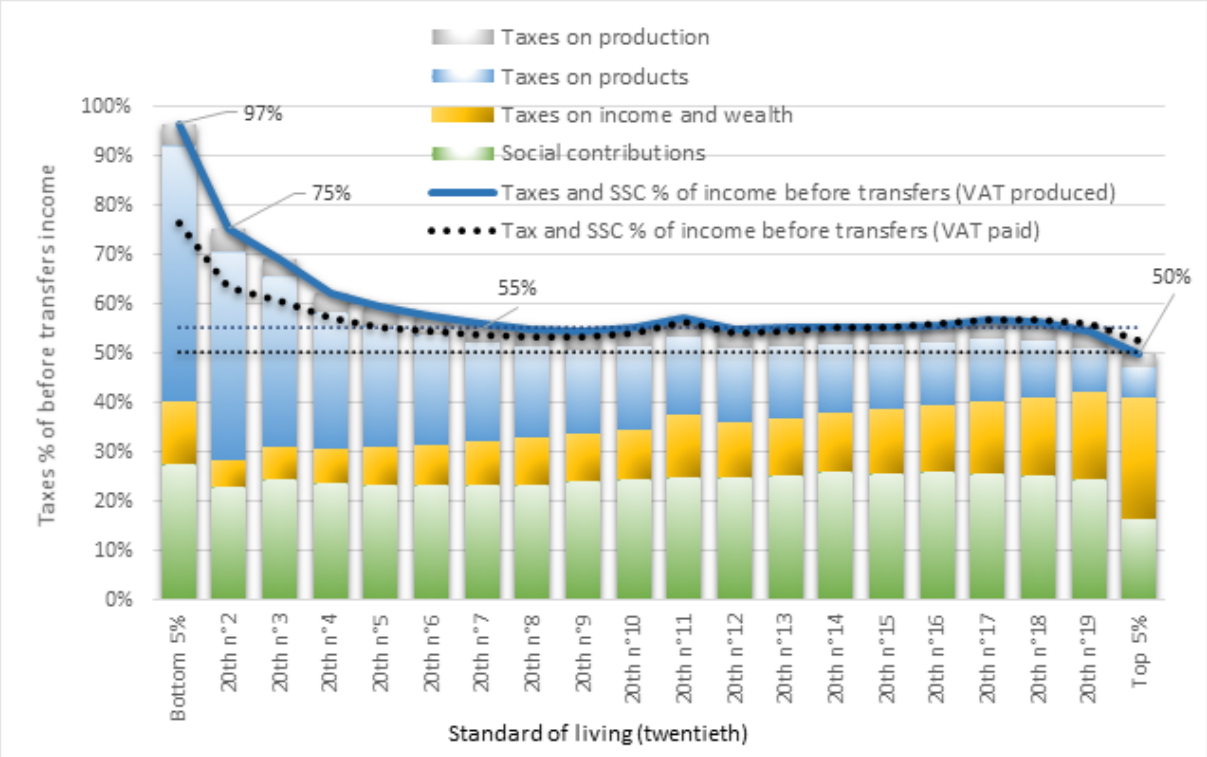
Note: This figure displays income before and after transfers at market price with two different assumptions for VAT distribution in primary income. In the first assumption (presented also in Table 1), VAT is distributed in the primary income as a function of consumption, which we called in the figure "VAT refund as paid" for income before transfers and "VAT as paid prim. income" for income after transfers (to indicate that this assumption concerns the distribution of VAT in primary income). In the second assumption, VAT is distributed as primary income in the primary income (but as paid depending consumption in the redistribution), which we called in the figure "VAT refund neutrally" for income before transfers and "VAT neutral prim. Inc." for income after transfers.
Source: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

Figure A2. Overall tax rate by twentieth of standard of living
A. In % of total income before transfers



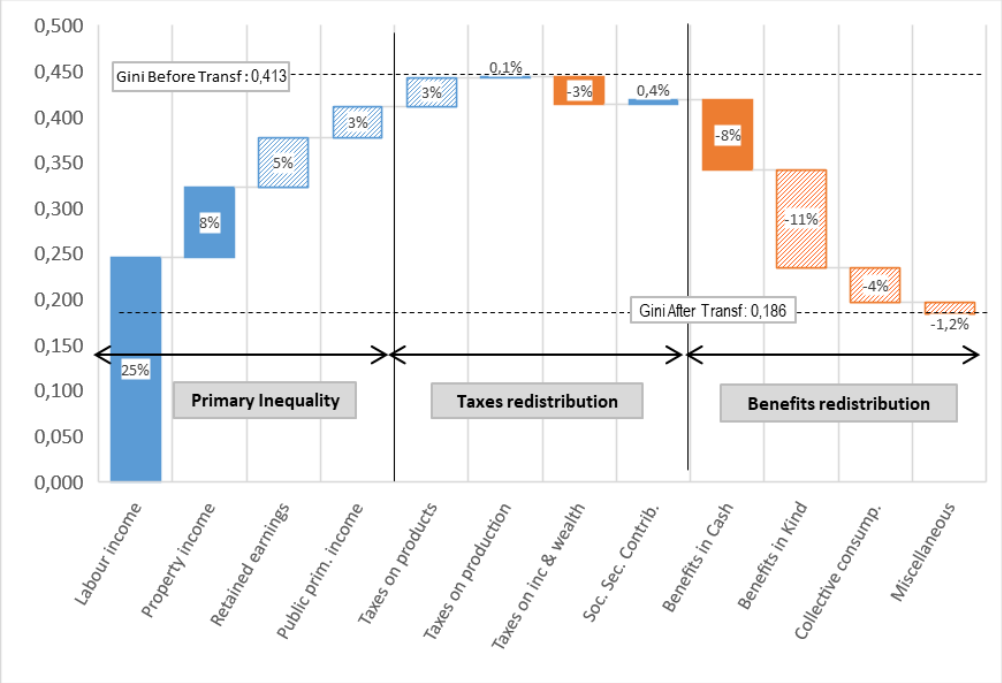
Note: overall tax rate and its decomposition in percentage of income before transfers. The corresponding figure is in the article (Figure 5) in percentage of income before transfers.
Source: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

B/ In % of total income before transfers depending on the VAT treatment



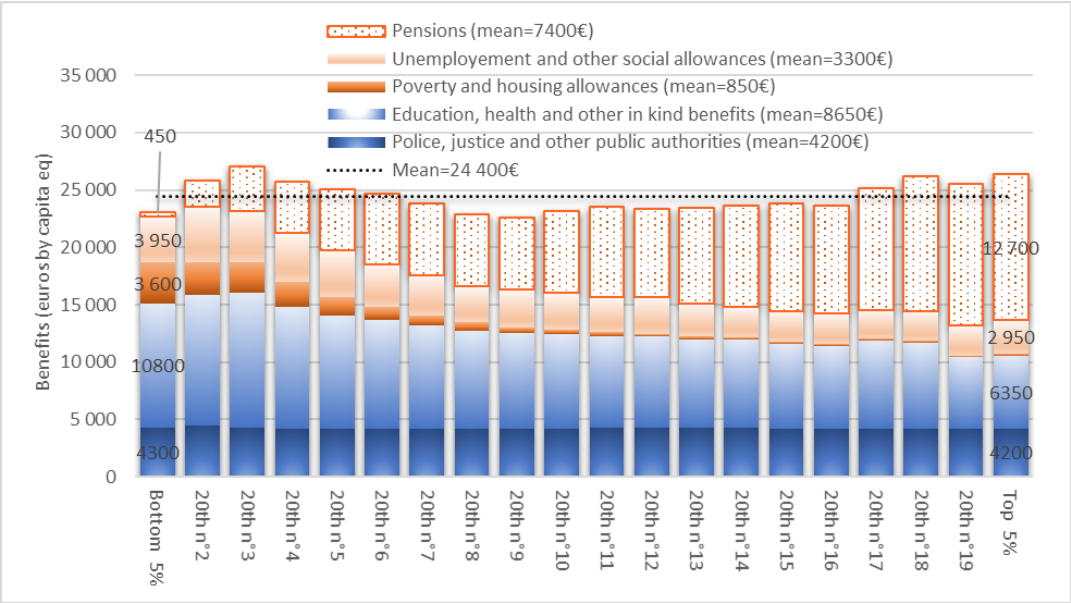
Source: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

Figure A3. Simplified representation of inequality formation and attenuation



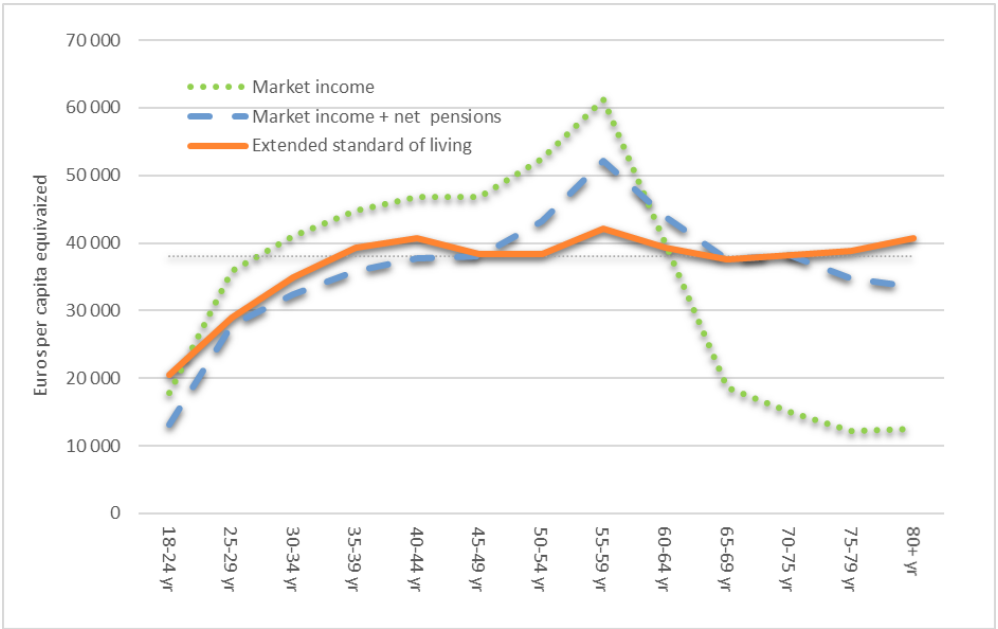
Note: This new Gini decomposition is a graphical representation for the Kakwani decomposition (corresponding to Table 2 in the article).
Source: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

Figure A4. Public transfers by twentieth of standard of living



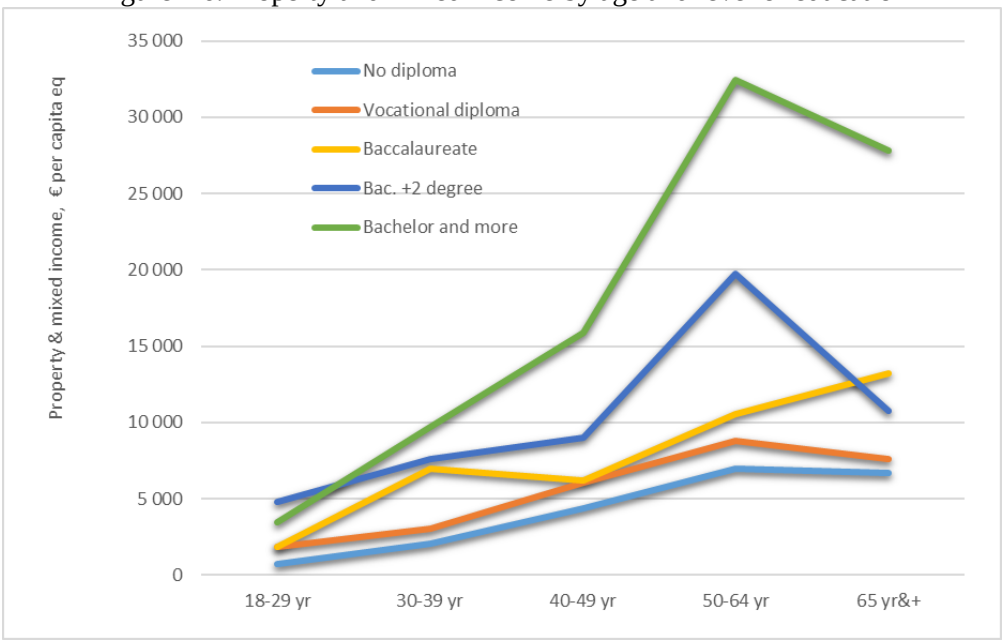
Note: total public transfers and its decomposition by twentieth of standard of living (m=mean over the whole distribution).
Source: INSEE, Distributional National Accounts, 2019. Authors' Calculations.

Figure A5. Before and after transfers income by age of household reference person



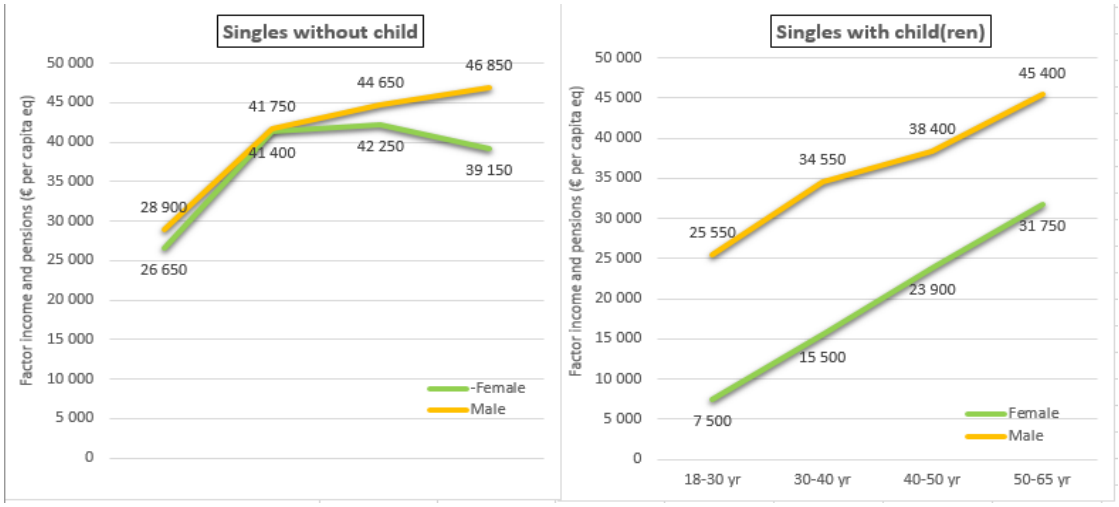
Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Figure A6. Property and mixed income by age and level of education



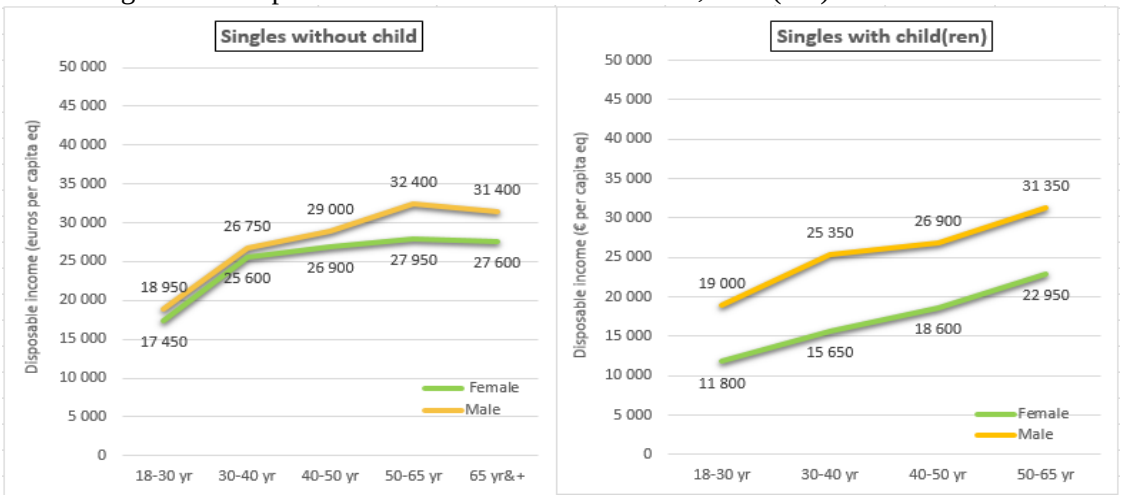
Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Figure A7. Primary income for single male and female, without (left) or with child (right)



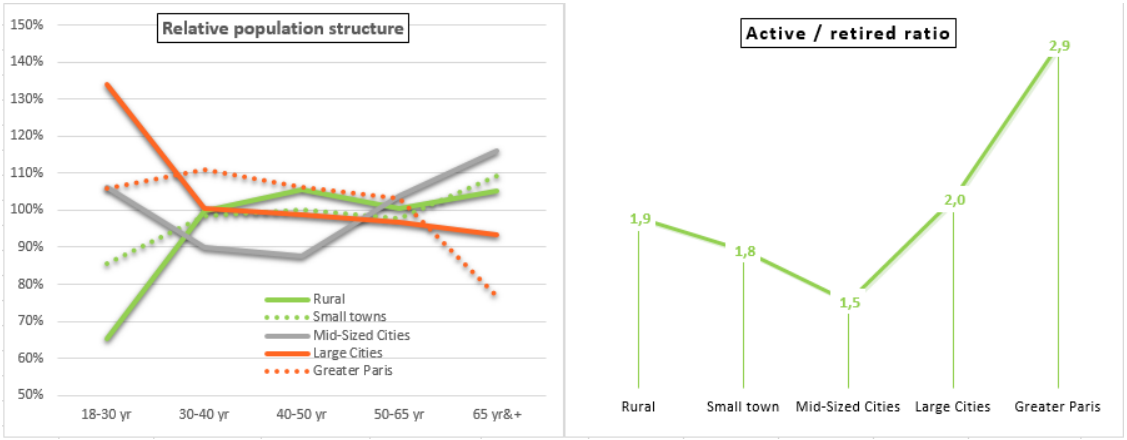
Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Figure A8. Disposable income for male and female, with (left) or without child



Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Figure A9. Greater Paris / Mid Sized Cities by age of household reference person



Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Appendix 3. Additional tables

Table A4. Factor income by age and level of education (excluding pensions)

(Unit : k€ per capita eq)	18-29 yrs	30-39 yrs	40-49 yrs	50-64 yrs	65 yrs&+	All
No diploma	15 000	20 000	25 500	30 000	9 500	24 900
Vocational diploma	23 000	27 000	34 000	38 500	11 000	18 450
Baccalaureate	28 000	38 000	38 000	46 000	17 000	28 750
Bac. +2 degree	35 500	49 000	50 500	64 000	14 500	34 900
Bachelor and more	41 000	65 500	75 500	100 500	37 000	47 550
All	29 550	41 850	45 450	50 000	14 200	36 850

Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Table A5. Total taxes paid by age and diploma

(Unit : euros)	18-29 yr	30-39 yr	40-49 yr	50-64 yr	65 yr&+	All
No diploma	-10 500	-13 500	-16 000	-19 500	-11 000	-14 000
Vocational dipl.	-14 000	-16 500	-20 500	-24 500	-12 500	-19 000
Baccalaureate	-17 500	-22 000	-23 000	-29 000	-18 500	-22 500
Bac. +2 degree	-20 500	-29 000	-30 000	-38 500	-17 500	-29 500
Bachelor & more	-25 000	-39 500	-45 500	-61 000	-33 000	-43 500
All	-18 000	-25 000	-27 500	-31 000	-15 000	-24 000

Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Table A6. Fiscality by age and diploma (weighted sum over ages)

(Unit : euros)	Taxes on products &prod.	Taxes on inc.&wealth	Social Sec. Contribution	Total taxes	% inc. bef. transfers	% total inc. bef. taxes
No diploma	375 000	210 000	335 000	920 000	57%	39%
Vocational dipl.	435 000	280 000	445 000	1 160 000	55%	40%
Baccalaureate	495 000	440 000	555 000	1 490 000	57%	42%
Bac.+2 degree	545 000	530 000	715 000	1 790 000	56%	43%
Bachelor & more	675 000	1 040 000	1 090 000	2 805 000	58%	47%

Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

Table A7. Transfers received by nature and age - diploma (weighted sum over ages)

(Unit : euros)	Pensions	Other in cash	Health	Education	Other in kind	Total	Total exc. pensions
No diploma	440 000	315 000	355 000	120 000	535 000	1 765 000	1 325 000
Vocational dipl.	530 000	265 000	270 000	125 000	490 000	1 680 000	1 150 000
Baccalaureate	695 000	220 000	230 000	140 000	440 000	1 725 000	1 030 000
Bac.+2 degree	710 000	205 000	180 000	135 000	420 000	1 650 000	940 000
Bachelor&more	910 000	200 000	190 000	145 000	405 000	1 850 000	940 000

Source: INSEE, National Distributional. Authors' Calculations.

Table A8. Greater Paris / Mid Sized Cities by age of household reference person

	Factor income and pensions	Disposable income	Extended disposable income
18-29 yrs	136%	121%	113%
30-39 yrs	155%	130%	117%
40-49 yrs	154%	139%	125%
50-64 yrs	161%	128%	131%
65 yrs+	147%	124%	120%
All	154%	129%	123%

Source: INSEE, National Distributional Accounts, 2019. Authors' Calculations.

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