

Predistribution vs. Redistribution: Evidence from France and the U.S. *

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Abstract

We quantify the extent of redistribution over time by the percentage reduction from pretax to post-tax inequalities, and we estimate how much of the changes in post-tax inequalities can be attributed to redistribution versus changes in pretax inequalities. Using detailed micro-data, we construct homogenous annual series of post-tax national income for France over the 1900-2018 period, and compare them with those recently constructed for the U.S. We obtain three major findings. First, redistribution has increased in both countries over the period, earlier in the U.S., later in France, to reach similar levels today. Second, the substantial long-run decline in post-tax inequality in France over the 1900-2018 period is due mostly to the fall in pretax inequality accounting for three quarters of the total decline. Third, the reason why overall inequality is much smaller in France than in the U.S. is entirely due to differences in pretax inequality. These findings suggest that future policy discussions on inequality should pay more attention to policies affecting pretax inequality and should not focus exclusively on “redistribution”.

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Introduction

The issue of how to select the most adequate policies to reduce inequalities has attracted considerable interest, both in academia and in the public debate, in particular in light of the significant increase in inequality documented over the last decades in many countries. However, despite numerous research efforts, comparable long-term estimates of redistributive policies remain deceptively scarce.

Public policies aiming to reduce inequalities can be classified into two categories. First, for a given level of pretax inequality, taxes, transfers and other public spending can reduce post-tax income inequality. This is what is usually called redistribution policies. The public economics literature has largely been influenced by an approach which treats pre-tax inequalities as given, and where the policy options for reducing inequalities largely rest on various combination of tax-and-transfers, with the constraints imposed by the behavioral responses to the tax and transfer system (e.g., this is the generic logic of optimal taxation literature).¹ However, public policies can also affect the pretax distribution of income (what we will call “predistribution”). For instance, the legal and social system contributes to determine the bargaining power of workers vis-à-vis firm owners and managers, via wage-setting rules, corporate laws, trade regimes or labor market regulations. Educational and health care policies impact the access to skills and jobs, and therefore the overall inequality of labor earnings. Taxation and transfers can also affect pre-tax income via behavioral responses of labor supply or different dynamics of capital accumulation. Although these channels are known to impact inequalities, the lack of adequate data series with sufficient historical and comparative breadth has limited the ability to evaluate the long-term impact of various public policy options on inequality.

This paper aims to quantify the amount of redistribution over time and across two countries, France and the U.S., and estimate the relative magnitudes of redistribution and changes in pretax income in accounting for the observed evolution of inequality. We define redistribution in a broad sense by all the government policies affecting pretax income to obtain a post-tax income, including the impact of taxation and public spending. More specifically, we include in the measure of redistribution the large share of public spending—health, education and collective public expenditures—that are not often included in

¹See Mirrlees (1976), Kaplow (2008), Piketty and Saez (2013) and Tanninen et al. (2019) for general surveys of this approach.

redistributive analyses.

We make three main contributions. First, we clarify what we really can measure with redistribution, i.e., changes from pretax inequality to post-tax inequalities. This is not the full effects of public policies on inequalities, but only the direct impact of taxation and public spending. By affecting pretax inequality, policies can have also a major impact on post-tax inequalities that will not be captured by any measure of redistribution. Comparison across time and countries that disregard potential effects of predistribution lead to misleading conclusions in confusing direct redistribution effects with the total impact of policies on inequalities. By clarifying what we really measure with redistribution, we propose a conceptual framework that leaves a large place to the potential role of predistribution policies on overall inequalities, even if we stress our lack of knowledge on its contribution to inequality.

Second, we bring new data estimates on a century of post-tax inequality measures in France. We construct micro-files of the distribution of post-tax, post-transfer and post public spending income by combining national accounts, administrative tax data and household survey data in a comprehensive and consistent manner following DINA methodology. We develop a microsimulation model and use explicit tax incidence assumptions to impute all taxes, transfers and collective expenditures. The imputation of in-kind transfers and collective expenditures follows the best micro evidence to-date.² As a result, our French post-tax income series are annual, fully consistent with macroeconomic aggregates and cover the entire income distribution, from bottom to top percentiles. We then update previous work on pretax inequalities in France by Garbinti et al. (2018), as well as pretax and post-tax inequality series in the U.S. from Piketty et al. (2018a).³

Third, we quantify the impact of redistribution on inequality dynamics. Our analysis relies on inequality indicators defined either as the ratio between average incomes of the top 10% and bottom 50% groups (ratio T10/B50) or as the ratio between average incomes of the top 10% and bottom 90% groups (ratio T10/B90). We use these indicators to assess the magnitude of inequality reduction implied by redistribution in France and the

²The imputation of in-kind transfers and collective expenditures is the most difficult part of this exercise. We show how variants for imputing these public spending affect our results.

³Note that this comparison is made possible by the fact that both series are based on the very same methodology and are anchored to national accounts. See Alvaredo et al. (2020) for a complete presentation of the general methodology to construct pre-tax and post-tax distributional national accounts. See also Blanchet et al. (2019) for an attempt to present DINA estimates for European countries using machine learning and survey calibration.

U.S. by sub-periods. This is done by computing the relative variation in our inequality indicators (ratio T10/B50 or ratio T10/B90) when going from pretax to post-tax income, thus obtaining measures of redistribution which can be compared to other changes in pre-tax inequalities that also affect post-tax inequalities.

Our analysis leads to three sets of results. First, we document that the reduction of inequality implied by redistribution is significant in both countries and increasing throughout the entire 20th century, even though not at the same pace and in the same period. As a case in point, redistribution measured by the T10/B90 ratio was similar in France and in the U.S. just before WWI (reducing pretax inequality by less than 10% in both countries), then increased sensibly in the U.S. after WWII while France kept a similar level of redistribution (-25% vs -12.5% for 1945-1955). From the mid-1970s onwards, redistribution increased in France, which caught-up with the U.S., and then both countries experienced increasing redistribution. At the end of the period (2010-2018), both France and the U.S. have increased redistribution, but the increase is more pronounced in France reaching a higher redistribution level (-33%) than in the U.S. (-29%). Using the more precise indicator T10/B50, the level of redistribution is higher, but still remarkably close for both countries (-47% for the U.S. vs -51% for France).

Second, we use a simple formula to decompose the evolution of post-tax income inequality between the variation in pre-tax income inequality and the change in redistribution. We show that the long-run decline in inequality in France over the 1900-2018 period (-64%) is due mostly to the fall in pretax inequality (-43%), and to a lesser extent to direct redistribution (-21%).

Third, by comparing France with the U.S., we find that most of the post-tax inequality differences across the two countries can be attributed to changes in pre-tax inequalities. The pattern of U.S. inequality over the period from 1913 to 2018 is one of a significant decline in post-tax inequality (-37%) up to the 1980s, followed by a steep increase since then, to end slightly below the inequality level of 1913 (-15%). This evolution is the result of two opposing factors: rising pretax income inequality (+7%) and rising redistribution (-22%). These results show that if inequality has decreased much more in France than in the U.S. during the 1900-2018 period, this is not due to a relatively more important increase in redistribution by French tax and public spending. The major factor behind this differential trend comes from the differential evolution of pretax income inequality

between the two countries. Pretax income inequality has decreased relatively more in France than in the U.S. over the 1900-1983 period and has increased relatively less since 1983. In other words, both changes in pretax inequality and redistribution have had a significant impact on the historical reduction of inequality, but the former is quantitatively about three times as large as the latter.

Related literature. Our paper builds upon a long tradition of research studying the historical evolution of income inequality. Following the pioneering work by Kuznets (1953) and Piketty (2001, 2003), a number of authors have used income tax data to construct long-run series of top income shares (see Atkinson and Piketty (2007, 2010) for a global perspective on top incomes). Several recent papers have attempted to combine the various available sources in a systematic manner in order to construct long-term income series of “distributional national accounts” (DINA) (see in particular Piketty et al. (2018a) for pre-tax and post-tax DINA in the U.S.; Garbinti et al. (2018) for pre-tax DINA in France). The present paper follows this line of work and provides a more thorough analysis of the role of redistribution in inequality dynamics.⁴

Second, our paper relates to the large literature, initiated by Okner and Pechman (1974), that studies the progressivity and the tax burden of tax and transfer systems (for work related to France, see Bourguignon, 1998; Accardo et al., 2009; Landais et al., 2011; Chanchole and Lalanne, 2012; Eidelman et al., 2013; Bozio et al., 2020).⁵ Our key contribution to this literature is to construct long-term, annual series of pretax and post-tax income for France that provide a comprehensive view of how government redistribution affects inequality. Indeed, our French series cover the entire distribution, are fully consistent

⁴We should also emphasize that the present research is part of a broader multi-country project, namely the WID.world project, with the aim of providing long-term homogeneous series of income and wealth consistent with national accounts in as many countries as possible in the coming years. See also Morgan (2017), Alvaredo et al. (2019), Novokmet et al. (2018) and Piketty et al. (2019) for recent work on pretax income inequality in Brazil, the Middle East, Russia and China, respectively. See Saez and Zucman (2016), Garbinti et al. (2021), Martinez-Toledano (2017) for work on wealth inequality in the U.S., France and Spain, respectively.

⁵Bourguignon (1998), Chanchole and Lalanne (2012), and Eidelman et al. (2013) use microsimulation models and household surveys to estimate the progressivity of the tax and transfer system for one or two given years. Accardo et al. (2009) break down disposable income reported in the national accounts by income quintiles for the year 2003. Bozio et al. (2020) analyzes the impact of social security contributions on labor income inequality over the 1967-2015 period. The paper most directly related to ours is Landais et al. (2011), which combines tax data with national accounts to estimate tax rates by pretax income groups for a given year. See also Piketty and Saez (2007), Mirrlees et al. (2010), Sutherland and Figari (2013) with EUROMOD, Bengtsson et al. (2016), and OECD work by Zwijnenburg et al. (2017) for cross-country comparison exercises.

with national accounts, and consider all forms of taxes and government expenditure.

Third, our study complements the macro literature that analyzes the role of taxes and transfers on inequality dynamics (Kaymak and Poschke, 2016; Hubmer et al., 2017). The use of our detailed micro series of pretax and post-tax income could improve the ability of macroeconomic models to reproduce distributional dynamics over time (Ahn et al., 2018).

Fourth, our paper contributes to the broad literature on the determinants of pretax income inequality. This literature has typically discussed the relative role of education policies (Katz and Murphy, 1992; Chetty et al., 2017), minimum wage (Autor et al., 2016), compensation bargaining (Piketty et al., 2014), international trade and technological change (Autor et al., 2014; Acemoglu and Restrepo, 2020), as driving forces of increased inequality. Our results suggest that such “predistribution”—policies, rules and mechanisms impacting pretax income inequality—matters much more than direct redistribution in explaining differences in overall inequality between the U.S., France and possibly other European countries. Generally speaking, our findings contribute to the expending policy debate on the notion of “predistribution” and call for a better comprehension of these mechanisms.⁶

The rest of this paper is organized as follows. In section 2, we describe our data sources and methodology. In section 3, we present our main results regarding the overall magnitude of redistribution in France and the U.S. In section 4, we present detailed results on the anatomy of redistribution, the role of tax progressivity, monetary transfers and in-kind transfers. In section 5, we discuss our incidence assumptions and present variants to test the robustness of our results. In the final section, we offer concluding comments and discuss research perspectives.

1 Conceptual framework

In this section, we present the conceptual framework which will lead to the specific empirical estimates of income inequalities series and measures of redistribution, that we present in this paper. Our analysis is grounded on the income concepts developed by national accounts, as they allow comparison across time and countries (section 1.1). We then describe formally how variations in the level of inequality indicators can be ascribed

⁶The notion of “predistribution” has played an increasingly important role in policy debates since the 2000s, particularly in British policy debates (see e.g., O’Neill and Williamson, 2012; Thomas, 2017).

to redistribution, or predistribution, and under which conditions these can be compared across time and countries.

1.1 Income definitions

In line with the DINA guidelines, we use three basic income concepts in our analysis: pretax income, post-tax disposable income and post-tax income. By definition, average income per adult is equal to average national income per adult for pretax and post-tax income.⁷

Pretax income inequality (I_{pre}). It is our benchmark concept to study the distribution of income. Pretax income is defined as the sum of all income flows going to labor and capital, after taking into account the operation of the pension and unemployment insurance systems, but before taking into account other taxes and transfers. That is, we deduct pension and unemployment contributions, and add pension and unemployment distributions. This concept should be benchmarked against the definition of factor income, which is equal to the sum of all income flows going to labor and capital, before considering the operation of the pension and unemployment system. One problem of that measure is that retired individuals typically have very small factor income in countries using pay-as-you pension systems. As a result inequality of factor income tends to rise mechanically with the fraction of old-age individuals in the population, which biases comparisons over time and across countries.⁸ Pretax income inequality will not be affected by ageing population nor by the design of the pension system. However, the limitation of the concept of pretax income is that it does not incorporate the redistribution carried out by the pension and UI systems over the life-cycle.

Disposable income inequality (I_{disp}). It is defined as pretax income minus all forms of taxes plus all individualized monetary transfers. This income concept is the one used traditionally for measuring redistribution, as it well defined in all institutional settings. The limitation of this concept is that it does not incorporate a large part of public spending,

⁷National income is defined as GDP minus capital depreciation plus net foreign income, following standard national accounts guidelines (SNA 2008).

⁸Note that looking at the distribution of factor incomes among the working-age population can yield additional insights: it allows to better measure the distribution of labor costs paid by employers (see our companion paper Garbinti et al. (2018) for a presentation of factor income series).

namely public services, whether in the form of in-kind transfers (e.g., education, health) or collective consumption expenditure (e.g., defense, police, justice).

Post-tax income inequality (I_{post}). Post-tax income is defined as the sum of all income flows going to labor and capital, after considering the operation of the pension and unemployment system, and also after taking into account all forms of taxes and transfers (monetary transfers, in-kind transfers, and collective consumption expenditure). In other words, post-tax income is defined as disposable income plus in-kind transfers and collective consumption expenditure.

1.2 Redistribution vs predistribution

Redistribution. In the literature, usually, redistribution γ , i.e., the reduction in inequality due to a given tax and transfer system, is defined as $\gamma(I_{disp}, I_{pre}) = I_{disp}/I_{pre}$. If one defines T_t as the tax and monetary transfer system, one can write γ as:

$$\gamma(T_t, I_{pre}) = \frac{I_{disp}(T_t, I_{pre})}{I_{pre}}.$$

The limitation of this measure of redistribution is that it fails to incorporate policies, like in-kind public spending, with a direct impact on post-tax inequalities. Our analysis follows the more ambitious objective to include such public spending, and therefore compares pretax inequalities to post-tax inequalities. Noting now T government tax and spending, i.e., the usual tax and monetary transfer system, to which we add public spending in kind, we can define redistribution γ as:

$$\gamma(T, I_{pre}) = \frac{I_{post}(T, I_{pre})}{I_{pre}}. \tag{1}$$

This way of writing the reduction in inequality when going from pretax to post-tax income allows to underline two mechanisms. First, there is a direct effect of T on γ , which is rather intuitive: the higher the level of redistribution T , the higher the reduction in inequality. Second, due to the presence of I_{pre} at the denominator: the higher the initial level of inequality I_{pre} , the higher the reduction in inequality.

Predistribution. While informative, the approach described above does not account for the fact that tax and spending T could have also an *indirect* effect on the distribution of pretax income. For instance, behavioral responses to a high level of taxation could lead to decreasing the amount of taxable income; education policies could lead to higher skills at the bottom of the income distribution, and thus lower pretax inequality, etc. Consequently, the *observed* level of pretax income inequality encompasses both the *indirect* effect of T on pretax inequality and the level of inequality that would prevail in the absence of any tax and transfer system I_0 .

We can thus define *predistribution* α as the reduction in pretax income inequality compared to a counterfactual world without any tax and transfer system I_0 :

$$\alpha(T, I_0) = \frac{I_{pre}}{I_0} \quad (2)$$

Ideally one would like to measure the total effect of government tax and spending on inequalities, i.e., how much counterfactual inequalities without any government interventions are reduced by all public policies. This measure, represented by the ratio of I_{post} to I_0 can be written as the product of redistribution and predistribution:

$$\frac{I_{post}}{I_0} = \gamma(T, I_{pre}) \cdot \alpha(T, I_0) \quad (3)$$

The obvious problem is that I_0 is not observable, and therefore the level of predistribution is hard to assess.

Issues with cross-country comparisons. Acknowledging the potential impact of government tax and spending on pretax inequality leads to a serious concern about cross-country comparisons. If one wants to compare how a given tax and transfer system T_1 in one country reduces pretax income inequality compared to a system T_2 in another country, then the differences between T_1 and T_2 will not only affect post-tax income distribution through $\gamma(T, I_0)$ but also through its effect $\alpha(T, I_0)$ on pretax income. If T_1 induces more behavioral responses than T_2 than $\alpha(T_1, I_0) > \alpha(T_2, I_0)$ and the direct comparison between $\gamma(T_1, I_0)$ and $\gamma(T_2, I_0)$ will not account for how each system reduce inequality.

Note also that the *predistribution* effect may also mechanically leads to misleading comparisons. For instance take two countries with similar levels of disposable inequality

I_{post} , I_0 and T . In a country A, an important part of T is used to finance public education, while it is not the case in a country B. Pretax income inequality is then likely to be lower in country A ($I_{pre}^A < I_{pre}^B$). Consequently, for similar level of post-tax income inequality, $\gamma^A = I_{post}/I_{pre}^A < \gamma^B = I_{post}/I_{pre}^B$ which could be interpreted as a lower redistribution in country A relative to B while this lower γ^A observed would only be the result of the *predistribution* effect of the public funding of education.

Issues with changes over time. A similar problem arises by comparing reduction in post-tax inequality over time within one single country. One could attribute lower levels of redistribution γ for a period of time when policies were mostly directed at reducing pretax inequalities. Again, as an example, a country A investing in education in period t leading to a reduction in pretax inequality in $t + 10$ without any change in the level of redistribution from pretax to post-tax inequalities would see its estimate of redistribution be reduced over the period, while the total effect of these policies on pretax inequalities lead to a reduction in post-tax inequalities.

Estimating redistribution and predistribution. In this paper, we aim to construct long series of pretax and post-tax inequalities for France, comparing them with the ones available for the U.S. The objective is to quantify redistribution γ and assess how much differences in post-tax inequalities can be attributed to redistribution vs changes in pre-tax inequalities. Let be clear from the onset that we will not be able to measure predistribution α , i.e., to estimate how much of the changes in pretax inequalities can be attributed to policies vs exogenous shocks. However, by establishing clearly the contribution of redistribution vs the potential role of predistribution, one provides a quantitative estimation of what we know about the level of redistribution and what we miss with potential impacts on pretax inequalities.

2 Data and methodology

In this section we describe the concepts, data sources and main steps of the methodology that we use in this paper in order to construct our post-tax income distribution series over the 1900–2018 period. Complete methodological details of our French specific data sources and computations are presented in the Online Data Appendix along with a wide set of

tabulated series, data files and computer codes.⁹

2.1 Data sources

Broadly speaking, we combine three main types of data: national accounts; fiscal data (income tax returns); and household surveys.

Income tax returns (1970–2018). We start with the micro-files of income tax returns that have been produced by the French Ministry of Finance since 1970. We have access to large annual micro-files since 1988. These files include about 400,000 tax units per year, with large over-sampling at the top (they are exhaustive at the very top; since 2010 we also have access to exhaustive micro-files, including all tax units, i.e., approximately 37 million tax units in 2010-2012). Before 1988, micro-files are available for a limited number of years (1970, 1975, 1979, and 1984) and are of smaller size (about 40,000 tax units per year).

These micro-files allow us to estimate the distribution of fiscal income, i.e., income reported on income tax returns. In order to estimate the distribution of national income (pretax and post-tax), we need to combine income tax micro-files with other data sources, namely national accounts and household surveys, and to apply a number of imputation/simulation rules.

Income tax tabulations (1900–1969). Unfortunately, no income tax micro file is available in France before 1970, so we have to use income tax tabulations. Detailed income tax tabulations have been produced by the French Finance Ministry since the creation of income tax in France in 1914 (first applied in 1915). These tabulations are available on an annual basis since 1915 (with no exception) and are based upon the universe of all tax units.¹⁰ They report the number of taxpayers, total income and income taxes paid for a large number of income brackets. These tabulations were first used in a systematic manner by Piketty (2001, 2003) to estimate top shares of fiscal income and then by Garbinti et al.

⁹We also refer the readers to (Garbinti et al., 2018), which describes the sources and methods used for the construction of pre-tax income distribution series for France. A longer and more complete discussion of the general methodological issues involved in creating DINA estimates (not specific to France) is presented in Alvaredo et al. (2020).

¹⁰We also rely on the estimates of the distribution of income for years 1900 and 1910 produced by the French Finance Ministry in the context of the parliamentary debates about the creation of an income tax (using data from various sources, including property taxes and inheritance taxes).

(2018) to estimate the complete distribution of fiscal and pretax income.

National accounts. We use the official national accounts established by the French national statistical institute (INSEE) for the 1949-2018 period. For transfers, we rely on CNAF and DREES files that report the number of beneficiaries and the aggregate amount of each transfer since 1946. For the 1900-1948 period, we use the historical series of national accounts reported in Piketty and Zucman (2014), which rely on the detailed series constructed by Villa (1994). All data files and complete methodological details are given in Online Appendix A.

2.2 Construction of post-tax income series

Micro-simulation of tax and transfers (1970–2018). In order to simulate the French tax and transfer system, we proceed as follows. First, we exploit the richness of the income tax micro-files to simulate very precisely all monetary transfers and taxes levied on income (progressive and flat income taxes, and social security contributions). In particular, we are able to consider all changes in tax schedules or specific tax deductions, exemptions and credits over time. We also use all socio-demographic variables reported in micro-files (number and age of dependents, marital status, disability status, etc.) in our simulation exercises.

Second, when the appropriate tax base is not directly observable in our micro-files, we use our estimated variables of wealth¹¹ and income as a proxy. Wealth taxes, property taxes, and residence taxes are computed using our estimated values of taxable wealth, housing assets, and rents paid, respectively. Although imperfect, this methodology still allows us to simulate the different tax schemes and the specific exemptions, discounts and tax cap for low-income earners, disabled, widows or elderly.¹²

Third, we must impute the remaining taxes and transfers based on rules and tax incidence assumptions. As explained in the previous section, professional taxes, and sales and excise taxes are assumed to be borne by consumers only, proportionally to

¹¹See Garbinti et al. (2021) for details about the construction of our wealth series.

¹²We should also stress that we have made every attempt to collect and use additional information from official reports to check and improve our simulations. For example, our simulations of wealth taxes are fully consistent with wealth tax tabulations, which report the number of taxpayers as well as average taxable wealth and tax paid by tax bracket. The number of beneficiaries of each monetary transfer is also consistent with the statistics provided by official reports (CNAF and DREES files).

their consumption (disposable income minus saving). Corporate taxes are allocated proportionally to dividends, life insurance income, and interests.

Estimation of tax and transfers before 1970. In the present paper, we develop a very simple procedure to estimate the distributions of post-tax disposable and post-tax national income over the 1900-1969 period. Going from fiscal to disposable income requires to deduct bequest and income taxes from fiscal income and add back monetary transfers.¹³ Conceptually, the distribution of post-tax disposable income can be recovered from the distribution of fiscal income using the following equation:

$$Disp_{pt} = a_{pt} \cdot Fisc_{pt} \cdot \frac{Disp_t}{Fisc_t},$$

where $Fisc_{pt}$ and $Disp_{pt}$ are fiscal and disposable income accruing to percentile p at time t , $Disp_t/Fisc_t$ is the ratio between average disposable income and average fiscal income at time t , and a_{pt} are correction factors capturing the redistributive effects of monetary transfers, and bequest and income taxes by year and percentile.

Our objective is to estimate a_{pt} over the 1900-1969 period as $Fisc_{pt}$ is provided by Garbinti et al. (2018) and $Disp_t/Fisc_t$ can be computed using the National Accounts. Before World War I, we can assume that our correction factors a_{pt} are equal to 1. Indeed, income taxes and monetary transfers did not exist and the redistributive effects of bequest taxes were negligible as they represented less than 0.7% of national income and were based on small tax rates. Over the 1915-1969 period, one simple approach (referred to as the “simple method”) would be to assume that correction factors rise linearly from 1915 to 1970. While this approach is clearly an approximation, it has the merit to capture the trend in redistribution induced by the progressive development of monetary transfers, and bequest and income taxes over the 1915-1969 period. One drawback of this simple approach is that it does not capture non-linear changes in redistribution over time.

To overcome this limitation, we go one step further and develop a more sophisticated interpolation procedure (our baseline method). This procedure consists in splitting the correction factors a_{pt} into three tax-specific correction factors (income taxes/bequest taxes/monetary transfers) and use all available information to estimate their changes over time.

¹³Note that fiscal income is already net of production taxes, corporate taxes and social security contributions. In addition, the tax system was much less complex over the 1900–1969 period as flat income taxes and wealth taxes did not exist.

In particular, the correction factors for income taxes are constructed using income taxes paid each year by income group as reported in the tax tabulations. Correction factors for bequest taxes and monetary transfers take into account the yearly evolution of their macroeconomic aggregates as reported in the National Accounts.

In order to assess the robustness of our 1900-1969 series, Appendix Figure 1 reports the evolution of the bottom 50% (Panel A) and the top 10% (Panel B) shares for disposable income (simple or baseline method) as well as for pretax income over the 1900-2018 period. Appendix Figure 1 shows that disposable income shares derived from the simple and baseline methods are almost identical except during the 1919-1925 period where exceptional monetary transfers were implemented and could by definition not be taken into account by the linear interpolation implemented in the simple method. If we exclude the 1919-1925 period, the fact that the simple and baseline methods deliver consistent income shares reflects that the redistribution induced by taxes and monetary transfers is likely to follow a smooth and continuous trend over the 1900-1969 period. Disposable and pretax income shares are very close over the 1900-1969 denoting a small impact of taxes and monetary transfers on inequality. Although our method should be seen as exploratory and incomplete, we argue that it should not under-estimate the level and evolution of disposable income inequality. Indeed, pretax and disposable income shares are also very similar over the 1970-1975 period where a microsimulation exercise is conducted on micro-files.

Distribution of in-kind transfers and collective expenditure. Few studies provide detailed measures of the redistributive impact of non-monetary transfers, and even fewer offer estimates of changes over time.¹⁴ As we know relatively little about who benefits from this government spending, we need to make some assumptions about their distribution. We are well aware that these assumptions could be improved with studies that could bring a more precise light over their true distributive effects.¹⁵ Our baseline scenario (V1) assumes i) a lump-sum imputation of health care expenditures and public spending on

¹⁴For France we rely on the few studies done on health expenditures (e.g., Jusot et al., 2016) or education expenditures (Allègre et al., 2012; Courtioux and Lignon, 2017).

¹⁵Nonetheless, including these public spending is a necessary step to compare countries with differential in-kind vs. monetary transfers: countries with higher level of in-kind transfers would appear artificially poorer if one used only a measure of disposable income.

education to individuals¹⁶, and ii) a proportional imputation to post-tax disposable income for collective expenditures. A lump-sum imputation attributes the same average monetary value to each adult individual, and is therefore characteristic of a strong redistributive impact of these expenditures. A proportional imputation to post-tax disposable income is, on the contrary, neutral to the measurement of inequality. In order to assess the sensitivity of our results to the imputation of in-kind transfers and collective expenditure, we also present two alternative variants. We impute all these public spending either on a lump-sum basis (scenario V2)—the most redistributive assumption—or proportionally to post-tax disposable income (scenario v3). This last scenario has the advantage of being neutral and to be equal to disposable inequality measures, i.e., after tax and monetary transfers.

Finally, in order to ensure that aggregate pretax and post-tax national incomes match exactly with aggregate national income, we follow Piketty et al. (2018a) and attribute 50% of government deficit (or surplus) in proportion to taxes and 50% in proportion to transfers and expenditures. This assumes that fiscal adjustment will be borne equally by taxes and spending. In practice, this makes very little difference (except in years with very large deficit or surplus).

3 Quantifying Redistribution

We start by comparing the long-run evolution of pretax and post-tax income inequality between France and the U.S., before proposing a quantification of the extent of redistribution in these two countries.

3.1 The long-run evolution of pretax and post-tax income inequality: France vs. United States

We report on Figure 1 the evolution of post-tax income inequality in France and the United States over the 1900-2018 period, as measured by the shares of total post-tax income going to the top 10%, the middle 40%, and the bottom 50%. Post-tax income is defined as pretax income minus all taxes plus all monetary transfers, in-kind transfers, and collective expenditures. As a reminder our baseline scenario assumes a lump-sum

¹⁶For France which is characterized by a single-payer system where almost all health spending is paid for by the government, healthcare spending is attributed as a fix lump sum to all adults. For the U.S., healthcare spending is assigned on a lump sum basis to the beneficiaries.

imputation of health care expenditures and education spending to individuals, and a proportional imputation to post-tax disposable income for collective expenditures.

For France, we observe a large decline of the top 10% post-tax income share (T10) from about 48% in 1900-1910 to 23% in 1983. This fall has been at the advantage of both the bottom 50% (B50), whose post-tax income share increased from 15% to 32%, and the middle 40% (M40), whose pretax income share increased from 36% to 44%. Since 1983, this trend halted, with a slight increase in the top 10% income share (+2 percentage points, from 23% in 1983 to 25% in 2018) and a corresponding erosion of the middle 40% income shares.

The comparison with post-tax series from the U.S.¹⁷ is interesting both for the similarities and divergence between the two countries. First, the share of post-tax income of the top 10% (T10) is very similar in both countries from the start of the period until 1974-75, when a marked divergence starts to emerge. Whereas the share of T10 continues to fall in France, the U.S. experiments a steep rise in the share of post-tax income going to that group, from 27% in 1974 to 37% in 2018. These gains are made almost uniquely at the expense of the bottom 50% which experiences an increase in France and a marked decrease in the U.S. from 27% in 1974 to 22% in 2018. The middle group (M40) appears largely unaffected by these changes and represents in both countries a very similar share of post-tax income around 44%.

Figure 2 compares the evolution of pretax and post-tax income inequality in France (Panel A) and in the U.S. (Panel B) over the 1900-2018 period. Two stylized facts are worth highlighting from these series.¹⁸ First, the evolution of pretax and post-tax income inequality has been far from steady and differs strongly between the two countries. While pretax inequality has followed a U-shaped pattern in both countries, post-tax inequality is L-shaped in France and U-shaped in the U.S. The increasing progressivity of the French tax and transfer system has been able to counteract the gradual rise in pretax income inequality, leading to a relatively constant level of post-tax income inequality since the early 1980s. This contrast strongly with the U.S. case, where rising redistribution has not matched the dramatic increase in pre-tax inequality. Second, the difference between pretax

¹⁷U.S. post-tax income series are provided by Piketty et al. (2018a). The decomposition of the bottom 90% income share between the bottom 50% and the middle 40% shares is available for the U.S. only since 1962.

¹⁸Note that our stylized facts are robust to the use of alternative concepts of post-tax income (variants 2 and 3). See Online Appendix Figures 2 and 3.

and post-tax affects mostly the top 10% and bottom 50% income shares in both countries, leaving almost unchanged the middle 40% share. The difference in income shares of the middle group M40 is at most 2-3 p.p. in France, while it is around 1 p.p. in the U.S. By contrast T10 income share is reduced significantly by redistribution, for instance in 2018 from 34% to 25% in France and from 45% to 37% in the U.S., while B50 income share rises from 21% to 32% in France, respectively from 14% to 21% in the U.S.

3.2 Measuring the extent of redistribution

Current level of redistribution (2010-2018). Table 1 presents some key statistics on the extent of redistribution in France and the U.S. in the recent period (2010-2018), measured as $\gamma - 1$, i.e., the difference between post-tax and pretax income shares over pretax income. Thus defined, redistribution reduces the top 10% income shares by 25% in France against 19% in the U.S., while it increases the bottom 50% income share by 52%, compared to 53% in the U.S. In both countries the middle 40% share is only very modestly affected—even if it is noticeable that redistribution marginally benefits the middle 40% in the U.S., while it is negative in France.

One simple inequality indicator which can be used to assess the extent of redistribution is the ratio between the average income of the top 10% income group and the average income of the bottom 50% income group (T10/B50). In terms of pretax income, this ratio is equal to 8.0 in France, i.e., on average top 10% income earners make eight times more than bottom 50% income earners, compared to a ratio of 15.7 in the U.S. In terms of post-tax income, this ratio is reduced to 3.9 in France, i.e., a reduction of 51%, compared to 8.4 in the U.S., i.e., a reduction of 47%. In that sense, one can say that redistribution reduced pretax inequality by 51% in France against 47% in the U.S. over the 2010-2018 period.

In Online Appendix Table 1, we have also computed other inequality indexes—such as Gini and Theil indexes and Palma and P75/P25 ratios—to measure the change in inequalities over time and find similar results.¹⁹ We prefer to highlight income ratios as inequality indicator for several reasons. First, they are intuitive and transparent

¹⁹All the inequality indicators depict an increase in redistribution for France and the U.S. over the 1970-2018 period. Redistribution was relatively higher in the U.S. over the 1970-1979 period. Since 2010, both countries carry out similar level of redistribution whatever the inequality indicator used. If anything, the level of redistribution in France over the 2010-2018 period appears slightly higher than in the U.S. when using the Gini index and slightly lower when using the Theil index.

statistics whose interpretation is straightforward. Second, they are not data-demanding and can therefore be used over historical data, which are usually not available at a very disaggregated level. Finally, they allow for a clearer decomposition of the role played by redistribution on inequality in the upper and lower segments of the distribution (while synthetic indexes like Gini and Theil tend to blur these distinctions). For instance, one can see that the 51% reduction in inequality in France comes primarily from the decline from bottom-end inequality. That is, top-end inequality (as measured by the ratio T10/M40) is reduced by 21% on average over the 2010-2018 period, while bottom-end inequality (as measured by the ratio M40/B50) is reduced by 38%. A very similar pattern is found for the U.S., where top-end inequality (ratio T10/M40) is reduced by 20%, while bottom-end inequality (M40/B50) is reduced by 33%.

How much does redistribution reduce inequality over time? We now turn to an analysis of long-term changes in redistribution between France and the U.S. Figure 3 presents the evolution of inequality ratios for pretax and post-tax income over the 1900-2018 period for the two countries. Panel A presents the evolution of the ratio T10/B50, which is available only from 1962 onwards for the U.S. In terms of pretax income, French top 10% income earners used to earn about 18 times more than bottom 50% income earners in 1900. The ratio T10/B50 has decreased almost continuously from 18.4 in 1900 to 6.1 in 1983, and increased since then to 8.0 in 2018.

The post-tax income ratio decreased dramatically during WWI, from 16.6 in 1910 to 9.3 in 1919, and then stabilizes around 10.5 over the 1920-1929 period. After 1929, post-tax income followed closely the pretax income ratio up to the mid-1970s, then decreased more rapidly than the pretax ratio over the 1974-1984 period, before stabilizing around 4. In the 1960s, inequality indicators were similar in the U.S. and in France, with ratios around 9 for pretax income and 7 for post-tax income, decreasing in both countries. From 1980 onwards, U.S. inequality indicators start increasing sensibly, along with measures of redistribution. France's path diverges here with a much less pronounced increase in pre-tax inequality, but with a similar increase in redistribution. At the end of the period, both countries reduce pretax inequalities by 50%—slightly more in France (51%) than in the U.S. (47%)—albeit with considerable difference in the level of pretax and post-tax inequalities.

To adopt a long-term perspective, panel B of Figure 3 presents the ratio T10/B90

which is available for both countries over the entire period of study.²⁰ During the 1925-1935 period, both France and the U.S. had T10/B90 post-tax ratios around 7, with similar redistribution levels (around 12% reduction). After WWII, both countries experienced a very steep drop in inequality, which was partly reversed in the U.S. despite increasing redistribution.

Figure 4 presents the annual evolution of our redistribution indicator $\gamma - 1$, i.e., the percentage reduction from pretax to post-tax inequalities for T10/B50 (panel A) and T10/B90 (panel B). The T10/B50 indicator highlights the massive shock that WWI represents for France. During the war, and the following years, the very large health care spending and monetary transfers to veterans and widows, funded by debt and increased taxation have all contributed to that temporary spike in redistribution. From 1928 onwards, the extent of redistribution has been almost continuously increasing in France, most notably since 1973. The U.S. presents a similar picture of increasing redistribution, starting from very similar levels in both countries in the 1960s (around 25% reduction of pretax inequality), and reaching 45% of reduction at the end of the period in both countries. If one looks at the T10/B90 indicator (panel B), the shock represented by wars is evident in both countries—WWI for France and WWII for the U.S.—but contrary to France, the U.S. maintained after the war a high level of redistribution through the 1950s, 1960s and 1970s. With that indicator, the U.S. was the most redistributive country post WWII until the early 1980s, as France increased its level of redistribution steadily from 1973 onwards. Overall, the impact of redistribution on inequality has increased dramatically over time. Over the 1900-1914 period, redistribution played a modest role by reducing inequality between the top 10% and the bottom 90% income groups by 8% in France and in the U.S. In contrast, it reduced the same inequality indicator by 33% in France vs 29% in the U.S. over the 2010-2018 period. Interestingly, redistribution has increased first in the U.S., where higher level of redistribution is noticeable as soon as 1945, whereas France experienced a more continuous increase in redistribution, with a stronger trend from the mid-1970s onwards.

Panel A of Fig. 5 presents the same index of redistribution with the ratio T10/B90 comparing the benchmark estimate of post-tax income (V1) with the V3 variant where

²⁰Note that the use of this alternative indicator is unlikely to affect our long-term trends and interpretations as the evolution of T10/B50 and T10/B90 are highly correlated. Using the average income of the bottom 90% group over the bottom 50% group will mechanically decrease the level and the changes in redistribution and inequality (see Table 2).

health care spending is allocating proportionally to disposable income. That latter measure is equivalent to disposable income, after tax and monetary transfers. One can see with this figure that redistribution has been mostly in the form of tax and transfers in the U.S. up to the 1970s, at a time this form of monetary redistribution was still limited in France. Since the 1970s, both countries have experienced a form of convergence with a strong increase in monetary transfers in France and an increase in health care spending in the U.S. Comparing estimates of post-tax income with disposable income highlights the importance of including non-monetary transfers in cross-country analysis of redistribution, and not focusing exclusively on the tax and benefit system. Panel B of Figure 5 presents another alternative assumption for collective expenditures (scenario V2, assuming lump-sum gains of all collective expenditures). The general pattern is very similar except that the level of redistribution is much higher in both countries.

This long-term analysis has highlighted that the reduction of inequality implied by redistribution is significant in both countries and increasing throughout the entire 20th century, even though not at the same pace and in the same period. We now turn to an attempt to decompose changes in post-tax inequality to uncover what have been the main drivers of inequality over the last century.

3.3 The contribution of redistribution to changes in inequalities

In order to quantify the respective role of falling pretax income inequality and rising redistribution in the long-term decline of post-tax inequality in France, we rely on the following formula:

$$\frac{I_{t2}^{post}}{I_{t1}^{post}} = \frac{I_{t2}^{pre}}{I_{t1}^{pre}} \times \frac{I_{t2}^{Dis}}{I_{t2}^{pre}} \times \frac{I_{t2}^{post}}{I_{t2}^{disp}} \quad (4)$$

Where I^{pre} , I^{disp} and I^{post} are the inequality indicators (e.g., ratio T10/B50) computed using either the concept of pretax (pre), disposable (Dis) or post-tax (post) income, and $t1$ and $t2$ are the beginning and the end of the period considered. Equation (4) formalizes the decomposition of post-tax inequality into three terms: i) changes in pretax inequality, ii) changes in redistribution due to taxes and cash transfers, and finally iii) changes in in-kind and collective expenditures.

Table 2 presents this decomposition for the T10/B50 indicator (panel A) and for the

T10/B90 indicator (panel B) for both France and the U.S. For France, the overall decline in post-tax T10/B50 inequality over the 1900-2018 period (-75%) can be ascribed mostly to a decline in pre-tax inequality (-45%), and somewhat to tax and monetary transfers (-21%). Reduction of inequality from in-kind transfers or collective expenditures is comparatively small (in our baseline scenario -9%). The evidence is qualitatively similar using the indicator T10/B90 with respectively an overall decline in inequality of -64%, explained mostly by pretax inequality changes (-43%) and taxes and monetary transfers (-13%). For the U.S., the overall reduction in post-tax T10/B90 inequality over the 1913-2018 period (-15%) is the result of an increase in pretax inequality (+7%) corrected by an increasing redistribution from taxes and monetary transfers (-9%) and in-kind transfers and collective expenditures (-13%).

However, this long-term analysis masks two very different underlying dynamics. The decline in post-tax income inequality happens during the 1900-1983 period. It is mostly due to the fall in pretax income inequality (89% of the total decline for France, and 77% for the U.S.) and, to a lesser extent, to the rise in redistribution. In contrast, the 1983-2018 period is characterized by a moderate increase in post-tax income inequality in France (+10% in T10/B90). This stability is the result of two opposing forces: rising pretax income inequality (+26% in T10/B90) compensated largely by rising redistribution (-16%). For the same period, the contrast with the U.S. is startling. The overall increase in post-tax inequality (+37%) can be decomposed into an even higher increase in pretax inequality (+50%) only partially reduced by an increase in redistribution (-16%), even if that latter increase is of the same magnitude as the one observed in France. Note that the results are similar when using the indicator T10/B50.²¹

To sum up, these results show that if inequality has decreased much more in France than in the U.S. during the 1900-2018 period, this is not due to a relatively more important increase in redistribution by the French tax and transfer system. The major factor behind the differential trend in post-tax income inequality comes from the differential evolution of pretax income inequality between the two countries. Over the recent period, the rise in redistribution was similar in both countries. However, it was able to annihilate the slight rise in pretax inequality in France, but not in the U.S. where the increase in pretax income

²¹As a sensitivity analysis, Appendix Table 2 depicts the same findings using the two other variants of post-tax income (V2 or V3). This is explained by the fact that the contribution of in-kind transfers and collective expenditures to the evolution of post-tax inequality remains small whatever the concept of post-tax income used.

inequality has been much steeper.

3.4 Comparison of pretax and post-tax real income between France and the U.S. 1962–2018

Because pretax and post-tax DINA series are fully consistent with national income, they can be used to consistently compare income levels across countries. Figure 6 sets the macroeconomic comparison of income levels between France and the U.S. It presents the ratio of French national income per capita relative to the U.S. level from 1962 to 2018. This ratio rose from 60% in the early 1960s to 85% in 1982, then decreased to 70% at the end of the period. To understand this relative income performance, it has been usual to relate it to both productivity catch-up in the first half period, and to a relative decline in hours of work in France relative to the U.S. which has been well documented.²²

What has not been yet documented is how the average national income trend can be split into distributional analysis. Figure 7 presents such decomposition between B50, M40 and T10 income groups, comparing relative level of pretax and post-tax income (in constant 2018 euros PPP) by income group between France and the U.S. This period is of particular interest as the level of inequality is similar between the two countries in the early 1960s and diverge dramatically since then. Table 3 provides absolute numbers for 1962 and 2018.²³

In 1962, both countries depict the same level of pretax and post-tax income inequality. However, there are important cross-country differences due to the large gap in average national income between the two countries (15,000 euros vs. 24,000 euros). As a result, all French income groups earn approximately 60% of their U.S. counterpart in 1962. The recent period contrasts dramatically with the early 1960s. Post-tax income of the French bottom 50% group is now 10% higher than its U.S. counterpart (24,000 vs. 22,000 euros), reflecting a dramatic increase of the bottom 50% FR/U.S. ratio from 61% to 108% over the 1962-2018 period. In contrast, the middle 40% ratio increases only slightly to 73% (42,000 vs. 59,000 euros) and the top 10% ratio decreases to 46% (96,000 vs. 208,000 euros). Two significant results emerge from this analysis. First, post-tax income of the

²²See for instance Blundell and Laroque (2011, 2013) for an in-depth comparison of the UK, the US and France.

²³The annual evolution of pretax and post-tax income between France and the U.S. over the 1962-2018 period is provided in Appendix Figure 4 (Panel A to C).

French bottom 50% group was 60% lower than its U.S. counterpart in 1960, it is now 10% higher. Second, the ratios France/U.S. of pretax and post-tax income has remained very similar during the entire period, highlighting that redistribution has not been the main driver of these changes. If pretax inequality has been the main driver of the changes in inequality over time in both countries, redistribution has also played an important role. In the next section, we look at the tools of redistribution used in the U.S. and France.

4 Anatomy of Redistribution in France vs the United States

In this section, we delve into more details of the structure of redistribution, looking at the respective role of taxation and public spending.

4.1 From the structure of taxation to tax progressivity

Figure 8 presents the evolution of the structure of taxes and transfers for France and the U.S. over the 1900-2018 period. Taxes represented less than 10% of national income in the early 20th century and increased up to 25% in the early 1950s in both countries. Since the early 1950s, the total tax burden, excluding contributive Social Security contributions, has remained relatively constant in the U.S., hovering around 25%, while it continued to increase in France, reaching 40% in the mid-1990s.²⁴

Changes in the structure of taxation. From the start of our series, the structure of taxation appears markedly different in France and the U.S. In the early 20th century, indirect taxes represented in France 92% of total taxes, and capital taxes only 8%. By contrast, in the U.S., capital taxes represented 60% of the total, indirect taxes 26% and income taxes 12%. Over the 20th century, the French tax structure has been dramatically altered, with a decline of the share of indirect taxes in total taxes from 92% to 36% today. Capital taxes and progressive income taxes have significantly risen over this period, but the most striking increase has occurred for Social Security contributions (SSCs). Both

²⁴These figures exclude from the total tax burden contributive Social Security contributions (notably pension contributions) in line with the definition of pretax income. The total tax burden including these mandatory contributions is represented with a dotted line. France has also experienced an increase in these contributive SSCs post WWII, with a total tax burden reaching 55%, while the difference is more modest for the U.S. with total tax burden around 30%.

contributive (pensions and UI) and non-contributive SSCs have been expanded after WWII but focusing on the non-contributive SSCs—the most similar to other form of taxation—, they reached 40% of the total taxes by the 1990s. This striking change reflects the rise of the French welfare state after 1945, largely influenced by a Bismarckian model whereby SSCs on earnings fund social benefits. From the 1990s onwards, non-contributive SSCs on labor earnings have been reduced, and replaced by flat-rate income taxes—taxing both labor and capital income as the same rate.

In the U.S., the change in the tax structure has affected mostly capital taxes. These have declined from around 60% of total revenues to less than 20%. Indirect taxes have remained at approximately the same level throughout the century, and the most striking evolution has been the development of income taxation, which increased from a low level of 1% of national income in the 1910s to 11% today.

To sum-up, although both countries have experienced significant changes in the structure of taxation over the 20th century, the differences between the two countries remain large. In France, indirect taxation and non-contributive SSCs represent together 60% of total taxes (75% over the 1900-1995 period), while in the U.S. progressive income tax and capital taxes together make the bulk of taxation, with 70% of the total taxes.

Tax progressivity. The structure of taxation provides some clues about the progressivity of the tax system, but comparisons are hazardous without detailed micro data and tax simulations. We can carry out robust analysis of the tax burden by income groups since the 1970s when we have access in both countries to administrative micro data.

Figure 9 presents the evolution of taxes paid by different income groups, the top 10%, middle 40% and bottom 50% in France and the U.S. over the 1970-2018 period. At the start of the period, tax progressivity appears very limited in France, with average tax rates around 31-33% for all groups, while in the U.S. tax progressivity is clearly apparent: the top 10% group faces average tax rates of 32%, like in France, compared to 22% for the middle 40% and 19% for the bottom 50%. During the 1970-1995 period, the overall increase in the tax burden in France affects all income groups, only marginally increasing tax progressivity: average tax rate for the top 10% group increases to 40%, to 39% for the middle 40% and 37% for the bottom 50%. From 1995 onwards, tax progressivity increases sensibly in France in the context of constant overall tax burden: the tax rate of top 10% reaches 48%, while the bottom 50% experiences a decrease of average tax rates to

31%. In contrast, the U.S. has experienced a relative stability in tax progressivity, despite fluctuations of the average tax rate of the top 10% group.²⁵

Figure 10 provides a more detailed picture of the evolution of tax progressivity in France and the U.S. by depicting the distribution of tax rates along the income distribution in 1970 and 2018. In France, the move towards more tax progressivity is clearly visible: in 1970, taxes rates increase slightly from 27% to 33% when we move from P10-P20 to P40-50, then remain stable until P99.5, before reaching 39% for P99.9-100. By 2018, the average tax rates have shifted upward for the top 50% of the income distribution, with an almost linear increase from 27% for P10-P20 to 50% for P99-99.9. At the very top of the income distribution (P99.9-100), the increase is less pronounced, from 39% in 1970 to 49% in 2018, leading to a small regressivity in French tax rates. On the other hand, the tax increase is highest for the first half of the top 1% (P99-99.5), whose average tax burden jumped from 32% to 50%.

In the U.S., tax progressivity is much more important than in France in 1970. Average tax rates increased from 15% for P10-P20 to 54% for P99.9-100. By 2016, the U.S. tax burden has shifted downwards, but not equally for all income groups. Two parts of the income distribution have experienced the most decline in tax rates: first, the middle of the income distribution, from P20 to P70, has seen a reduction of average tax rates of 3-4 percentage points²⁶; second, the top 5 percent of the income distribution has seen its tax burden reduced by at least 3 percentage points, with the highest decline for the top 0.1%, where tax rates have declined from 54% in 1970 to 38% in 2018.²⁷

Interestingly, French and U.S. tax rates at the very top have followed opposite trends. The tax rate faced by the French top 0.1% increased dramatically over the 1970-2018 period and is now equal to the level faced by the U.S. top 0.1% in 1970. In contrast, the tax rate faced by the U.S. top 0.1% has declined dramatically and converges toward the level faced by the French top 0.1% in 1970.

²⁵Average tax rates of the bottom 50% and top 10% groups have declined slightly over the 1970-2018.

²⁶Note that we have classified EITC as a monetary transfer (see next section). Tax rates are therefore computed gross of EITC.

²⁷As shown by Saez and Zucman (2019), the profile of taxation is regressive at the very top once we disentangle the top 0.1% between P99.9-99.99 and P99.99-100 in 2018. See also Saez and Zucman (2019) for a detailed analysis of the long-run changes in tax progressivity in the U.S. and the distributional effects of the recent reforms of the U.S. tax system.

4.2 The role of monetary transfers for redistribution

We now look at the spending side of redistribution, by analyzing the role of transfers, in the evolution of redistribution in France and the U.S. We first look at the long-run change in the composition of transfers, distinguishing between monetary transfers, in-kind transfers (in particular education and health) and collective consumption goods (including police, public infrastructures, etc.).

Evolution of public spending over the 20th century. Figure 8 present the evolution and composition of public spending—outside contributive social insurance—respectively in France and the U.S. In both countries, public spending has increased dramatically from the beginning of the 20th century to the mid-century. In France, public spending increased from 7% of national income in 1910 to approximately 34% in 2018.²⁸ Most of the increase is concentrated in the decade following WWII, with the creation of the French welfare state (public health care insurance, universal child benefits, etc.). Another expansion appears during the 1974-1984 period, notably with healthcare expenditures. Monetary transfers (including child benefits, means-tested benefits, or housing benefits) represent a small part of total spending, i.e., around 4% of national income.

In the U.S., public transfers increased from 8% of national income in 1913 to 26% today. Most of the change happened in the aftermath of the Great Depression that led to the creation of the American welfare state, though the share of public spending continued to increase after WWII and during the 1960s. In comparison to France, monetary transfers and health care expenditure represent a much smaller part, despite a continuous increasing trend from the 1980s onwards—in part at the expense of collective expenditures (down from 14% of national income in the early 1980s to 11.5% in the late 2010s).

The contribution of monetary transfers to redistribution. Taking advantage of our administrative micro data, we now focus on the role played by monetary transfers since the 1970s. While they are a small part of total public transfers both in France and in the U.S., they have a strong impact on individuals' disposable income and are a crucial tool of any welfare state. In Figure 11, we present the average monetary transfers received by the different income groups previously defined, for France (panel A) and the U.S. (panel B).

²⁸In line with the previous analysis of taxes, we exclude here spending on contributory pensions and unemployment insurance benefit.

For France, the long-term evolution has been a reduction of universal (non means-tested) child benefits and related family transfers (e.g., benefits for non-working mothers) and a strong increase in means-tested benefits like income support and housing benefits.²⁹ This compositional change has impacted the distribution of monetary transfers (see Fig. 11.a), with a reduction of transfers received by the top 10% and the middle 40% and an increase for the bottom 50%—i.e., average transfers received by B50 increased from 2.7% to 6% of national income over the period 1970-2018.³⁰

Figure 11.b presents similar estimation for the U.S. In the 1970s and 1980s, monetary transfers received by the top 10% and the middle 40% declined substantially to the benefit of the bottom 50%. In 2007-2010, in the aftermath of the Great Recession, monetary transfers increased markedly for the bottom 50% and middle 40%. After 2008, extraordinary government programs were implemented. Besides tax credits for low- and middle-income families, it consisted in an increase in funding and access to food assistance programs for low-income families, extension of unemployment benefits, and increases in amount of EITC (see Almeida (2020) for a detail of changes in redistribution).

Overall redistribution through monetary transfers has increased in both countries, but the size of these transfers, notably towards the bottom 50%, has been much more pronounced in France, compared to the U.S.

5 Discussion: from redistribution to predistribution?

To summarize our main results, pretax income inequality appears to be the main factor to account for differential level and trend in inequality between France and the U.S. over the 20th century. Redistribution plays an important role today in reducing post-tax

²⁹Housing benefits have played a significant role in this increase in redistribution. Until the late 1970s, subsidized housing consisted mainly of government funded construction. But this policy did not target the poorest households (since many households managed to stay in the subsidized units after their income had become too high to allow them to stay). At the end of the 1970s, the government decided to change its housing policy towards housing benefits, instead of public housing projects. See Fack (2006) for a detailed discussion about changes in housing policies. Regarding means-tested benefits, disabled adults allowance increased in the 1970s, while the late 1980s saw the creation of a minimum income benefit (the Revenu minimum d’insertion, RMI) dedicated to the poorest households as an income support of last resort. This benefit was replaced in 2009 by the Revenu de solidarité active (RSA).

³⁰In 1998, the top 10% income group in France experienced a significant drop in transfers received, corresponding to the introduction of means-testing in child benefits, a reform which was repealed the following year, but re-introduced in 2015.

inequalities in both the U.S. and France, by 47% vs 51% using our benchmark measure of the ratio T10/B50. But this reduction of inequalities by direct redistribution has only contributed for a quarter of the total change in inequalities over the period.

Predistribution vs other pretax changes. In section 1, we have defined predistribution α as the impact of government interventions that lead to changes in pre-tax inequalities compared to a counterfactual case of no intervention. One immediate question is the share of pretax inequality changes one can attribute to taxation and public spending. One polar alternative would be to assume that all changes in pretax inequalities are exogenous—this is the traditional approach in public economics, which focuses therefore only on redistribution—, and another polar alternative would assume that all changes to pretax inequalities are due to government interventions. Let’s be very clear, we are unable in the context of the present paper to identify the exact role played by predistribution to account for differential level and trend in pretax inequality between France and the U.S.

However, our findings clearly show that differences in post-tax income inequality between the two countries are explained by differences in pretax inequality rather than differences in redistribution. This implies that research and policy discussions should, in the future, focus on predistribution as much as on redistribution. In particular, a greater attention should be devoted to the study of the various policies and rules that can account for the fact that pretax inequality is so much larger in the U.S. than in France.

Which policies are likely to impact pretax changes? The set of policies that can affect the distribution of pretax income is potentially large. It includes the education system (particularly the inequality in education spending across social groups), labor market regulations (e.g., the level of the minimum wage and the various legal rules affecting the role of unions and the bargaining power of workers), and other policies affecting the distribution of primary assets and capabilities (including the health care system, the inequality of wealth and inheritance, etc.). The tax system has also an influence on pre-tax income: first, because taxation can lead to behavioral responses affecting labor and capital income, and second because progressive taxation of income and wealth can also affect the formation of top end compensation packages and wealth inequality (see e.g., Piketty et al., 2014; Piketty, 2014; Piketty et al., 2018b).

As a consequence, an inadequate take-away from our results would be that the non-

monetary transfers (e.g., education spending, public goods) have only a very small impact on the evolution of inequality within country or on the differences in inequality across countries. We believe, on the contrary, that our analyses highlight that a large set of policies can have an impact on pre-tax inequality (within country and over time) that would not be captured with the usual concept of redistribution because this analytical tool can only capture direct redistribution from a given pre-tax income inequality. In capturing redistribution, it misses “predistribution”.

Conclusion

In this paper, we have presented post-tax Distributional National Accounts (DINA) for France. That is, we have combined national accounts, tax and survey in a comprehensive and consistent manner to build homogenous annual series on the post-tax, post-transfer distribution of national income by percentiles over the 1900–2018 period, with detailed breakdown by age, tax and transfer categories over the 1970–2018 period.

Our main conclusion is that changes in pretax inequality levels seem to play the central role in explaining the long-term evolution of the distribution of post-tax income in France. The same conclusion also applies if one attempts to account for the difference in inequality levels between France and the United States. These findings suggest that policy discussions on inequality should in the future pay more attention to policies affecting pretax inequality and should not focus exclusively on “redistribution” (i.e., redistributive taxes and transfers, for a given level of pretax inequality).

Finally, we emphasize that many of the important policy issues touched upon in this work—e.g., regarding the respective role of predistribution and redistribution—can only be analyzed more fully when we have more countries with consistent pretax and post-tax DINA series.

References

- Accardo, J., V. Bellamy, G. Consalès, M. Fesseau, S. Le Laidier, and E. Raynaud**, “Les inégalités entre ménages dans les comptes nationaux. Une décomposition du compte des ménages,” in “L’économie française,” INSEE, 2009, pp. 77–101.
- Acemoglu, Daron and P. Restrepo**, “Robots and Jobs: Evidence from US Labor Markets,” *Journal of Political Economy*, 2020, 128 (6), 2188–2244.
- Ahn, S., Kaplan G., Moll B., Winberry T., and Wolf C.**, “When Inequality Matters for Macro and Macro Matters for Inequality,” *NBER Macroeconomics Annual*, 2018, 32 (1), 1–75.
- Allègre, G., T. Mélonio, and X. Timbeau**, “Dépense publique d’éducation et inégalités. Une perspective de cycle de vie,” *Revue économique*, 2012, 63 (6), 1055–1078.
- Almeida, Vanda**, “Income Inequality and Redistribution in the Aftermath of the 2007–2008 Crisis: The US Case,” *National Tax Journal*, 2020, 73 (1), 77–114.
- Alvaredo, F., A. B. Atkinson, T. Blanchet, L. Chancel, L. Bauluz, M. Fisher-Post, I. Flores, B. Garbinti, J. Goupille-Lebret, C. Martínez-Toledano, M. Morgan, T. Neef, T. Piketty, A.-S. Robilliard, E. Saez, L. Yang, and G. Zucman**, “Distributional National Accounts Guidelines, Methods and Concepts Used in the World Inequality Database,” Technical Report, World Inequality Lab 2020.
- , **L. Assouad, and T. Piketty**, “Measuring Inequality in the Middle East 1990–2016: The World’s Most Unequal Region?,” *Review of Income and Wealth*, 2019, 65 (4), 685–711.
- Atkinson, A. and T. Piketty**, *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, Oxford University Press, 2007.
- and – , *Top Incomes: A Global Perspective*, Oxford University Press, 2010.
- Autor, D. H., A. Manning, and L. C. L. Smith**, “The Contribution of the Minimum Wage to US Wage Inequality over Three Decades: A Reassessment,” *American Economic Journal: Applied Economics*, 2016, 8 (1), 58–99.
- , **D. Dorn, G. Hanson, and J. Song**, “Trade Adjustment: Worker Level Evidence,” *Quarterly Journal of Economics*, 2014, 129 (4), 1799–1860.
- Bengtsson, N., B. Holmlund, and Waldenström D.**, “Lifetime versus Annual Tax-and-Transfer Progressivity: Sweden, 1968–2009,” *The Scandinavian Journal of Economics*, 2016, 118 (4), 619–645.
- Blanchet, T., L. Chancel, and A. Gethin**, “How Unequal Is Europe? Evidence from Distributional National Accounts, 1980–2017,” *WID Working Paper*, 2019, (2019/06).
- Bourguignon, F.**, *Fiscalité et redistribution*, Conseil d’analyse économique, 1998.
- Bozio, Antoine, Thomas Breda, and Malka Guillot**, “The Contribution of Payroll Taxation to Wage Inequality in France,” *PSE working paper*, 2020, (2016-05).
- Chanchole, M. and G. Lalanne**, “Photographie du système socio-fiscal et de sa progressivité,” *Economie & Prévision*, 2012, (200-201), 19–40.

- Chetty, R., J.N. Friedman, E. Saez, N. Turner, and D. Yagan**, “Mobility Report Cards: The Role of Colleges in Intergenerational Mobility,” *NBER Working Paper*, 2017, (23618).
- Courtioux, P. and V. Lignon**, “Décomposer les rendements privés de l’enseignement supérieur : une analyse par microsimulation dynamique du système socio-fiscal français,” *Economie & prévision*, 2017, (210), 69–94.
- Eidelman, A., F. Langumier, and A. Vicard**, “Prélèvements et transferts aux ménages : des canaux redistributifs différents en 1990 et 2010,” *Economie et Statistique*, 2013, 459 (1), 5–26.
- Fack, Gabrielle**, “Are housing benefit an effective way to redistribute income? Evidence from a natural experiment in France,” *Labour Economics*, 2006, 13 (6), 747–771.
- Garbinti, B., J. Goupille-Lebret, and T. Piketty**, “Income Inequality in France, 1900–2014: Evidence from Distributional National Accounts (DINA),” *Journal of Public Economics*, 2018, 162, 63–77.
- , – , and – , “Accounting for Wealth Inequality Dynamics: Methods, Estimates and Simulations for France,” *Journal of the European Economic Association*, 2021, 19 (1), 620–663.
- Hubmer, J., P. Krusell, and A. Smith**, “The Historical Evolution of the Wealth Distribution: A Quantitative-Theoretic Investigation,” *NBER Working Papers*, 2017, (23011).
- Jusot, F., R. Legal, A. Louvel, C. Pollak, and A. Shmueli**, “A quoi tient la solidarité de l’assurance maladie entre les hauts revenus et les plus modestes en France ?,” *Revue française d’économie*, 2016, 31, 15–62.
- Kaplow, Louis**, *The theory of taxation and public economics*, Princeton University Press, 2008.
- Katz, L. and K. Murphy**, “Changes in Relative Wages, 1963–1987: Supply and Demand Factors,” *Quarterly Journal of Economics*, 1992, 107 (1), 35–78.
- Kaymak, B. and M. Poschke**, “The evolution of wealth inequality over half a century: The role of taxes, transfers and technology,” *Journal of Monetary Economics*, 2016, 77 (C), 1–25.
- Kuznets, S.**, “Shares of Upper Income Groups in Income and Savings,” *National Bureau of Economic Research*, 1953.
- Landais, Camille, Thomas Piketty, and Emmanuel Saez**, *Pour une révolution fiscale. Un impôt sur le revenu pour le 21ème siècle*, Seuil, 2011.
- Martinez-Toledano, C.**, “Housing Bubbles, Offshore Assets and Wealth Inequality in Spain,” *WID.world Working Paper*, 2017, (2017/19).
- Mirrlees, J.A., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles, and J. Poterba**, *Dimensions of Tax Design : The Mirrlees Review*, Oxford University Press, 2010.
- Mirrlees, James A.**, “Optimal tax theory: A synthesis,” *Journal of Public Economics*, 1976, (6), 327–358.

- Morgan, M.**, “Falling Inequality beneath Extreme and Persistent Concentration: New Evidence for Brazil Combining National Accounts, Surveys and Fiscal Data, 2001–2015,” *WID.world Working Paper*, 2017, (2017/12).
- Novokmet, Filip, Thomas Piketty, and Gabriel Zucman**, “From Soviets to Oligarchs: Inequality and Property in Russia 1905–2016,” *Journal of Economic Inequality*, 2018, 16 (2), 189–223.
- Okner, B.A. and J.A. Pechman**, “Who Paid the Taxes in 1966?,” *American Economic Review*, 1974, 64 (2), 168–174.
- O’Neill, M. and T. Williamson**, *The Promise of Predistribution*, Policy Network, 2012.
- Piketty, T. and G. Zucman**, “Capital is Back: Wealth-Income Ratios in Rich Countries 1700–2010,” *Quarterly Journal of Economics*, 2014, 129 (3), 1255–1310.
- , **E. Saez, and G. Zucman**, “Distributional National Accounts: Methods and Estimates for the United States, 1913–2013,” *Quarterly Journal of Economics*, 2018, 133 (2), 553–609.
- , – , and **S. Stantcheva**, “Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities,” *American Economic Journal: Economic Policy*, 2014, 6 (1), 230–271.
- , **G. Postel-Vinay, and Rosenthal. J.-L.**, “The End of the Rentiers: Paris 1842-1957,” *WIL Working Papers*, 2018.
- , **L. Yang, and G. Zucman**, “Capital Accumulation, Private Property and Rising Inequality in China, 1978–2015,” *American Economic Review*, 2019, 109 (7), 2469–96.
- Piketty, Thomas**, *Les hauts revenus en France au 20e siècle*, Grasset, 2001.
- , “Income inequality in France, 1901–1998,” *Journal of Political Economy*, 2003, 111 (5), 1004–1042.
- , *Capital in the 21st century*, Harvard University Press, 2014.
- and **Emmanuel Saez**, “Optimal Labor Income Taxation,” in M. Auerbach, R. Chetty, M. Feldstein, and E. Saez, eds., *Handbook of Public Economics*, Vol. 5, Elsevier, 2013, pp. 391–474.
- Richard, Bozio Antoine Blundell and Guy Laroque**, “Labour Supply and the Extensive Margin,” *American Economic Review*, 2011, 101 (3), 482–486.
- and – , “Extensive and Intensive Margins of Labour Supply: Work and Working Hours in the US, UK and France,” *Fiscal Studies*, 2013, 34 (1), 1–29.
- Saez, E. and G. Zucman**, “Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data,” *Quarterly Journal of Economics*, 2016, 131 (2), 519–578.
- Sutherland, H. and F. Figari**, “EUROMOD: the European Union tax-benefit microsimulation model,” *International Journal of Microsimulation*, 2013, 1 (6), 4–26.
- Tanninen, Hannu, Matti Tuomala, and Elina Tuominen**, *Inequality and Optimal Redistribution* Cambridge Elements. Public Economics, Cambridge University Press, 2019.
- Thomas, A.**, *Republic of Equals. Predistribution and Property-Owning Democracy*, Oxford University Press, 2017.

Villa, Pierre, “Un siècle de données macro-économiques,” *Insee Résultats*, 1994, 86–87.

Zwijnenburg, J., Bournot S., and F. Giovannelli, “Expert Group on Disparities in a National Accounts Framework: Results from the 2015 Exercise,” *OECD Statistics Working Papers*, 2017, (2016/10).

Table 1 – How much does redistribution reduce inequality, France vs. US, 2010–2018 ?

	France			United States		
	Pretax	Post-tax	$\gamma - 1$	Pretax	Post-tax	$\gamma - 1$
<i>Income shares (averages 2010–2018)</i>						
Top 10%	33%	25%	-25%	44%	36%	-19%
Middle 40%	46%	44%	-5%	41%	42%	2%
Bottom 50%	21%	32%	52%	14%	22%	53%
<i>Inequality indicators (ratios between average incomes)</i>						
Total inequality (T10/B50)	8.0	3.9	-51%	15.7	8.4	-47%
Upper inequality (T10/M40)	2.9	2.3	-21%	4.3	3.4	-20%
Lower inequality (M40/B50)	2.8	1.7	-38%	3.7	2.4	-33%
Simplified Total inequality (T10/B90)	4.5	3.0	-33%	7.2	5.1	-29%

NOTE: Total inequality, as measured by the ratio between the average incomes of the top 10% and the bottom 50%, drops from 8.0 in pretax income to 3.9 in post-tax income in France on average over the 2010-2018 period. This translates into a measure of our redistribution indicator $\gamma - 1$ of 51%, i.e., a reduction of 51% of the T10/B50 inequality indicator.

Table 2 – Decomposition of the evolution of post-tax income inequality: France vs. U.S.

	France			United States		
	1900–2018	1900–1983	1983–2018	1913–2018	1913–1983	1983–2018
<i>Panel A: T10/B50 inequality indicator</i>						
Changes in post-tax income inequality	-75%	-76%	4%			42%
Due to changes in pretax inequality	-45%	-59%	29%			66%
Due to changes in taxes and cash transfers	-21%	-11%	-20%			-10%
Due to changes in in-kind and collective expenditures (relative to disposable income)	-9%	-6,8%	-4%			-14%
<i>Panel B: T10/B90 inequality indicator</i>						
Changes in post-tax income inequality	-64%	-67%	10%	-15%	-37%	35%
Due to changes in pretax inequality	-43%	-56%	26%	7%	-29%	50%
Due to changes in taxes and cash transfers	-13%	-5%	-12%	-9%	-3%	-7%
Due to changes in in-kind and collective expenditures (relative to disposable income)	-8%	-6%	-4%	-13%	-5%	-9%

NOTES: Post-tax inequality relies on the benchmark scenario (scenario V1) which allocates health-care expenditures on a lump-sum basis, and education spending and collective expenditures proportionally to post-tax disposable income.

Table 3 – Average real income by income group, France vs. U.S., 1962–2018

	1962			2018		
	Pretax	Post-tax	$\frac{Post-tax}{Pretax}$	Pretax	Post-tax	$\frac{Post-tax}{Pretax}$
<i>Panel A: France</i>						
Full Population	14 730 €			38 548 €		
Bottom 50%	5 386 €	7 014 €	130%	16 038 €	24 486 €	153%
Middle 40%	16 761 €	16 242 €	97%	44 132 €	41 783 €	95%
Top 10%	53 326 €	47 266 €	89%	128 762 €	95 916 €	74%
<i>Panel B: United States</i>						
Full Population	24 152 €			55 301 €		
Bottom 50%	9 813 €	11 406 €	116%	15 735	23 459	149%
Middle 40%	26 768 €	27 525 €	103%	56 466	58 032	103%
Top 10%	85 373 €	74 392 €	87%	248 472	204 273	82%
<i>Panel C: Ratio France/US</i>						
Full Population	61%			70%		
Bottom 50%	55%	61%		102%	104%	
Middle 40%	63%	59%		78%	72%	
Top 10%	62%	64%		52%	47%	

NOTES: The unit is the adult individual (20-year-old and over; income of married couples is splitted into two). Income corresponds to national income. Fractiles are defined relative to the total number of adult individuals in the population.

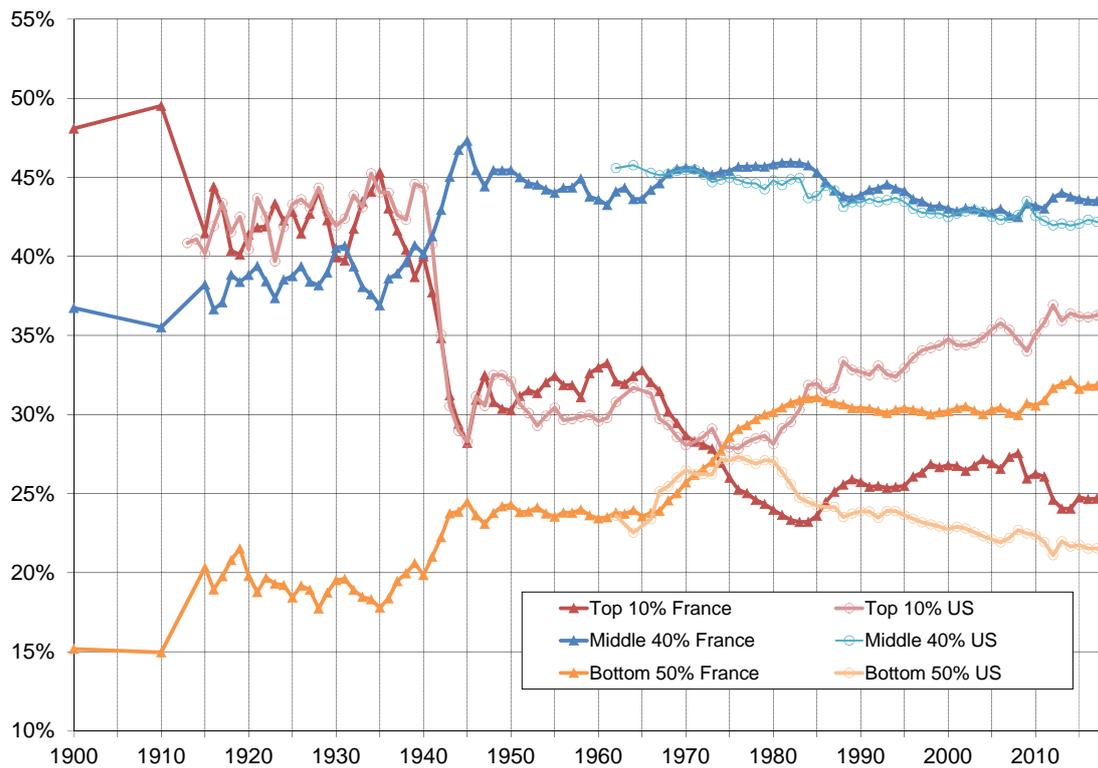
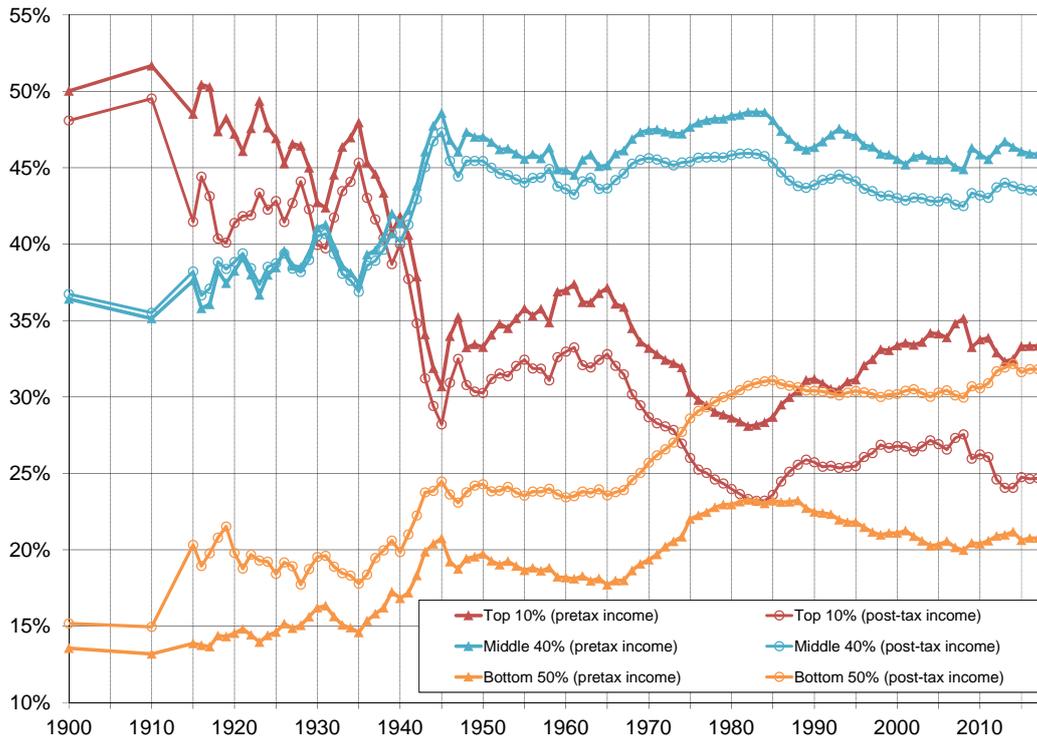


Figure 1 – Post-tax Income Inequality: France vs. the U.S., 1900–2018

NOTES: Post-tax income is defined as the income after tax, monetary, in-kind and collective transfers. Distributions of post-tax income is computed among equal-split adults (income of married couples divided by two). Imputation of in-kind and collective expenditures follows here the baseline scenario (V1), i.e., a lump-sum imputation of health care expenditures and education, while collective expenditures are imputed proportionally to post-tax disposable income. Estimates for the U.S are from Piketty, Saez and Zucman (2018).

(a) France 1900–2018



(b) United States (1913–2018)

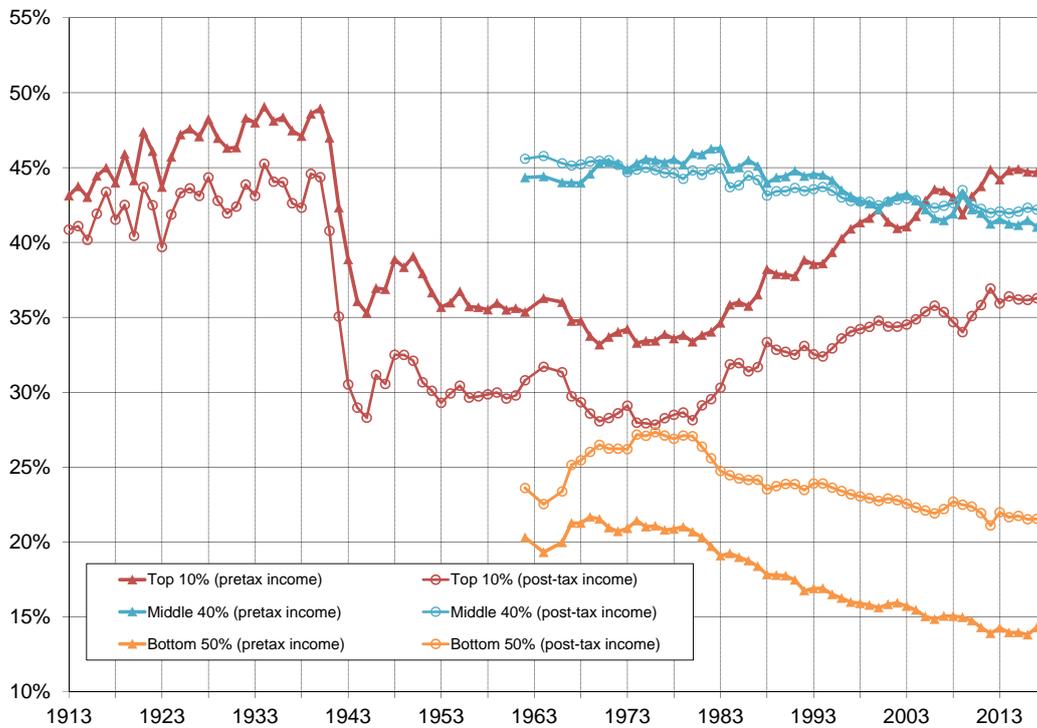
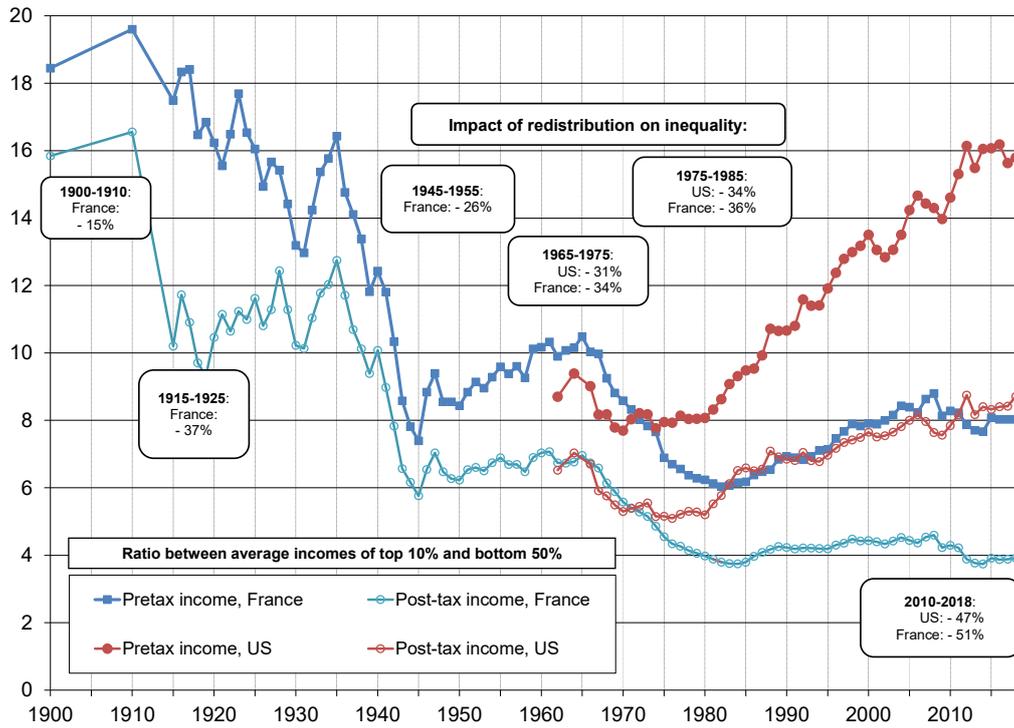


Figure 2 – Pretax vs Post-Tax Income Inequality

NOTES: Distributions of pretax national income and disposable income among equal-split adults (income of married couples divided by two). Estimates for the U.S are from Piketty, Saez and Zucman (2018).

(a) Ratio T10/B50



(b) Ratio T10/B90

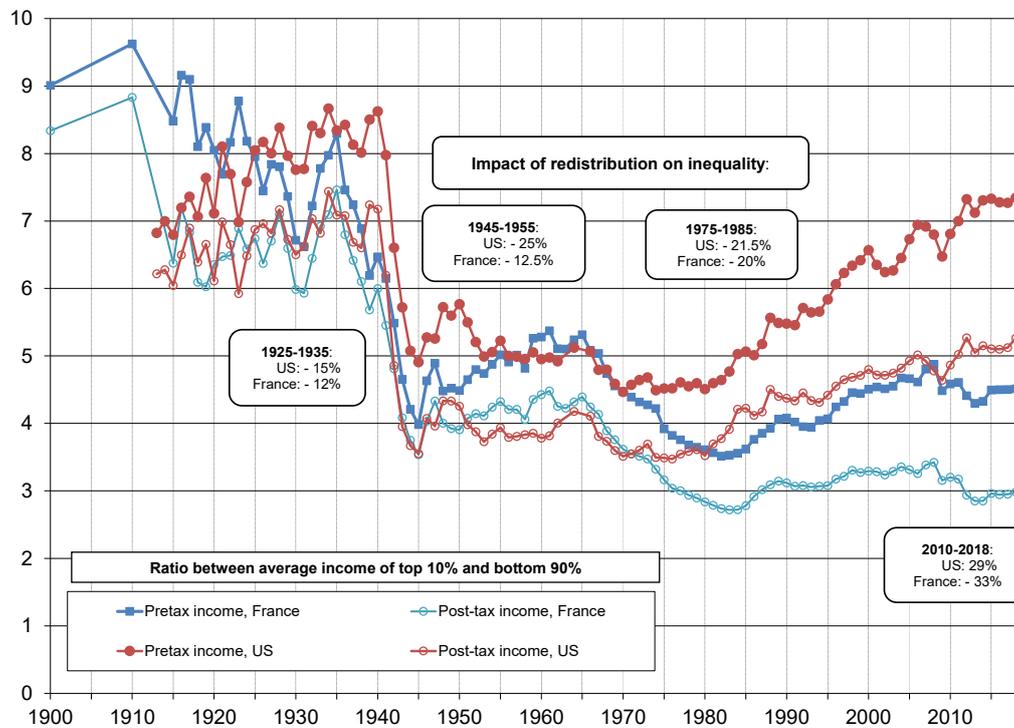
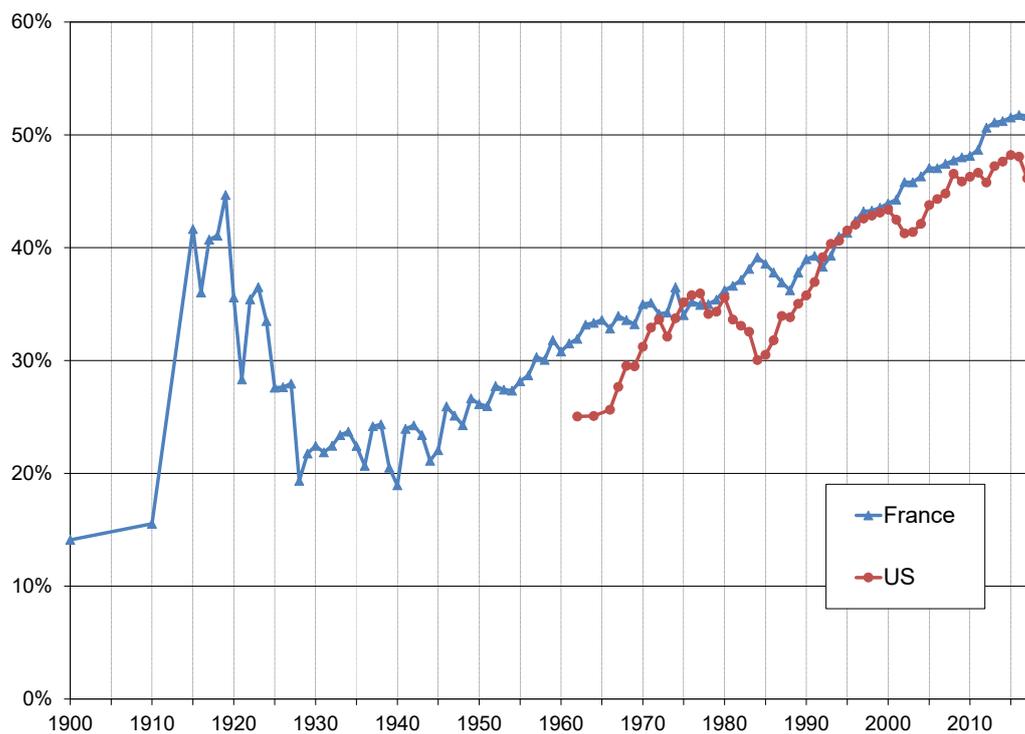


Figure 3 – Inequality and Redistribution: France vs. U.S.

NOTES: Distributions of pretax national income and disposable income among equal-split adults (income of married couples divided by two). Estimates for the U.S are from Piketty, Saez and Zucman (2018).

(a) Redistribution $1 - \gamma$ for T10/B50



(b) Redistribution $1 - \gamma$ for T10/B90

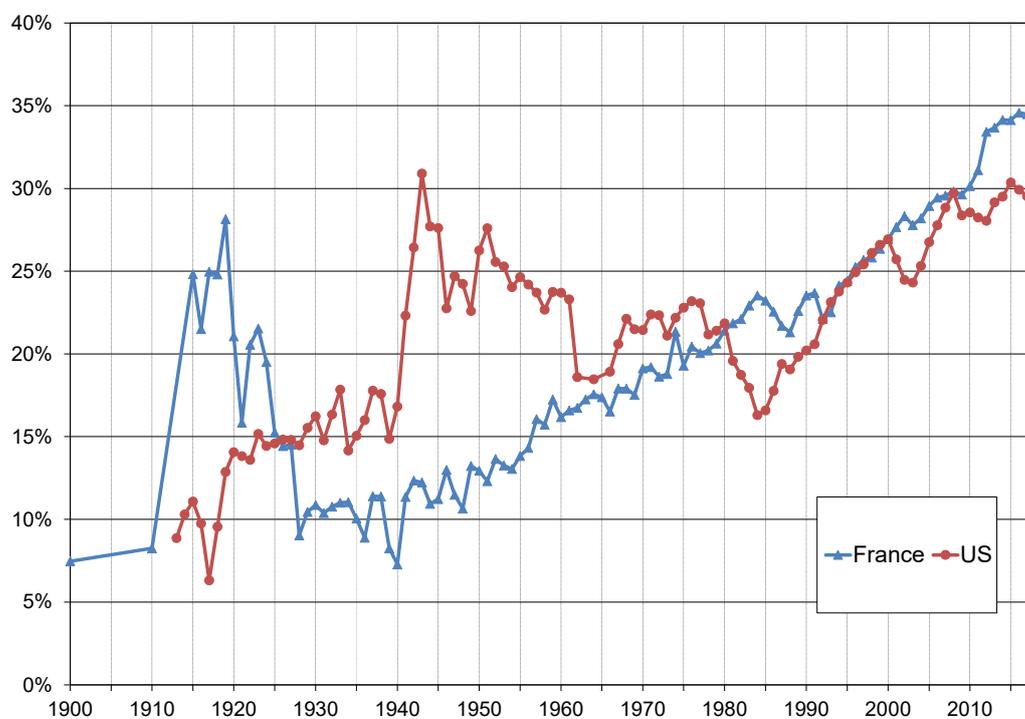
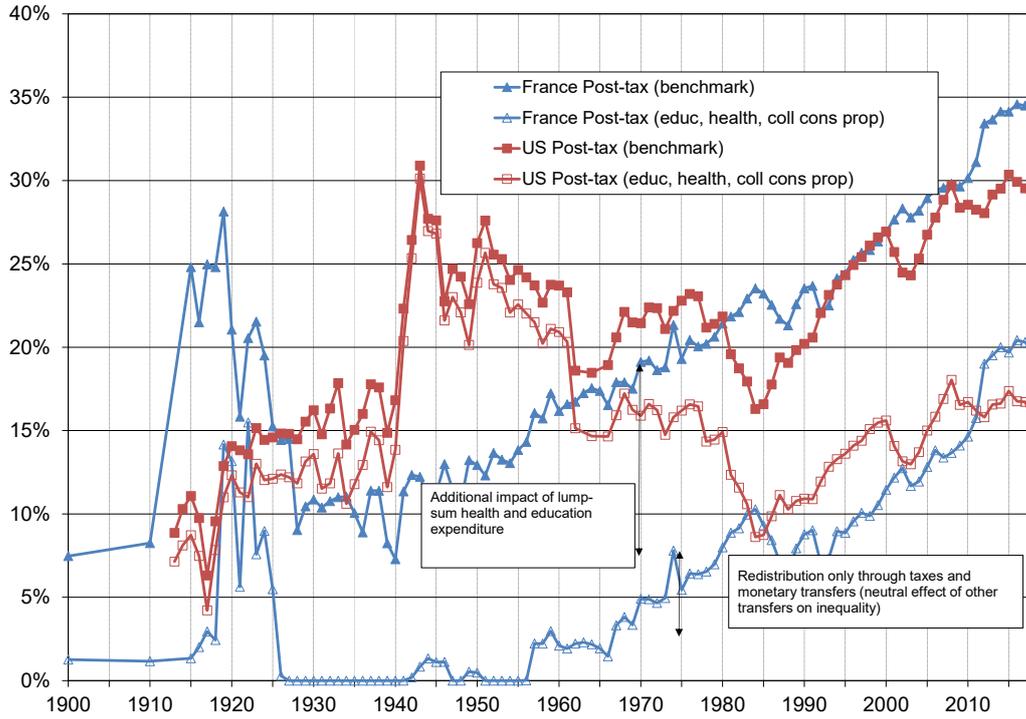


Figure 4 – Extent of Redistribution: France vs United States, 1900–2018

NOTES: Distributions of pretax national income and disposable income among equal-split adults (income of married couples divided by two). Estimates for the U.S are from Piketty, Saez and Zucman (2018).

(a) Ratio T10/B90, Post-Tax V1 vs V3



(b) Ratio T10/B90, Post-Tax V1 vs V2

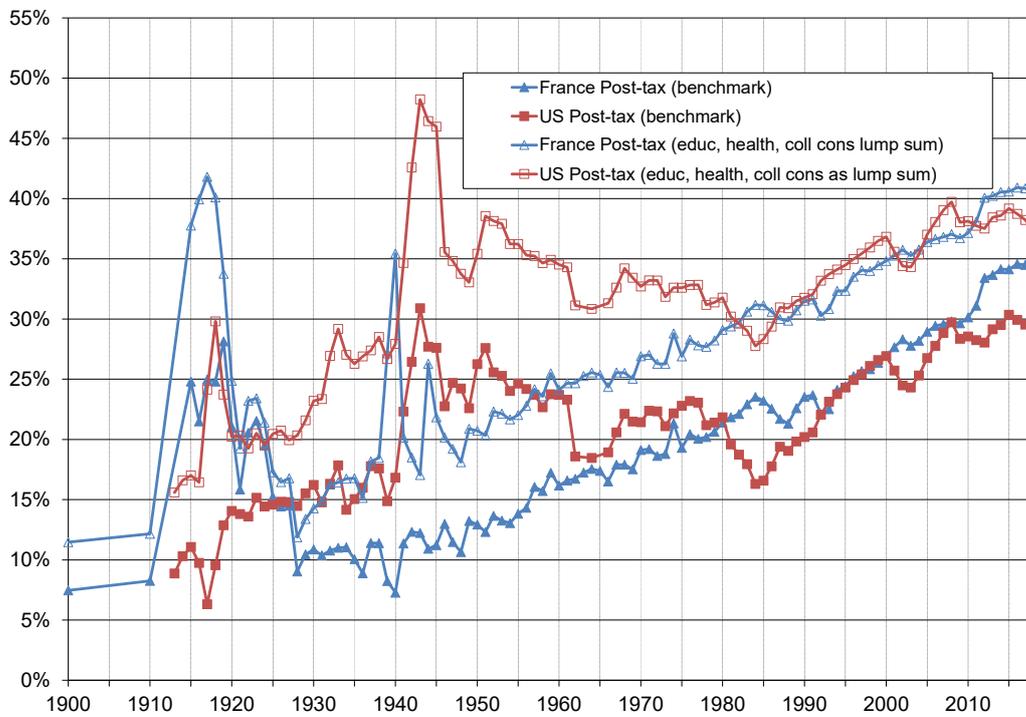


Figure 5 – Variants of Redistribution Measures

NOTES: Distributions of pretax national income and disposable income among equal-split adults (income of married couples divided by two). Estimates for the U.S are from Piketty, Saez and Zucman (2018).

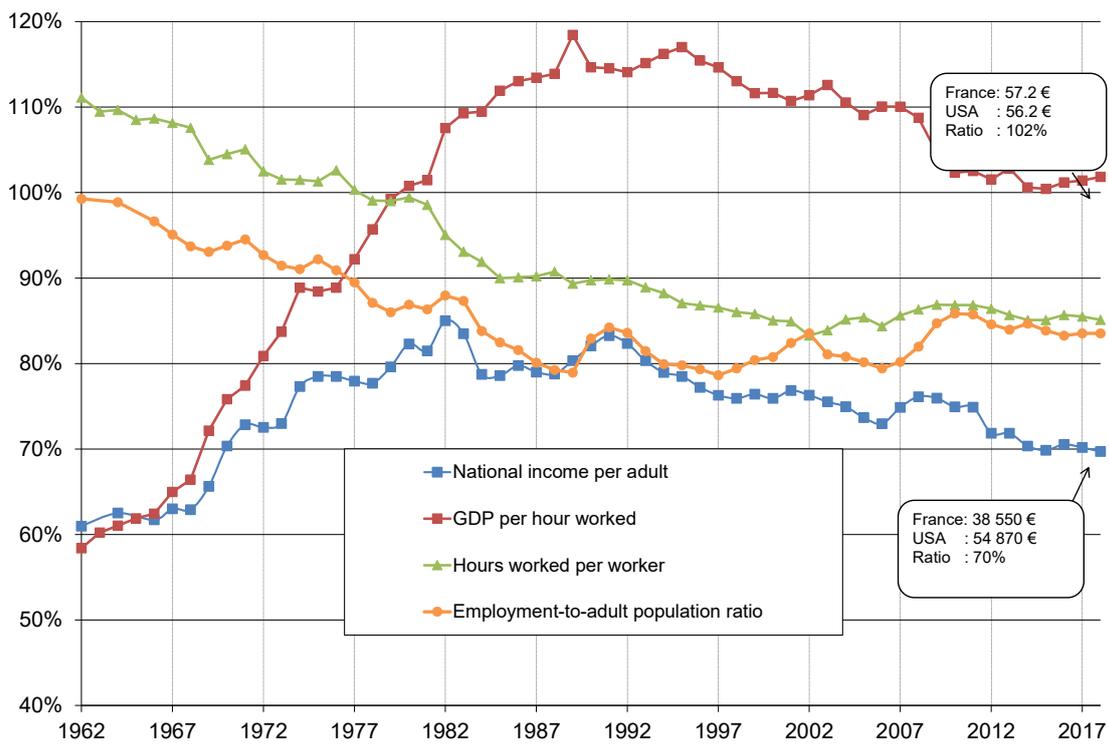


Figure 6 – Average income and productivity: ratio France/USA, 1962-2018

NOTES: Ratios France/USA for GDP per hour of work (OECD series) and per adult national income (WID.world). Both series are expressed in PPP 2018 Euros.

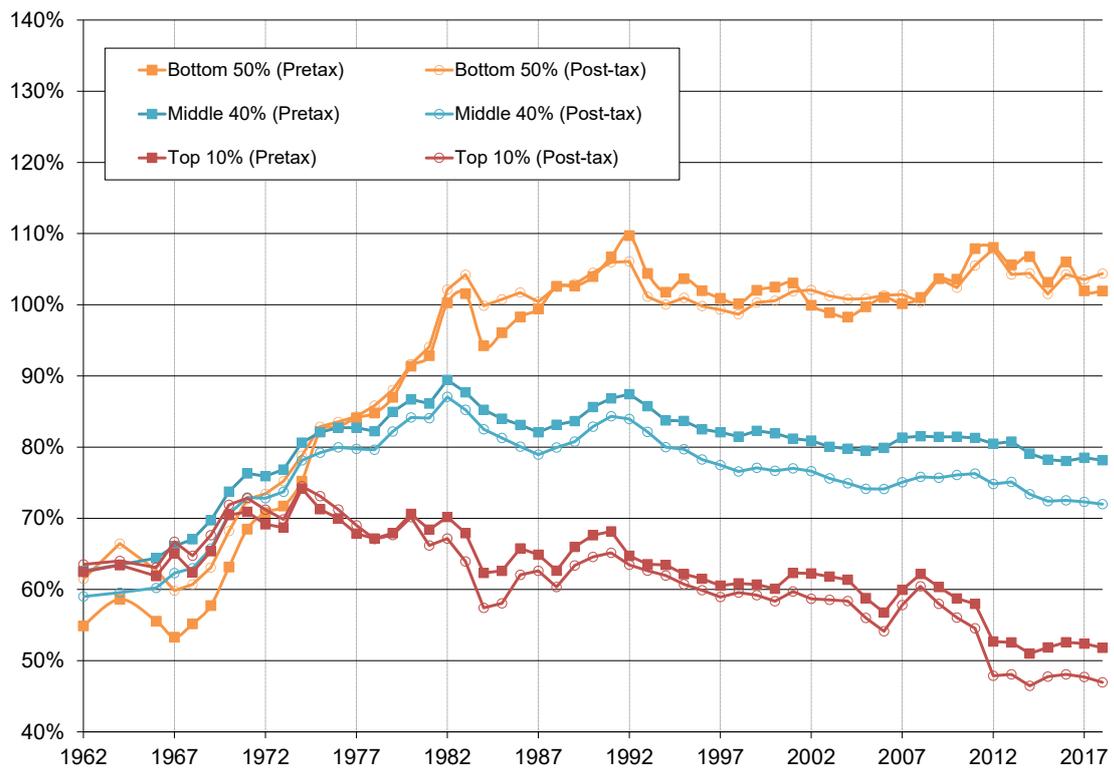
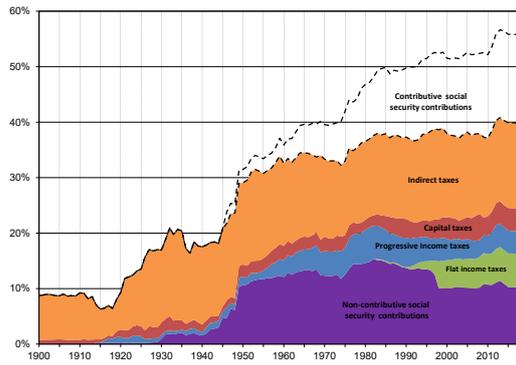


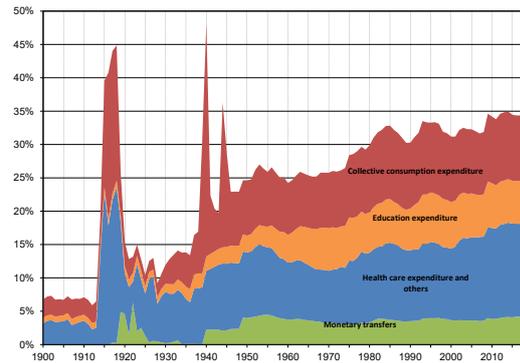
Figure 7 – Average real income by income group: ratio France/U.S.

NOTES:

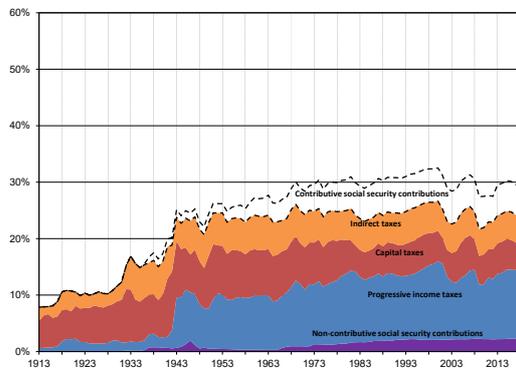
(a) Taxation (France, 1900–2018)



(b) Transfers (France, 1900–2018)



(c) Taxation (United States, 1913–2018)



(d) Transfers (United States, 1913–2018)

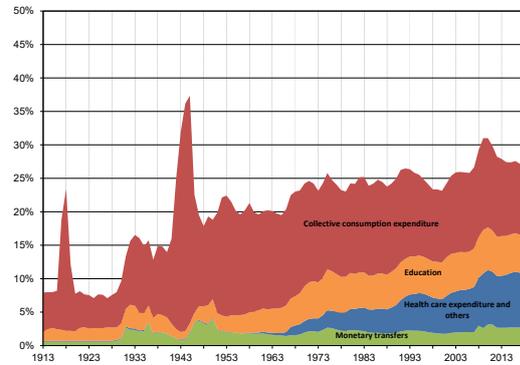


Figure 8 – Structure of taxes and transfers (percentage of national income)

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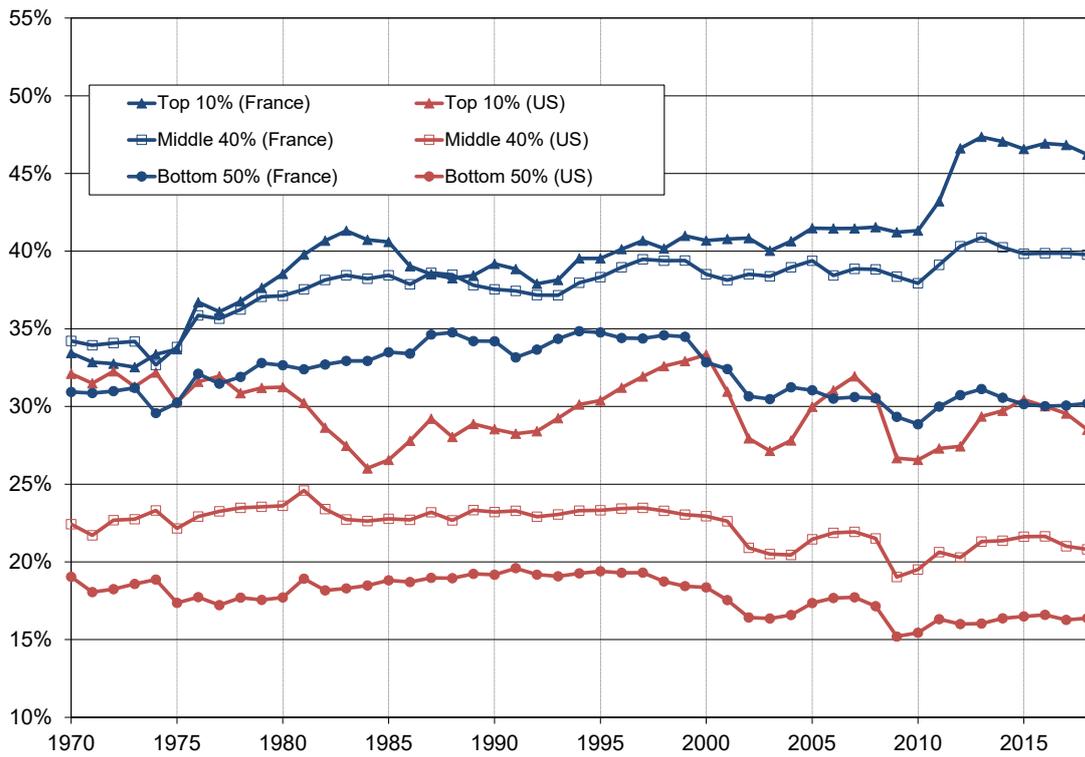


Figure 9 – Taxes paid by pretax income group, France vs U.S. 1970–2018

NOTES: Distributions of pretax national income among equal-split adults (income of married couples divided by two). Estimates for the U.S are from Piketty, Saez and Zucman (2018).

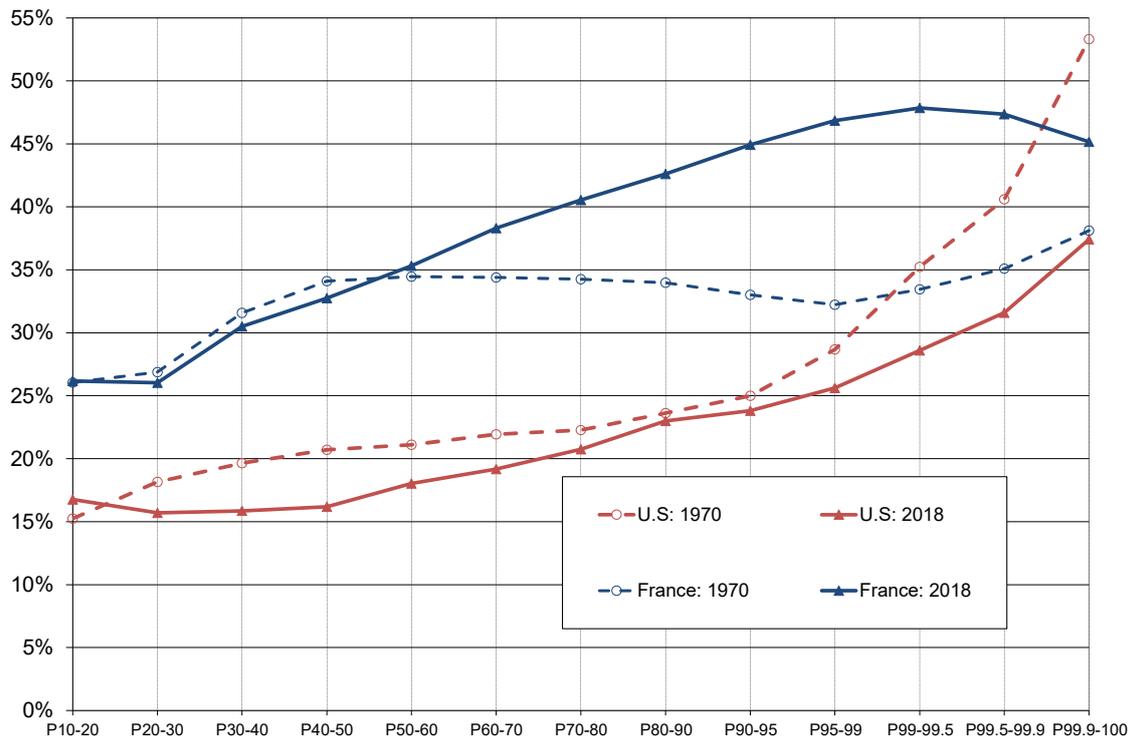
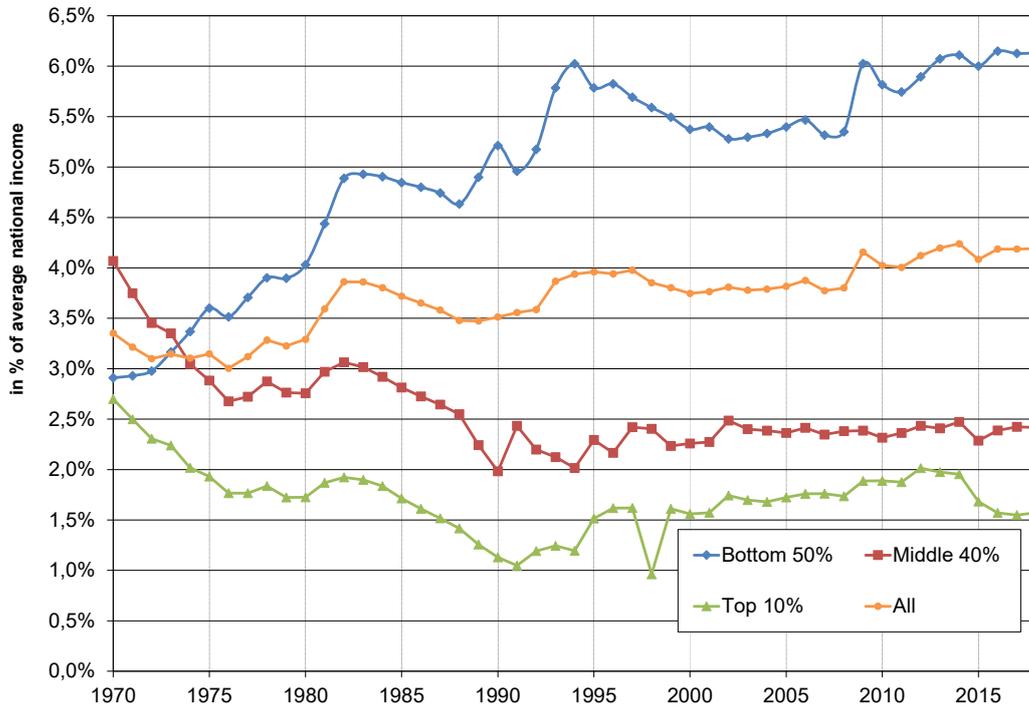


Figure 10 – Taxes paid by pre-tax income group, 1970 vs 2018

NOTES: Average tax rates by pretax income group of equal-split adults for France and the U.S. Total taxes exclude contributive social contributions. US series: Piketty, Saez and Zucman (2018).

(a) France



(b) United States

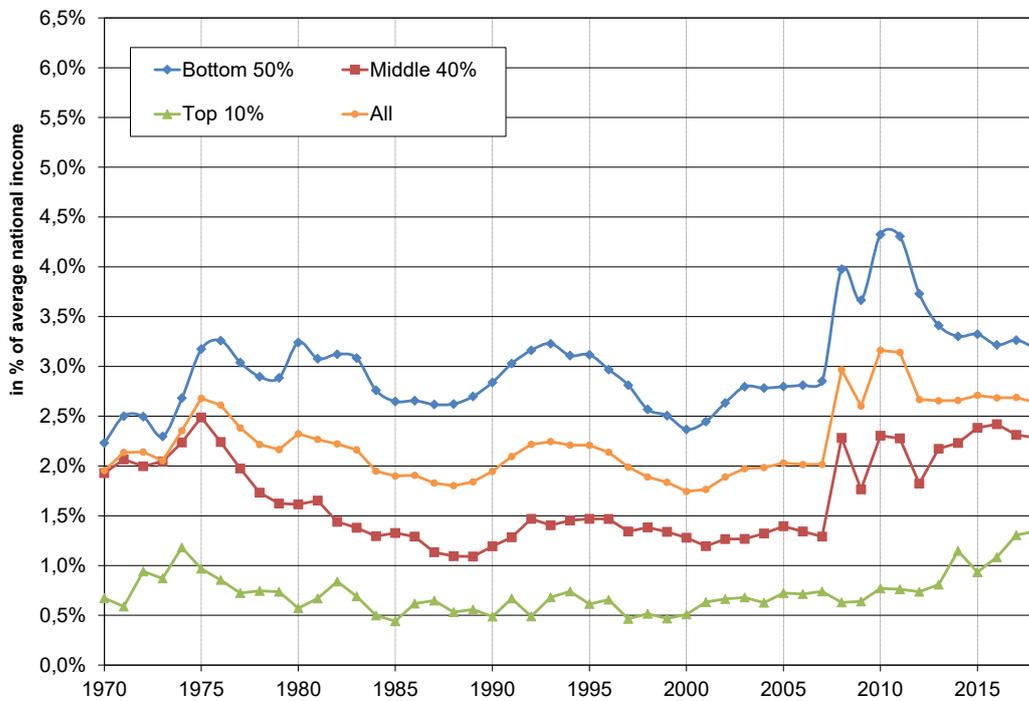


Figure 11 – Average monetary transfers received by post-tax income group

NOTES: Distributions of pretax national income and disposable income among equal-split adults (income of married couples divided by two). Estimates for the U.S are from Piketty et al. (2018a).

(For Online Publication)

Appendix to

Predistribution vs. Redistribution:
Evidence from France and the U.S.

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April 2021

This Appendix provides complements

List of Appendices

Appendix References

A-2

Appendix References