

Income Inequality in France, 1900-2014: Evidence from Distributional National Accounts (DINA)

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Abstract. This paper presents "Distributional National Accounts" (DINA) for France. That is, we combine national accounts, tax and survey data in a comprehensive and consistent manner to build homogenous annual series on the distribution of national income by percentiles over the 1900-2014 period, with detailed breakdown by age, gender and income categories over the 1970-2014 period. Our DINA-based estimates confirm the long-run pattern found in previous tax-based series, i.e. a long-run decline in income inequality, largely due to a sharp drop in the concentration of wealth and capital income following the 1914-1945 capital shocks. However, our new series deliver higher inequality levels than the usual tax-based series for the recent decades, because the latter miss a rising part of capital income. Gender inequality in labor income declined in recent decades, albeit fairly slowly among top labor incomes. E.g. female share among top 0.1% earners was only 12% in 2012 (vs. 7% in 1994 and 5% in 1970). Finally, we find that distributional changes can have large impact on comparisons of well-being across countries. E.g. average pre-tax income among bottom 50% adults is 30% larger in France than in the U.S., in spite of the fact that aggregate per adult national income is 30% smaller in France. Post-tax comparisons (in progress) are likely to exacerbate this conclusion.

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Section 1. Introduction

Income inequality has increased significantly in many developed countries over the last decades, with significant variations across countries and regions. This trend has attracted considerable interest among academics, policy-makers, and the global public. In recent years, following up on Kuznets' (1953) pioneering attempt, a number of authors have used administrative tax records to construct long-run series of top income shares (Alvaredo et al., 2011-2016). Yet despite this endeavor, we still face limitations when measuring income inequalities. One important limitation is the large gap between national accounts - which focus on economic aggregates and macro-economic growth - and inequality studies - which focus on distributions using survey and tax data but usually without trying to be fully consistent with macro aggregates. This gap makes it hard to rigorously address questions such as: what fraction of total economic growth accrues to the bottom 50%, the middle 40% and the top 10% of the distribution? How much is due to changes in the labor and capital shares in national income, and how much is due to changing dispersions of labor earning, capital ownership, and returns to capital? How does per capita growth of the bottom 50% and the bottom 90% income and wealth groups compare to overall growth, and how is this affected by taxes and transfers?

This paper attempts to bridge the gap between national accounts and inequality studies more systematically than has been done in the past. We combine national accounts, tax, and survey data in a comprehensive and consistent manner to build "Distributional National Accounts", that is, homogenous series on the distribution of total national income in France since 1900. In contrast to previous attempts to

construct top income series for France (Piketty 2001, 2003), which are based upon fiscal income, our estimates capture 100% of national income recorded in the national accounts, and cover the entire distribution, from bottom percentiles to top percentiles. This allows us to provide decompositions of growth by income groups consistent with total economic growth used in macroeconomics.

From a methodological perspective, our key contribution is to construct prototype micro-files of pre-tax and (soon) post-tax income distribution consistent with macro-aggregates, obtained by statistically matching tax and survey data and making explicit assumptions about the distribution of income categories for which there is no readily available source of information. That is, we combine national accounts, tax and survey data in a comprehensive and consistent manner to build homogenous annual series on the distribution of national income by percentiles over the 1900-2014 period, with detailed breakdowns by age, gender and income categories over the 1970-2014 period. We also plan to include taxes and transfers in our prototype micro-files and to measure their overall magnitude and changes in inequality (in-progress, not included in the current draft). The corresponding micro-files and computer codes are available on-line. In our companion paper (Garbinti, Goupille and Piketty, 2016), we develop similar methods in order to construct prototype micro-files of wealth distribution that are fully consistent with the income files presented in this paper. Our objective is to extend these methods and estimates and to develop homogenous “Distributional National Accounts” (DINA) in as many countries as possible in the coming years (see Piketty, Saez and Zucman (2016) and Saez and Zucman (2016) for the U.S. case).¹

¹ All updated files and results will be made available on-line on the World Wealth and Income Database (WID) website: see <http://www.wid.world>.

Although the present paper is primarily methodological, we also come with a number of substantial conclusions. Generally speaking, our DINA-based estimates confirm the long-run pattern found in previous tax-based series, i.e. a long-run decline in income inequality, largely due to a sharp drop in the concentration of wealth and capital income following the 1914-1945 capital shocks. However, our new series deliver higher inequality levels than the usual tax-based series for the recent decades, because the latter miss a rising part of capital income. Our new series also allow us to better analyze the conditions under which wealth concentration might keep rising and possibly return to pre-WW1 levels in the future.

Next, our detailed breakdowns by age and gender allow us to explore new dimensions of inequality dynamics together with the top income dimension. For instance, we find that gender inequality in labor income declined in recent decades, albeit fairly slowly among top labor incomes. E.g. female share among top 0.1% earners was only 12% in 2012 (vs. 7% in 1994 and 5% in 1970).

Finally, since our new series are anchored to national accounts, they allow for more reliable comparisons across countries. We find that distributional changes can have large impact on comparisons of well-being across countries. E.g. average pre-tax income among bottom 50% adults is 30% larger in France than in the U.S., in spite of the fact that aggregate per adult national income is 30% smaller in France. Post-tax comparisons are likely to exacerbate this conclusion.

The paper is organized as follows. Section 2 relates our work to the existing literature. Section 3 presents our concepts, methods and data sources. In Section 4 we present our long run results regarding the distribution of national income over the 1900-2014 period. In Section 5 we present detailed inequality breakdowns by age and gender for the 1970-2014 period. In Section 6 we put our findings in comparative perspective. The conclusion (Section 7) discusses a number of venues for future research. This paper is supplemented by an on-line data appendix including complete series and additional information about data sources and methodology.

Section 2. Related literature

This paper follows a long tradition of research trying to combine national accounts with distributional data. Most work in this area follows the pioneering contribution of Kuznets (1953), who first combined income tax tabulations with national income series to estimate top income shares in the U.S. over the period 1913-1948.

Following Piketty (2001, 2003), who constructed top income shares series for France using methods similar to Kuznets, a new interest has been given to the study of income inequality over the long run using tax return data (see e.g. Piketty and Saez (2003) for the U.S; Atkinson (2005) for the UK and Atkinson and Piketty (2007, 2010) for a global perspective on top incomes). This interest has led to *The World Top Incomes Database* (WTID) that gathers homogenous long-term series of top income shares broken down by income source for thirty-one countries. All these contributions used similar sources (tax data) and methods (Pareto interpolation).

As pointed out by Atkinson, Piketty and Saez (2011), these series suffer however from important limitations. In particular they are based on fiscal income, which can diverge from national income because of tax exempt income, tax avoidance and evasion. They focus on pre-tax and pre-transfer income inequality and are therefore silent on redistributive effects of public policies between and across countries. Finally, these series measure only top income shares (typically top 10% and top 1%) and hence give no information on the evolution occurring within the bottom of the distribution, letting aside a crucial part of the analysis.

Meanwhile, the ERFS surveys by the French National Statistical Institute² provide information about incomes (and, for recent period, between pre and post tax incomes). These surveys are available from 1970, but it is only from 1996 that they are produced on an annual basis and matched with fiscal data. They are not consistent with national income and are often on reduced sample size (around 35,000 observations since 2002) compared to fiscal data. This explain why these surveys cannot be used alone to study income inequality on the long run.³

As a first step to use all available information between National Accounts, surveys and tax data, Landais, Piketty, Saez (2011) provide recent series (2006-2008) for France to better approach all the distribution of pre and post-tax incomes. Another step has been made with Piketty, Saez and Zucman (2016)⁴ and, to a larger extent, with the “DINA project”. Its purpose is to produce homogenous series of pre and post-tax incomes, to allow for comparison over time within and across countries as well as to assess the role of fiscal system and its evolution.

² ERFS : Enquête Revenus Fiscaux et Sociaux

³ Some works have mixed information from different surveys with National Accounts. Cf for instance Accardo et al. (2009) for France, or Fixler and Johnson (2014) and Fixler et al. (2015) for the US.

⁴ More information about the related literature and more specifically the US work can be found in Piketty, Saez and Zucman (2016)

Section 3. Concepts, data sources and methods

In this section we describe the concepts, data sources and main steps of the methodology that we use in order to construct our income distribution series. Broadly speaking, we combine three main types of data: national accounts; fiscal data (income tax returns); and household surveys. We first present our income concepts. We then describe our data sources and methods for the recent decades (1970-2014), when we can use micro-files of income tax returns. Finally we proceed to describe our data sources and methods for the long-run historical series (1900-2014), which rely on income tax tabulations. 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. (2016). 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.

Section 3.1. Income concepts

Our income distribution series are constructed using income concepts that are based upon national accounts categories.⁵ More precisely, we aim to present consistent series based upon four basic income concepts (with a number of variants): pre-tax national income, pre-tax factor income, post-tax disposable income and post-tax national income. By construction, average income per adult is equal to average national income per adult for all concepts (except post-tax disposable income).

⁵ The reason for using national accounts concepts is not that we believe they are perfectly satisfactory. Our rationale is simply that national accounts are the only existing attempt to define income and wealth in a consistent manner on an international basis.

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

Pre-tax national income (or more simply pre-tax income) is our benchmark concept to study the distribution of income. Pre-tax income is equal to the sum of all income flows going to labor and capital, after taking into account the operation of the pension system, but before taking into account other taxes and transfers. That is, we deduct pension contributions (as well as other social contributions, as defined by SNA 2008 national accounts guidelines) from incomes, and add pension distributions (as well as other social benefits, as defined by SNA 2008). The same rule applies to fiscal income in most countries: contributions are deductible, and pensions are taxed at the time they are distributed.

In contrast, pre-tax factor income (or more simply factor income) is equal to the sum of all income flows going to labor and capital, before taking into account the operation of the pension system, but before taking into account other taxes and transfers. That is, we do not deduct pension contributions (or other social contributions). One problem is that retired individuals typically have very small factor income, so that 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. This is why we use pre-tax national income as our benchmark concept. On the other hand, looking at the distribution of factor incomes can yield additional insights, especially if we look at it among the working-age population. For instance, it allows to better measure the distribution of labor costs paid by employers.

Finally, post-tax national income is equal to the sum of all income flows going to labor and capital, after taking into account the operation of the pension system, but after taking into account other taxes and transfers (cash transfers, in-kind transfers, and collective expenditures). In contrast, post-tax disposable income excludes in-kind transfers and collective expenditures. In the present paper, we focus upon pre-tax inequality and provide series using our two pre-tax income concepts. Our companion paper (Bozio, Garbinti, Goupille and Piketty, 2017) we analyze the evolution of post-tax inequality and provide series using our two post-tax concepts.

Our preferred income distribution series refer to the distribution of income among equal-split adults (i.e. the income of married couples is divided into two). We also present tax-units series (looking at the income distribution between tax units, i.e. married couples and singles) as well as individualistic-adults series (i.e. labor income is allocated to each individual income earner within the couple).⁶ We further discuss the interpretation of these various series, which in our view convey three complementary and legitimate approaches to inequality measurement.

We compute national income and the various subcomponents of pre-tax national and factor income and post-tax national and disposable income using the official national accounts established by INSEE for the 1949-2015 period. For the earlier periods, we use the historical series provided by Piketty and Zucman (2014). All data files and complete methodological details are given in the data appendix (see appendix A).

⁶ Capital income of married couples is always divided into two (because we do not have other information).

Section 3.2. Data sources and methods for recent decades (1970-2014)

We now describe the data sources and methodology used to estimate the distribution of income for the 1970-2014 period. Over this period we can use the micro-files of income tax returns that have been produced by the French Finance Ministry since 1970. We have access to large annual micro-files since 1988. These files include about 400,000 tax units per year, with large oversampling at the top (they are exhaustive at the very top; since 2010 we also have access to exhaustive micro-files, including about the universe of all tax units, i.e. about 37 million tax units in 2010-2012).⁷ 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 (pre-tax, factor 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 rules.

We start with pre-tax national income series. The gap between fiscal income and national income can be decomposed into three components: tax-exempt labor income, tax-exempt capital income, and production taxes. Before we take each of these three components in turn, note that income tax micro-files allow us to split fiscal labor income into three components (wages; pension and unemployment benefits; and labor component of mixed income, which we assume for simplicity to be equal to

⁷ As of July 2016, the latest micro-file available is the 2012 micro-file. For years 2013-2014 we apply the same method as that described below for 1971-1974, 1976-1978, 1980-1983 and 1985-1987.

70% of total mixed income) and fiscal capital income into four components (tenant-occupied rental income; dividend; interest; and capital component of mixed income, i.e. 30% of total mixed income).⁸

Tax-exempt labor income, which we define as the gap between national-accounts labor income and fiscal labor income, consists of non-taxable compensation items such as health benefits and a number of other in-kind benefits. In the absence of specific information, we simply impute them in proportion to fiscal labor income.⁹

Tax-exempt capital income raises more complicated issues. It includes four main components: owner-occupied rental income (imputed rent); interest and dividend income going to tax-exempt life insurance assets; other tax-exempt interest income paid to deposits and saving accounts; corporate retained earnings and corporate taxes. It is worth stressing that all of these components have increased significantly in recent decades. In particular, life insurance assets did not play an important role until the 1970s, but gradually became a central component of household financial portfolios since the 1980s-1990s.¹⁰

⁸ Fiscal capital income also includes realized capital gains, but we do not use this variable for imputation purposes in our benchmark series (because it is too lumpy). Income tax micro-files also allow us to split mixed income into different form of self-employment activities (BIC, *bénéfices industriels et commerciaux*; BNC, *bénéfices non commerciaux*; BA, *bénéfices agricoles*), but we do not use this decomposition.

⁹ More precisely, we upgrade all observed individual-level fiscal labor incomes by multiplying them by the aggregate ratio between national-accounts labor income and fiscal labor income. We do this separately for wages, pensions and unemployment benefits, and mixed income. See appendix C for full details and computer codes.

¹⁰ Imputed rent has also become gradually more important over time with the rise of homeownership. In addition, note that imputed rent was actually included in fiscal rental income (together with tenant-occupied rental income) until 1963 in France. Finally, corporate retained earnings and corporate taxes were relatively small until the mid-20th century and also increased significantly in recent decades.

Regarding owner-occupied housing, life insurance assets, and deposits and saving accounts, we use available wealth surveys in order to impute these assets on the basis of income, age and gender (for more details, see our companion paper Garbinti, Goupille-Lebret and Piketty (2016)). Housing surveys (including information on housing assets and debt) were conducted by INSEE in 1970, 1973, 1978, 1984, 1988, 1992, 1996, 2001, 2006 and 2013. Household wealth surveys (including housing, business and financial assets and debt) were conducted by INSEE in 1986, 1992, 1998, 2004, 2010 and 2014.¹¹ The 2010 and 2014 wealth surveys are the French component of the Eurosystem HFCS survey and are more sophisticated than previous surveys. We then attribute the corresponding asset income flows on the basis of average rates of return observed in national accounts for this asset class.

Regarding corporate retained earnings and corporate taxes, we impute them in proportion to individual dividend and interest income. More precisely we impute to individuals the fraction that can be attributed to individuals, i.e. we subtract the fraction of domestic corporate capital that can be attributed to the government. We also subtract the fraction that can be attributed to the rest of the world (in case the country has a negative net foreign asset position), or add the fraction that domestic households own in the rest of the world (in case the country has a positive net foreign position).¹²

Finally, note that production taxes (in the SNA 2008 sense) include a number of indirect taxes, including value added taxes, which in effect are paid by corporations

¹¹ These wealth surveys were called « enquête actifs financiers » in 1986 and 1992, and « enquête patrimoine » since 1998. Housing surveys were always called « enquête logement ».

¹² In effect we assume that corporate retained earnings and corporate taxes are the same in domestic corporations and foreign corporations. See appendix C for a more detailed discussion and for corresponding data files and computer codes.

before they can distribute labor and capital income flows, and are therefore excluded from fiscal income. Production taxes also include property taxes, which we attribute to individuals in proportion to their owner-occupied and tenant-occupied housing assets. For simplicity, we choose to attribute production taxes other than property taxes in proportion to the sum of individual labor and capital incomes. An alternative assumption (followed in Landais, Piketty and Saez (2011)) would be to attribute them partly to consumption, i.e. income minus some estimate of saving. To the extent that the purpose of wealth accumulation is wealth in itself (e.g. power, prestige, etc., at least in part) rather than simply postponed consumption, this would be particularly justified.

More generally, we should stress that our implicit tax incidence assumptions are relatively rudimentary and could be improved in future estimates. For instance our assumption to attribute corporate taxes solely to interest and dividend income and property taxes solely to housing assets amounts to assuming that these two forms of assets involve relatively distinct and segmented choice processes. This is to some extent the case, but one might want to adopt a more unified view of portfolio choices, in which case corporate and property taxes should both fall on all assets. In appendix B we look at a number of variants and conclude that they have a relatively small impact on the general patterns and long run evolutions. However this is clearly an issue that would deserve additional research.

We should also mention the fact that a more satisfactory approach to tax incidence should also take into account the impact of taxes on quantities. That is, labor and capital taxes are likely to have an impact on the supply and demand of labor and

capital and the level of output. This is clearly beyond the scope of the present paper, but this is something that future research on DINAs should definitely attempt to address, e.g. by making simplified but plausible assumptions on the various supply and demand elasticities.

Finally, in order to ensure that aggregate pre-tax national income matches exactly with aggregate national income, we choose for simplicity to attribute government deficit (or surplus) in proportion to all other incomes. In effect, this leaves the distribution unaffected. Another assumption, followed by Piketty, Saez and Zucman (2016) for the U.S., consists of attributing 50% of government deficit (or surplus) in proportion to taxes and 50% in proportion to transfers and expenditures. In effect, this is assuming 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).

Regarding factor income series, the only difference with our benchmark pre-tax income series is that we set pensions and unemployment benefits to zero, and that we upgrade fiscal labor income (other than pensions and unemployment benefits) so as to match national-accounts labor income. We also take into account the fact that social contributions are not strictly proportional and often involve significant exemptions for low wages or high wages, with important variations over the 1970-2014 period.

Finally, regarding our post-tax income series, we need to make assumptions regarding the distribution of cash and in-kind transfers and of collective expenditures.

For the most part, we follow the assumptions made by Piketty, Saez and Zucman (2016) for the U.S. case (in progress).

Section 3.3. Data sources and methods for long-run series (1900-2014)

We now describe the data sources and methodology used to estimate our long-run series. 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 throughout the 1915-2014 period (with no exception) and are based upon the universe of all tax units.¹³ They report the number of taxpayers and total income for a large number of income brackets. These tabulations were first used in a systematic manner by Piketty (2001, 2003). In the present paper we update and considerably refine these estimates.¹⁴ Complete methodological details, data files and computer codes are provided in appendix D. Here we simply describe the main steps.

First, by applying the generalized, non-parametric Pareto interpolation techniques developed by Blanchet, Fournier and Piketty (2016) to these tabulations, we produce annual series of fiscal income for the entire distribution and not only for the top decile

¹³ As of July 2016, the latest tabulation available is the 2014 tabulation.

¹⁴ We also use estimates of the distribution of income for years 1900 and 1910 that were 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).

(the initial estimates by Piketty (2001, 2003) focused on the top decile and did not attempt to go below the 90th percentile). Next, the income tax tabulations also include detailed information on the numbers of married couples and of singles in each income bracket (and also on the numbers of dependent children, which was used in a systematic manner by Landais, 2003). We use the computer codes developed by Blanchet, Fournier and Piketty (2016) in order to estimate separately the distribution of fiscal income among tax units and among equal-split individuals (the initial estimates by Piketty (2001, 2003) focused on tax units and did not attempt to correct for different tax unit sizes).¹⁵

In the on-line appendix we provide a systematic comparison for the 1970-2014 period between the distribution of fiscal income (from bottom to top percentiles) estimated via the micro-files and via the income tax tabulations, and we find that the two series are virtually identical (see appendix C). Given that the tax tabulations are available annually and are based on the universe of taxpayers (and therefore suffer from no sampling problems), we adopt the tax-tabulations series as our benchmark series for the distribution of fiscal income.¹⁶ Income tax tabulations also include detailed breakdowns by income categories (wages, self-employment income, dividend,

¹⁵ Our methodology is complicated by the fact that income tax tabulations are based upon a concept of “taxable income” (i.e. fiscal income minus a number of specific deductions instituted by the tax law, such as a 10% lump-sum deduction for professional expenses of wage earners, etc.) rather than the concept of “fiscal income” that we are interested in (i.e. income reported on fiscal declarations, before any further deduction). Therefore we need to apply a number of corrections in order to take into account the many changes in the tax law that occurred between 1914 and 2014. Another complication comes from the fact that income tax tabulations prior to 1985 only cover tax units that are subject to positive income tax. This calls for other corrections, taking into account the fact that the relevant exemption threshold varies with the marital status and numbers of children. All the different steps are carefully described in appendix D, together with full data files and computer codes.

¹⁶ The gaps between the two series are virtually negligible for the post-1988 period (when micro-files start to be annual and of very large size), and are slightly more significant between 1970 and 1984 (when micro-files are of smaller size and are not annual). See appendix C.

interest, etc.), which we use to estimate separately the distribution of fiscal labor income and fiscal capital income.¹⁷

Finally, in order to estimate the distribution of pre-tax national income from the distribution of fiscal income, we proceed as follows. Regarding the 1970-2014 period, when the micro-files allow for relatively sophisticated imputation procedures by income and asset categories (see above), we naturally use these corrections in order to construct our benchmark series.¹⁸ Regarding the 1915-1970 series, our correction procedure is more rudimentary. We start from the presumption that the induced corrections on percentile shares tends to rise over time (at the beginning of the period, tax rates are relatively small, so that incentives for tax optimization are limited, and legal tax exemption regimes are rare), which is confirmed by the detailed breakdowns by labor and capital incomes, so we assume that correction rates rise according from 1915 to 1970. This is clearly an approximation, but as we will later discuss when we present separately our results for fiscal income and national income series, the impact on our long run patterns is likely to be limited (and in any case would tend to reinforce our main findings). Finally, note that we do not attempt to provide factor income series nor fully individualized series prior to 1970 (tax tabulations do not include any information on within-couple distribution of income, so one would need to find other data sources in order to do this). More generally, we stress that our long-run series should be viewed as exploratory and incomplete, and we hope that they will be further developed and refined in future research.

¹⁷ One important limitation of the detailed tabulations by income categories is that, prior to 1945, they only cover a limited number of years (namely, 1917, 1920, 1932, 1934, 1936 and 1937); they then become annual in 1945. Fortunately there are separate annual tabulations for wages over the 1919-1938 period, and quasi-annual inheritance tabulations over the 1902-1964 period.

¹⁸ That is, we compute the national-income/fiscal-income ratios by year and percentile using the micro-files series, and we apply these ratios to the fiscal-income tax-tabulations series. See appendix D for detailed data files, computer codes and robustness checks.

Section 4. Long-run trends in income inequality (1900-2014)

We now present our main findings regarding the long-run evolution of income inequality over the 1900-2014 period.

First, it is useful to have in mind the general evolution of average income in France. As one can see from Figure 1, per adult national income has increased considerably in the long run, from about 5 000 € around 1900 to 35 000 € in 2014 (all figures expressed in 2014 €). However the growth has been far from steady and happened mostly during the 1945-1980 – often referred to as the “Thirty Glorious Years” in France. That is, the growth rate of per adult national income has been negative during the 1900-1945 period (-0.1% per year), then jumped to 3.7% per year over the 1945-1980 period, and finally was divided by almost four over the 1980-2014 period (0.9% per year). We observe similar patterns in most European countries and in Japan, and to a lesser extent in the U.S. and in the U.K (where the shocks created by WW1 and WW2 were less damaging than in Continental Europe).

Next, we report on Table 1 the income levels, thresholds and shares for 2013. In 2013, average income per adult in France was about 35 000€. Average income within the bottom 50% of the distribution was about 16 000€, i.e. about half of the overall average, so that their income share was about 23%. Average income within the next 40% of the distribution was about 38 000€, so that their income share was close to 45%. Finally, average income within the top 10% was about 110 000 € (i.e. about 3.2 times average income), so that their income share was about 32%.

We report on Figures 2 and 3 the evolution of the income shares going to these three groups over the 1900-2014 period. The major long-run transformation is the rise of the share going to the bottom 50% (the “lower class”) and the middle 40% (the “middle class”) and the decline of the share going to the top 10% (the “upper class”). However this long run evolution has been far from steady. The top 10% income share fell abruptly during the 1914-1945 period, from more than 50% of total income at the eve of World War 1 to slightly more than 30% of total income in 1945. One can see a rise in inequality during the reconstruction period and up until 1967-1968. Between 1968 and 1983, we observe a large reduction of inequality, which is well-known to be due to a large compression of wage inequality (driven in particular by very large increases in the minimum wage) and a significant reduction of the capital share. Beginning around 1983, one observes the reverse evolution. This general periodization is relatively well-known and has already been studied elsewhere (see in particular Piketty 2001, 2003, 2014).

The main novelties here are the following. First, we are able to show that both the bottom 50% and the middle 40% benefited (in comparable proportions) from the long run decline in the top 10% share. Next, we can better analyze both the long run pattern and the recent trends. Regarding the recent trend, we see that the top 10% income share declined somewhat after the 2008 financial crises, but that it is still significantly higher than in the early 1980s (see Figures 2-3). Most importantly, if we look at the top 1% income share, we see a very significant increase between 1983 and 2007: the top 1% share rose from less than 8% of total income to over 12% over this period, i.e. by more than 50%. This is less spectacular than in the United States, but this is still fairly spectacular. Between 2008 and 2013, the top 1% share has

fluctuated between 10% and 12%, which is still significantly larger than in the low inequality point of the early 1980s.

Moreover, the higher we go at the top of the distribution, the higher the rise in top income shares (see Figures 5-7). Our detailed series also allow us to see that the rise of very top incomes is due both to the rise of very top labor incomes and very top capital incomes (see Figure 8). In certain cases, both can be very related: e.g. top managers can first benefit from very high labor incomes through large bonuses or stock options (the difference between exercise value and option value is generally counted as labor income under French tax law, just like in the U.S.), and then from very high capital incomes derived from their equity participation.

Given the relative stagnation of average income in France since 1980 (at least as compared to the previous decades), this spectacular rise of very top incomes has not gone unnoticed. Even though the macroeconomic impact on the overall top 10% share and on bottom 90% incomes has been relatively limited, the political and psychological impact has probably been more substantial. Like in other countries, the large increase in very top managerial compensation packages are largely covered by the media and show to the broader public that the “Thirty Glorious Years” are not over for everyone.

Another novelty of our new national-income series is that they deliver higher inequality levels than the fiscal-income series for the recent decades, because the latter miss a rising part of capital income (see Figure 9). Our new series are still not perfect, but they are clearly more reliable.

Note however that moving from tax-unit series from equal-split series has the opposite effect on inequality levels, given the rise of the fraction of singles (see Figure 10). We tend to prefer equal-split series, but we should stress that if we are interested in the inequality of purchasing power and living standards, then the truth is probably in between the two series, depending on the exact equivalence scale than one favors for couples as compared to singles.

Our new series also confirm that the long run decline in income inequality is entirely due to the fall of top capital incomes following the 1914-1945 capital shocks (see Figure 11-12). Throughout the 1900-2014 period, bottom and middle incomes are mostly derived from labor income, while capital income becomes predominant at very high incomes. This is still true today (see Figure 13). But the difference is that one needs to go higher in the distribution today for capital income to become dominant, because the concentration of wealth and capital income has declined very substantially (see Figures 14-15).

Our new series allow us to document and analyze in a much more comprehensive manner than previous studies the long-run transformation of wealth and capital income concentration. In our companion paper (Garbinti, Goupille-Lebret and Piketty, 2016), we use our detailed wealth and income series in order to estimate synthetic saving rates by wealth group and to simulate a simple dynamic model of wealth accumulation. The general conclusion is that relatively small changes in structural parameters like the inequality of saving rates or rates of return across wealth groups can have huge long-run consequences. This also allows us to discuss the conditions

under which wealth concentration might keep rising in the coming decades, and might possibly return to pre-WW1 levels.

Section 5. Detailed inequality breakdowns by age and gender (1970-2014)

We now present a number of new findings from our detailed inequality breakdowns by age and gender that are available over the 1970-2014 period. We start with age and then move to gender.

As one can see from Figures 16-17, the age-labor income and the age-income profiles have always been upward sloping over the 1970-2014 period, at least between age 20 and 60, and this has not changed a lot over this period. Over age 60, the profile is generally quite flat, except in 1970, when it was downward sloping, reflecting the fact that the pension system was less generous at the time, and gradually improved over time. It is also striking to see that the age-capital income profile (and the age-wealth profile, see our companion paper) is much more strongly upward sloping than the age-labor income profile (see Figure 18).

If we now look at inequality, we find that it is almost as large within each age group as for the population taken as a whole (see Figure 19).

We now come to gender gaps. Here the main novelty is that we are able to offer detailed annual series on gender gaps, with reliable data on top incomes. The general conclusion is that although gender gaps have declined a lot since 1970 (the age of patriarchy), they are still extremely high, particularly at the top (see Figures 20-24).

The recent situation shows a rising gender gap along ages (Figure 20). While men earn in average 1.25 times more than women when they are 25, this gender gap continuously increases up to 1.64 when they are 65, with an average of 1.5. If we look at a longer temporal perspective, this significant gender gap turns out to be the lowest we observe (Figure 21). In particular, the French labor model of the 1970s appears clearly as patriarchal with men earning 3.5 to 4 times women labor income and women's labor force participation rate around 45%. While we document a continuous decline of gender inequality in labor income during recent decades (partly due to a dramatic increase of the share of working women from 45% in 1970 to 80% in 2012 (Figure 22)), Figure 23 makes clear that women still do not access higher-paying jobs. In 2012, female share is indeed 42% among top 50% earners, 30% among top 10% and 12% among 0.1% with a very moderate upward trend observed since 1994.

Section 6. International comparisons

We now put our findings in a broader cross-country perspective. One of the objectives of the DINA series is that the income levels can be more easily compared across countries. Unfortunately DINA series are available solely for France and the U.S. at this stage, so we limit our comparison to the U.S.

We first confirm that top income shares increased much more in the U.S. than in France since the 1980s (see Figures 25-26). That is, France used to be more unequal than the U.S. around 1910, and is now substantially more equal. The rise of U.S. inequality happened since 1980, and certainly involves a complex combination of factors, including a highly unequal education system, changing labor market rules (with a large fall in U.S. federal minimum wage), changing governance and incentives for top executive pay-setting (for a discussion, see Piketty 2014).

In our view, the most striking finding is that although per adult national income is about 30% smaller in France (which is largely due to longer hours of work in the U.S., with comparable hourly productivity), bottom 50% average income is about 30% higher in France (see Figure 27). This would probably be reinforced if we look at after-tax after-transfer inequality (in progress). But it is interesting to see that this is already the case for pre-tax pre-transfers inequality. More generally, long-term changes in inequality reflect large changes in both pre-tax inequality (itself influenced by policies and institutions) and after-tax inequality.

Section 7. Concluding comments and research perspectives

In this paper, we have combined fiscal data, national accounts and survey data in order to produce unified series covering the entire distribution of income in France over the period 1913-2013 (DINA).

We document large changes in inequality both over time and across countries that cannot be seen as the results of any natural economic laws and seem more likely to be the product of changes in institutions and public policies. While World Wars led to massive capital destruction, some less extreme events have also played an important role in the evolution of inequality. The protests of 1968 and the austerity turn in 1983 are two turning points in income inequality. They are related to political questions and direct changes in minimum wages and, to a broader extent, to regulation of wages. The end of a patriarchal system with the evolution of the economic role of women is another example of events driven by political debates related to controversial views of society organization.

This work is due to be extended to lots of countries. The comparison between countries with diverse institutions and different tax and transfer systems may help to better understand the specific role of public policies and, more specifically, how they shape income and gender inequalities.

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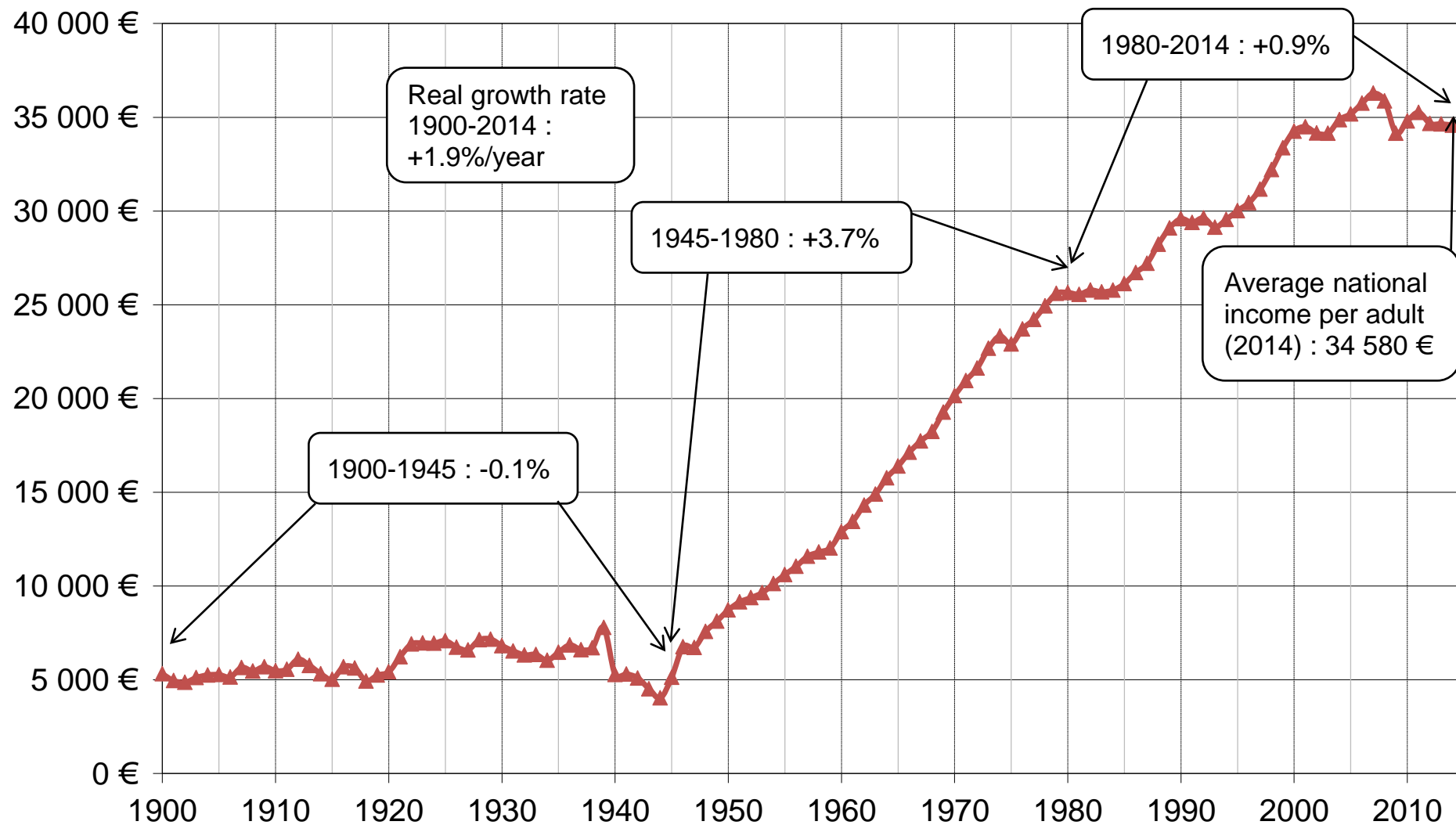
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Table 1 : Income thresholds and income shares in France, 2013

Income group	Number of adults	Income threshold	Average income	Income share
Full Population	26 725 740	0 €	34 440 €	100.0%
Bottom 50%	13 362 870	0 €	15 510 €	22.5%
Middle 40%	10 690 296	27 420 €	38 920 €	45.2%
Top 10%	2 672 574	60 970 €	111 230 €	32.3%
<i>incl. Top 1%</i>	<i>267 257</i>	<i>162 400 €</i>	<i>359 290 €</i>	<i>10.4%</i>
<i>incl. Top 0.1%</i>	<i>26 726</i>	<i>536 410 €</i>	<i>1 308 290 €</i>	<i>3.8%</i>
<i>incl. Top 0.01%</i>	<i>2 673</i>	<i>2 064 350 €</i>	<i>5 181 850 €</i>	<i>1.5%</i>
<i>incl. Top 0.001%</i>	<i>267</i>	<i>9 562 310 €</i>	<i>18 990 120 €</i>	<i>0.6%</i>

Notes: This table reports statistics on the distribution of income in France in 2013. 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. Source: Appendix Table B1.

Figure 1: The uneven rise of per adult national income in France, 1900-2014 (€2014)



National income divided by adult population. National income = GDP - capital depreciation + net foreign income.

Figure 2: Top 10% income share, France 1900-2013: long-run fall in inequality

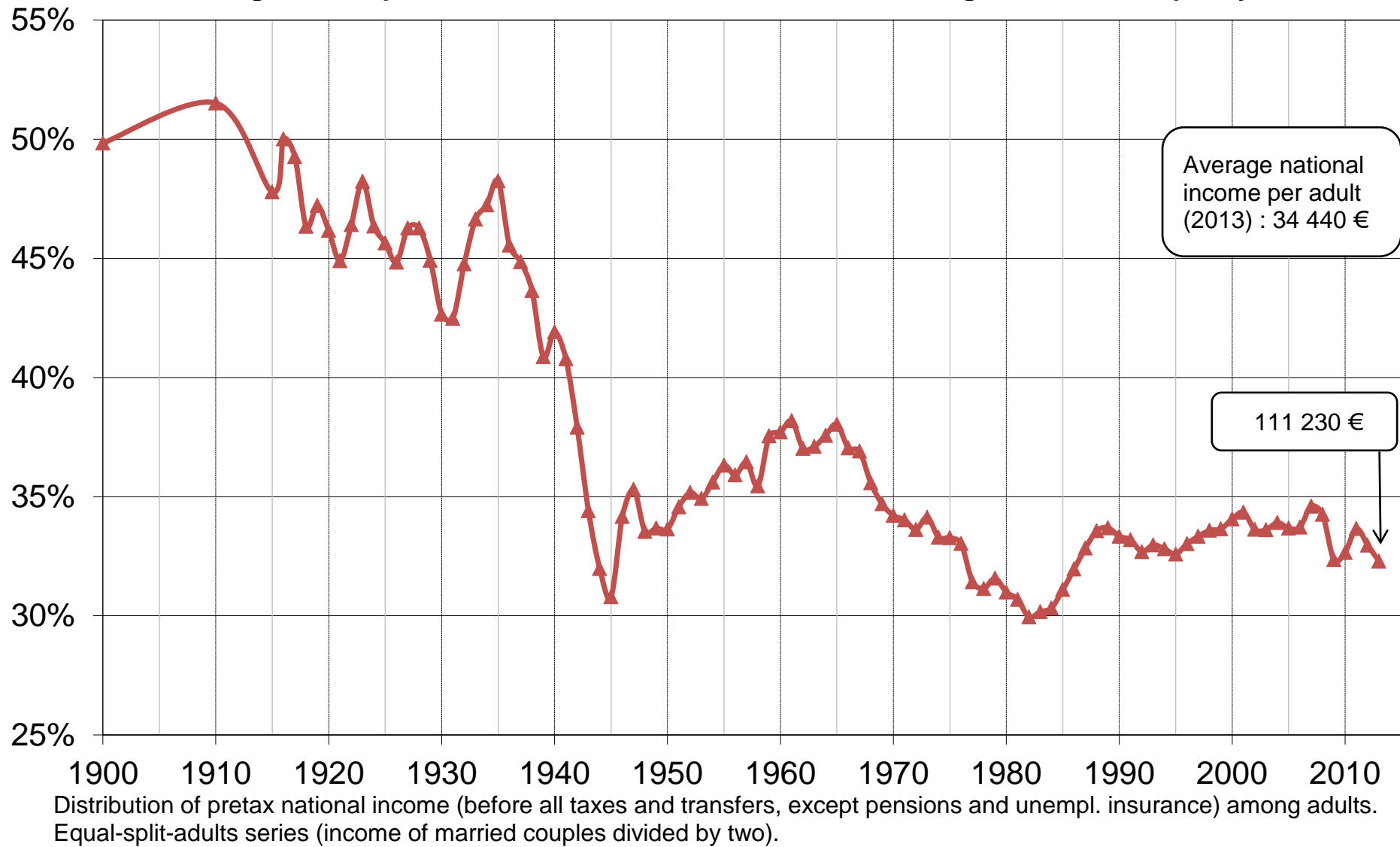
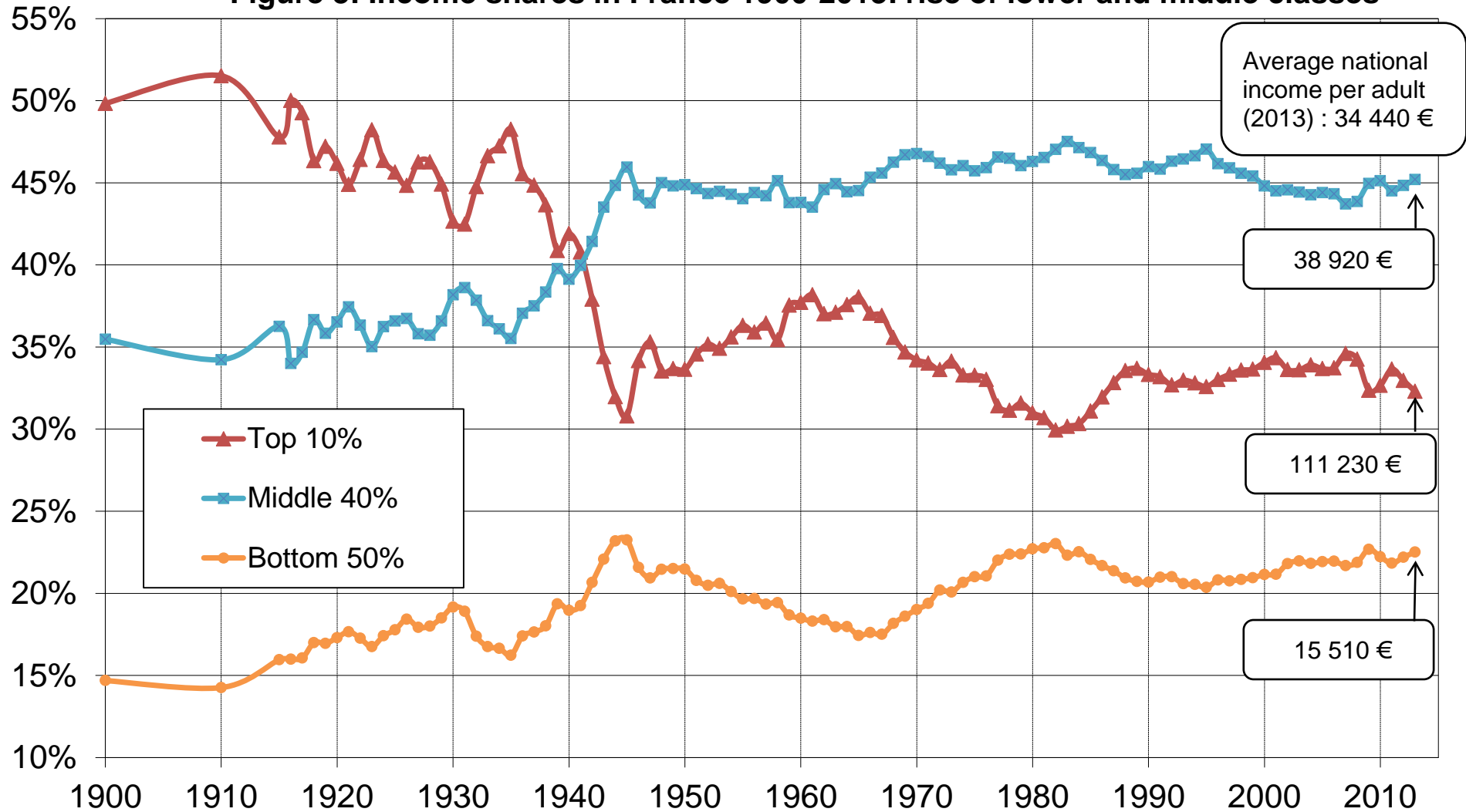
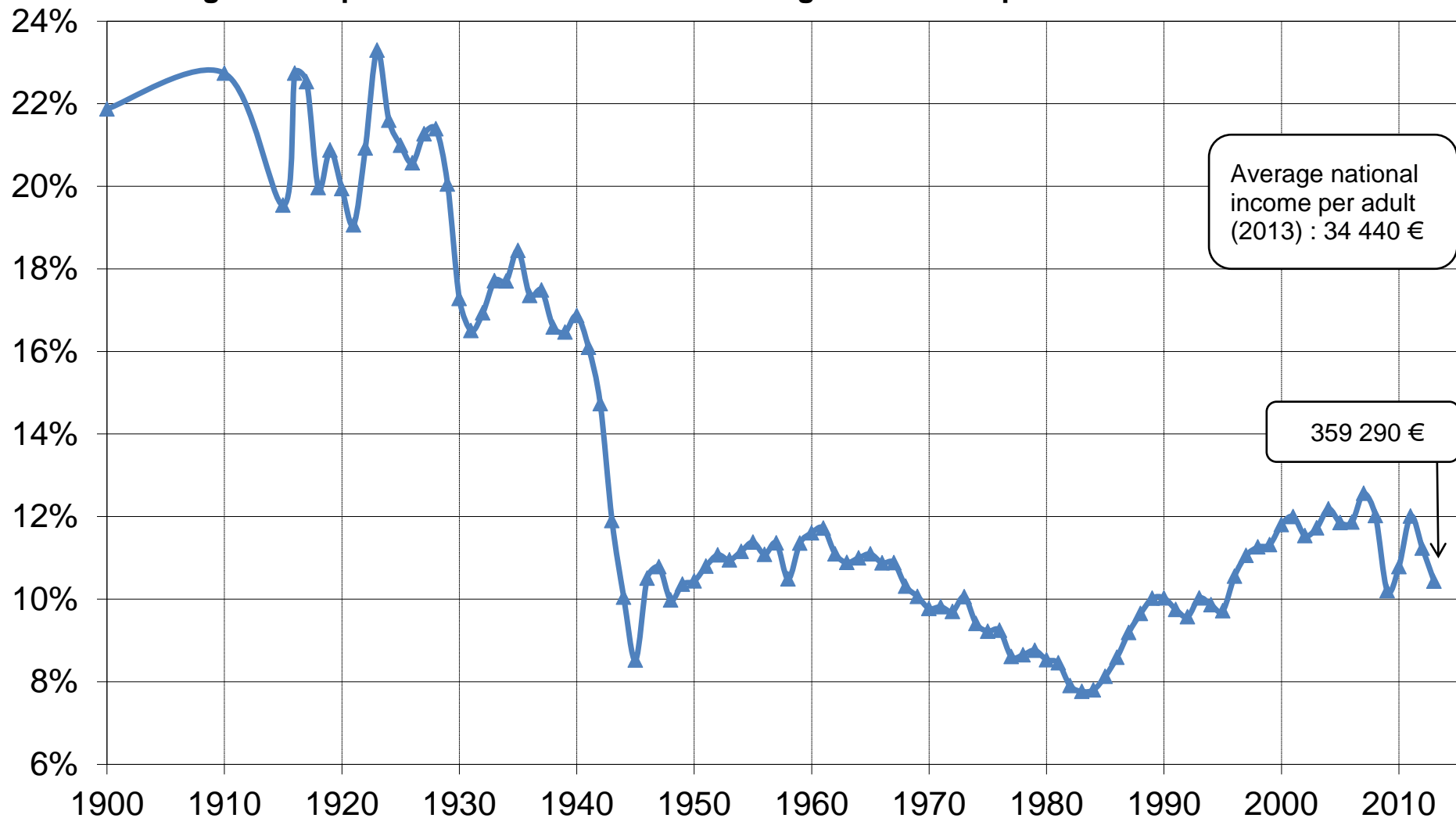


Figure 3: Income shares in France 1900-2013: rise of lower and middle classes



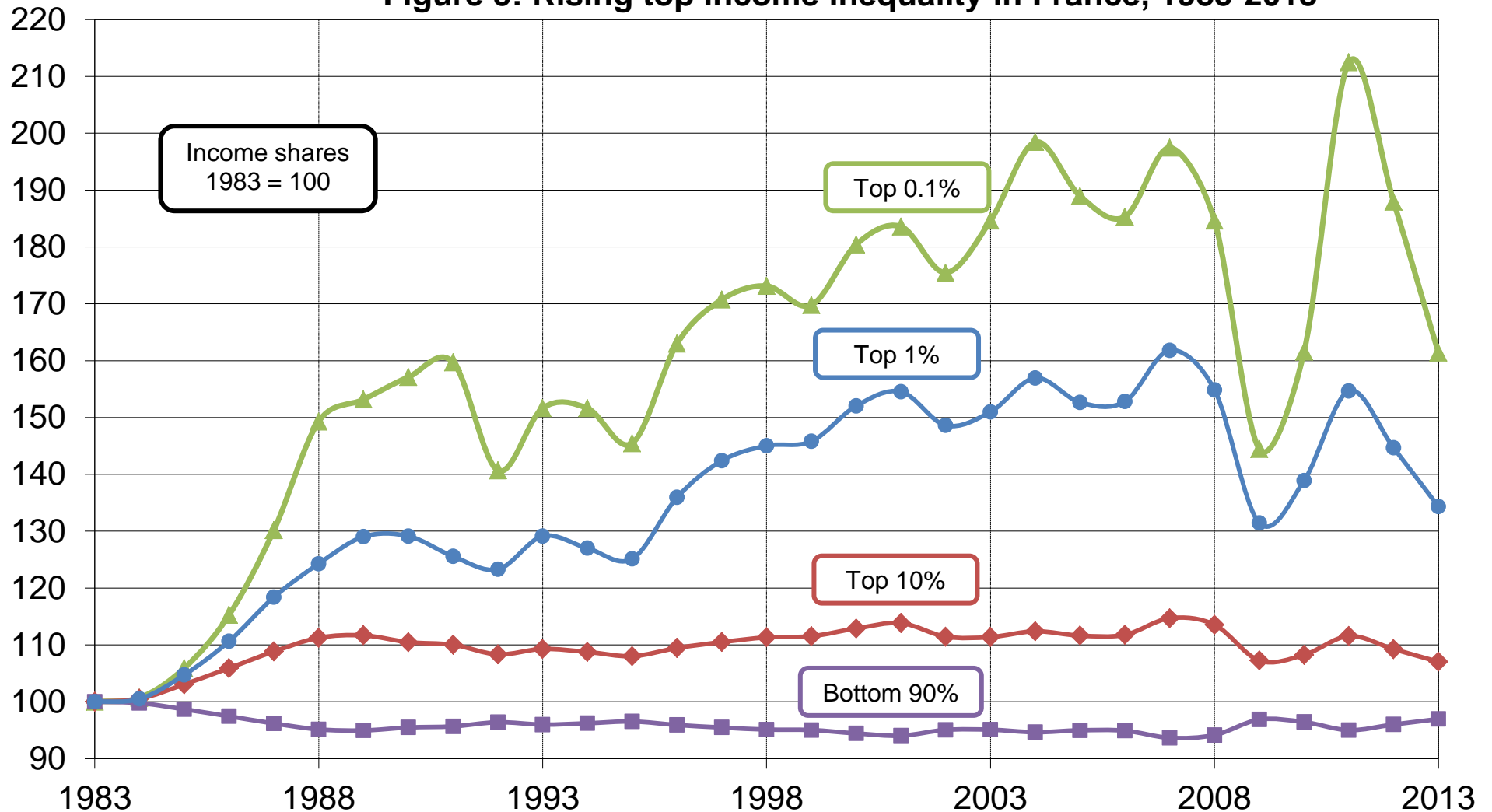
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 4: Top 1% income share in France: long-run fall but upward trend since 1980s



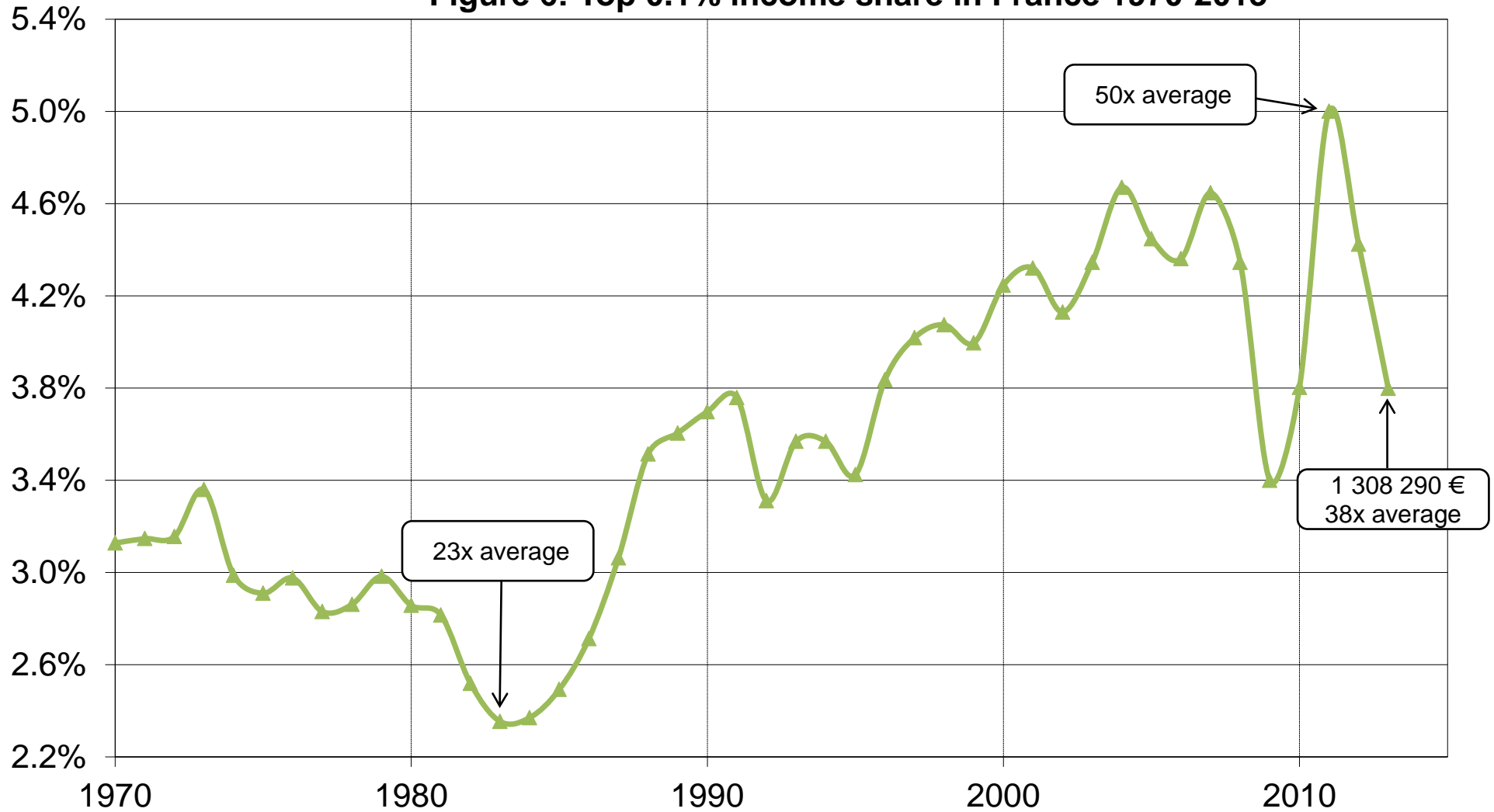
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 5: Rising top income inequality in France, 1983-2013



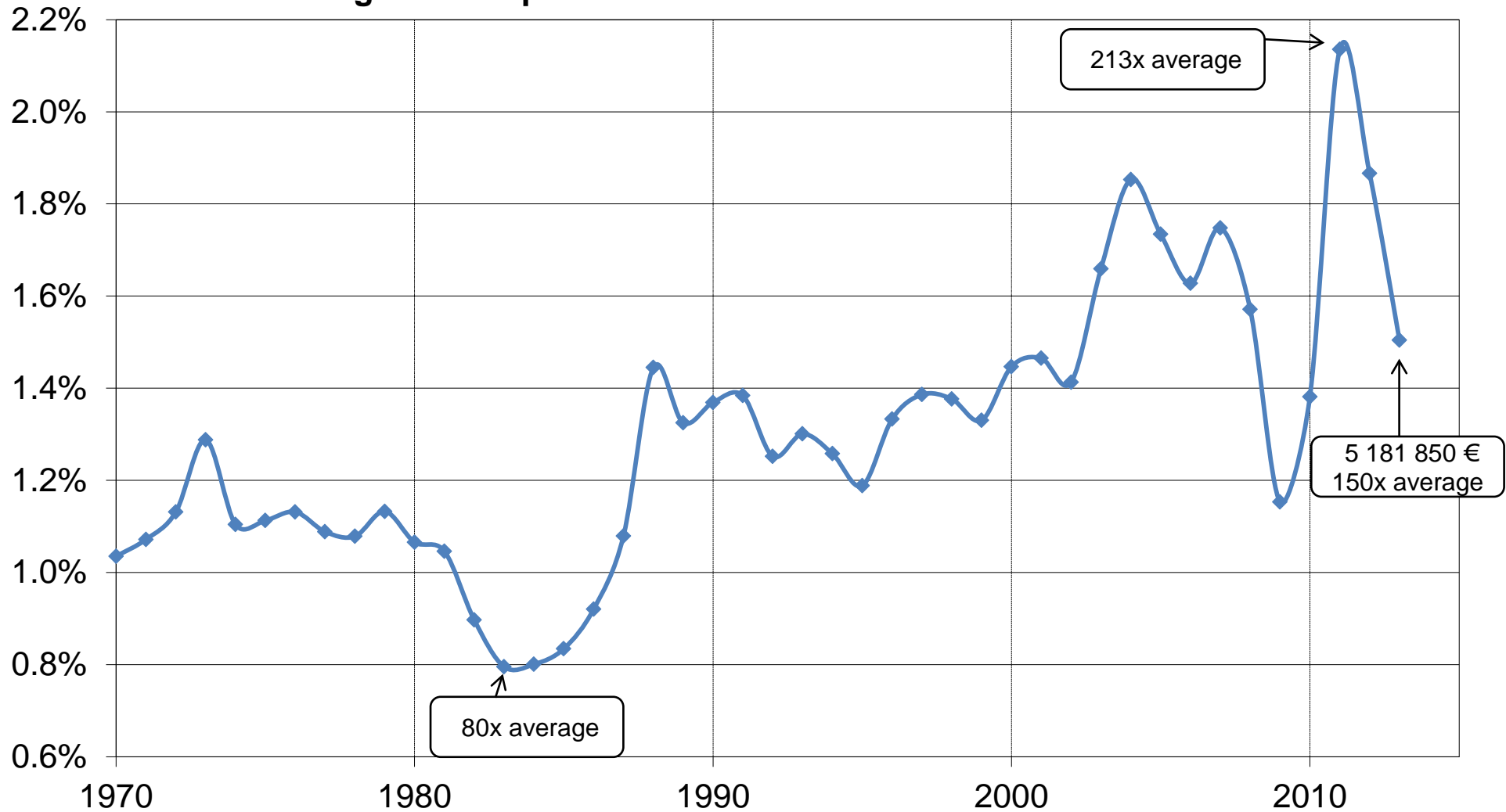
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl.insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 6: Top 0.1% income share in France 1970-2013



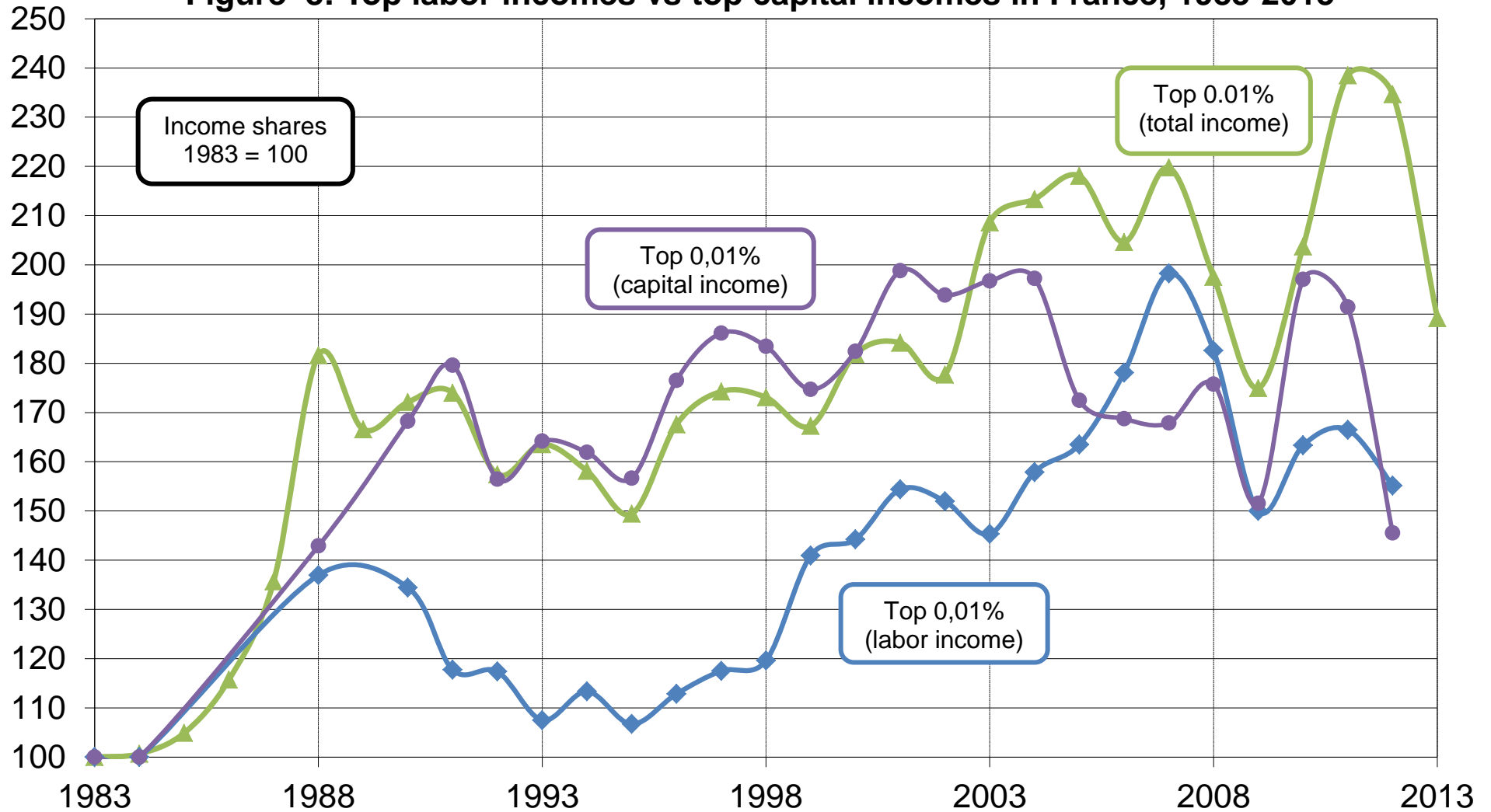
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl.insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 7: Top 0.01% income share in France 1970-2013



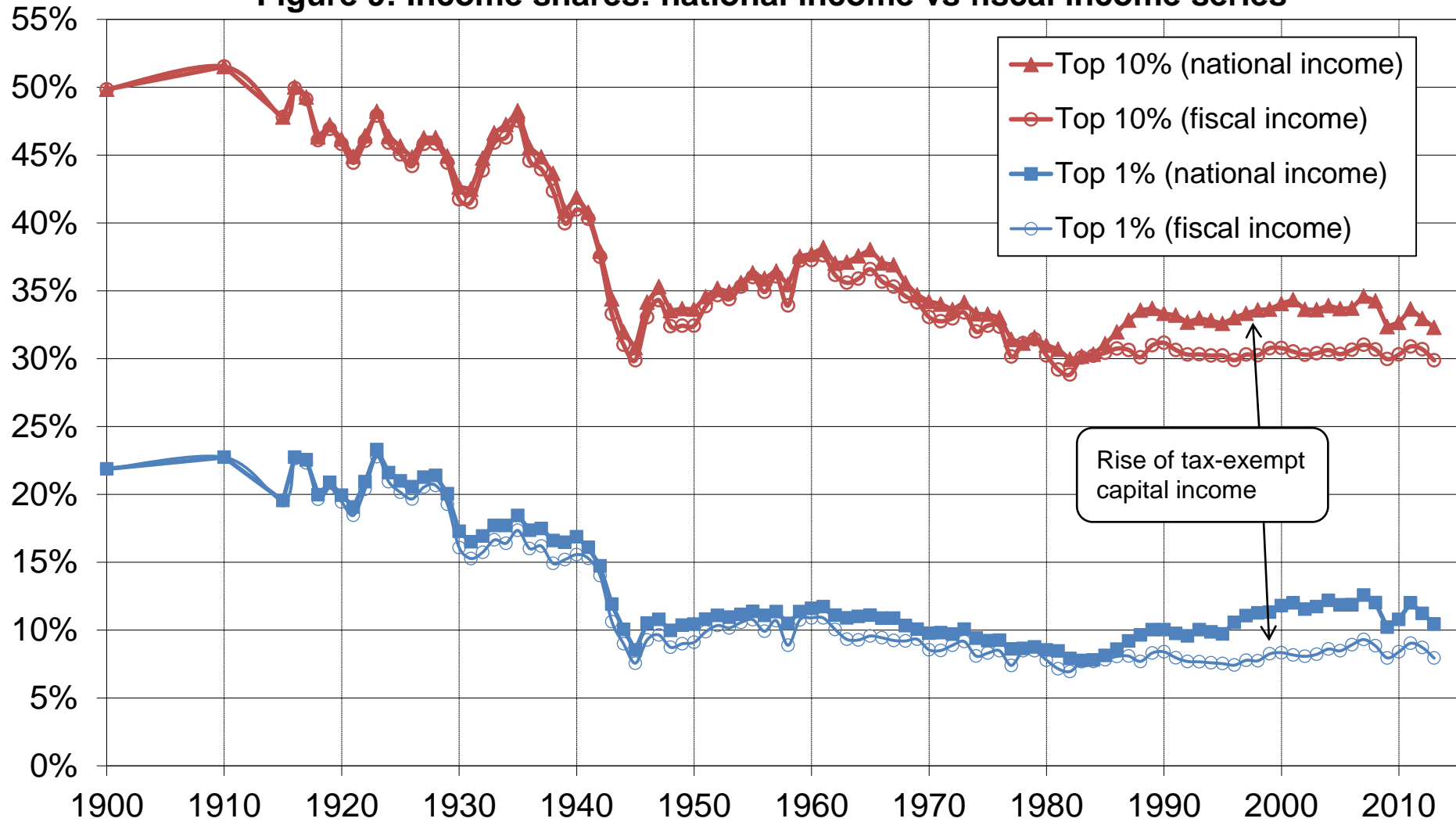
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl.insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 8: Top labor incomes vs top capital incomes in France, 1983-2013



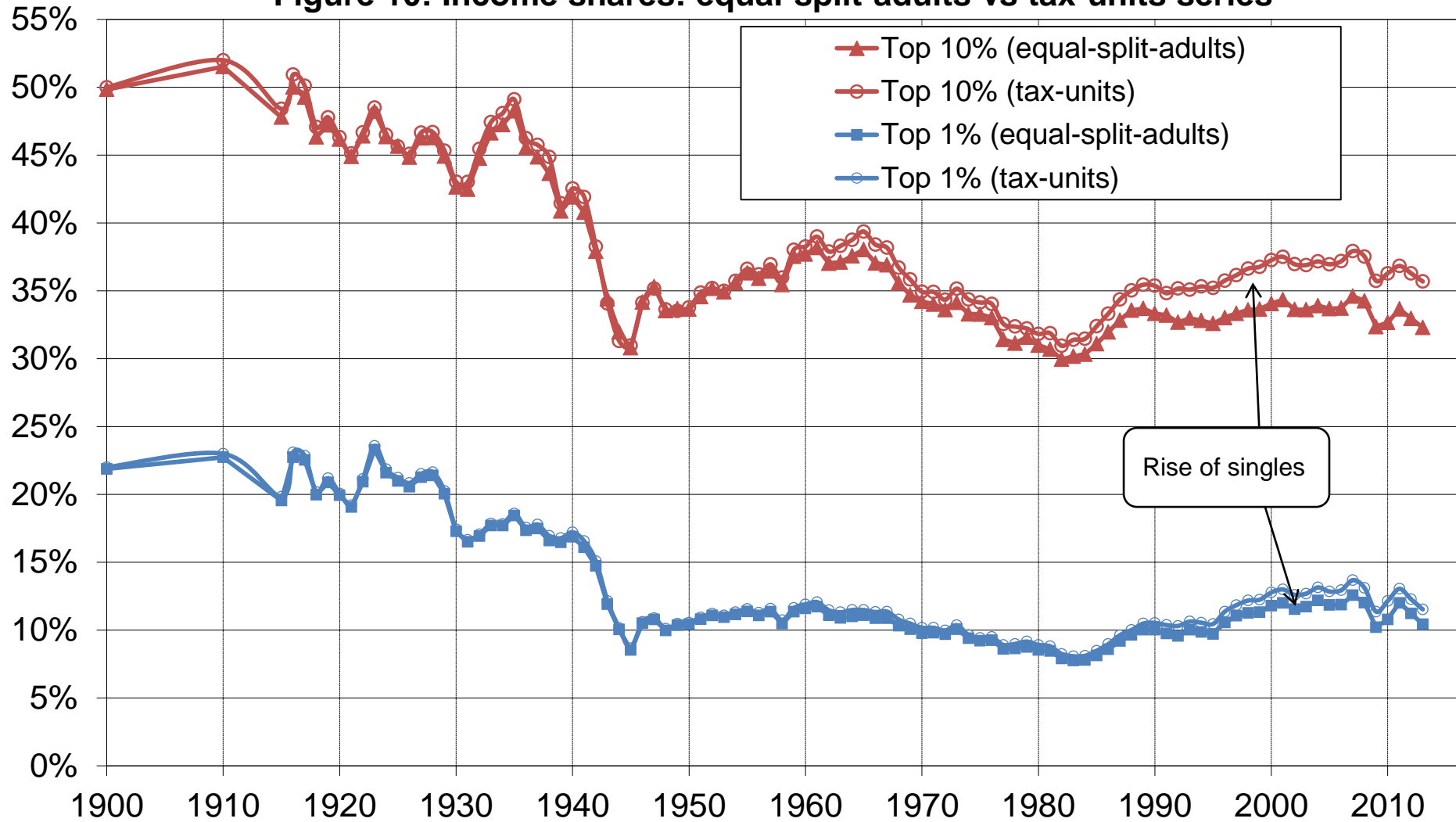
Distributions of total income, capital income and labor income among adults.
 Equal-split-adults series (income of married couples divided by two).

Figure 9: Income shares: national income vs fiscal income series



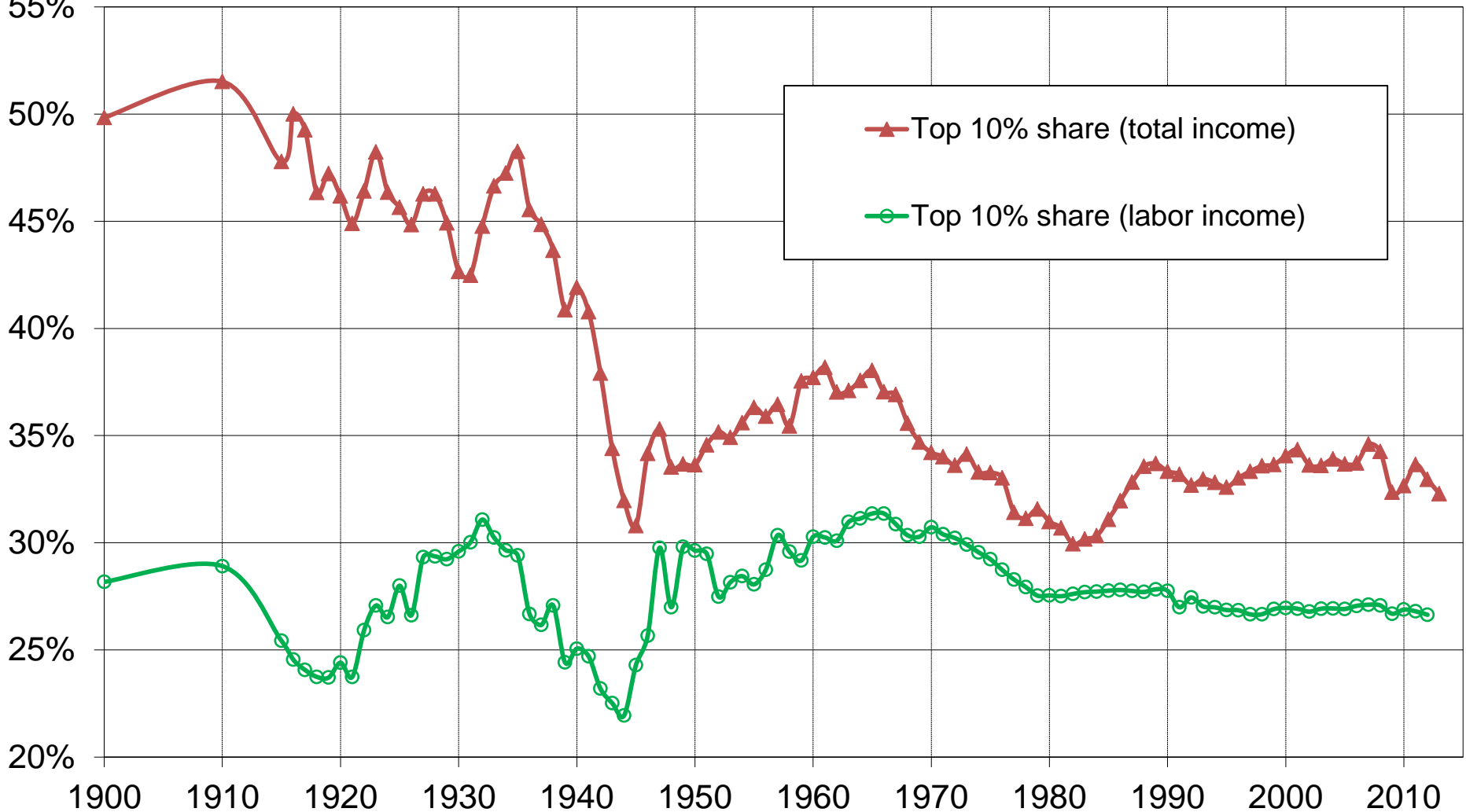
Distribution of pretax national income (incl. tax-exempt labor and capital income) vs pretax fiscal income (reported on income tax returns). Equal-split-adults series (income of married couples divided by two).

Figure 10: Income shares: equal-split-adults vs tax-units series



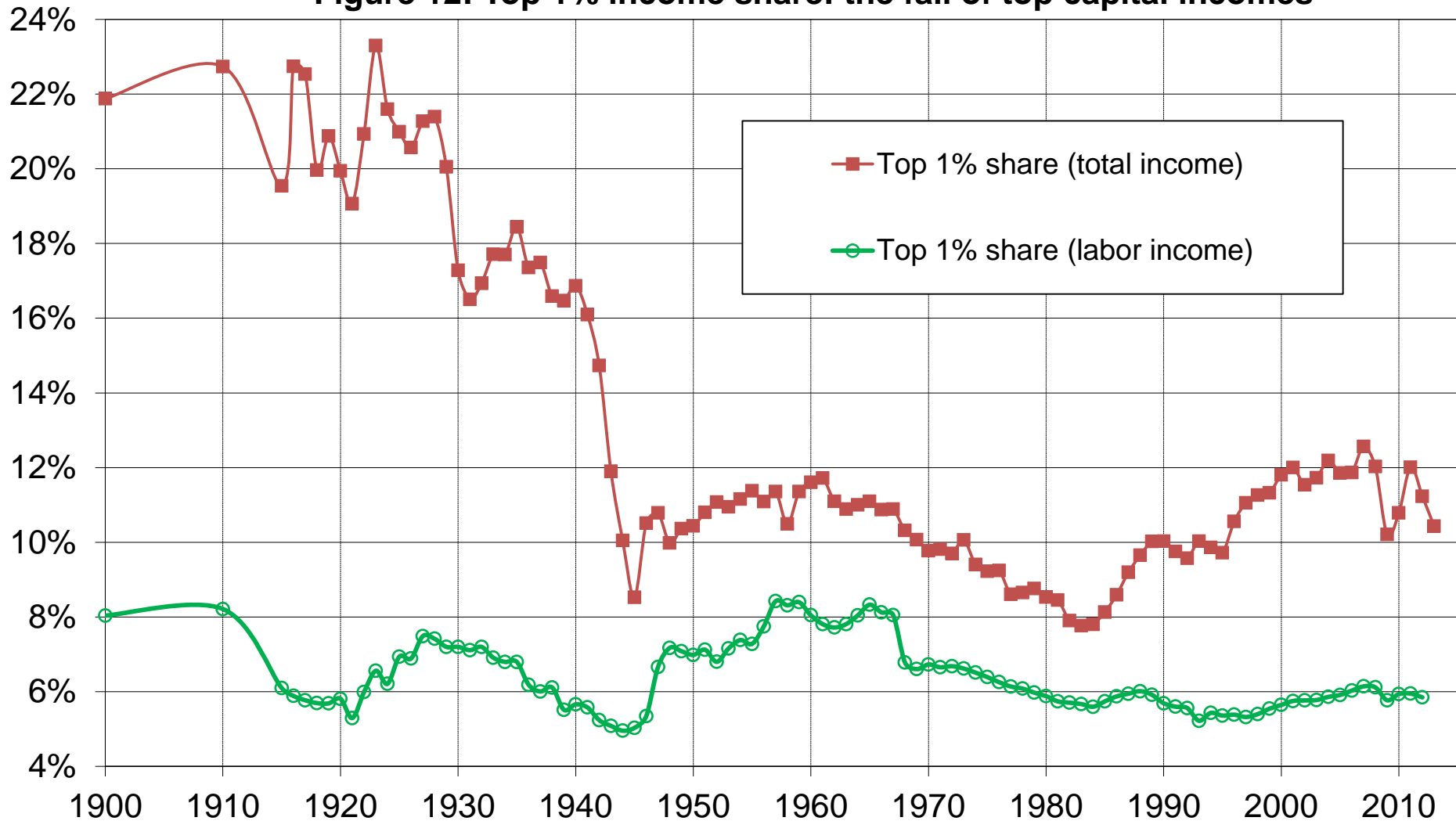
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two) vs tax-units series (singles and married couples).

Figure 11: Top 10% income share: total income vs labor income inequality



Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 12: Top 1% income share: the fall of top capital incomes



Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 13: Income composition by income level, France 2012

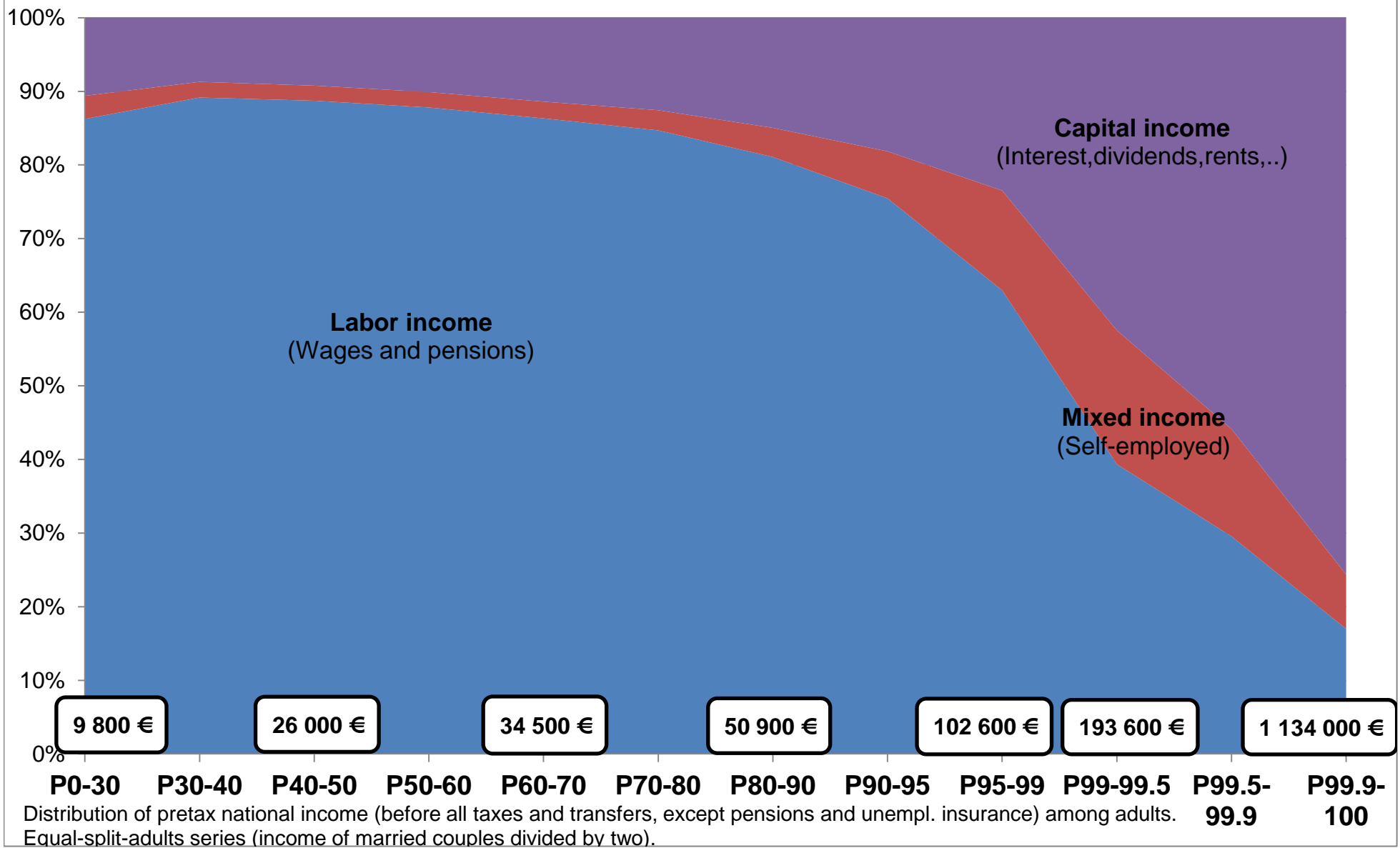
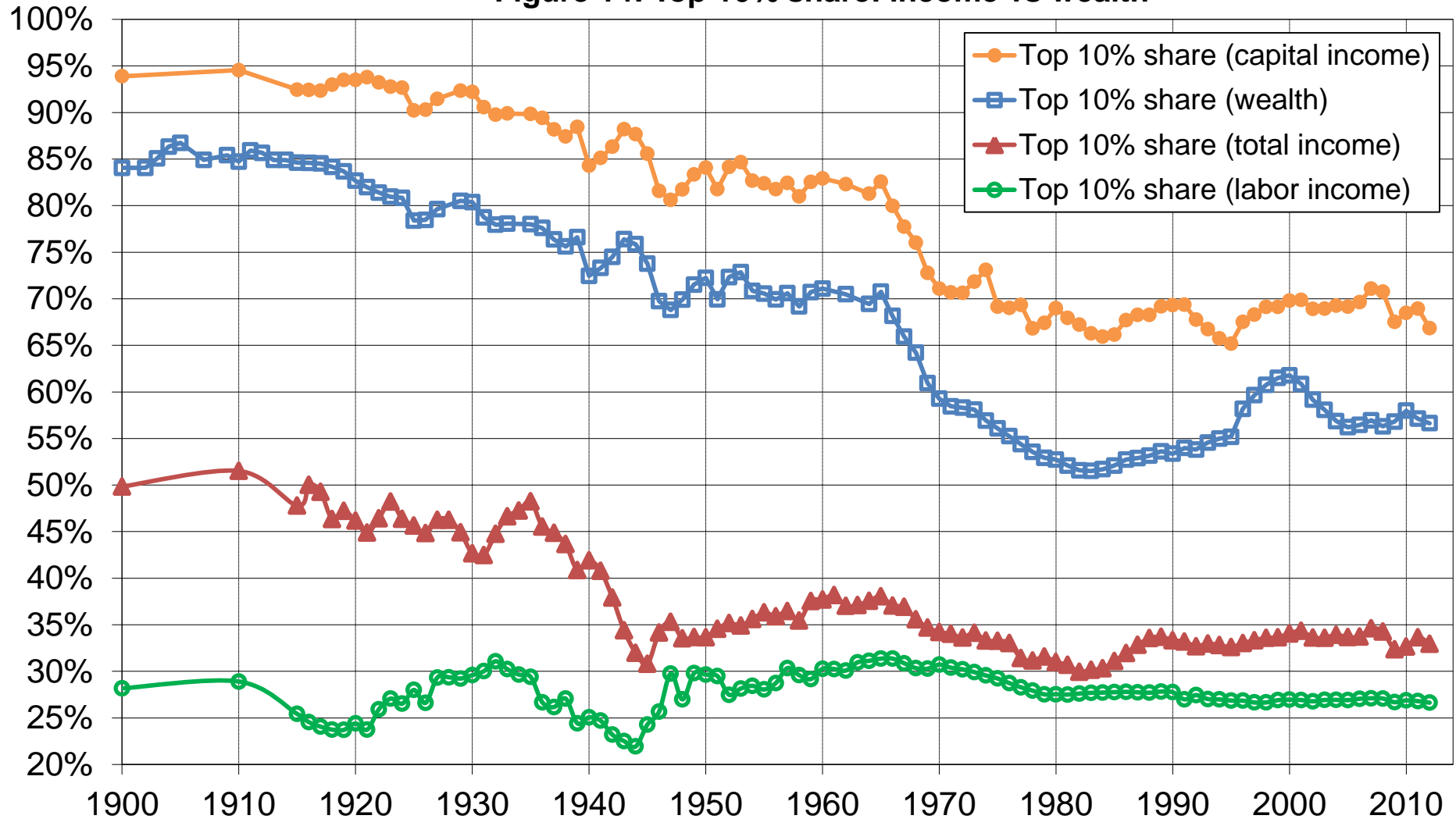
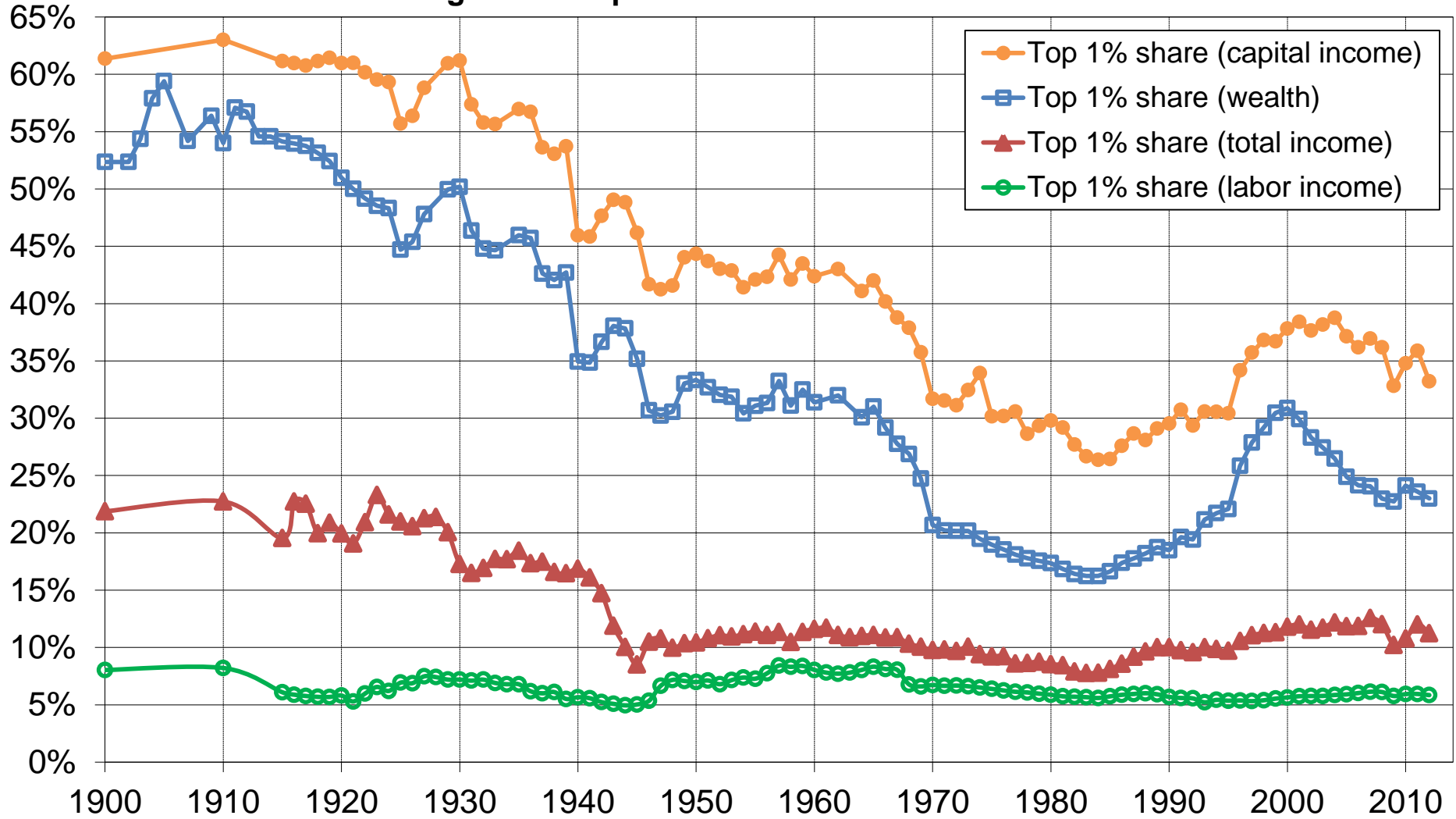


Figure 14: Top 10% share: income vs wealth



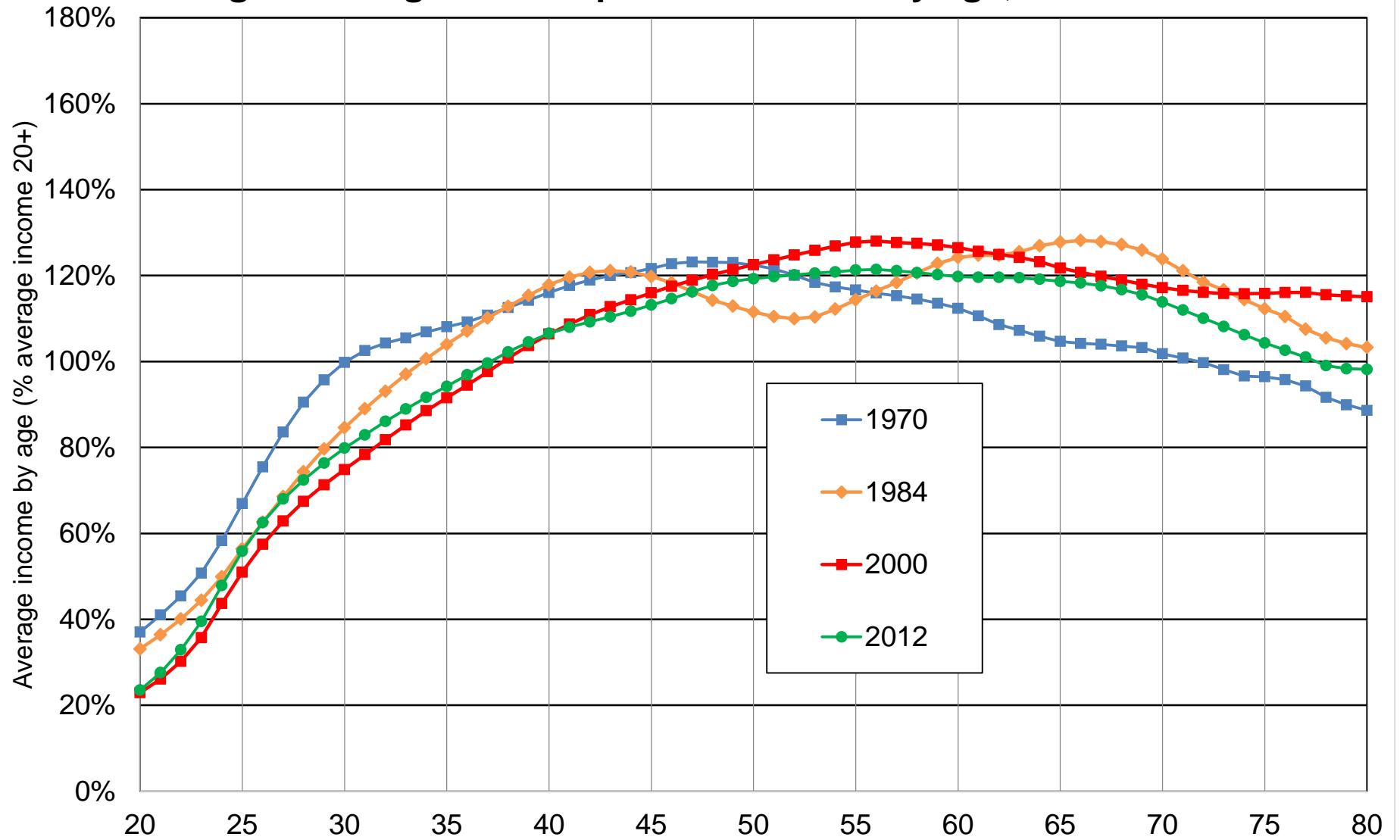
Distribution of total income, labor income, capital income and net wealth among adults.
Equal-split-adults series (income and wealth of married couples divided by two).

Figure 15: Top 1% share: income vs vs wealth



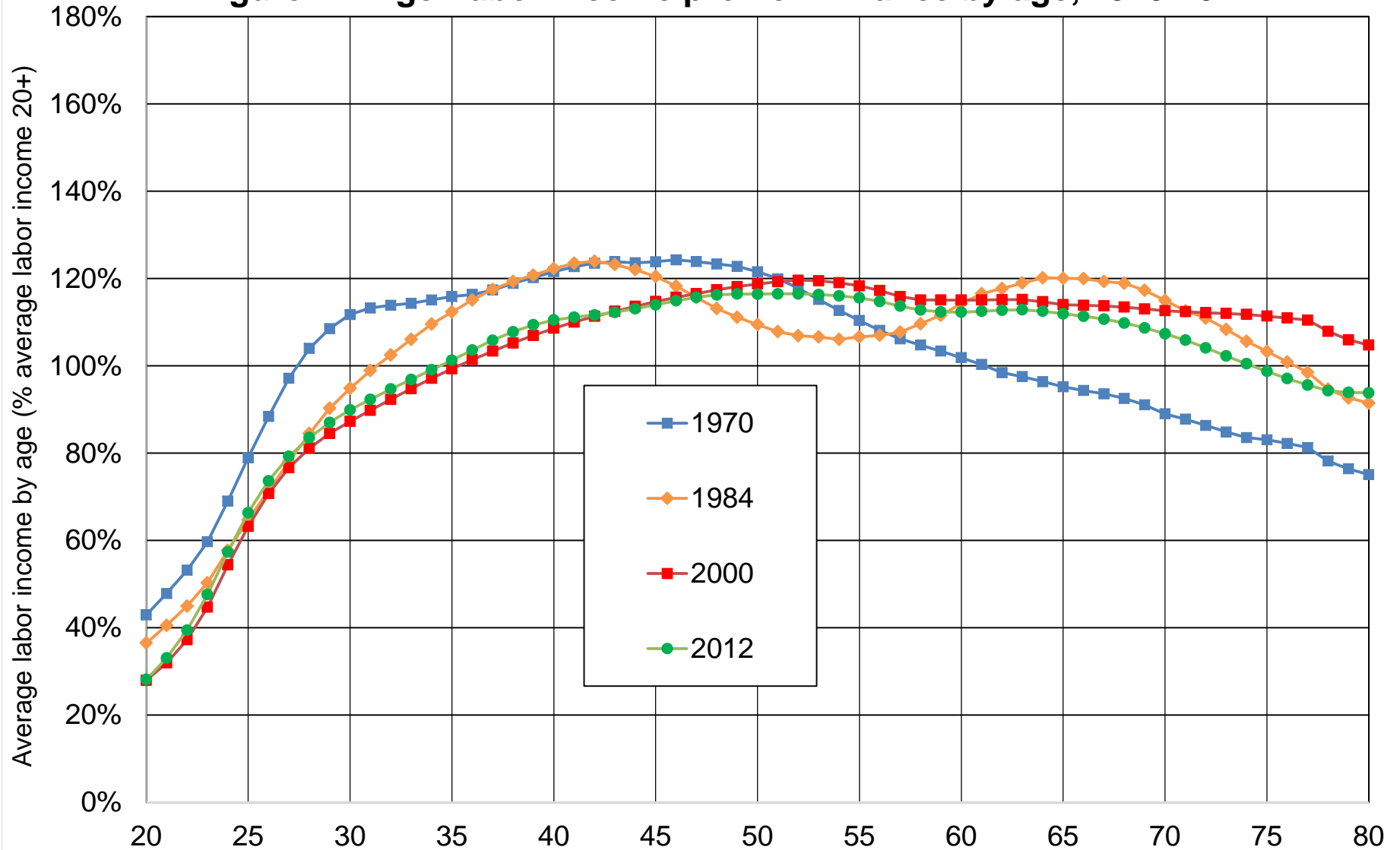
Distribution of total income, labor income, capital income and net wealth among adults.
Equal-split-adults series (income and wealth of married couples divided by two).

Figure 16: Age-Income profile in France by age, 1970-2012



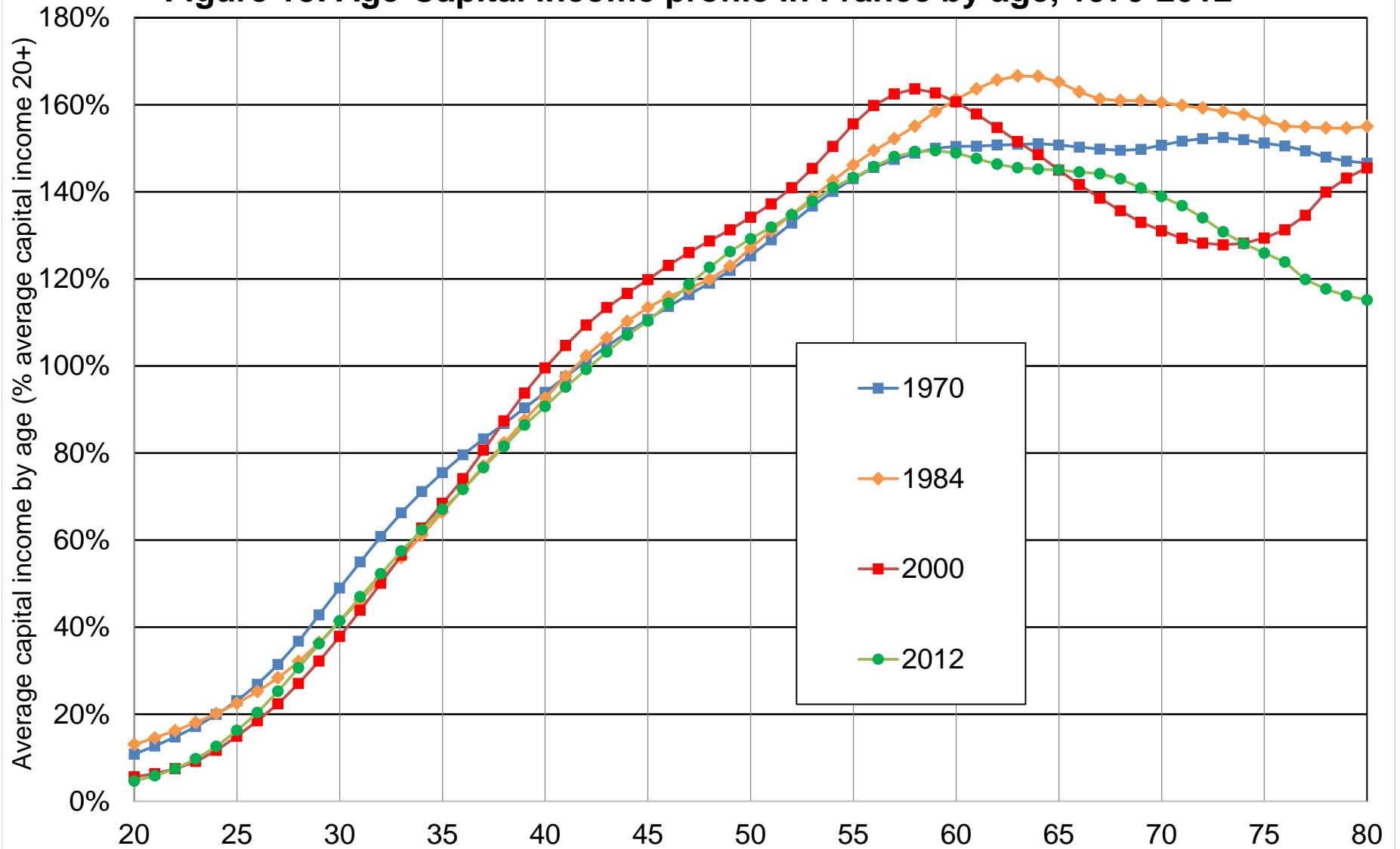
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 17: Age-Labor income profile in France by age, 1970-2012



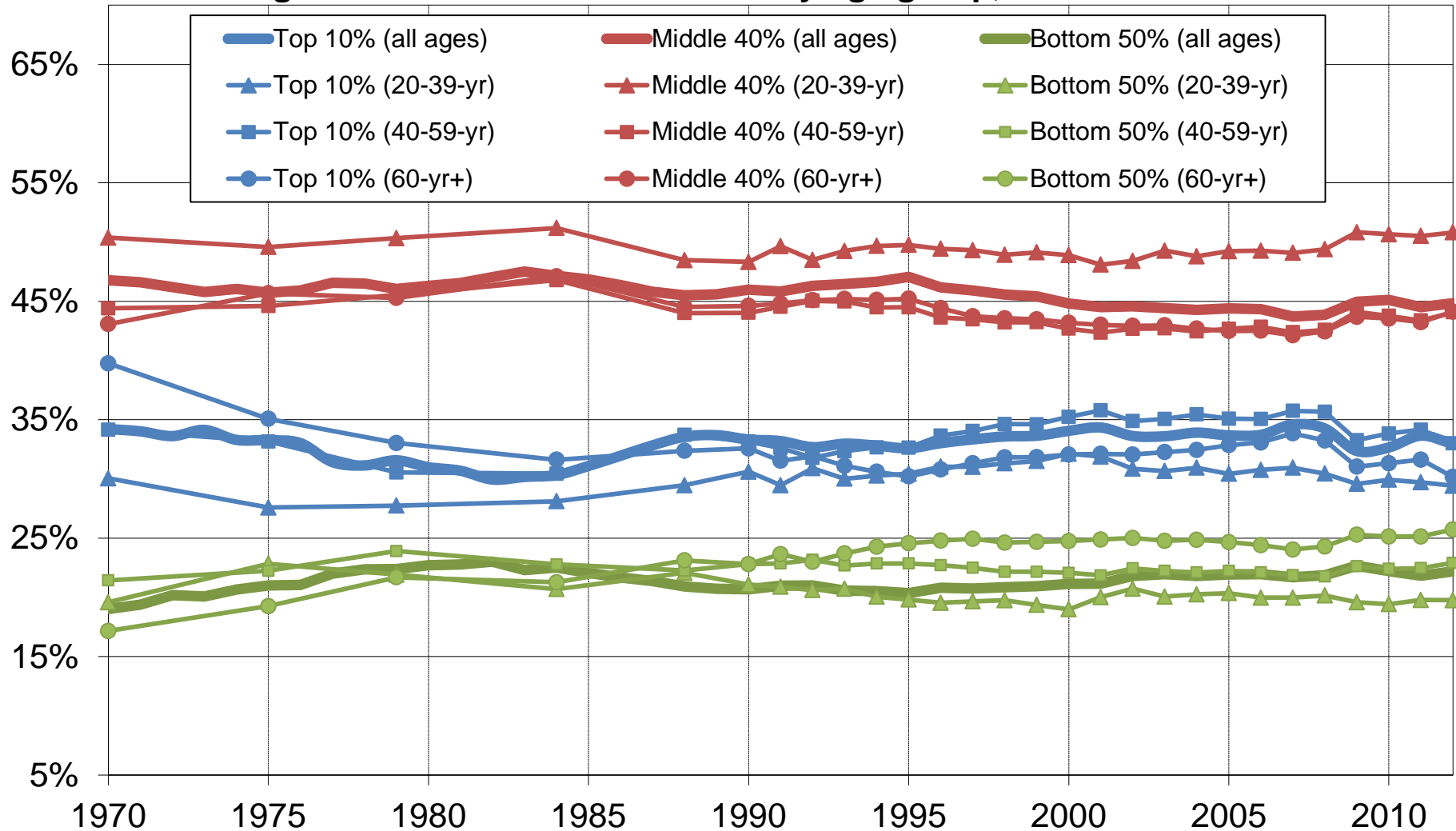
Distribution of pretax labor income (incl. pensions, unempl. insurance and 70% of mixed income) among adults.
 Equal-split-adults series (income of married couples divided by two).

Figure 18: Age-Capital income profile in France by age, 1970-2012



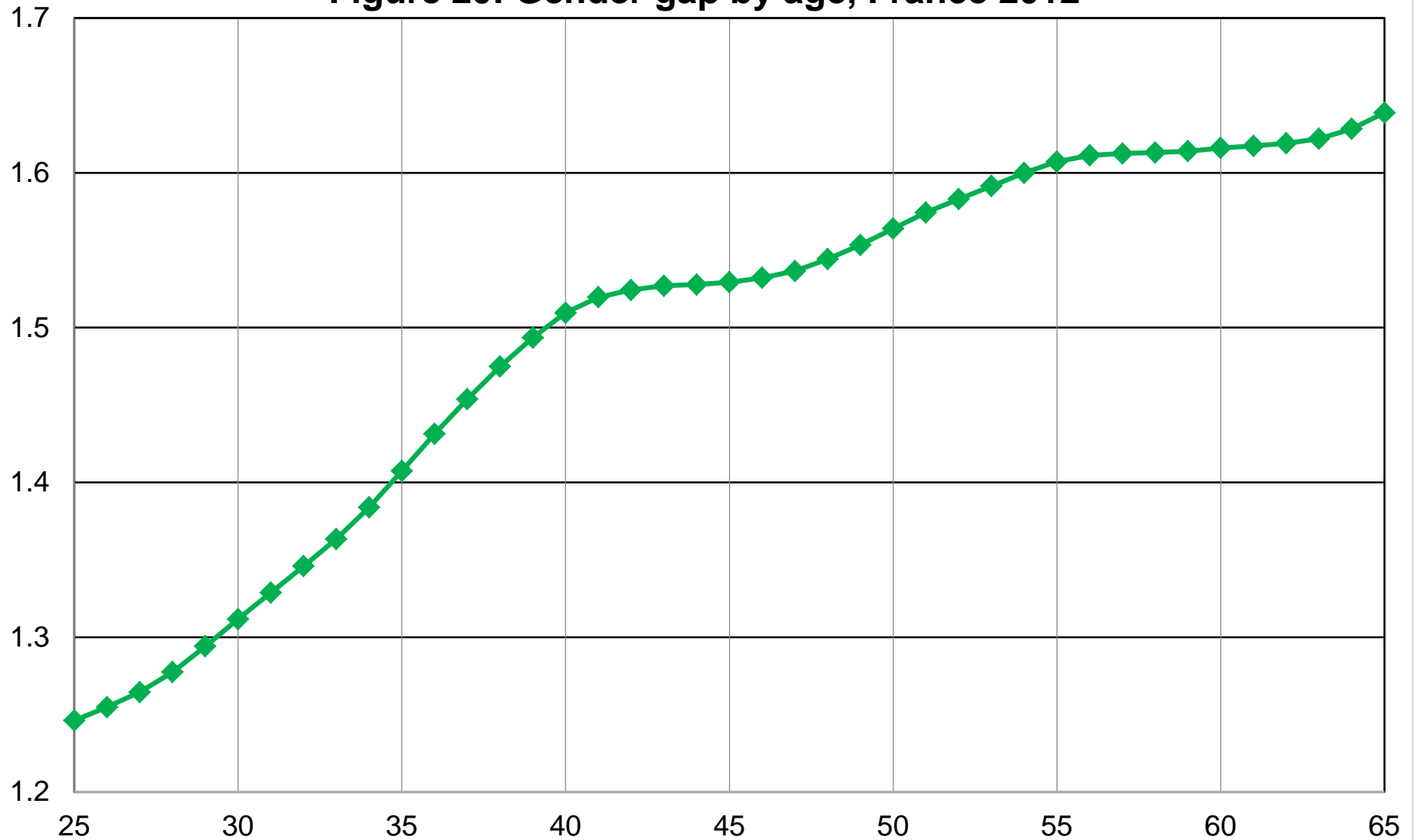
Distribution of pretax capital income (incl. 30% of mixed income) among adults.
 Equal-split-adults series (income of married couples divided by two).

Figure 19: Income concentration by age group, France 1970-2012



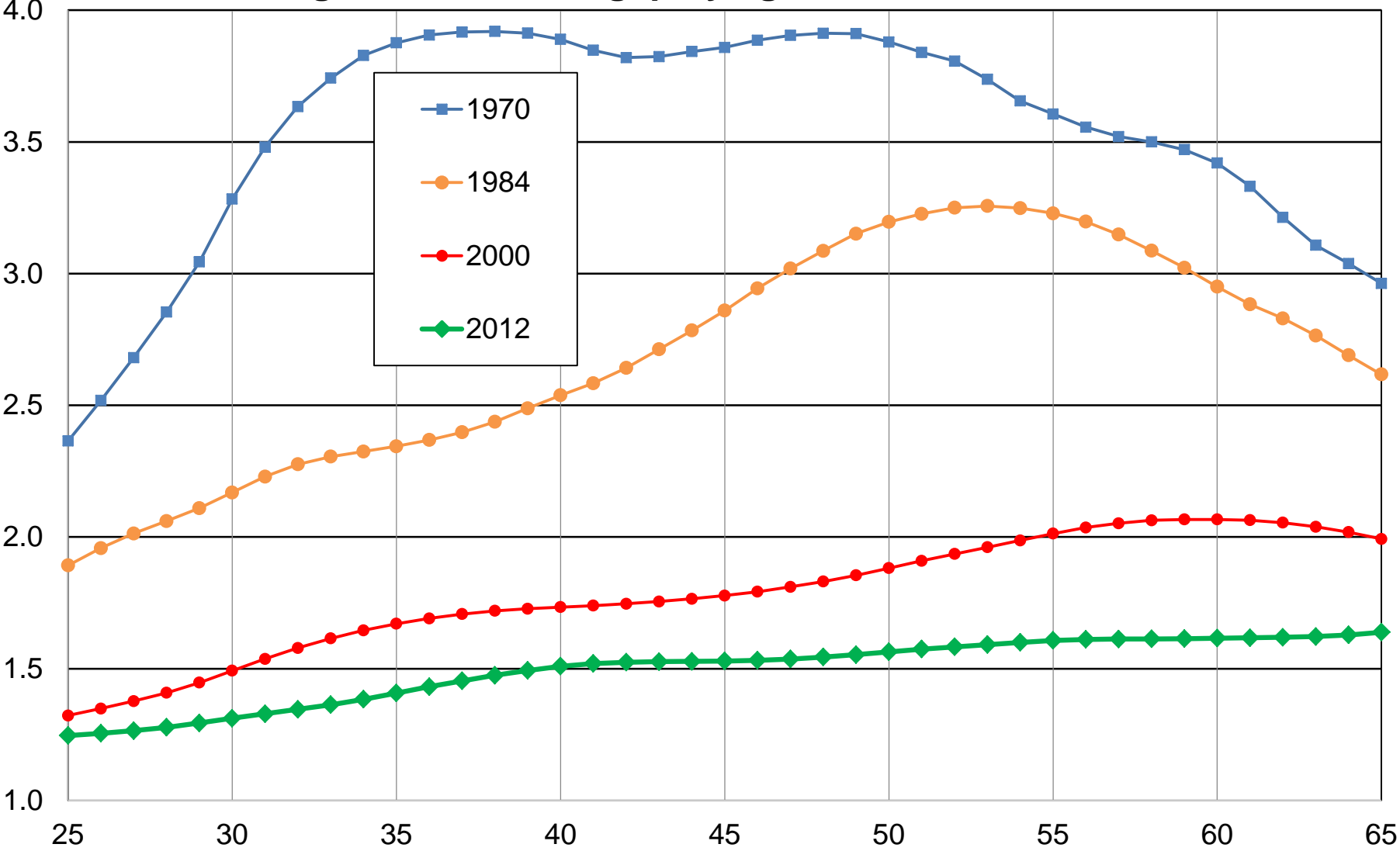
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 20: Gender gap by age, France 2012



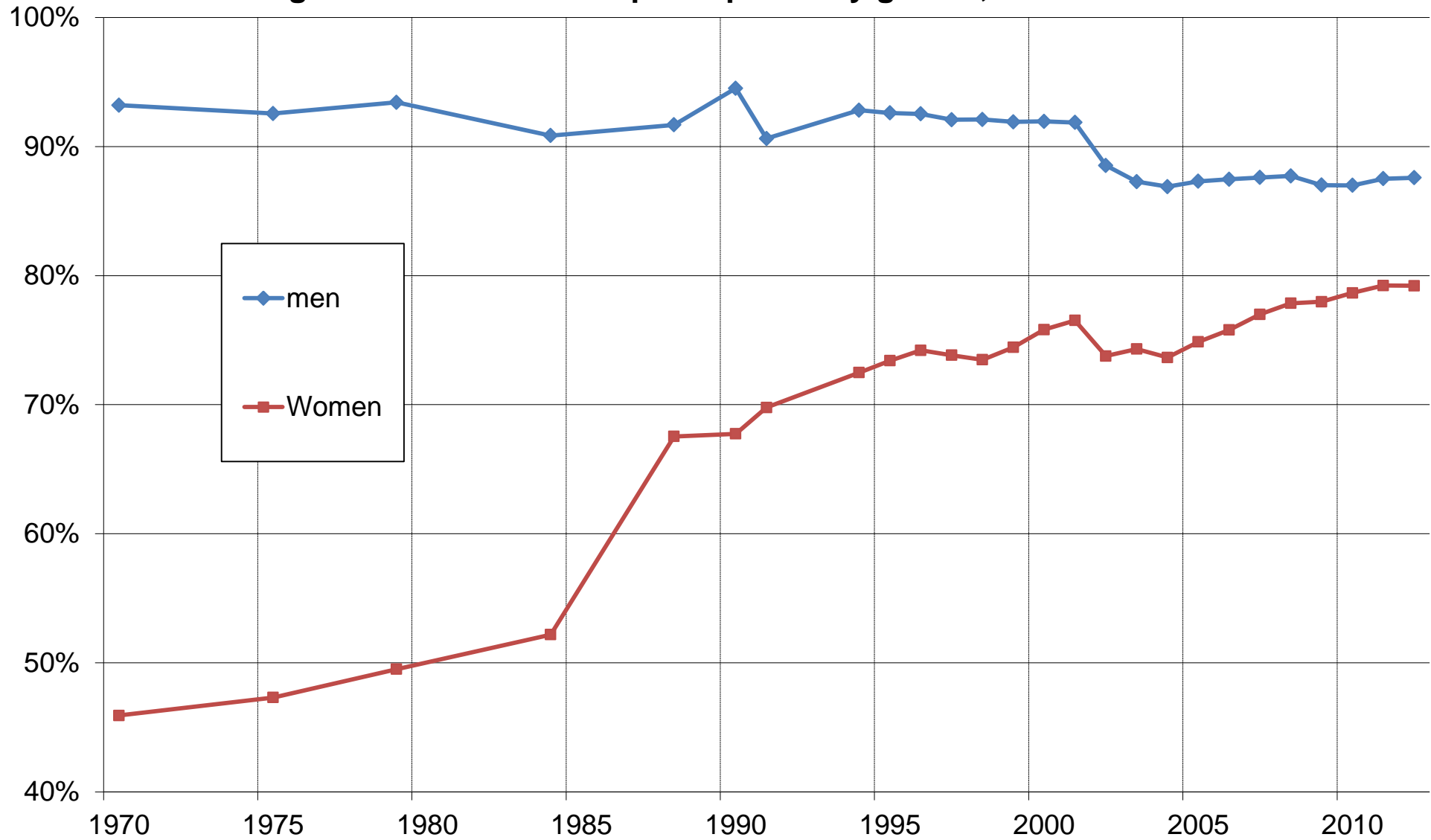
Ratio between average labor income of men and women by age (incl. non participants).
Labor income includes wages, pensions, unemployment insurance and 70% of mixed income.

Figure 21: Gender gap by age, France 1970-2012



Ratio between average labor income of men and women by age (incl. non participants).
 Labor income includes wages, pensions, unemploy. insurance and 70% of mixed income.

Figure 22: Labor market participation by gender, France 1970-2012



Fraction of men and women 25-to-65-year-old with positive labor income.

Labor income includes wages, pensions, unemploy. insurance and 70% of mixed income.

Figure 23: Share of women in fractiles of top labor incomes in France, 1970-2012

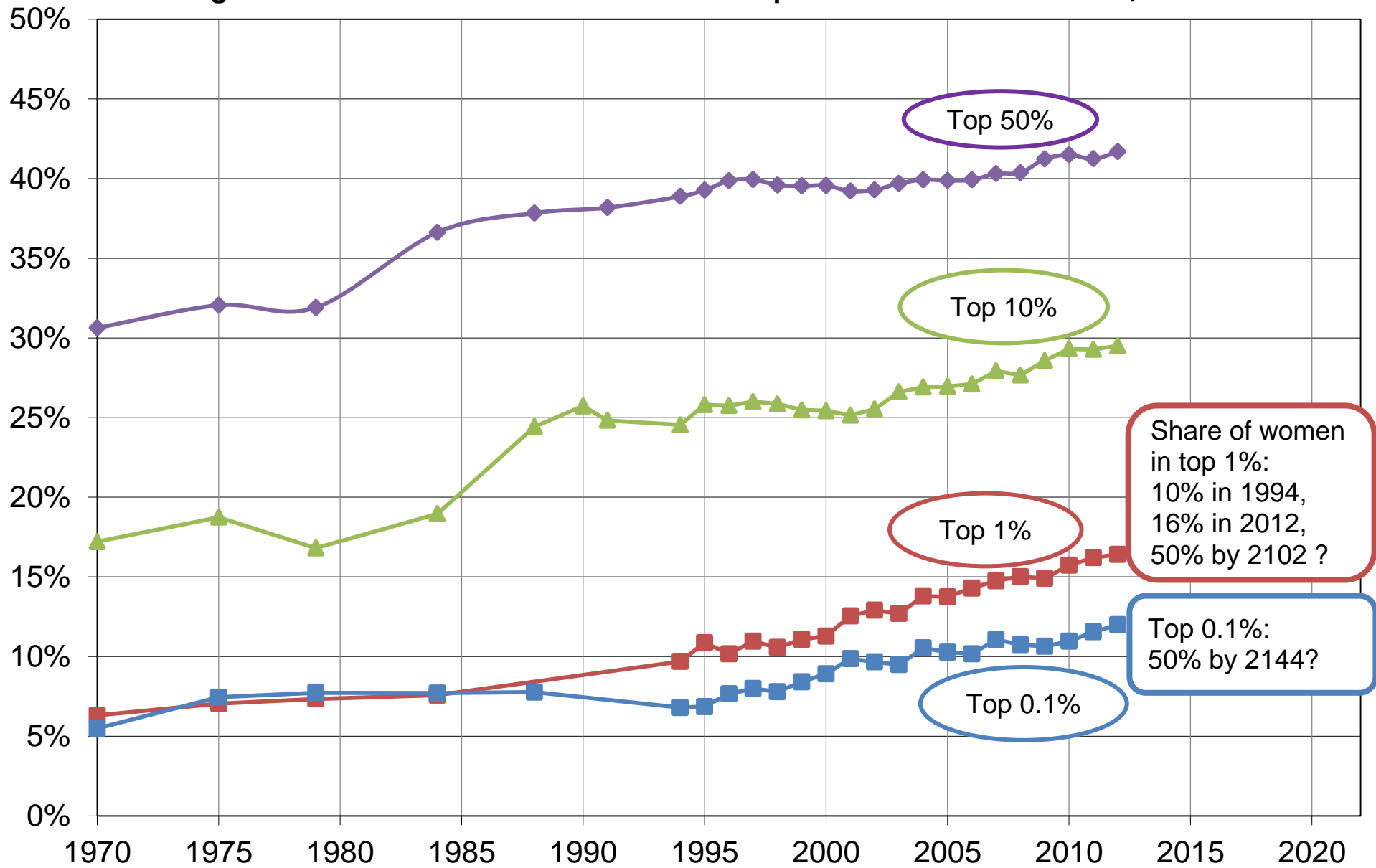
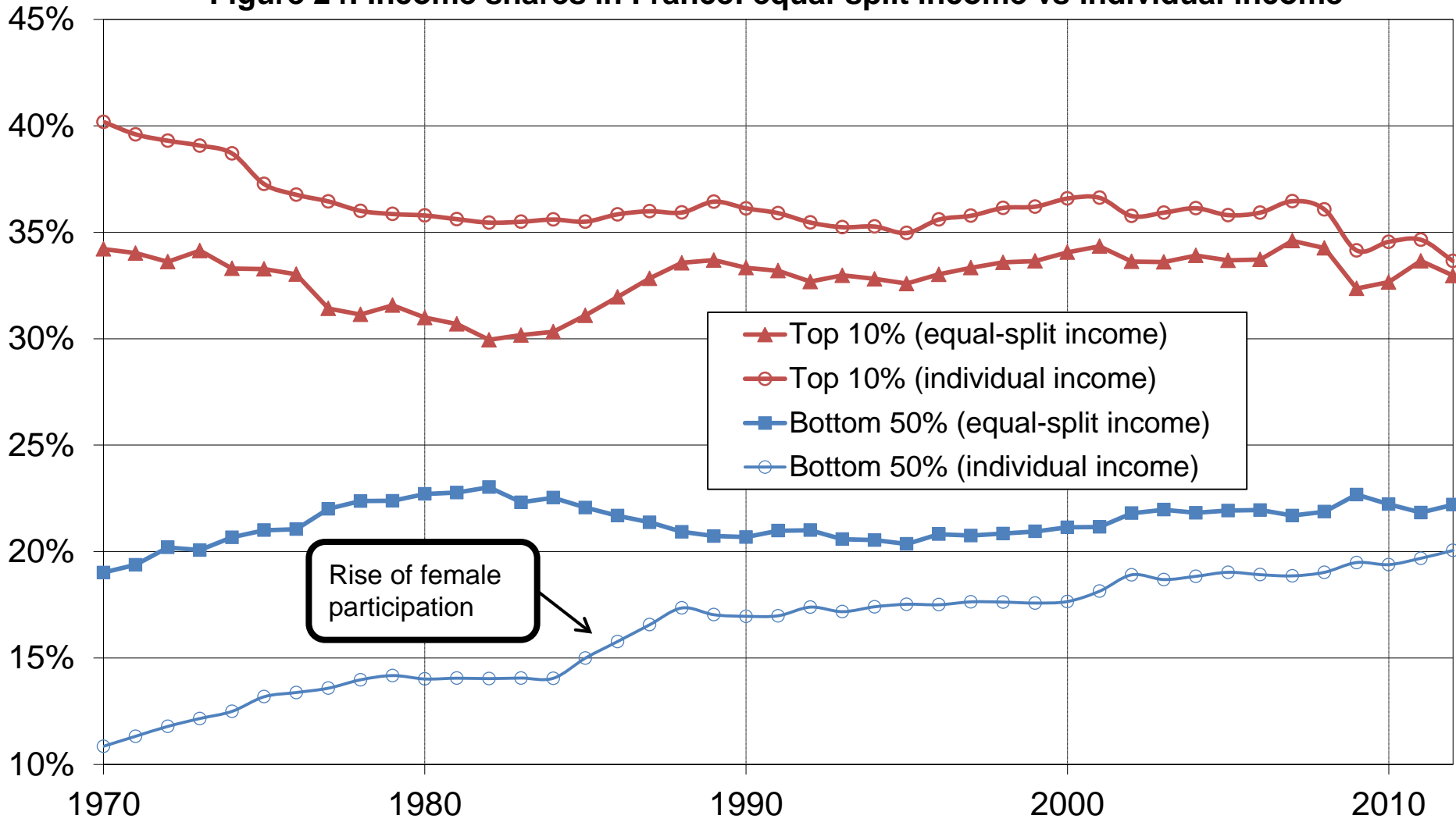
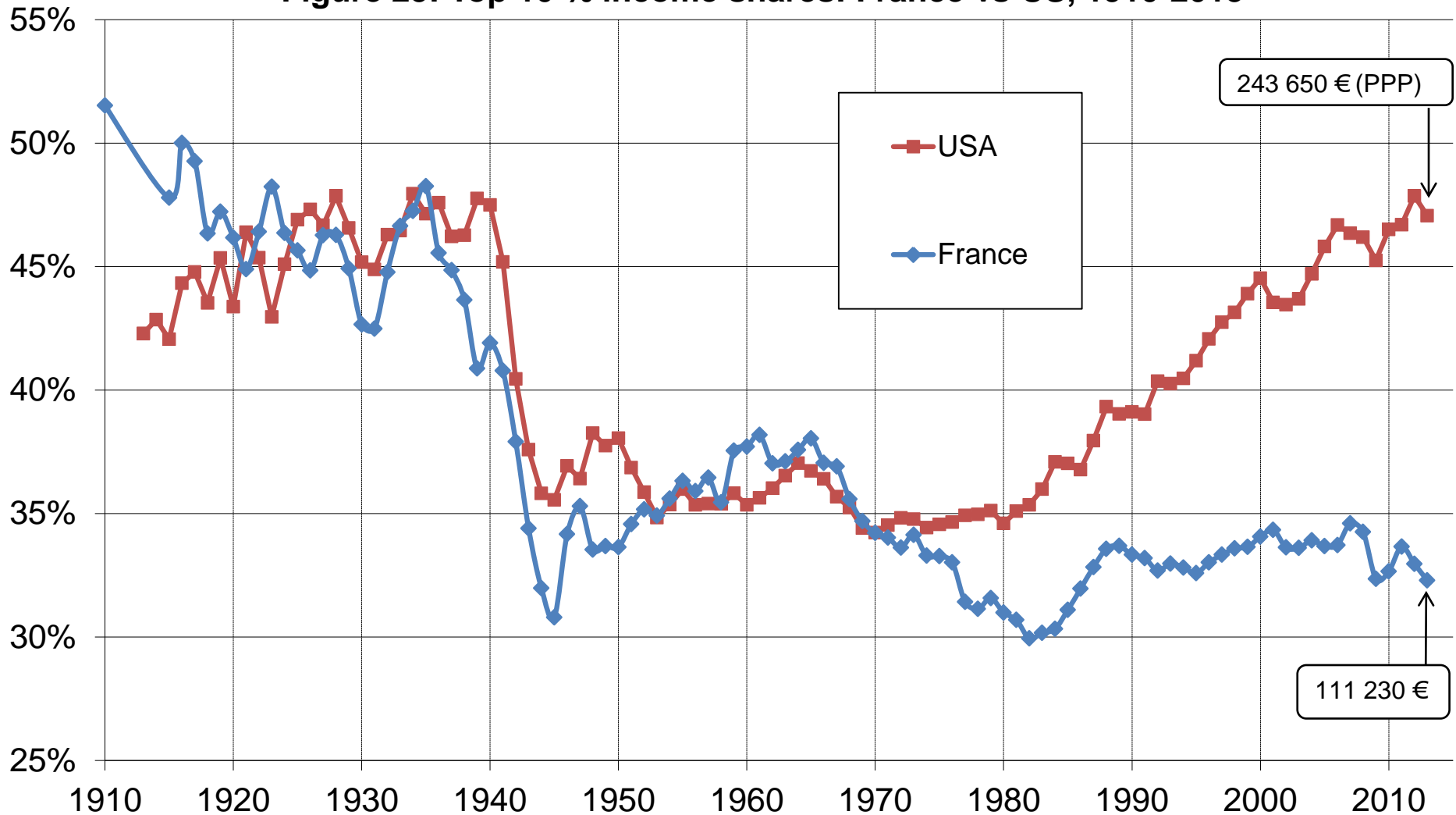


Figure 24: Income shares in France: equal-split income vs individual income



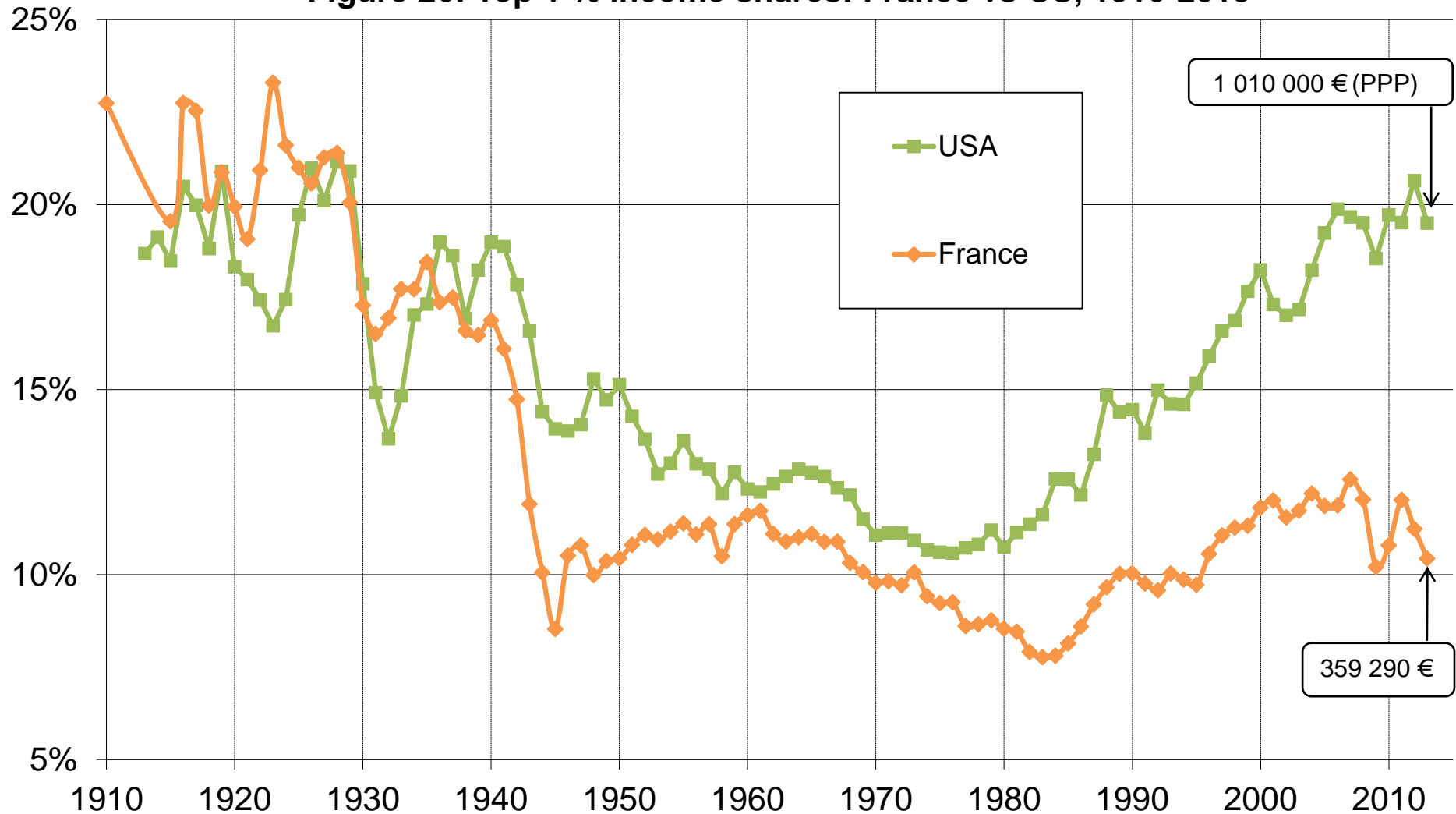
Distribution of pretax national income: equal-split income series (income of married couples divided by two) vs individual income series (capital income of married income divided by two, but labor income allocated to each individual).

Figure 25: Top 10 % income shares: France vs US, 1910-2013



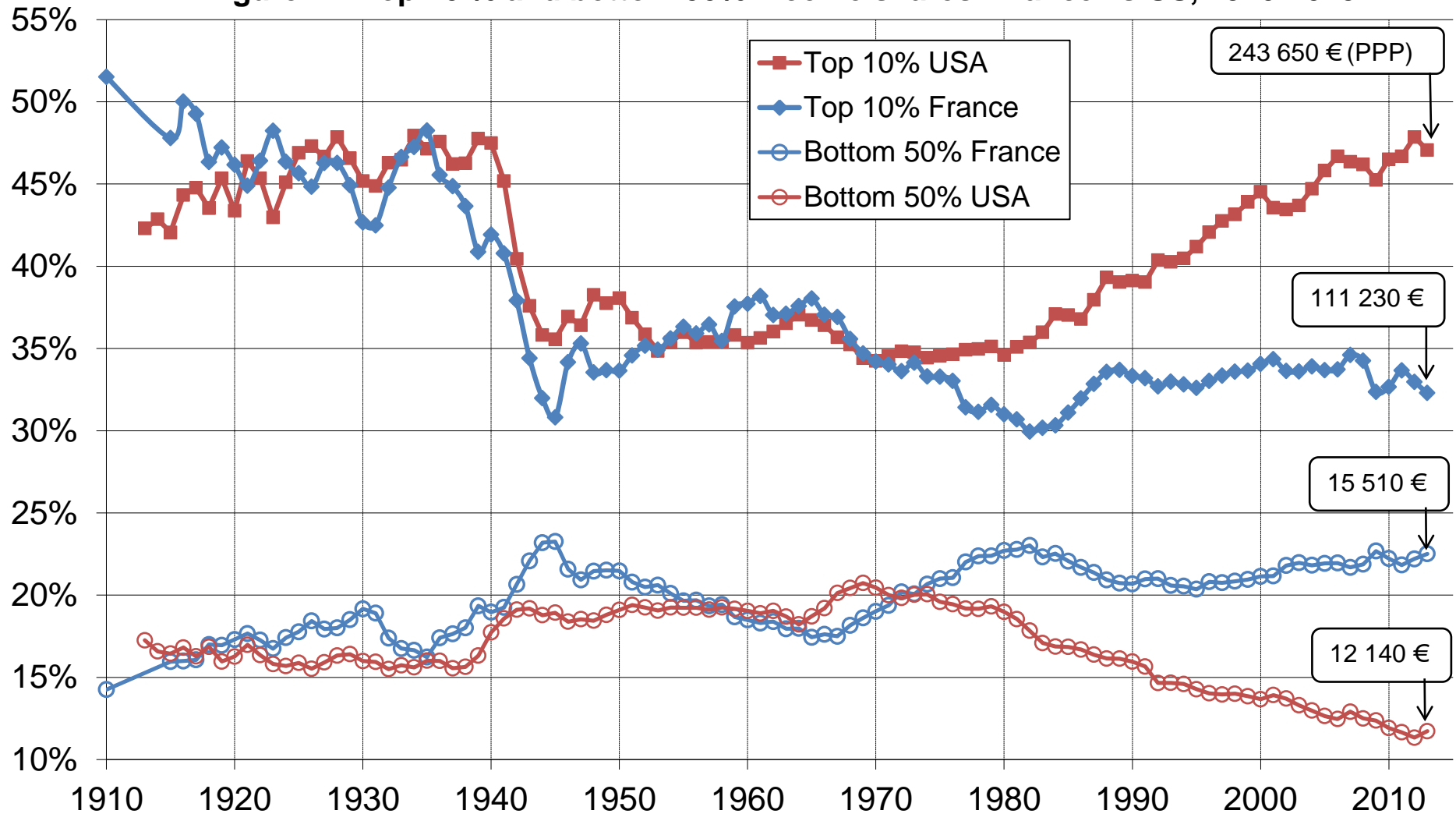
Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 26: Top 1 % income shares: France vs US, 1910-2013



Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).

Figure 27: Top 10 % and bottom 50% income shares: France vs US, 1910-2013



Distribution of pretax national income (before all taxes and transfers, except pensions and unempl. insurance) among adults. Equal-split-adults series (income of married couples divided by two).