Anatomy of Inequality and Income Dynamics in France*

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Abstract

This paper examines income inequality and dynamics in France, using exhaustive administrative panel data. We find that the market income distribution is highly unequal, with the top 1% receiving around 6% of the income. Income mobility is characterized by strong persistence at all income levels and for all age groups. We propose a non-parametric framework that accounts for differences in income risk along the market income distribution, revealing significant differences in income growth moments. Our findings indicate that the distribution of growth rates has high variance, excess skewness and is fat-tailed. In particular, we find a U-shaped pattern for income dispersion along the income distribution. We also investigate the role of redistribution as an insurance tool against income risk and find that transfers are particularly pivotal in reducing income risk for the lower part of the income distribution. We show substantial heterogeneity in income risk across locations, education and occupation groups, and the share of capital in total income. Our study provides new insights into the factors driving income inequality and dynamics in France and highlights the importance of the social-fiscal system in mitigating income risk.

Keywords: Inequality, Income mobility, Income dynamics.

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1 Introduction

Income inequality, insecurity, and lack of opportunities are at the forefront of social and political debates in many rich countries, including France. To design better policy solutions to these challenging issues, we first need a better understanding of the actual patterns and better measurement. This paper provides a comprehensive study of inequality, mobility, and income dynamics and risk in France. We present key statistics related to these issues, explore heterogeneity across different groups, and highlight the role of progressive taxes and transfers in providing insurance against income risk in addition to redistribution.

While most recent literature has focused on labor earnings dynamics, our study adopts a broader approach by using market income as a reference. This measure encompasses not only labor earnings, but also capital income, self-employed income, and other income sources. Given the heterogeneity of these income types and their persistence across individuals, market income is a more comprehensive measure for studying income dynamics. We utilize exhaustive longitudinal administrative data from 2006 to 2017, allowing us to construct granular measures of cross-sectional inequality and income persistence for market income.

Our analysis begins with cross-sectional inequality, revealing a stark inequality in the distribution of market income. The share of market income going to the top 1% represents around 6% on average. Inequality is much more pronounced among older age groups.

Comparisons of cross-sectional distributions do not capture the potential role of income persistence in mitigating or amplifying inequality over the medium or long-term. To obtain a more comprehensive picture, we therefore examine how individuals move along the income distribution over time and the heterogeneity of income growth rates across individuals. We find low mobility along the income distribution in France. Regardless of their initial income group, an individual's relative ranking is very persistent. A majority of individuals (around 70%) will remain between -10% and +10% of their initial percentile over a five year horizon. This result is similar over a nine year horizon. This persistence is stronger at the bottom and top of the income distribution. For example, 76% of individuals starting in the top decile of the market income distribution are still there after five years, while 54% of individuals starting in the bottom decile will not move up the income ladder. This set of results is consistent with the extensive literature that has investigated the trends of inequality (Piketty (2003), Verdugo (2014), Guillot et al. (2020), Bozio et al. (2020)) and earnings persistence in France (Buchinsky et al. (2003), Bonhomme and Robin (2009), Pora and Wilner (2020), Kramarz et al. (2022), Loisel and Sicsic (2023)).

To better understand the mechanics of income mobility, we follow the non-parametric framework developed by Guvenen et al. (2021) that accounts for differences in income risk along the market income distribution. We analyze key statistical moments of individuals' income growth conditional on their rank in the income distribution and studying different age groups separately. Three key results emerge from our analysis. First, the variance of income growth rates follows an U-shaped pattern with respect to the initial position in the income distribution: the bottom and the top of the income distribution experience more volatility in income growth compared to the rest of the distribution, but this pattern does not vary significantly by age group. Secondly, the distribution of growth rates is right-skewed for the end bottom

of the recent income distribution as individuals have more chances of large increases in their market income. We also find that the remaining part of the distribution has either no skewness (younger cohorts) or is mildly left-skewed (older cohorts). Third, we show that the distribution of growth rates is fat-tailed, as measured by kurtosis, and kurtosis follows a similar inverted U-shape pattern as the variance of income growth.

Investigating potential sources of heterogeneity in market income dynamics, we find significant variation in income risk across individuals' locations. Capital owners experience more variance, a lower skewness and a higher kurtosis in their market income growth, suggesting that the composition of income significantly influences the dynamics of income over time. Individuals with higher levels of education have lower income growth risk at the top of the distribution and there are large differences in income risks across occupations. These results underline the importance of considering these heterogeneities when studying the dynamics of income.

Lastly, we explore the role of redistribution as an insurance tool against income risk by analyzing the different patterns in market versus disposable income. Redistribution mitigates market income risk, particularly for the lower part of the income distribution and lower-educated individuals, and reduces the variation in the dispersion of income risk across different locations. Transfers, rather than taxes, primarily drive this reduction in income risk.

Related literature Our paper makes several contributions to the literature on income mobility and income dynamics. We focus on France, which has not been extensively studied in the literature and use market income as a reference rather than labor earnings, as it gives a more accurate representation of individuals' position in the income distribution.

A first strand of the literature describes the mobility of individuals in the earnings distribution. Auten et al. (2013) find that between 41% and 49% of individuals in the top 1% are still there after five years in the US. In the French context, Buchinsky et al. (2003), Kramarz et al. (2022) and Loisel and Sicsic (2023) also find strong persistence in the position of individuals in the earnings distribution, although France appears to be less mobile than the US. We contribute to this literature by providing rank-rank correlations and transition matrices for market income. We find a 5-year rank-rank correlation around 0.8, with differences across age groups. These results are consistent with Kramarz et al. (2022), and Loisel and Sicsic (2023) on a longer period.

Another strand of the literature focus on individuals earnings changes, such as Kopczuk et al. (2010) in the US. A particular focus has been put on disantangling the transitory and permanent components of log earnings change, often assuming they follow Gaussian processes (see Meghir and Pistaferri (2011) for a review). A recent literature has extensively explored the deviations of earnings dynamics from the standard lognormality assumption and the underlying factors that explain it, in an effort to better model the profiles of income over the life cycle. Bonhomme and Robin (2009, 2010) develop a series of statistical models that account for the excess skewness and kurtosis of log earnings growth observed in the data. Guvenen (2009) investigates labor earnings risk patterns and finds consistent evidence in support of the presence of heterogeneous income profiles, particularly among higher-educated individuals.

Guvenen et al. (2014) explore the relationship between individual earnings risk and business cycles using data from the US Social Security administration. They find that the left-skewness of the shocks, not only the variance, is significantly countercyclical.

Arellano et al. (2017) further investigate these deviations from the canonical model of earnings dynamics by using a nonlinear panel data framework, and show the nonlinear transmission of income shocks to consumption. Guvenen et al. (2021) use nonparametric methods and panel data representative of the US population to document patterns of earnings changes. They show that the distribution of log earnings changes displays negative skewness and excess kurtosis, and these patterns depend on the age and position in the earnings distribution. They also stress the role of unemployment spells in explaining these results. Pora and Wilner (2020) and Kramarz et al. (2022) find similar results for France. We contribute to this literature by using market income as a reference rather than labor earnings–thereby including a broader population and more income types–and find qualitatively similar patterns.

Part of this literature explores the sources of these deviations from normality. Altonji et al. (2013) find that unemployment shocks have a significant impact in the short-run but also in the long-run through the wage rate. De Nardi et al. (2021) investigate similar questions using data from the Netherlands and the United States and show that working hours explain most of the excess skewness and kurtosis. Kramarz et al. (2022) find, in the French context, differences in earnings changes between men and women. Drechsel-Grau et al. (2022) find striking differences in income dynamics between workers and entrepreneurs in Germany. In this paper, we investigate the differences in market income dynamics across well-studied conventional dimensions, such as location, education level and occupation, and more understudied ones, such as the share of capital income.

Finally, a set of studies assess the insurance role of taxes, transfers, and the spouse income over the life cycle. Using Norwegian data, Blundell et al. (2015) show that the variances of the permanent shocks differ across skill groups, and the variance of the transitory shocks is decreasing over the life cycle. They also find that taxes and transfers significantly reduce the level and persistence of shocks, particularly for low-skilled individuals whose age profiles of the variances of permanent and transitory shocks are significantly flattened. De Nardi et al. (2021) find that redistribution reduces significantly the different moments of the labor earnings changes both in the Netherlands and in the United States, but to a lesser degree in the latter because family insurance plays a larger role than in the former. Similar results have been found by Halvorsen et al. (2019) for Norway, Leth-Petersen and Sæverud (2022) for Denmark and Busch et al. (2022) for Sweden.[1] We contribute to this literature by analyzing the extent to which the social-fiscal system modifies the patterns of income risk–rather than earnings risk–distribution along different groups. Our study thus contributes to the understanding of the factors that shape income inequality in France and the role of the social-fiscal system in mitigating the risks associated with income fluctuations. In addition, we provide evidence on how the social-fiscal system insure differences in income risk across observables characteristics, such

[1] Accardo (2016) finds similar results for one-year growth rate in France using survey data and taking disposable income by units of consumption as a reference. Our paper uses a combination of administrative data for a large population and with more timespan. We also take market income as the reference, as it gives a better view of the role of redistribution in mitigiting income risk.

as location, education level, occupation, and the share of capital income.

The remainder of the paper is organized as follows. Section 2 presents the data, the definition of the income variables, and the restrictions we impose in order to construct the datasets for the analysis. In Section 3, we start by showing some cross-sectional results on the income inequality in France along different types of income and age groups. Then, we investigate the income mobility of individuals and quantify it using a rank-rank setting in the whole population and by age group. In Section 4, we investigate the differences in market income dynamics. The section starts by describing the distribution of the income growth by looking at several moments of the distribution. Then, we analyze how these moments change across several dimensions: location, share of capital income, education level, and occupation. Finally, in Section 5, we analyze to what extent the social-fiscal system modifies the patterns of income risk distribution along the different groups considered in the previous section.

2 Data and variables

This section gives an overview of our data, sample and key variables of interest.

2.1 Data

Income tax returns. Our first dataset is the universe of de-identified income tax returns of French tax residents over the period 2006-2017, provided by the *Direction Générale des Finances Publiques* (DGFIP). The income tax returns contain comprehensive income data at the individual and household levels, namely labor, capital, and self-employed income.[2] It also contains key demographic information such as household composition and age. Importantly, it allows us to follow individuals over time.

Economic and Demographic Characteristics Panel data. Our second dataset is the *Echantillon Démographique Permanent* (EDP). It is a large individual level panel dataset following a random sample equivalent to 4% of the French population over the period 2010-2018.[3] It is a rich dataset linking several administrative datasets, including the Census, matched employer-employee data[4], income tax returns, and information from social insurance agencies. Of particular interest for us, the Census provides detailed information on individuals' socio-demographic characteristics such as sex, education, and occupation. This panel also contains the same detailed information on income from income tax returns as mentioned above and information on taxes and transfers (see subsection 2.2 for a full description). We are thus able to define a

[2]Filing a tax return is mandatory if a person checks at least one of the following requirements: begin taxable; having a main residence that has a rental value that exceeds 150€ in Paris and in local authorities located within a radius of 30 km from Paris, and 114€ in other areas; owning a tourist plane, a tourist vehicle, a pleasure boat, one or more racehorses, or who have a secondary residence, or who use the services of a domestic employee. In practice, the coverage of tax returns is alsmost exhaustive for the population of French tax residents, as non-taxable persons who do not have any of the above items are incentivize to file a tax return. They will receive a notice that it is essential to carry out certain administrative procedures and that they need to obtain tax or social advantages.

[3]Up to 2008, it sampled 1% of the French population: every individual born the first 4 days of October. Since 2008, the population has been extended to individuals born in the first 4 days of January, April, July and October.

[4]*DADS* (*Déclaration annuelle des données sociales*) database.

more comprehensive income aggregates that captures the disposable (after taxes and transfers) income.

Sample. We impose some restrictions on the both datasets, given the particularities of the French personal income tax and the scope of our analysis. Our benchmark sample consists of French fiscal residents in mainland France, aged between 30 and 50 years. We only consider main filers, excluding dependents such as children. Finally, we impose a minimum income threshold to be consistent with the existing literature. To do so, we first convert nominal values to real values using the Consumer Price Index (CPI). Then, we define a minimum income threshold equal to 260 working hours paid at the minimum wage, as in Kramarz et al. (2022). Our analysis focuses on individuals with market income equal to or greater than this threshold.[5]

For the Economic and Demographic Characteristics Panel data, we construct an additional sample by matching the baseline EDP dataset with the census data and keep only individuals for which we have information from one of the census between 2004 and 2019. We do this in order to recover individuals' most recent education level and occupation. This sample contains fewer observations but includes additional individual-level variables.

2.2 Key Variable Definitions

Household definition. The household definition differs to some extent between the two datasets. In the income tax returns, a household is defined according to the marital status: two individuals who are either married or in a civil union. The EDP adopts a broader definition of a household: a collection of individuals living in the same place. A couple may be two individuals who are married, in a civil union, or simply living together.

Income aggregates. We begin by defining several income aggregates at the household level using the definitions from the French National Institute of Statistics. This enables us to construct aggregates that are consistent across French datasets, facilitating future comparisons and extensions. We then further aggregate different income measures into four income concepts. First, we define *household labor income* as the sum of all reported income from labor, such as wages, salaries, and remunerations of board members. Second, we define *household capital income* to include income from real estate (mainly income from renting) and income from bonds, dividends, or life insurance policies. Notably, capital losses are also considered in the definition, which in rare cases can lead to negative capital income values. Capital gains are not included, due to their specific tax treatment. As capital gains generally concern individuals at the very top of the income distribution, beyond the top 0.1%, our results should not change significantly when including them. The third aggregate we consider is *self-employment income*, which includes net-of-cost business income taxed under the personal income tax. The income considered includes potential rebates for different tax regimes and other deductions. Lastly, we define *other income* as the sum of net alimonies, foreign-origin income, and life annuities. The sum of theses four income aggregates represents the *market income*. In order to obtain *market*

[5] See Subsection 2.2 for a definition of the market income.

income plus transfers, we add all transfers households receive, such as unemployment benefits, pensions, and welfare benefits. Finally, we subtract taxes and social contributions paid by households to obtain the *disposable income*.

Since we are ultimately interested in income dynamics at the individual level, we define equivalent income aggregates for each individual based on their household status. Following the standard approach in the literature, we divide the household income by 2 for individuals that are married or in a civil union in the income tax returns, and by 2 for main filers (even if filing separately) for the EDP. For all other individuals, the income aggregates remain the same.

Recent income. Our analysis relies on a measure of market income that is not sensitive to mean reversion or age effects, thus better describing individuals' positions in the market income distribution, net of business cycle and life cycle components. For a given year t, we consider the average market income of individual i from birth cohort b between the years t and $t-2$, retaining only individuals present in the data for at least 2 years. For an individual present in our data for all three years, this measure will be equal to $\tilde{Y}_{i,b,t} = \sum_{j=0}^{2} Y_{i,b,t-j}/3$. We then define a measure of *recent income* (hereafter RI) by dividing the market income $\tilde{Y}_{i,b,t}$ by the average of the variable for a birth cohort b in year t, allowing us to control for age and year effects.

Rank definitions and age groups Depending on the analysis, we consider different definitions of market income ranks. The main measure of an individual i's rank in year t is their percentile in the market income distribution of birth cohort b in year t. We use the within-cohort distribution to avoid capturing movement in the overall distribution due only to life cycle dynamics. We also define an alternative measure of rank by applying the previous definition to the recent income distribution. In some cases, we will also consider individuals' rank in the market income distribution for a given year t, regardless of the birth cohort. We define these positions in the income distribution for the market income and recent income. Finally, we group individuals into age groups for a given year t and define four age groups (30-34, 35-39, 40-44, 45-49).

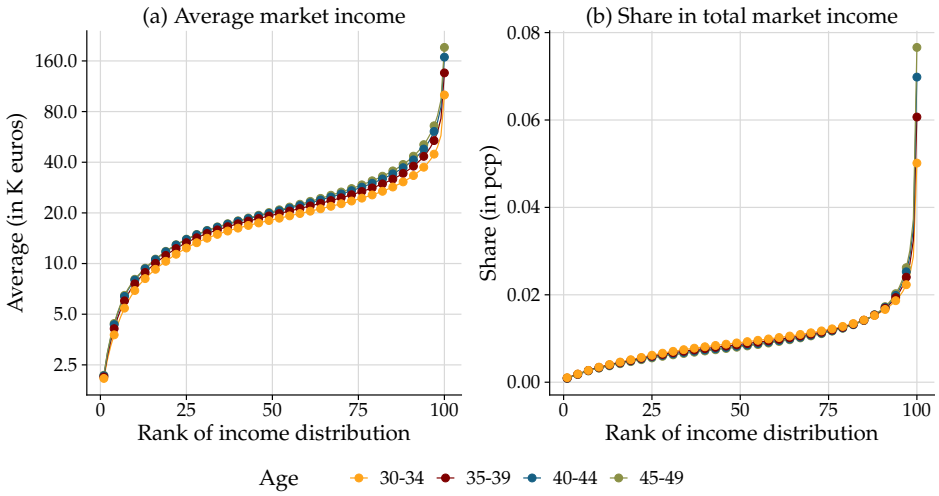
3 Inequality and Mobility in France

In this section we provide some stylized facts on income inequality and income mobility patterns in France.

3.1 Sizeable cross-sectional inequality

Figure 1 presents measures of the distribution of market income for the period 2006-2017. Panel (a) shows the average annual market income by rank in the income distribution and age groups. The overall distribution pattern is similar across age groups, but older cohorts have slightly higher average incomes, consistent with a life cycle pattern of income. Individuals in the 1st percentile have an average market income of 2,150 euros, while it is around 20,000 euros for the 50th percentile. However, individuals in the top percentile differ significantly across age

Figure 1: Income distribution, 2006-2017



Notes: The Figure shows measures of income distribution over the period 2006-2017. Panel (a) shows the evolution of the average market income by age group and position in the income distribution. Panel (b) shows the income concentration for the different age groups by plotting the share of each rank in the total market income of the age group. Both measures are computed by taking the average values over the period. *Source*: Income tax returns.

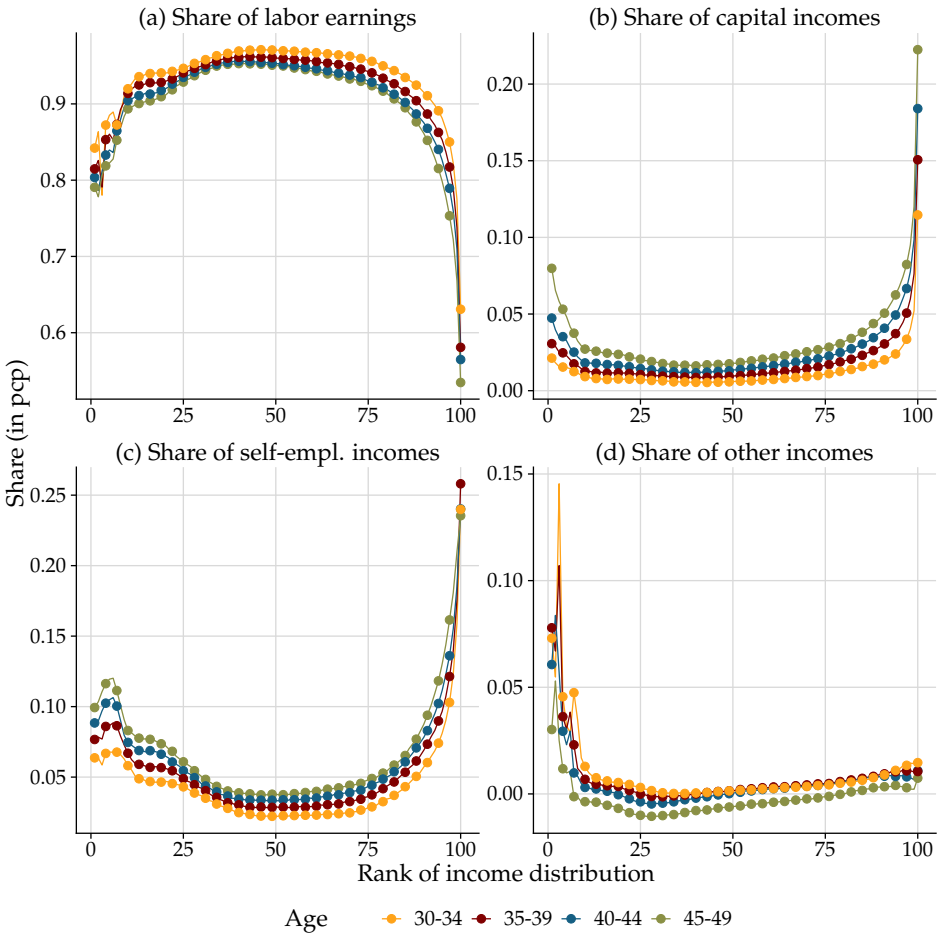
groups, with average incomes ranging from 100,000 euros for those in their early 30s to around 192,500 euros for those aged 45-49. Panel (b) plots the share of overall income going to a given percentile, again within each age group. The share of the overall income for the bottom of the distribution is close to 0%, for the median slightly less than 1%, and for the top percentile between 5% and 7.6%. Income concentration at the top increases with age.

Sources of income along the income distribution. Next, we investigate the structure of market income by different types of income. Figure 2 shows the share of labor earnings, capital income, self-employed income, and other income in market income along the market income distribution, by age group. Overall, labor earnings represent the largest share of market income for all ranks and age groups. The share of labor earnings exhibits an inverted U-shape, with lower values for the bottom and top percentiles compared to the middle of the distribution, where individuals receive more than 95% of their market income from labor earnings. However, the underlying factors behind these lower shares of labor earnings differ for the bottom and top of the distribution. The share of capital income increases along the income distribution, while the share of other income decreases, and the share of self-employed income has a U-shaped profile, more pronounced at the top of the income distribution. These results apply to all age groups.

In summary, individuals at the bottom of the market income distribution have a high share of labor earnings, along with self-employed income and other income, while those at the top have a smaller share of labor earnings but larger shares of self-employed income and capital income.

Decomposition by time periods. To understand changes in the different income measures, we reproduce Figure 1 for two sub-periods: 2006-2012 (Figure A1) and 2013-2017 (Figure A2).

Figure 2: Decomposition of market income, 2006-2017



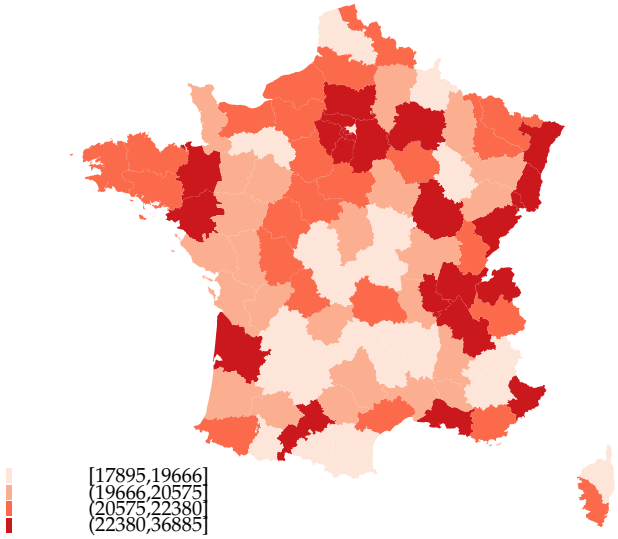
Notes: The Figure shows for the period 2006-2017 the share of labor earnings (Panel (a)), capital income (Panel (b)), self-employed income (Panel (c)) and other income (Panel (d)) in the market income along the rank in the market income distribution and by age group. See Subsection 2.2 for the definition of the types of income. All measures are computed by taking the average values over the period. *Source*: Income tax returns.

The choice to split in 2013 is due to several tax reforms targeting top earners implemented in France that year. The previously mentioned empirical facts stand regardless of the period considered. The average income of individuals is relatively stable between the two periods throughout the income distribution. However, the very top experienced a decrease in their average income after 2012, with the richest 1% losing on average around 10,000 euros, independent of their age group. This decrease translated into a less significant share of their income in the market income. We then split the period again to investigate changes in the shares by type of income in Figures A3 and A4. After 2013, individuals at the very top of the income distribution significantly decreased their share of capital income regardless of age group, while their share of labor earnings increased by about the same amount. However, this result does not necessarily imply a shift from capital to labor income for these individuals, as their market income overall decreased after 2013.

Decomposition by location. At the same time, there are sharp geographic disparities of income in France. We show in Figure 3 the average market income by county. In the vast majority

of French counties, individuals have on average a market income between 17,000 and 20,000 euros a year, while in only three counties individuals earned on average more than 30,000 euros. These three counties represent Paris and its western suburbs. More generally, counties where major cities are located (e.g. Rhône with Lyon, Bouches-du-Rhône with Marseille, etc.) seem to be better off than rural counties. However, the administrative division of counties within the Parisian agglomeration shows that sharp disparities can exist inside large urban areas. Indeed, we see that the county with the highest average income, Paris, lies next to one of the counties with the lowest average income, Seine-Saint-Denis.

Figure 3: Average market income by county (2006-2017)



Notes: The Figure shows the average market income by county over 2006-2017. *Source*: Income tax returns.

3.2 Low income mobility

The raw comparison between two cross-sectional income distributions at different points in time is important, but it ignores the potential mobility of individuals over time across the distribution. Individuals in the top 1% today may not be the same tomorrow. To understand income inequality in the long-run and the evolution of cross-sectional inequality, we need to analyze how people move along the income distribution and their differences in income growth. In this subsection, we briefly investigate the first question and try to quantify individuals' income mobility, while the remaining paper is dedicated to the analysis of the income growth process.

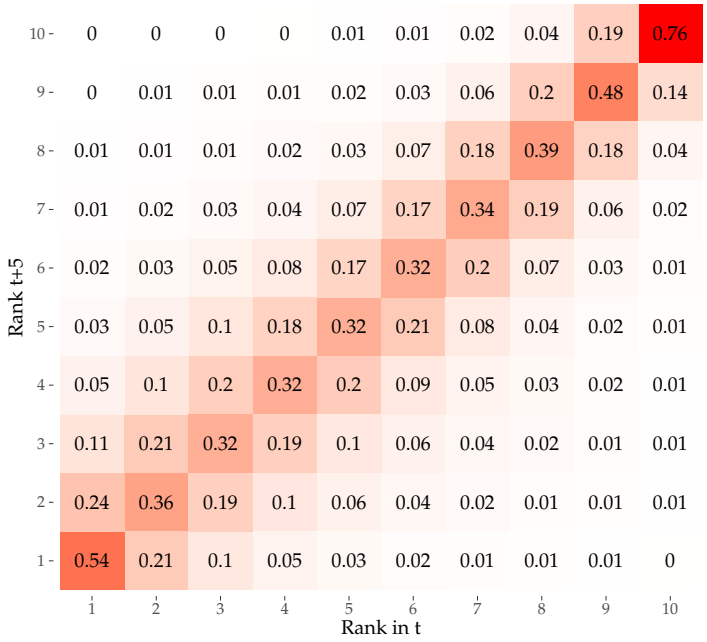
When assessing individuals' income mobility, several factors could bias the results and lead to different interpretations. First, there can be potential life cycle bias, as individuals generally experience higher growth rates of their income when they are young.[6] Therefore, the same level of income mobility may have different interpretations based on the age of the individual. The second factor is attenuation bias. More precisely, using individuals' income for a given year might not be the best measure of their position as the yearly income can be subject to noise and

[6]This is a standard result of the life cycle literature and Section 4 will make this fact clearer.

mean reversion. To address potential issues, we rank individuals according to their position in the distribution of recent income, which smooths incomes over three years and takes into account age effects. We focus on the income mobility of individuals at a 5-year horizon in this subsection.[7]

A simple way to characterize income mobility is to look at the probability for individuals to move from one position in the income distribution to another. This can be done by ranking individuals into income groups and computing a transition matrix between two different points in time. Figure 4 shows the overall mobility pattern using a transition matrix at a five-year horizon. Two interesting facts are worth noting.

Figure 4: Market income transition matrix at five years



Notes: The Figure shows the average probability of individuals to be in a given income group at $t+5$ conditional on their income group in year t. As a result, each column in the matrix sums up to 1. However, the rows do not sump up to 1 as some individuals might disappear before $t+5$. *Source*: Income tax returns.

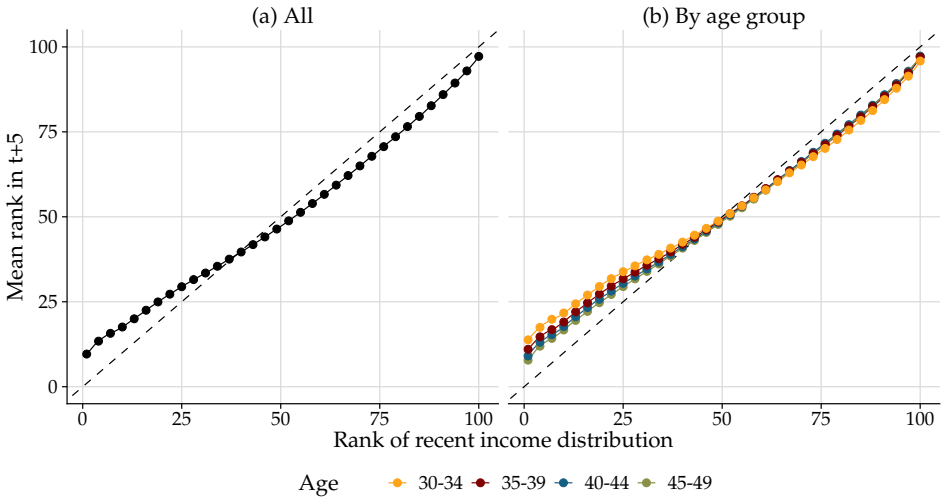
First, income mobility in France is characterized by strong persistence: individuals are most likely to stay in the same income group after 5 years, regardless of their initial income group. Moreover, the more distant the final rank is from the initial one, the less likely people are to access it. For example, individuals in the bottom decile have close to 0% chances to access the top decile, and vice versa for individuals in the top decile.

Second, there is substantial heterogeneity in the probability to remain in the same income group conditional on the initial decile. Individuals are more likely to stay in the same decile when starting at the bottom or the top of the distribution (54% and 76% respectively). People in the top decile have a 90% chance to stay in the top 20% of the distribution, while people at the bottom of the distribution have a 78% chance to stay in the bottom quintile of the distribution.

We summarize the previous results by looking at the mean rank of individuals conditional

[7]We provide in the Appendix some results for a 3 years and a 9 years horizons. Globally, a larger horizon does not change significantly the results as individuals still experience the highest probability of remaining in the same income group, although this probability is slightly smaller than at a smaller horizon.

Figure 5: Rank-rank analysis, five-year horizon



Notes: The figure show the mean rank of individuals at a five year horizon as a function of the recent income rank in Panel (a) for the whole population and in Panel (b) by age groups. *Source*: Income tax returns.

on their initial rank. We do so in Figure 5 by plotting the mean rank of individuals at a 5-year horizon given their initial rank in the recent income distribution. First, in line with the previous results, we observe in Panel (a) that there is sizable persistence in individuals' position in the income distribution given that the profile of the mean income is close to the 45-degree line. Second, the same pattern is present across age groups, as shown in Panel (b).

Using the quasi-linearity of the relationship between the initial rank and the destination rank, we define some measures of income mobility using a rank-rank specification as in Chetty et al. (2014). The idea is to fit a linear line into the previous plots by basically regressing individual i income rank in period $t+5$, $R^{RI}_{i,t+5}$, on her recent income rank in period t, $R^{RI}_{i,t}$:

$$R^{RI}_{i,t+5} = \alpha + \beta R^{RI}_{i,t} + \epsilon_i$$

The coefficient β characterizes the degree of relative positional mobility as it denotes the difference between the expected rank of an individual starting at the top and an individual starting at the bottom of the income distribution. This comes directly from the fact that the relationship between ranks is quasi-linear, which allows us to write $\bar{r}_{100} - \bar{r}_0 = 100 \times \beta$. A large β is associated with low relative positional mobility. We also define the absolute positional mobility for an individual as the expected rank conditional on her initial rank q at time t, $\bar{r}_q = E[R_{t+5}|R_t = q] = \alpha + \beta \times q$. Note that the coefficient α is equal to $\bar{r}_0$.

Table 1 shows the estimates for the different measures of relative and absolute mobility. Overall, the results highlight low relative mobility with a difference in the expected ranks of individuals starting at the bottom and top of the income distribution of 84. At the same time, young individuals between the ages of 30 and 34 display larger relative mobility with the same difference in expected ranks equal to 77, whereas older individuals are even less mobile in relative terms in line with life cycle arguments. For the absolute mobility, individuals at the bottom of the income distribution experience on average an increase of income rank in expectation of about around 3, whereas the increase for individuals in the median their rank at five years is

relatively stable. Moreover, there are some different patterns in terms of the age of individuals, but the absolute upward mobility remains relatively small, confirming the previous results.

Table 1: Absolute and relative mobility, five-years horizon

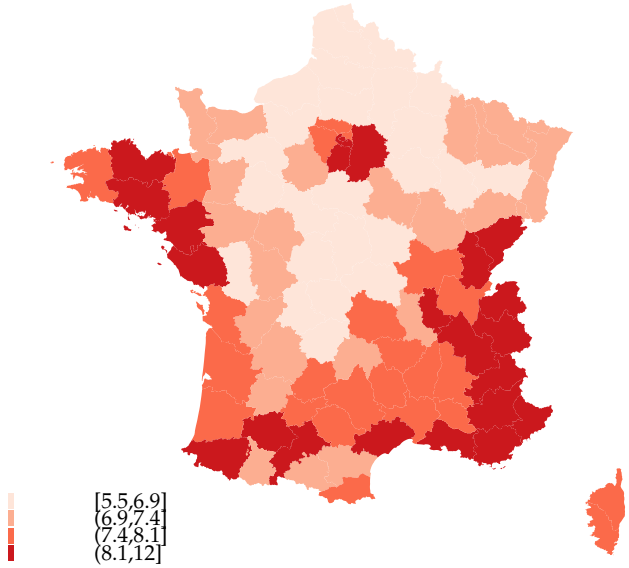
Age group	$\hat{\alpha}$	$\hat{\beta}$	$\bar{r}_{25}$	$\bar{r}_{50}$	$\bar{r}_{75}$
30-34	13.14 (0.009)	0.77 (<0.001)	32.3	51.4	70.6
35-39	10.24 (0.008)	0.81 (<0.001)	30.6	50.9	71.3
40-44	8.49 (0.007)	0.84 (<0.001)	29.5	50.5	71.5
45-49	7.34 (0.007)	0.85 (<0.001)	28.6	49.9	71.2
All	7.29 (0.004)	0.84 (<0.001)	28.4	49.4	70.5

Notes: The Table shows: (i) in columns 2 and 3 the estimates of the relative and absolute income mobility and (ii) in columns 4 to 6 the average rank of individuals that had an initial recent income rank of 25, 50 and 75. The results are computed for the whole population and by age group. *Source*: Income tax returns.

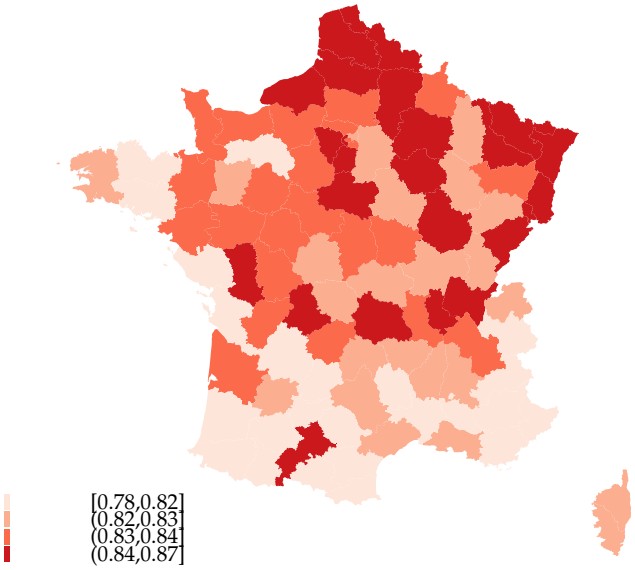
By location. We also investigate how theses measures of income mobility change accross locations. We plot in Figure 6 the absolute mobility (the α coefficient) in Panel (a) and the relative mobility (the β coefficient) in Panel (b). Firstly, we can observe that there is significant variation in the relative mobility with a difference in expected ranks of individuals between the top and bottom of the income distribution of 86 in the *Nord* and of 78 in the *Hautes-Alpes*. In general, relative mobility is significantly lower in the nord of France (high β). At the same time, the east of France seems to be characterized by a high mobility (low β). This result might be explained by the proximity of these counties to Switzerland and the labour mobility between the two countries. Secondly, we observe similar trends when we look at the absolute mobility for individuals starting at the very bottom of the income distribution ($\bar{r}_0$). For example, individuals in *Nord* county that start at the bottom of the income distribution see their position in the income distribution increase by 5.6 at a five years horizon whereas for individuals in *Haute-Savoie* their position will increase by 11.6.

Figure 6: Relative mobility and absolute mobility by county

(a) Absolute Mobility



(b) Relative Mobility



Notes: The Figure shows the estimates for the absolute (Panel (a)) and the relative (Panel (b)) market mobility at a five years horizon by county. *Source*: Income tax returns.

4 Market Income Persistence

4.1 Aggregate and idiosyncratic risks

We build on the standard approach in the literature to study the dynamics of log-income by splitting the log-growth rate between aggregate risk and idiosyncratic risk.[8] Formally, the log-income for individual i, year t, and birth cohort b can be written as the sum of the birth-cohort-year fixed effect and an idiosyncratic component:

$$\ln(Y_{i,b,t}) = \underbrace{\alpha_{b,t}}_{\text{birth-cohort-year fe}} + y_{i,b,t}$$

Then, taking the difference between two years t and $t+h$ the income log-growth rate can be written as:

$$g_{Y_{i,b,t+h}} = \underbrace{(\alpha_{b,t+h} - \alpha_{b,t})}_{g_{\bar{Y}_b}} + \underbrace{(y_{i,b,t+h} - y_{i,b,t})}_{g_{y_{i,b,t+h}}}$$

where $g_{\bar{Y}_b}$ is the aggregate growth rate for the birth cohort b and $g_{y_{i,b,t+h}}$ is the residualized growth rate. The former captures the life cycle component of growth, or how an age cohort is growing on average (aggregate risk). The latter measures how people grow relative to their age cohort. It measures individuals' income growth rate net of the group component (idiosyncratic risk). This is our main measure of interest in the remainder of the paper.

4.2 Moments for market income

Using this nonparametric framework, we describe several statistical moments of interest in the spirit of Guvenen et al. (2021). For simplicity, we derive the unconditional estimators, but the results hold when conditioning on key covariates (such as individuals' rank in the initial income distribution). We start our analysis by describing how the expected market income growth rate varies along the initial distribution of recent income and by age cohort. We then reproduce this analysis for higher-order moments.

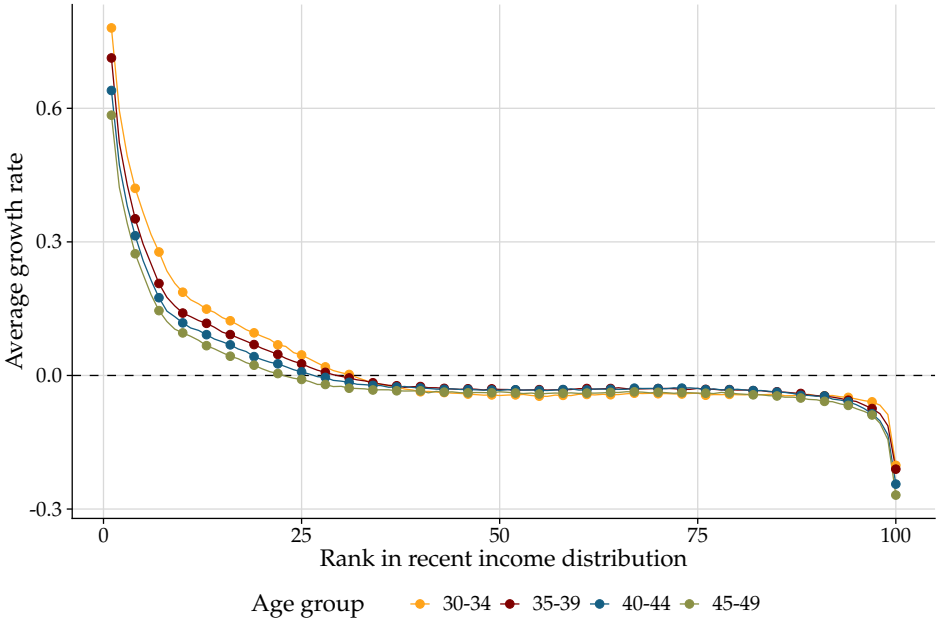
Expected value. Figure 7 plots the residualized five-year growth rates of market income by age cohort and rank in recent income distribution.[9] Two facts are worth noting. First, the expected growth rate is monotonically decreasing with the rank in recent income distribution. The bottom part of the distribution experiences very high growth rates regardless of their age group. The distribution starts to converge around the 25$^{\text{th}}$ percentile and remains fairly stable after. Only the very top of the distribution experiences a significantly lower growth rate compared to the rest of the population. In Section 3, we presented some possible explanations for these changes of income at the very top of the distribution. Second, the average growth rates by percentile are not different across age cohorts. More precisely, after accounting for life cycle

[8] See Meghir and Pistaferri (2011) for a review.

[9] While we report one point in every three percentiles, the underlying solid line is drawn using all percentiles.

patterns through the aggregate risk, market income growth rates are very similar on average across age groups.

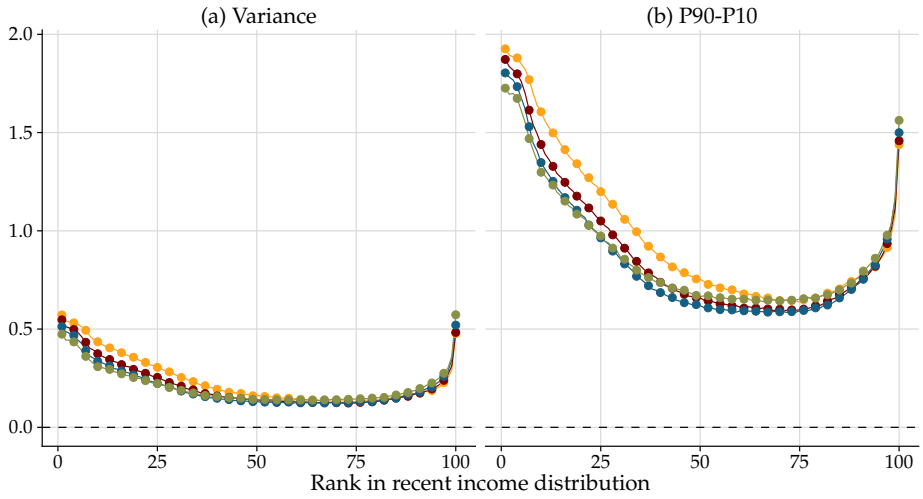
Figure 7: Average market income growth



Notes: Figure shows the average of the five-year log-income growth for the idiosyncratic component and the four age groups considered (30-34, 35-39, 40-44 and 45-49) along the distribution of the recent income distribution. See Subsection 2.2 for a definition of the recent income and age variable. *Source*: Income tax returns.

Dispersion. We show in Figure 8 two measures of the dispersion of the residualized market income growth rate by age group and along the distribution of recent income. Panel (a) plots the variance, and Panel (b) the difference between the 90^{th} and 10^{th} percentiles, a measure more robust to outliers. Consistent with the recent literature on earnings risk, both measures share similar features. First, the dispersion of the income growth displays a U-shaped pattern with higher variance at the tails and significantly smaller variance at the middle of the recent income distribution. In particular, the dispersion increases sharply at the very top of the income distribution. Second, the differences between the age cohorts are not as important as differences in the initial position in the recent income distribution.

Figure 8: Dispersion of the five years log-earnings growth rate



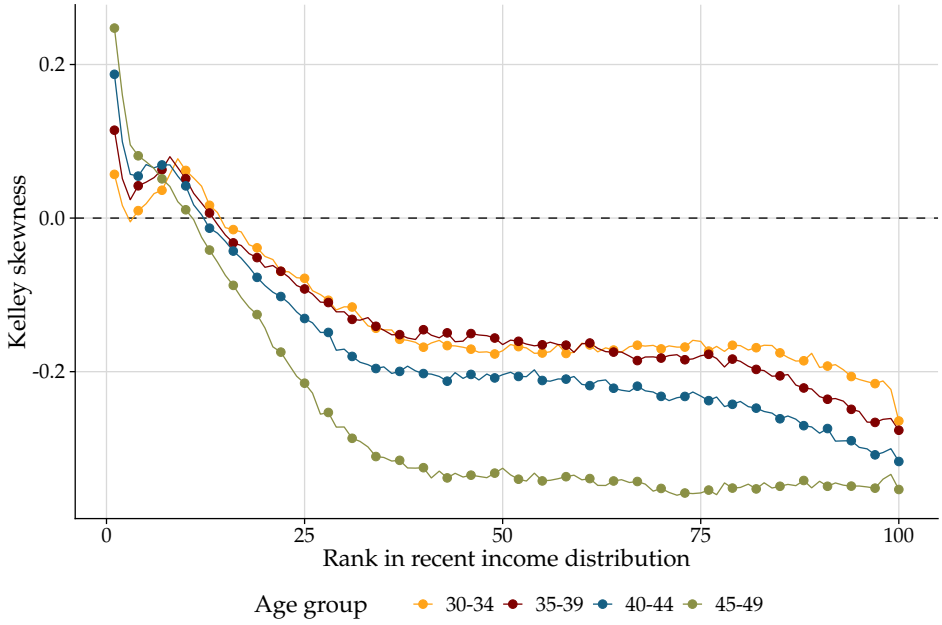
Notes: Figure shows two dispersion measures of the five-year log-income growth for the idiosyncratic component and the four age groups considered (30-34, 35-39, 40-44 and 45-49) along the distribution of the recent income distribution. Panel (a) plots the variance and Panel (b) the difference between the 90th and 10th percentiles. See Subsection 2.2 for a definition of the recent income and age variable. *Source*: Income tax returns.

Skewness. To visualize the patterns of the skewness, we implement an approximative measure as in Kelley (1947) that is widely used in the earnings risk literature (Guvenen et al. (2014), Pruitt and Turner (2020)). The skewness is defined as $\mathcal{S}[g_{Y_{i,b}}] = [(P_{90} - P_{50}) - (P_{50} - P_{10})]/(P_{90} - P_{10})$.[10] More precisely, this measure of the skewness accounts for the share of the dispersion as measured by $P90 - P10$ that is explained by the two tails of the income distribution. For example, a positive $\mathcal{S}[g_{Y_{i,b}}]$ implies that the distribution of $g_{Y_{i,b}}$ is more dispersed in the upper tail than the lower tail. Also, this measure is robust to outliers and unit-free, ranging between $[-1, 1]$.

Figure 9 plots the Kelley skewness measure of the income growth. First, the skewness is positive at the bottom of the income distribution: individuals have more chances of large increases in their market income. Second, the skewness is decreasing with the initial position in the income distribution, implying that chances to experience sizable positive idiosyncratic shocks are lower. Finally, older cohorts have markedly lower skewness at all points in the income distribution except for the very bottom.

[10]Note that for the skewness, and higher-order moments, the skewness of the income is equal to the skewness of the idiosyncratic risk.

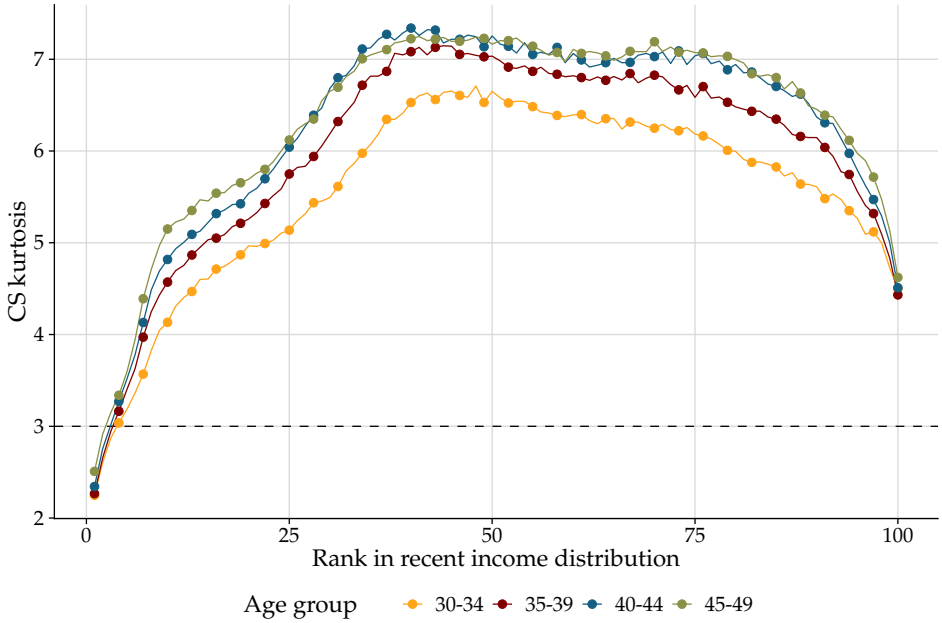
Figure 9: Skewness of the five years log-earnings growth rate



Notes: Figure shows two dispersion measures of the five-year log-income growth for the idiosyncratic component and the four age groups considered (30-34, 35-39, 40-44 and 45-49) along the distribution of the recent income distribution. Panel (a) plots the variance and Panel (b) the difference between the 90th and 10th percentiles. See Subsection 2.2 for a definition of the recent income and age variable. *Source*: Income tax returns.

Kurtosis. The kurtosis measures the likelihood of extreme income changes to happen. The higher the kurtosis, the thicker the tails of the distribution of log income growth. More precisely, a higher kurtosis means that it is more likely for an individual to experience an extreme realization (compared to a normal distribution). We use an approximate measure of the kurtosis as in Crow and Siddiqui (1967) defined by $\mathcal{K}[g_{Y_{i,b}}] = (P_{97.5} - P_{2.5})/(P_{75} - P_{25})$. Figure 10 shows that the kurtosis displays an inverted U-shaped profile across the recent income distribution. The income growth for individuals at the bottom (and top) of the income distribution is rapidly increasing (decreasing), whereas the kurtosis is relatively stable in the middle of the income distribution. Overall, the growth rate displays excess kurtosis along the whole income distribution, consistent with findings from the literature. Second, there are no significant differences between the age groups at any given point along the income distribution, except for young individuals in the middle of the recent income distribution.

Figure 10: Kurtosis of the five years log-earnings growth rate



Notes: The Figure shows the Crow and Siddiqui measure of the kurtosis of the five-year log-income growth for the idiosyncratic component and the four age groups considered (30-34, 35-39, 40-44 and 45-49) along the distribution of the recent income distribution. See Subsection 2.2 for a definition of the recent income and age variable. *Source*: Income tax returns.

In summary, the analysis of income growth rates and their various moments show several key findings. Firstly, the expected income growth rate decreases with the rank in the recent income distribution, with the bottom part of the distribution experiencing very high growth rates. Secondly, there is a U-shaped pattern in the dispersion of income risk, with higher variance at the tails and smaller variance at the middle of the recent income distribution. Thirdly, the skewness of income growth rates is positive at the bottom of the income distribution and decreases with the initial position in the income distribution. Older cohorts have lower skewness at any position in the income distribution except the very bottom. Finally, the kurtosis follows an inverted U-shape with the rank in recent income distribution, with fat-tailed more prononced in the middle of the distribution.

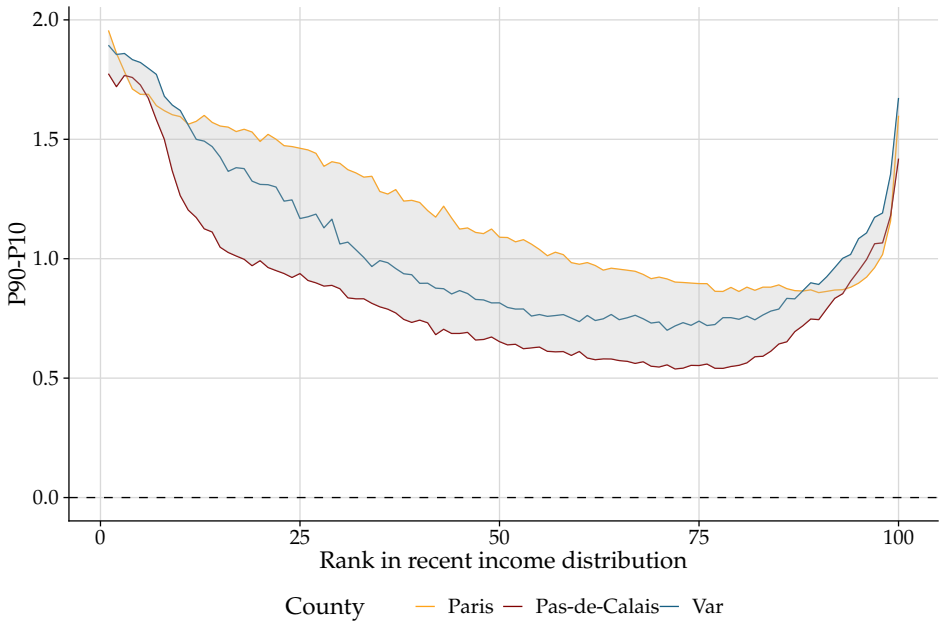
4.3 Heterogeneity in income growth

The previous subsection characterized the distribution of the idiosyncratic market income growth by age cohort and initial position in the recent income distribution. Nonetheless, we can think of other characteristics that could generate different patterns of income growth. For example, the location of individuals could play a role, as individuals could face different employment opportunities or shocks. At the same time, the mixture of income types that individuals have might lead to different income growth profiles. Also, as extensively documented in the literature, individuals' skills lead to different distributions of income growth. We will investigate the role of these characteristics in shaping market income dynamics in this subsection.

By location. We show in Figure 11 the range of the dispersion of income growth rates by county. First, as shown by the gray area in the figure, there is significant variation along the

county dimension in the dispersion of the income risk individuals experience, particularly in the middle of the income distribution. This result underlines the fact that individuals living in different locations have access to different employment opportunities and potentially experience different income shocks. Secondly, there is almost no difference in the dispersion of income growth for individuals at the very bottom and top of the income distribution. The higher moments of income growth highlight similar results, as shown in Figures A7 for the skewness and A8 for the kurtosis.[11]

Figure 11: Range of the dispersion of market income growth rate by county



Notes: The Figure shows the range of the dispersion of the five years log market income growth as measured by $P_{90} - P_{10}$ by county (the gray area) and the dispersion profiles for three counties: Paris, Pas-de-Calais and Var. *Source*: Income tax returns.

By share of capital income. In this analysis, we also split individuals according to their share of capital in their market income and examine the different moments of the idiosyncratic market income growth. For a given individual and year, the share of capital is defined as the sum of the capital income over the previous three years divided by the sum of the market income over the same period.[12] We then consider two groups of people, those with a share of capital income below and above 20%, respectively. Although a 20% cutoff might seem low, it is reasonable given the distribution of the values of the share of capital and taking into account the number of individuals in each group defined by the percentile in the income distribution and the value of the share of capital.[13] Finally, we do not consider the evolution along the age cohort, as we have seen in the previous sections that there are minimal differences along this

[11] We also show in the Online Appendix the same Figures by age group. As one could expect, the figures are more noisy, but they underline the same facts. However, it's worth pointing out that the differences between counties seem more important for young individuals, consistent with the interpretation of individuals facing different opportunities and/or shocks.

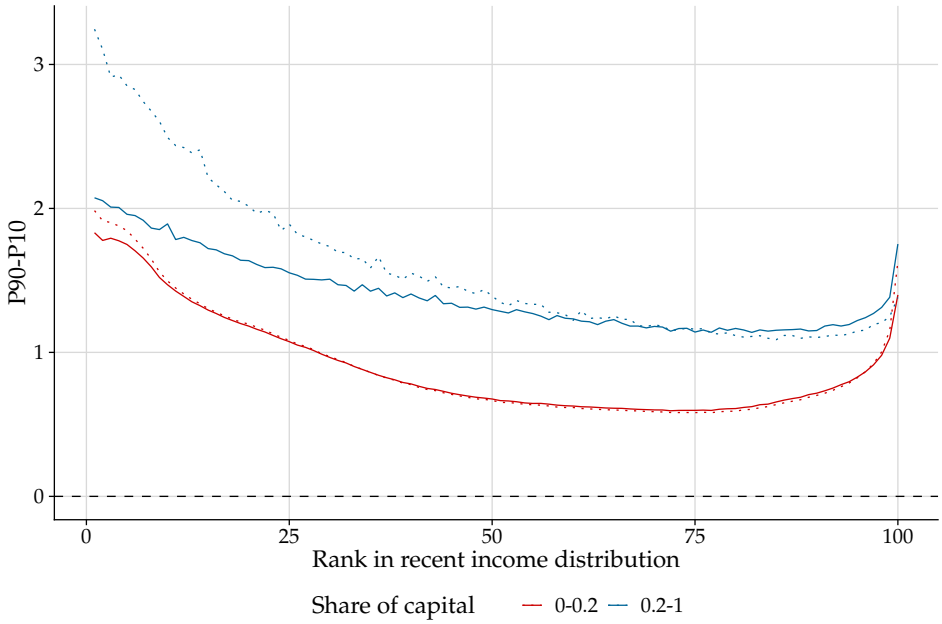
[12] It limits the effect of potential mean-reversions for the capital income and better captures the nature of individuals' income.

[13] We also have tried multiple cut-off values. The results do not globally change, but the Figures are in general more noisy as we have fewer individuals in each group.

dimension and that we already control to some extent for the age effect *via* the definition of recent income and the income variables considered.

Figure 12 shows the dispersion of market income (the solid lines) and labor income (the dotted lines) rates. Beyond the similar patterns we underlined in the previous section, the first result we observe is that the dispersion increases with the share of capital. For individuals in the same percentile of the recent income distribution, those with a higher share of capital income have a significantly higher dispersion of their market income, particularly in the middle of the distribution. Moreover, this result seems to be correlated with different dynamics of labor income for the two groups. Individuals with a higher share of capital income have a more dispersed labor income at the bottom of the recent income distribution, and the dispersion for these individuals decreases much slower than for individuals with a lower share of capital income. These results suggest that the two groups that we consider are subject to different underlying idiosyncratic risks.[14]

Figure 12: Dispersion of market and labor income growth rate by capital share



Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ for individuals that have a share of capital in their market income smaller or equal to 20% (the red lines) or larger than 20% (the blue lines) along the distribution of the recent income distribution. The share of capital for a given year is defined like the recent income as the capital income over the previous three years divided by the total income over the same period. The solid lines represent the dispersion of market income growth whereas the dotted lines represent the dispersion of labor income growth. See Section 2 for definitions of the different variables. *Source*: Income tax returns.

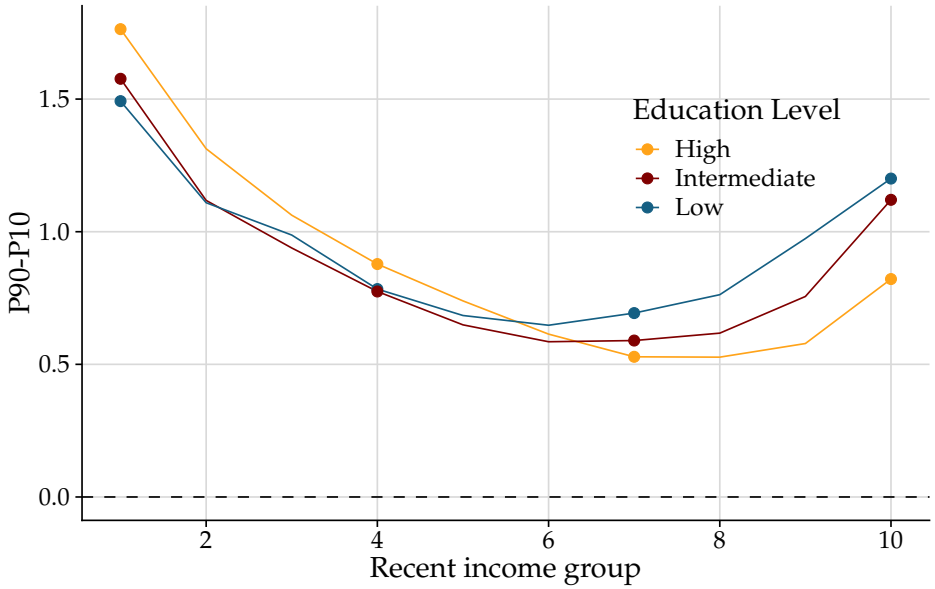
By education. The literature on income dynamics has extensively documented the different life cycle patterns for individuals with different skill levels (Blundell et al. (2015)). To study the income growth patterns by education, we use our second dataset, the EDP, which contains information on individuals' highest educational degree and occupation. Given the smaller sample, we consider a coarser definition of the position in the income distribution, namely

[14] We show in the Online Appendix the associated figures for the skewness and the kurtosis of the income growth for the two groups. The patterns of these higher-order moments confirm the importance of the mixture of types of incomes in the dynamic of income of individuals.

deciles.[15] For similar reasons as before, we do not look at the difference across age cohorts.[16]

Figure 13 shows the dispersion of market income growth by level of education and decile in the recent income distribution. Firstly, we observe the same U-shaped pattern for the three groups but more pronounced for individuals with a low or intermediate level of education. At the same time, individuals with a high level of education at the top of the income distribution experience an income growth that is only slightly more dispersed than the middle of the distribution and significantly smaller than the bottom of the distribution. Secondly, individuals with a high level of education have overall a more dispersed income growth for the first half of the income distribution, but the trend changes after the sixth decile.

Figure 13: Dispersion of market income growth rate by education level



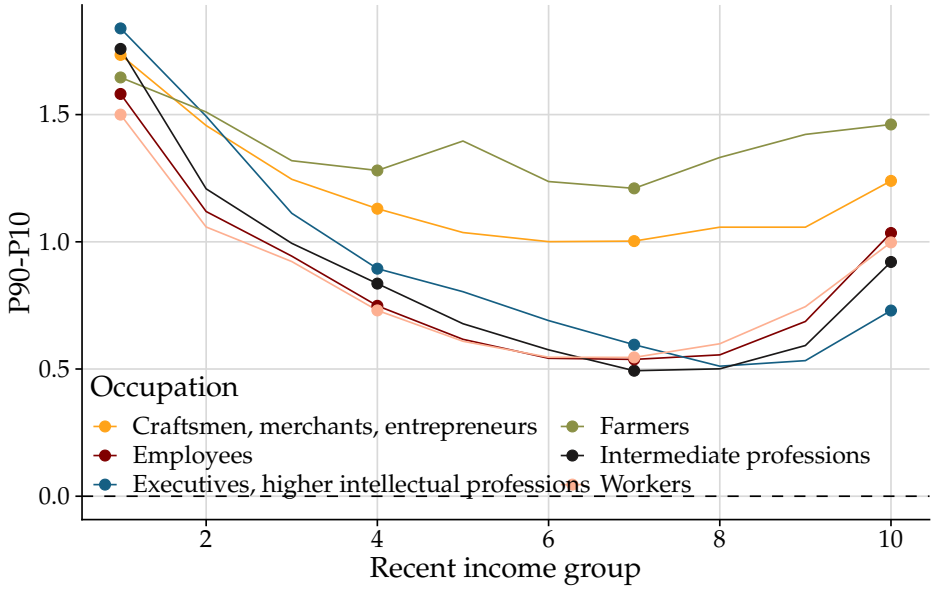
Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ along the deciles of the recent income distribution and education level defined as the latest degree the obtained by the individuals. Three levels of education are considered: *(i)* high for individuals that obtained at least a bachelor equivalent degree, *(ii)* intermediate for any high school degree and *(iii)* for all the other cases. See Subsection 2.2 for a definition of the recent income. *Source*: EDP.

By occupation. Results are very similar when considering the occupation of individuals, as shown in Figure 14. Firstly, the U-shaped pattern is more pronounced for workers, employees, and intermediate professions than for executives and higher intellectual professions, in line with the previous results. Secondly, craftsmen, merchants, entrepreneurs, and farmers seem to be outliers to the previous result, as their income growth is much more dispersed throughout the recent income distribution. For the middle of the income distribution, the dispersion of their income growth is more than double that of the other occupations.

[15] Our results also hold if we consider more than 10 income groups, but as expected, the plots are noisier.

[16] But, for comparison reasons we show in Figures A9 to A11 and Figure 15 the different moments of the market income growth by age cohort using the EDP dataset. We can see that overall the global patterns and results from Subsection 4.2 remain valid.

Figure 14: Dispersion of the market income growth rate by occupation



Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ along the deciles of the recent income distribution and type of occupation. The occupation variable is defined using the 2-digit professional category variable from the EDP dataset by only considering the first digit. See Subsection 2.2 for a definition of the recent income. *Source*: EDP.

5 Redistribution as Insurance

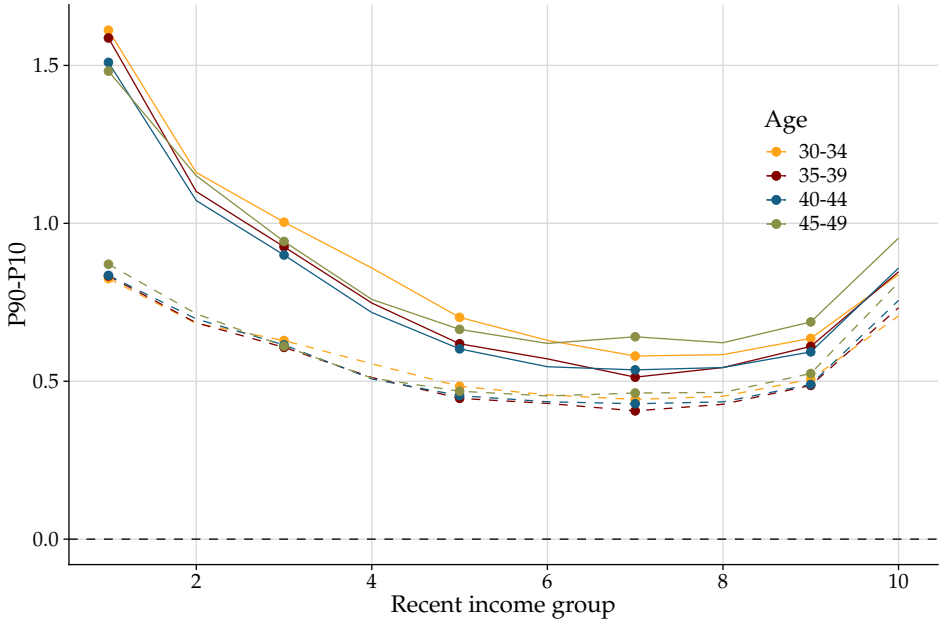
Section 4 examined the dynamics of market income and highlighted significant patterns along the initial position of individuals in the income distribution, as well as along several dimensions such as location, the share of capital, or the education level of individuals. In this section, we investigate the role and extent to which fiscal and social mechanisms might mitigate these patterns[17].

5.1 Disposable income persistence

We begin by studying income dynamics for the entire population, focusing on the disposable income aggregate that factors in social transfers and taxes. To streamline our analysis, we mainly consider our dispersion measure. In Figure 15, we depict the dispersion of both the market income (represented by solid lines) and disposable income (dotted lines) growth rates across the deciles of the recent income distribution and age groups. Note that upon adjusting for the aggregate age effect, the dispersion of both market and disposable incomes appears remarkably similar between age groups. To ensure clarity, we will set aside the age group dimension for the rest of the section and pool all age groups.

[17]The results and figures in this section are obtained using the EDP dataset. For comparison, we show in the Online Appendix the profiles of the dispersion, skewness, and kurtosis of the income growth by decile of recent income for the two datasets (POTES and EDP). The patterns are very similar between the two data sources.

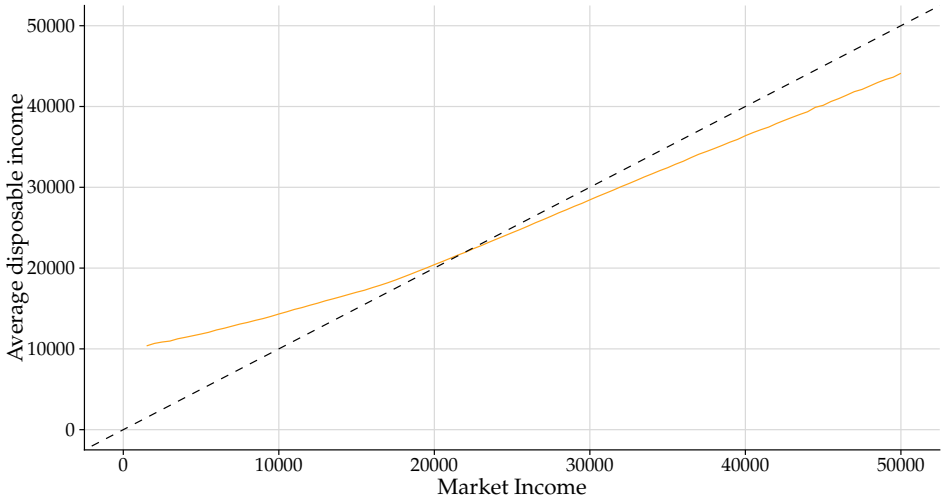
Figure 15: Dispersion of the market and disposable income growth rates



Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ by age group along the deciles of the recent income distribution using the EDP dataset. The solid lines correspond to the dispersion of the market income and the dotted lines to the dispersion of the disposable income of individuals. See Subsection 2.2 for a definition of the recent income and disposable income. *Source*: EDP.

A striking observation from the figure is that the dispersion of disposable income growth rate is significantly less than that of the market income growth rate for the initial three deciles of the income distribution. Further, the former's dispersion is less throughout the distribution. This indicates that fiscal and social mechanisms diminish the dispersion of idiosyncratic risk, especially at the lower end of the income distribution. Additionally, any minor disparities between age groups for the market income growth rates virtually disappear after factoring in transfers and taxes.

Figure 16: Redistribution by income market

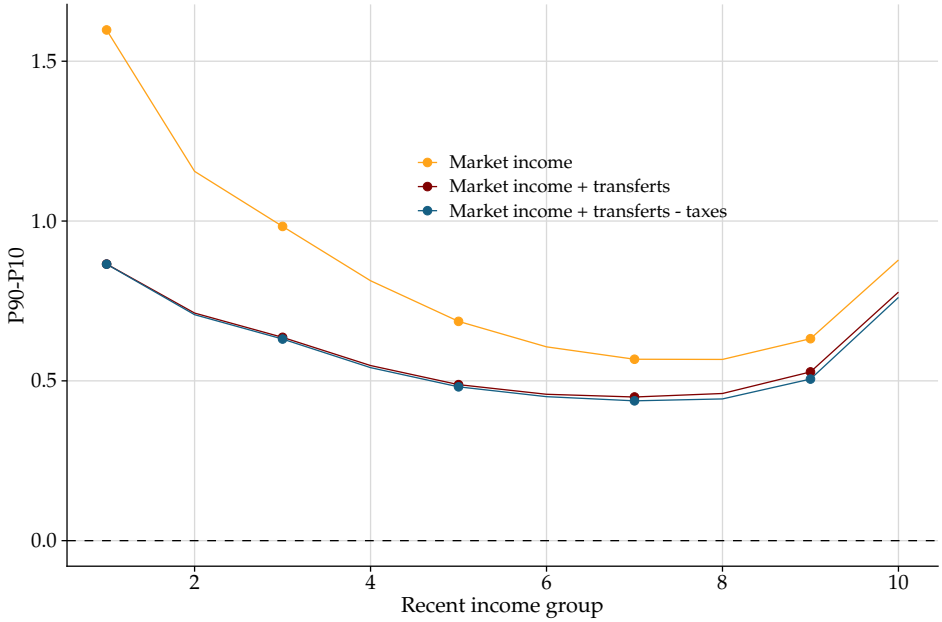


Notes: The Figure shows the average disposable income by value of the market income. The dashed line shows the first bisector for which disposable income is equal to the market income. *Source*: EDP.

A useful way to understand redistribution along the market income distribution is by examining income levels and plotting the average disposable income against different levels of market income, as done in Figure 16. For incomes up to approximately 22,000 euros, redistribution enhances individuals' income, as evidenced by the higher disposable income. More specifically, these individuals' income increases on average by around 3,700 euros once redistribution is accounted for. Redistribution diminishes as market income rises. Individuals with market income above 22,000 euros have a disposable income that is on average 3,000 euros lower than market income.

An alternative strategy involves successively incorporating social transfers and taxes and contrasting the dynamics among the three income aggregates. In Figure 17, we plot the dispersion of market income and two other income aggregates, the last of which ($market\ income + transfers - taxes$) equals disposable income. Firstly, mirroring Figure 15, we observe that transfers primarily contribute to the reduction in income risk, as defined by dispersion, especially at the lower end of the distribution. Secondly, taxes do not seem to play a significant role in diminishing market income dispersion, given the analogous dispersion patterns of the two related aggregates.

Figure 17: Dispersion of income growth rates with transfers and taxes



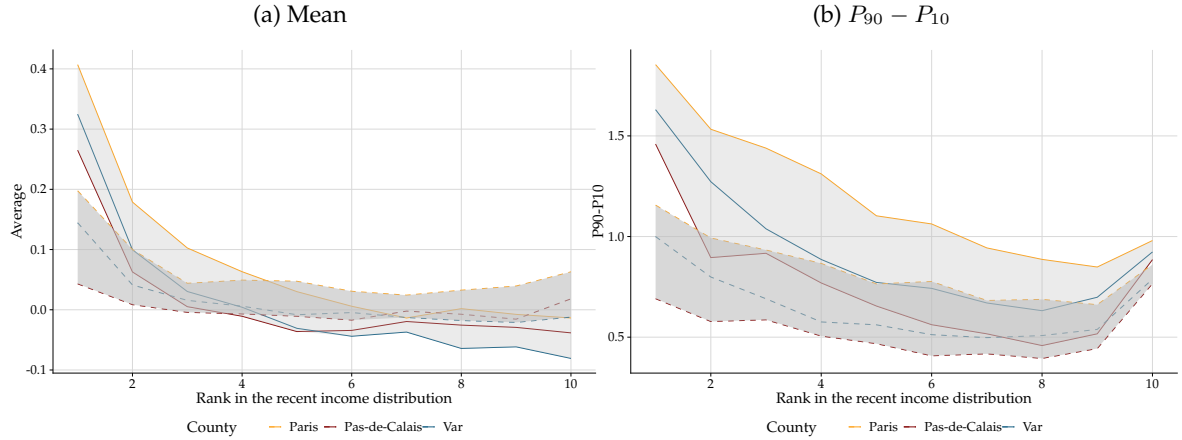
Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ for three alternative income aggregates along the deciles of the recent income distribution using the EDP dataset. The income aggregates are defined to progressively take into account transfers and taxes starting from the market income aggregate (pre-redistribution). Note that the market income plus the tranfers and minus taxes is equal to the disposable income. See Subsection 2.2 for a definition of the recent income and disposable income. *Source*: EDP.

5.2 Heterogeneity in redistribution and insurance

By location. In the previous section, we demonstrated that there is significant variation along the county dimension in the dispersion of income risk individuals face, consistent with the fact that different locations are characterized by different income shocks or employment opportunities. As shown in Figure 18, this variation is significantly reduced by fiscal and social

mechanisms. The range of the dispersion of disposable income (dark gray area) is considerably smaller than for market income.

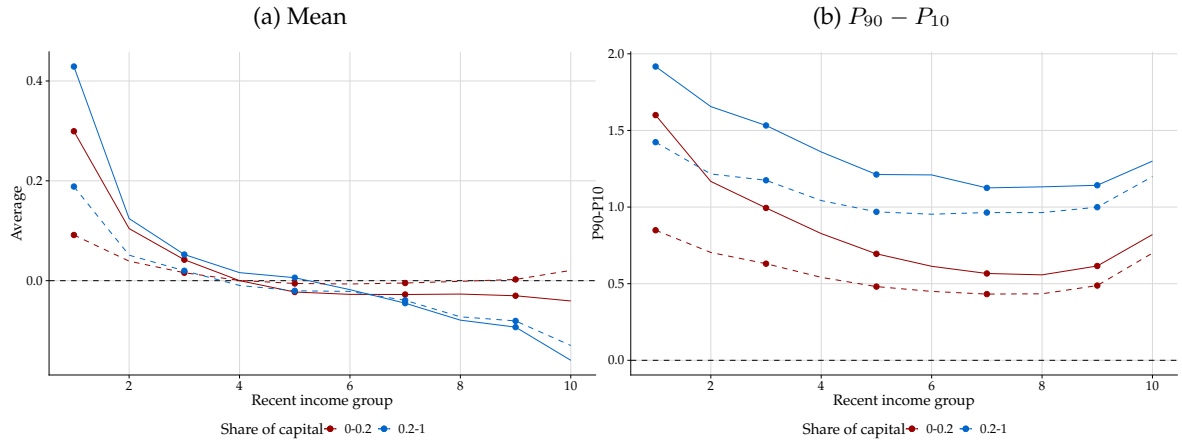
Figure 18: Range of the redistribution of the income growth rates by location



Notes: The Figure shows the range of mean (in Panel (a)) and the dispersion as measured by $P_{90} - P_{10}$ (Panel (b)) of the five years log-income growth by county for the market income (gray area) and the disposable income (dark gray area). The figure also shows the associated profiles for three counties (Paris, Pas-de-Calais and Var) for the market income (solid line) and the disposable income (dashed lines). *Source*: EDP.

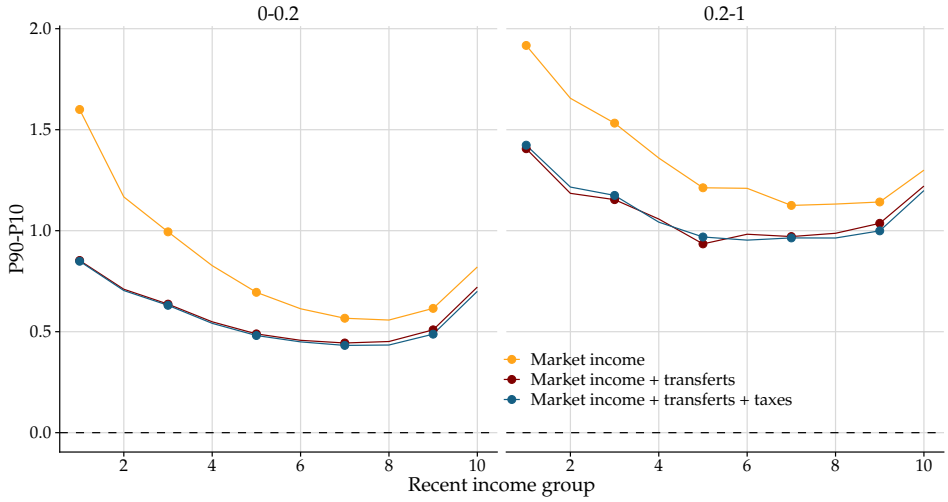
By share of capital income. We observe similar trends when looking at disposable income by the share of capital, as shown in Figure 19. The dispersion of the disposable income growth rate (dotted lines) decreases along the deciles of the recent income distribution. The magnitude of the decrease is generally more significant for individuals with a share of capital larger than 20%. Furthermore, the attenuation of the dispersion is substantially more important at the bottom of the income distribution and decreases rapidly along the income distribution, particularly for individuals with a lower share of capital income. This fact implies that the pattern observed in the whole population is mainly driven by individuals with little capital income. These results can be visualized more clearly when examining the dynamics for the market income aggregate and progressively adding transfers and taxes, as shown in Figure 20. Again, transfers appear to be the primary source of attenuation for the dispersion of income growth.

Figure 19: Redistribution of the income growth rates by share of capital



Notes: The Figure shows the mean (Panel (a)) and dispersion as measured by $P_{90} - P_{10}$ (Panel (b)) of the five years log-income growth of individuals that have a share of capital in their market income smaller or equal to 20% (the red lines) or larger than 20% (the blue lines) along the deciles of the recent income distribution. The share of capital for a given year is defined like the recent income as the capital income over the previous three years divided by the total income over the same period. The solid lines represent the dispersion of market income growth whereas the dotted lines represent the dispersion of disposable income growth. See Section 2.2 for a definition of the disposable income. *Source*: EDP.

Figure 20: Dispersion of income growth rates with transfers and taxes by capital share



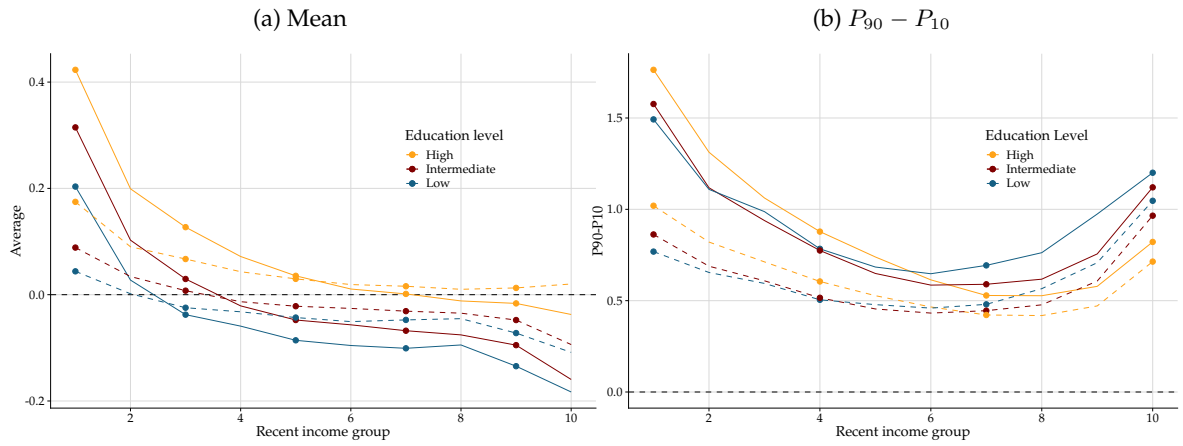
Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ for three alternative income aggregates along the deciles of the recent income distribution using the EDP dataset and by share of capital. The income aggregates are defined to progressively take into account transfers and taxes starting from the market income aggregate (pre-redistribution). Note that the market income plus the tranfers and minus taxes is equal to the disposable income. See Subsection 2.2 for a definition of the recent income and disposable income and notes to Figure 19 for a definition of the share of capital. *Source*: EDP.

By education and occupation. We again observe the same trends when looking at the dispersions of market and disposable income by education level (in Figure 21) and type of occupation (in Figure 22). More precisely, redistribution reduces the dispersion of the market income growth throughout the income distribution regardless of the education level or type of occupation, but the reduction is larger at the bottom of the income distribution and decreases rapidly afterward.

Furthermore, the size of the decrease at the bottom of the distribution is negatively corre-

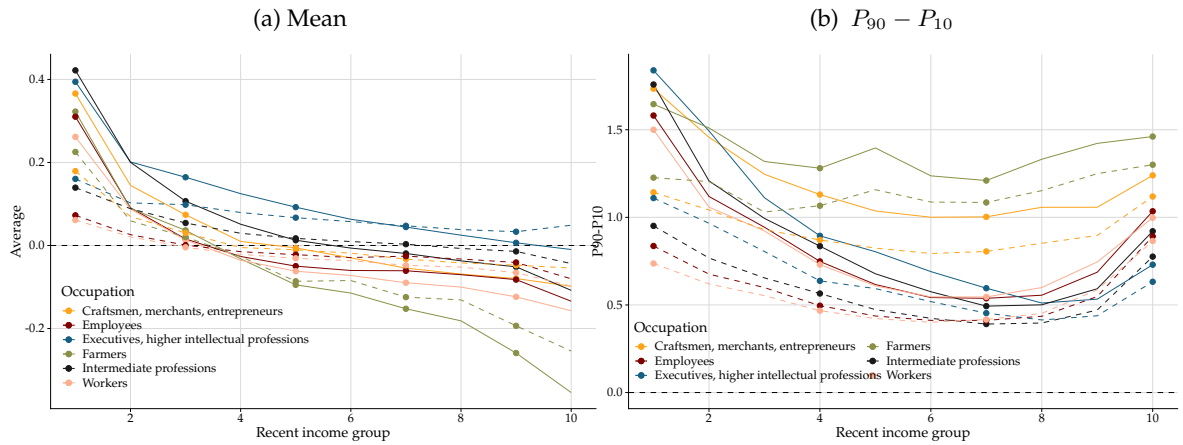
lated with the level of individuals' skills measured by either their education or occupation. For example, individuals with a high level of education in the first decile see the dispersion of their market income decrease by 57%, whereas the decrease is 68% for individuals with a low level of education. We observe the same pattern for the type of occupation, although this fact is less clear for craftsmen, merchants, entrepreneurs, and farmers, as the attenuation is fairly stable along the income distribution.

Figure 21: Redistribution of income growth rates by level of education



Notes: The Figure shows the mean (Panel (a)) and dispersion as measured by $P_{90} - P_{10}$ (Panel (b)) of the five years log-income growth by education level group along the deciles of the recent income distribution using the EDP dataset. The solid lines correspond to the dispersion of the market income and the dotted lines to the dispersion of the disposable income. See Subsection 2.2 for a definition of the recent income and disposable income and notes to Figure 13 for a definition of the education level groups. *Source*: EDP.

Figure 22: Redistribution of income growth rates by level of occupation

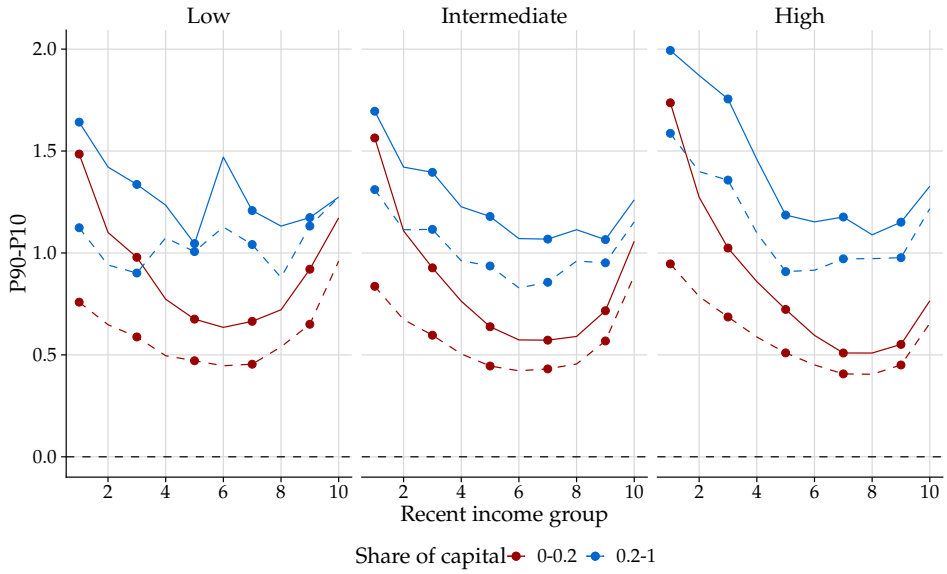


Notes: The Figure shows the mean (Panel (a)) and dispersion as measured by $P_{90} - P_{10}$ (Panel (b)) of the five years log-income growth by type of occupations along the deciles of the recent income distribution using the EDP dataset. The solid lines correspond to the dispersion of the market income and the dotted lines to the dispersion of the disposable income. See Subsection 2.2 for a definition of the recent income and disposable income and notes to Figure 14 for a definition of the type of occupation groups. *Source*: EDP.

By education and share of capital income. The previous results lead us to consider the possibility of an interaction between individuals' skills, as measured by their level of education, and the nature of their income, as captured by the share of capital. Figure 23 shows the dispersion

of market and disposable income by level of education and share of capital group. Firstly, we can observe that the dispersion of income growth for a given group of share of capital is similar for the middle of the income distribution regardless of the level of education. Secondly, for a given share of capital group, the dispersion of the market income growth rate increases with the level of education at the bottom of the distribution. Finally, redistribution reduces the dispersion of market income at the bottom of the income distribution, mainly for individuals with a low share of capital income, and even more for individuals with a low level of education.

Figure 23: Dispersion of the market and disposable income growth rates by share of capital and education level



Notes: The Figure shows the dispersion of the five years log-income growth as measured by $P_{90} - P_{10}$ by share of capital group and level of education along the deciles of the recent income distribution using the EDP dataset. See notes to Figures 12 and 13 for a definition of the share of capital and the education level groups, and Subsection 2.2 for a definition of the recent income and disposable income. *Source*: EDP.

6 Conclusion

This paper studies the patterns of income inequality and dynamics in France over the period 2006-2017, using comprehensive administrative panel data. We examine the persistence of both market income (before redistribution) and disposable income (after redistribution). The first measure is more comprehensive than previously-studied ones because it includes capital income, self-employed income, and other associated sources of income. The comparison of the patterns between market and disposable income provides insights into the role of redistribution as insurance against income shocks.

Building on the recent literature on income dynamics, we propose a non-parametric framework that accounts for differences in income risk along the market income distribution. We analyze several key statistical moments, such as variance, skewness, and kurtosis of individuals' income growth, conditional on their rank in the income distribution and age group. We find considerable differences in these moments along the income distribution, but less so by age. We show that these differences persist across socio-economic groups, defined by different

locations, shares of capital income, education levels, and occupation.

Finally, we demonstrate that redistribution through taxes and benefits mitigates market income risk, particularly for individuals in the lower part of the income distribution. Transfers rather than taxes are the primary driver of this reduction in income risk.

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Appendix

A.1 Moments computation

Using our decomposition of the income growth into three components, we describe several statistical moments of interest by providing their decomposition and empirical counterparts. For simplicity, we derive the unconditional estimators but the results hold when conditioning (such as individuals' rank in the initial income distribution).

Expected value The empirical implementation uses the mean instead of the expected value operator which in our case will be very close because of the size of our dataset.

$$\mathbb{E}[g_{Y_{i,b}}] = g_{\bar{Y}_b} + \mathbb{E}[g_{y_{i,b}}]$$

Variance We apply the same method for the variance:

$$\mathbb{V}[g_{Y_{i,b}}] = \mathbb{V}[g_{y_{i,b}}]$$

Skewness The total skewness is simply the skewness of the idiosyncratic risk[18].

$$\mathbb{S}[g_{Y_{i,b}}] = \mathbb{S}[g_{y_{i,b}}]$$

In order to compute the skewness we implement an approximate measure as in Kelley (1947). This measure of the skewness defined by $\mathcal{S}[g_{Y_{i,b}}] = [(P_{90} - P_{50}) - (P_{50} - P_{10})]/(P_{90} - P_{10})$ is widely used in the recent literature on earnings risk (Guvenen et al. (2014), Pruitt and Turner (2020)) and it is robust to outliers and unit-free ranging between $[-1, 1]$. More precisely, the measure of the skewness accounts for the share of the dispersion as measured by $P90 - P10$ that is explained by the two tails of the income distribution. More precisely, a positive $\mathcal{S}[g_{Y_{i,b}}]$ implies that the distribution of $g_{Y_{i,b}}$ is more dispersed in the upper tail than the lower tail.

Kurtosis Similar to the skewness, the total kurtosis is equal to the kurtosis of the idiosyncratic risk.

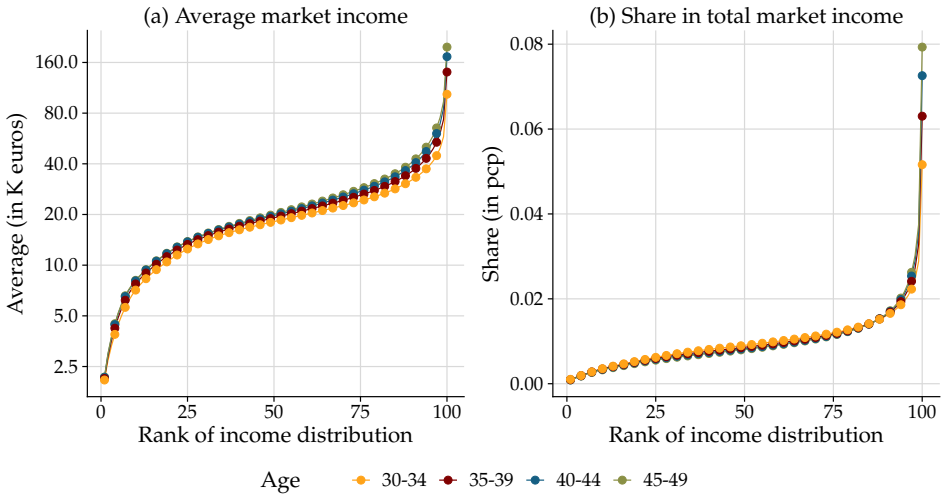
$$\mathbb{K}[g_{Y_{i,b}}] = \mathbb{K}[g_{y_{i,b}}]$$

For similar reasons as for the skewness, we use the Crow and Siddiqui (1967) measure of kurtosis defined by $\mathcal{K}[g_{Y_{i,b}}] = (P_{97.5} - P_{2.5})/(P_{75} - P_{25})$.

[18] Both the skewness and the kurtosis only depend on the idiosyncratic risk. They are centered moments, such that the aggregate risk component is net out by definition.

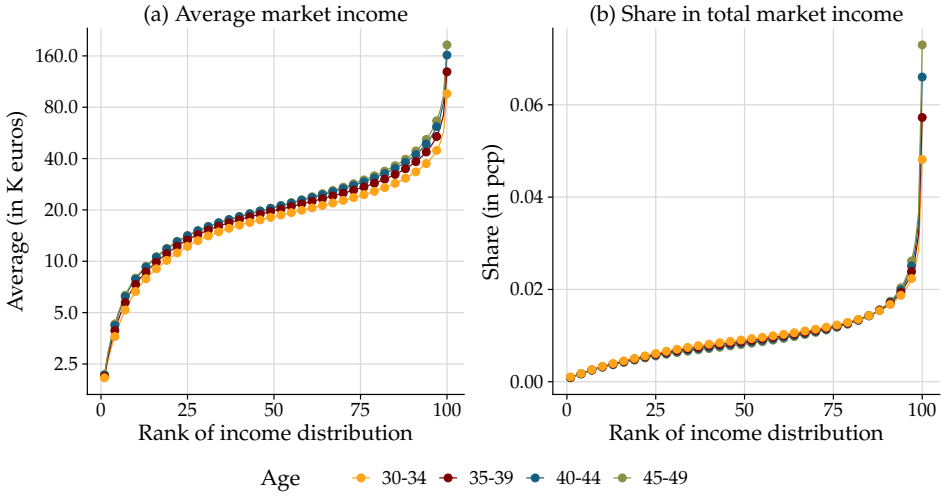
A.2 Figures

Figure A1: Income distribution, 2006-2012



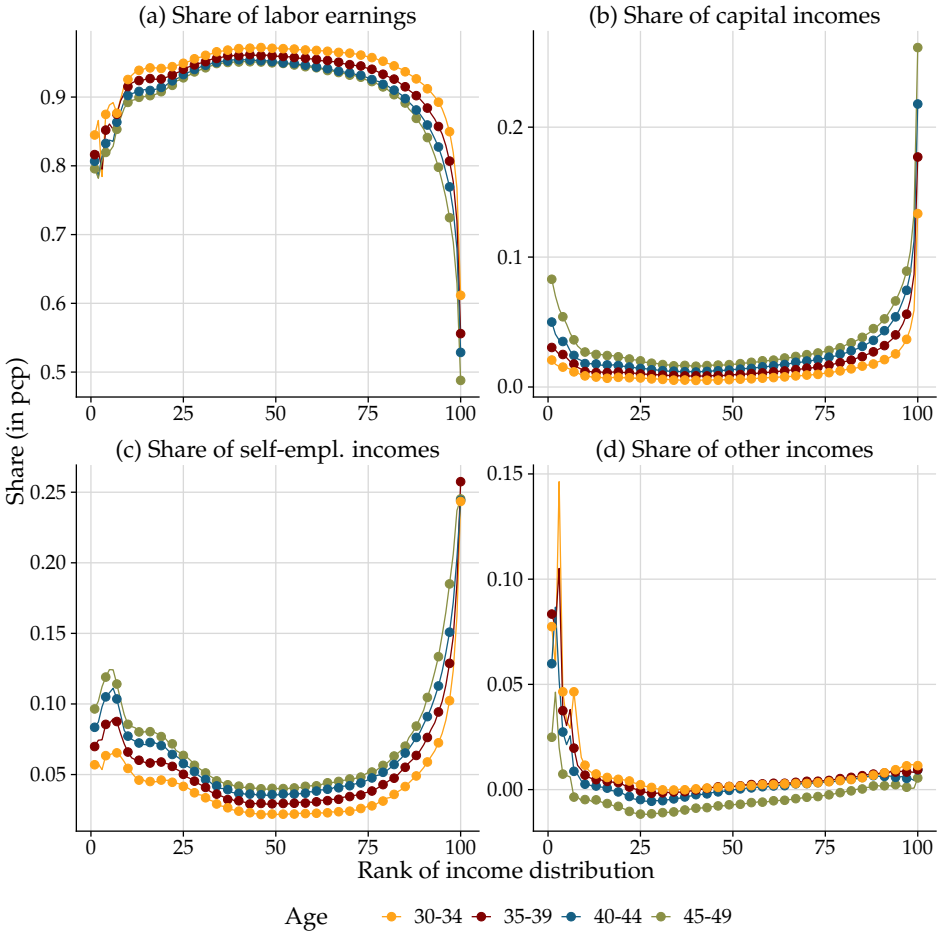
Notes: See notes to Figure 1 for details.

Figure A2: Income distribution, 2013-2017



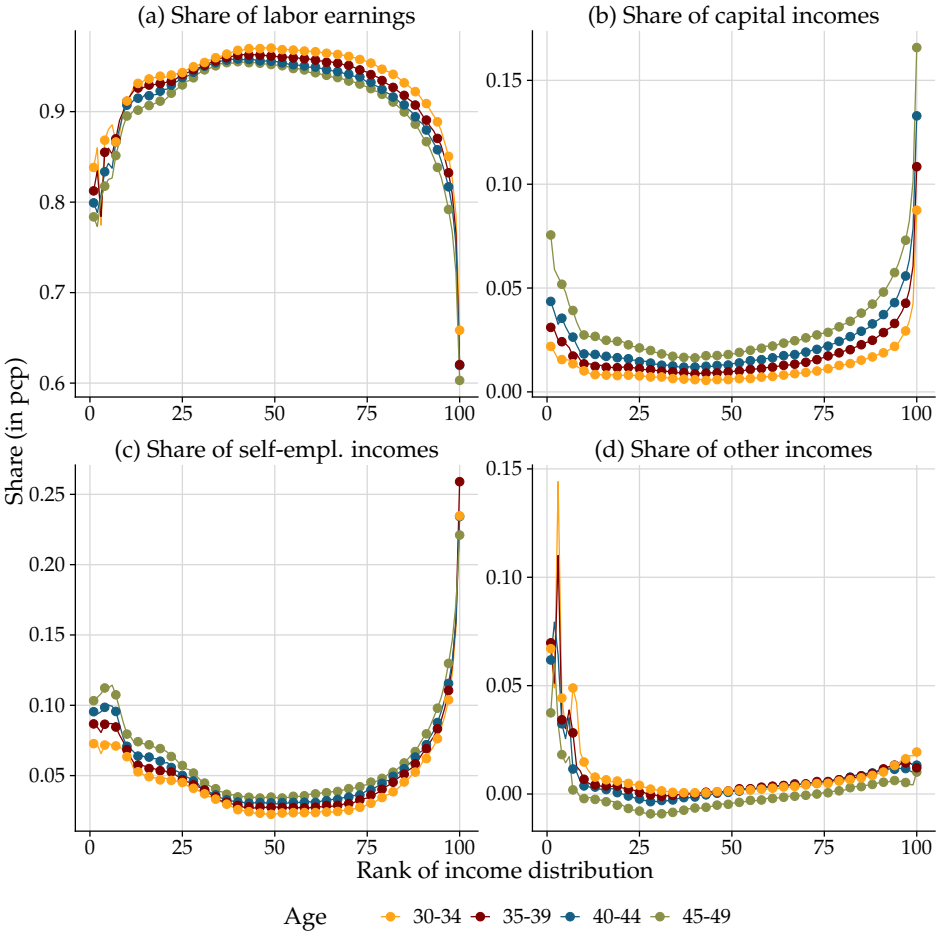
Notes: See notes to Figure 1 for details.

Figure A3: Decomposition of market income, 2006-2012



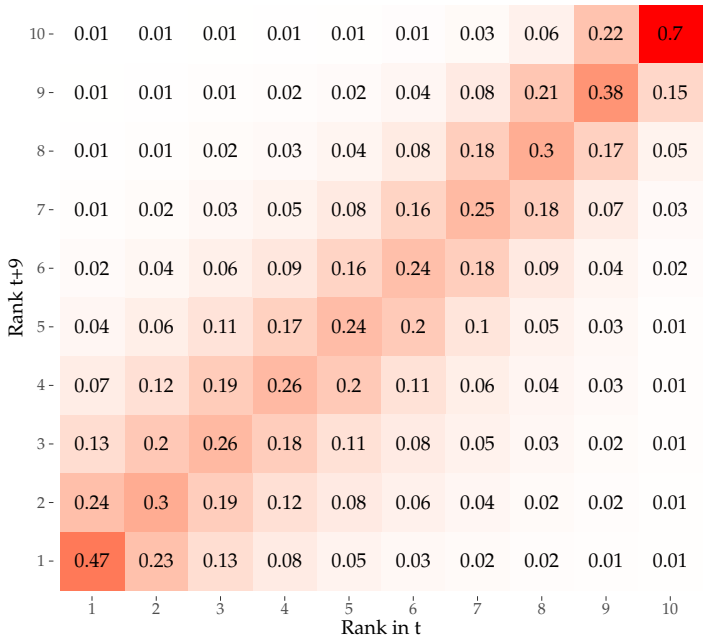
Notes: See notes to Figure 2 for details.

Figure A4: Decomposition of market income, 2013-2017



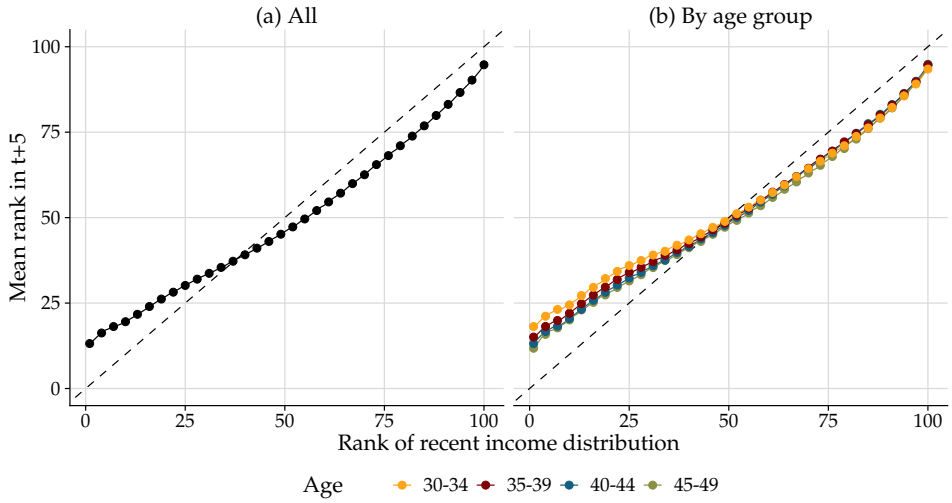
Notes: See notes to Figure 2 for details.

Figure A5: Market income transition matrix at nine years



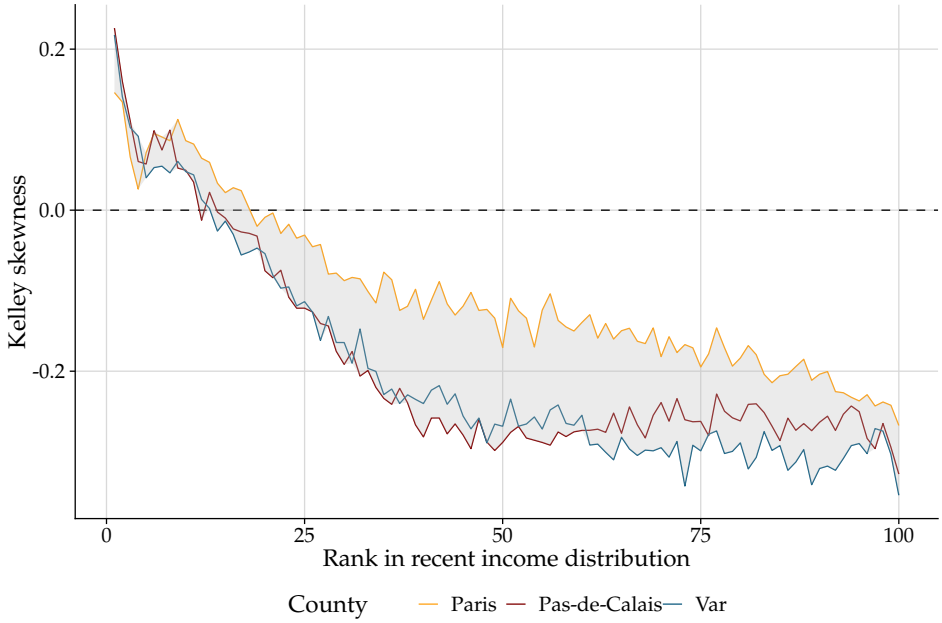
Notes: The Figure shows the average probability of individuals to be in a given income group at $t + 9$ conditional on their income group in year t. As a result, each column in the matrix sums up to 1. However, the rows do not sump up to 1 as some individuals might disappear before $t + 9$. *Source*: Income tax returns.

Figure A6: Rank-rank analysis 9 years horizon



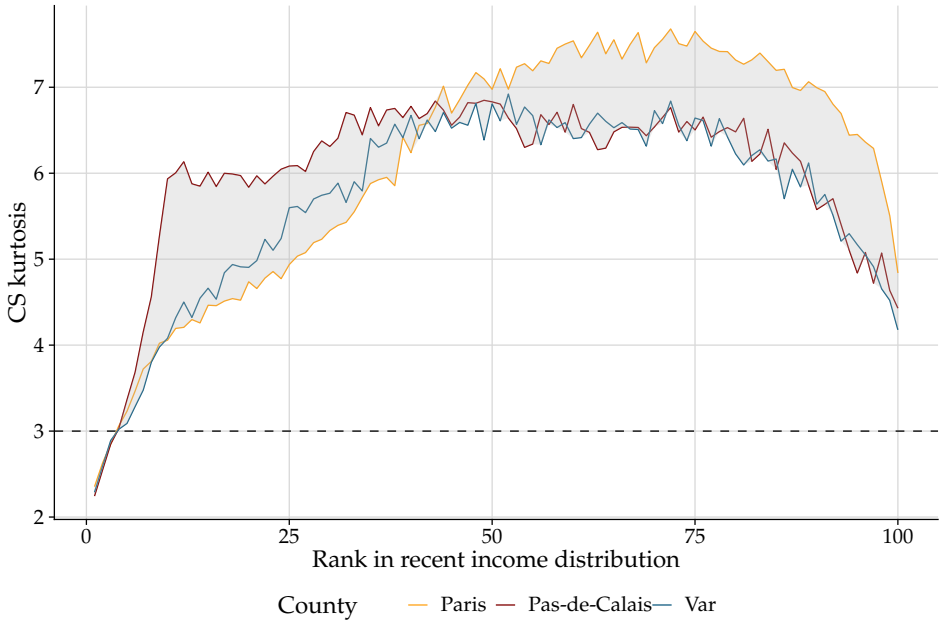
Notes: The Figure shows the mean of individuals at a nine years horizon as a function of the recent income rank in Panel (a) for the whole population and in Panel (b) by age groups. *Source*: Income tax returns.

Figure A7: Skewness of market income growth rates by county



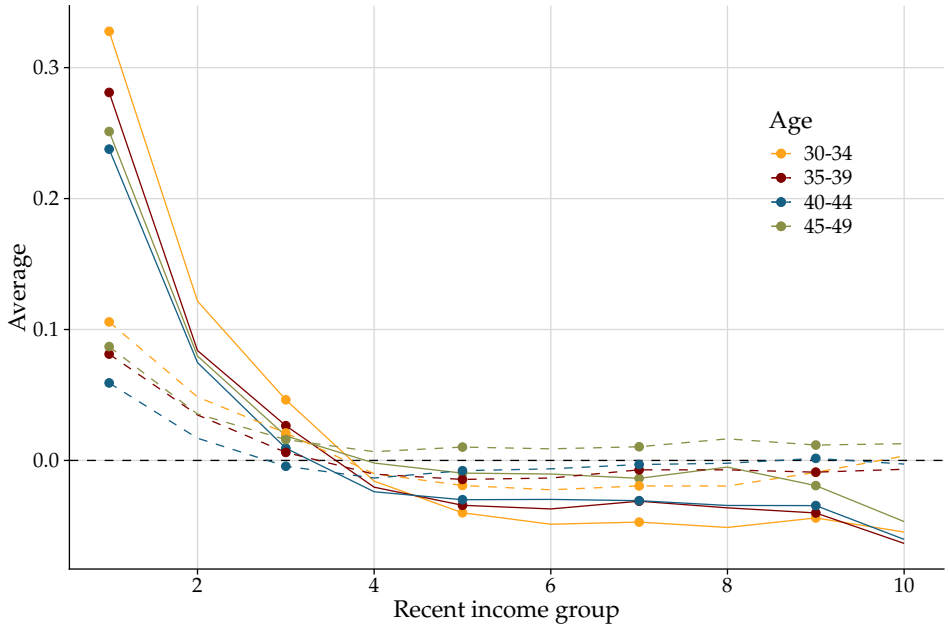
Notes: The Figure shows the range of the Kelley measure of the skewness of the five years log-income growth by county (the gray area) and the skewness profiles for three counties: Paris, Pas-de-Calais and Var. *Source*: Income tax returns.

Figure A8: Kurtosis of market income growth rates by county



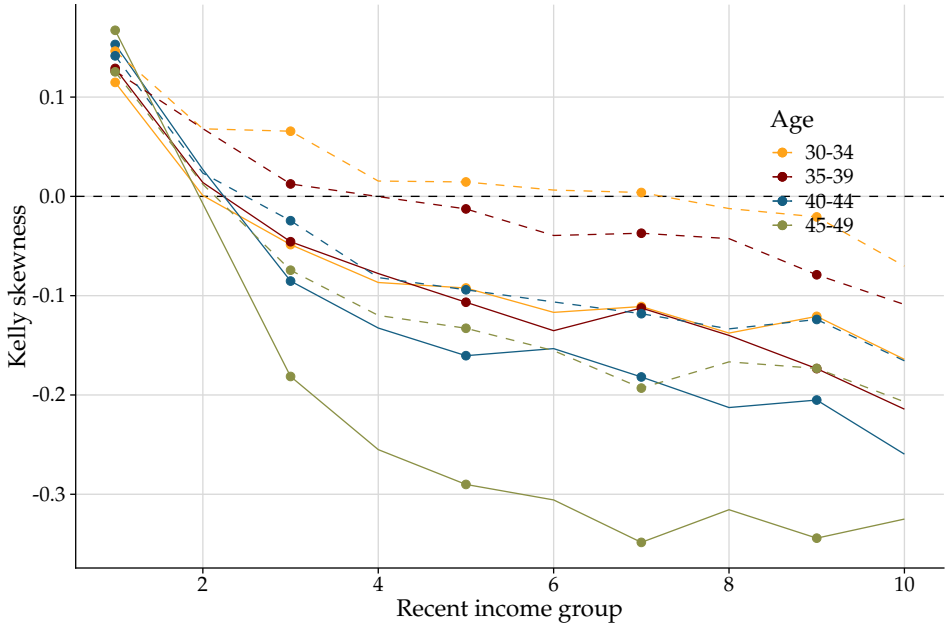
Notes: The Figure shows the range of the CS measure of the kurtosis of the five years log-income growth by county (the gray area) and the kurtosis profiles for three counties: Paris, Pas-de-Calais and Var. *Source*: Income tax returns.

Figure A9: Mean income growth rate (EDP)



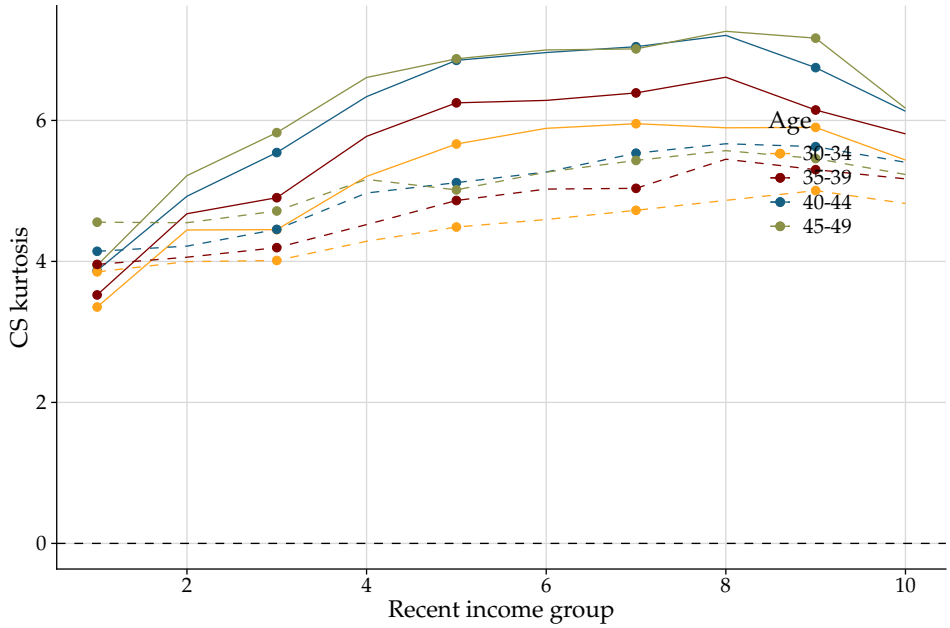
Notes: The Figure shows the average of the five years log-income growth by age group along the deciles of the recent income distribution using the EDP dataset. The solid lines correspond to the average of the market income and the dotted lines to the average of the disposable income of individuals. See Subsection 2.2 for a definition of the recent income and disposable income. *Source*: EDP.

Figure A10: Skewness income growth rate (EDP)



Notes: The Figure shows the Kelley measure of the skewness of the five years log-income growth by age group along the deciles of the recent income distribution using the EDP dataset. The solid lines correspond to the skewness of the market income and the dotted lines to the skewness of the disposable income of individuals. See Subsection 2.2 for a definition of the recent income and disposable income. *Source*: EDP.

Figure A11: Kurtosis income growth rate (EDP)



Notes: The Figure shows the Crow and Siddiqui measure of the kurtosis of the five years log-income growth by age group along the deciles of the recent income distribution using the EDP dataset. The solid lines correspond to the kurtosis of the market income and the dotted lines to the kurtosis of the disposable income of individuals. See Subsection 2.2 for a definition of the recent income and disposable income. *Source*: EDP.

A.3 Tables

Table A1: Absolute and relative mobility for different horizons

Age group	$\hat{\alpha}$	$\hat{\beta}$	$\bar{r}_{25}$	$\bar{r}_{50}$	$\bar{r}_{75}$
Panel A: 3 years					
30-34	9.53 (0.007)	0.83 (<0.001)	30.3	51.0	71.8
35-39	7.23 (0.006)	0.87 (<0.001)	29.0	50.7	72.4
40-44	5.84 (0.005)	0.89 (<0.001)	28.1	50.4	72.6
45-49	4.87 (0.005)	0.90 (<0.001)	27.4	50.0	72.6
All	5.30 (0.003)	0.89 (<0.001)	27.5	49.7	71.9
Panel B: 9 years					
30-34	16.79 (0.023)	0.70 (<0.001)	34.3	51.8	69.3
35-39	13.75 (0.020)	0.75 (<0.001)	32.4	51.0	69.7
40-44	11.87 (0.020)	0.77 (<0.001)	31.1	50.3	69.5
45-49	11.35 (0.022)	0.76 (<0.001)	30.4	49.5	68.5
All	9.32 (0.011)	0.78 (<0.001)	28.9	48.5	68.2

Notes: The Table shows: (i) in columns 2 and 3 the estimates of the relative and absolute income mobility and (ii) in columns 4 to 6 the average rank of individuals that had an initial recent income rank of 25, 50 and 75. The results are computed for the whole population and by age group. Panel A show these quantities for 3 years horizon and Panel B for 9 years horizon. See Section 3.2 for more details on how the quantities are computed. *Source*: Income tax returns.