Working Paper Series

Sources of Inequality in Italy

Roberto Iacono
Marco Ranaldi

ECINEQ WP 2018 - 479

ECINEQ 2018 - 479
October 2018

www.ecineq.org

Sources of Inequality in Italy*

Roberto Iacono†
Norwegian University of Science and Technology, Norway

Marco Ranaldi
PSE and University Paris 1 Panthéon-Sorbonne, France

Abstract

In this article, we study the link between the functional and personal distribution of income, focusing on the case of Italy between 1989 and 2016. To this end, we rely on the novel concept of income composition inequality. Income composition inequality focuses on how unequally the composition of income is distributed across the population. The higher the overall degree of income composition inequality is, the stronger the link between the functional and personal distribution of income. We show that the strength of this link decreased steadily in Italy over the period considered. This result is robust to the use of different definitions of capital and labor and different estimation techniques of the degree of income composition inequality. The implications of this result are twofold. First, fluctuations in the total factor shares of income are having an increasingly weaker impact on income inequality in Italy. Second, Italy is moving towards becoming a multiple sources of income society. Finally, we conceptualize a simple rule of thumb for policy makers seeking to reduce income inequality in the long run: This rule relates fluctuations in the total factor shares and the level of income composition inequality to the specific income source to be redistributed.

Keywords: Income composition inequality, functional and personal income distribution, Italy.

JEL Classification: C430, E250, H24.

*For their helpful comments and suggestions, we thank Emanuele Felice, Salvatore Morelli, Michele Raitano, Andrea Roventini. The usual disclaimer applies.

†**Contact details**: R. Iacono, Norwegian University of Science and Technology. E-mail: roberto.iacono@ntnu.no. M. Rinaldi, Paris School of Economics and University Paris 1 Panthéon-Sorbonne (Paris Jourdan Sciences Économiques, PjSE). E-mail: marco.ranaldi@psemail.eu.

"In my view, Economics has become too splintered into sub-disciplines [...]. There is a great need, particularly at this juncture, to unify the different branches of Economics. The link between macro and micro is essential, and Economics has suffered from allowing these to go their separate ways. Empirically, the national accounts need to be brought closer to micro-data on households. Theoretically, the aggregate analysis of distribution needs to look at both profits and the wages of heterogeneous workers. Growth theory, Macroeconomics, and Labour Economics are all part of the mix." A.B.Atkinson, (2009).

1 Introduction

This paper investigates the shape of the relationship between the functional distribution of income and the level of personal income inequality, focusing on the case of Italy between 1989 and 2016. In recent years, and with increased impetus following the pioneering works of Piketty (2014) and Piketty and Zucman (2014), the dynamics of factor income shares are again the subject of economists' attention given their potential effects on the level of personal income inequality (Atkinson, 2009; Glyn, 2011) and thereby on macroeconomic variables.

However, there is not yet consensus on the relationship between changes in the share of factor incomes and the effect on income inequality at the aggregate level. Recent empirical work by Bengtsson and Waldenstrom (2018) seeks to shed light on this relationship in the longer run and for a chosen set of advanced economies. In a related work, Gabbuti (2018) focuses in particular on the case of Italy and argues that this relationship varies in the long run, "reflecting fundamental changes in the economy and society" (*ibid*., 2). On a theoretical

level, Milanovic (2017) identifies the two necessary conditions (given by a high level of capital income inequality and a high and positive association between owners of capital income and overall top income earners) for the transmission of a change in factor income shares to the aggregate level of inequality.

To innovate on previous research on the topic, this paper proposes a shift in focus by providing a *joint* estimate of the degree of dispersion of each of the two income sources (capital and labor), which we label as *income composition inequality*. In other words, we introduce *one* tool to measure the overall dispersion of factor income shares, in contrast than the previously common practice of analyzing the impact on aggregate inequality of each of the factor shares. To do so, we employ the so-called income factor concentration (IFC hereafter) index, formally developed in Ranaldi (2017, 2018), to study the link between the functional and personal distribution of income in Italy.

Whenever the two income sources are *concentrated* correspondingly in the hands of the top (e.g., capital) and the bottom (e.g., labor) of the income distribution, the resulting high level of the IFC index signals a high degree of income composition inequality, regardless of the level of income inequality. In this case, the relationship between a sudden shock to factor income shares and the level of income inequality is strong. By contrast, IFC index takes a low value whenever income sources are equally shared across the population given the overall levels of income inequality and factor shares. In the latter case, a sudden shock to factor income shares has a limited effect on income inequality.

We endorse the approach of income composition inequality for future research on income inequality, based on the evidence that in rich countries, larger shares of the population earn their income from set of multiple income sources (Atkinson, 2009, Atkinson and Lakner,

2017, Ranaldi, 2018). Hence, in our view, a more thorough approach to the study of income inequality has to go beyond, on the one hand, an exclusive focus on the dispersion of total income, and on the other hand, it has to disregard the view of the classical economists according to which social classes and income sources perfectly coincide.

The results of this article show that income composition inequality, and therefore the link between the functional and personal distribution of income, decreased steadily in Italy between 1989 and 2016. This result, which is robust to different definitions of capital and labor and different estimation techniques of the IFC index, has two major implications. The first implication is that fluctuations in the total factor shares of income are having an increasingly weaker impact on income inequality in Italy. In other words, the fraction of the variation in the Gini coefficient explained by the change in factor shares has been decreasing. The second implication is that Italy is moving towards being a multiple sources of income society. These non-intuitive results support the choice of Italy as the case study for this work. Italy represents an example of a rich country for which the factor shares of income have experienced an intriguing non-monotonous trend in recent decades.

In parallel to the empirical findings, this article conceptualizes a simple rule of thumb for policy makers seeking to effectively reduce income inequality in the long run. The intuition here is that the the degree of income composition inequality (measured by the IFC index) becomes a key variable for the design of effective redistribution policies. Specifically, the rule of thumb relates the fluctuations in total factor shares and the level of income composition inequality to the specific income source to be redistributed. In other words, we claim that when the policy maker's expectation regarding the sign of the variation in factor share z coincides with her expectation regarding the sign of income composition inequality, it is preferable to

redistribute source z to reduce inequality in the long run.

This paper is structured as follows. Section 2 illustrates the method and data that we employ. Section 3 discusses the results at both the national and regional levels. Section 4 checks the validity of our results by varying the definitions of capital and labor. Section 5 introduces the above-mentioned rule of thumb for policy makers, and section 6 concludes the paper.

2 Methodology and data

This section introduces both the method and data that we employ. To assess the link between the functional and personal distribution of income, we follow the method proposed by Ranaldi (2017, 2018). The latter analytically defines the concept of *income composition inequality*, in an effort to estimate the extent to which the *composition* of income is unequally distributed across the population. Income composition is unequal whenever two sources of income, e.g., capital and labor,[1] are separately owned by the top and the bottom of the income distribution (or vice versa); on the other hand, there is equality of income composition whenever each individual owns the same population shares of the two income sources. Why and how is this measure of inequality relevant? Its role is highlighted by analyzing the interplay with changes in factor shares and aggregate income inequality. Whenever income composition inequality is high, then for example, capital income ends up in the hands of the wealthiest individuals. In this context, an increase in the capital share increases the level of overall income inequality, by boosting the income of the wealthy. Therefore, under a high level of income

[1] In what follows, we exclusively deal with these two sources, although the method can be applied to any pair of sources whose sum equals total income.

composition inequality, the link between the functional and personal distribution of income is strong. The opposite situation holds true when income composition inequality is low.

To measure income composition inequality, Ranaldi (2017, 2018) analytically defines the IFC index, labeled $\mathscr{I}_f$. The IFC index is constructed by means of the concentration curves for each income source. These curves are the cumulative distributions of income sources across the population, with individuals being indexed by their income rank (and not by capital or labor income rank). These curves cumulate an income source up to the level of the total factor share (which is less than 1), not to 1 as is the case for the more standard concentration curves developed by Kakwani (1977a, 1977b). The area below the "standard" concentration curve for an income source (which cumulates the income source up to 1) can be considered a good proxy for the level of concentration for the specific income source at the top, or at the bottom, of the income distribution. Indeed, when this area is large, the income source is concentrated primarily at the bottom of the income distribution, while when the area is small, the source is concentrated at the top. By introducing both the zero- and the maximum-concentration curves, which mirror the conditions of zero and maximum inequality in income composition, Ranaldi (2017, 2018) constructs the IFC index. Precisely, the latter is defined as the area given by the difference between the concentration curve for the income source and the zero concentration curve, suitably normalized. A graphical representation of the concentration curves for Italy in 1989 is illustrated in Figure 1. Formally, if we denote by $\mathscr{A}$ the area given by the difference between the zero-concentration curve and the concentration curve for capital (labor) and by $\mathscr{B}$ the difference between the zero-concentration curve and the maximum-concentration curve,

we can define the IFC index as follows:

$$\mathscr{I}_f = \frac{\mathscr{A}}{\mathscr{B}}. \tag{1}$$

Another way of expressing this index is as follows:[2]

$$\mathscr{I}_f = \frac{\pi w \left(\tilde{\mu}_w - \tilde{\mu}_\pi\right)}{\mathscr{B}}, \tag{2}$$

where π and w are the capital and the labor shares of income, while $\tilde{\mu}_w$ and $\tilde{\mu}_\pi$ are the areas of the *non-scaled* labor and capital concentration curves, respectively.[3]

Interestingly, simple algebra reveals that the derivative of the Gini coefficient, $\mathscr{G}$, with respect to changes in the capital share of income is as follows:

$$\frac{\partial \mathscr{G}}{\partial \pi} = 2\left(\tilde{\mu}_w - \tilde{\mu}_\pi\right). \tag{3}$$

Equation 3 states that the sign of the IFC index, which derives from the difference between the areas of the two concentration curves, determines whether an increase in the capital share of income positively or negatively affects the personal income distribution. Thus, the IFC index can be seen as a bridge between the functional and personal distribution of income. However, note that the overall change in the total income Gini coefficient is not solely determined by the dynamics of the factor shares. Indeed, changes in the structure of the labor market and the introduction of a new redistribution policy are only some of the forces that can influence its dynamics. In addition, it is also likely that two different surveys sample a country's population in two different ways, thereby provoking possible artificial changes in the level of income inequality.

[2]Note that $\mathscr{A} = \pi(\tilde{\mu}_y - \tilde{\mu}_\pi)$, where $\tilde{\mu}_y$ is the area of the Lorenz curve. As the area of the Lorenz curve can be broken down into the sum of the two areas below the concentration curves for capital and labor, hence $\tilde{\mu}_y = \pi\tilde{\mu}_\pi + w\tilde{\mu}_w$, we can easily find that $\mathscr{A} = \pi w\left(\tilde{\mu}_w - \tilde{\mu}_\pi\right)$.

[3]The two areas $\tilde{\mu}_w$ and $\tilde{\mu}_\pi$ should be multiplied by w and π, respectively, to obtain the areas of the concentration curves as in Ranaldi (2017, 2018).

Apart from its technical character, the IFC index also has value from the perspective of political economy. It can be read as a stylized measure of the *degree of capitalism* of a social system or economy. Following the framework proposed by Milanovic (2017), the two extreme values that the index can take coincide with two benchmark societies. Specifically, under maximum income composition inequality, a society can be defined as an example of *classical capitalism*, characterized by a class of wealthy capitalists and a class of poor workers. On the contrary, under minimum inequality in income composition, a society can be defined as an example of *new capitalism*, in which there is no longer any clear mapping between social class and income source. We can therefore state that a particular trend in income composition inequality provides us with novel insights into the form of capitalism towards which a society converges.

At this point of the analysis, we introduce the data and the definitions of capital and labor that we adopt. To compute the IFC index, we use the Survey of Household Income and Wealth ($SHIW$) provided by the Bank of Italy.[4] This survey comprises approximately $20,000$ individuals, distributed over approximately 300 Italian municipalities. This survey has been carried out since the 1960s, although information concerning returns on financial assess has only been available since 1989 (see Brandolini et al., 2018, for further information). Therefore, our analysis ranges from 1989 to 2016. The surveys are available every two years, with a two-year gap between 1995 and 1998.

The type of income provided by the Bank of Italy is net disposable income, which includes four different sources: (i) payroll income, (ii) pensions and transfers, (iii) net self-employment

[4]The SHIW has been the main source of information on incomes at both the household and individual levels in recent decades.

income and (iv) property income. All of these sources can be further decomposed.[5] In what follows, we adopt a single definition of capital income and two definitions of labor income.

Capital income is defined as the sum of property income (Y_{pr}) and the capital component of net self-employment income ($Y_{s\pi}$). Formally:

$$\Pi = Y_{pr} + Y_{s\pi}.$$

Regarding labor income, the first definition includes payroll income (Y_{pa}), the labor component of self-employment income (Y_{sw}), pensions (Y_{pe}) and net transfers (Y_{tr}), while the second definition is the same as the first except for the exclusion of transfers and pensions. Formally, we can write:

$$W_1 = Y_{pa} + Y_{sw} + Y_{pe} + Y_{tr}$$

$$W_2 = Y_{pa} + Y_{sw}$$

As the Bank of Italy does not furnish the capital and labor components of net self-employment income, we impute them. To this end, we adopt the imputation strategy proposed by Glyn (2011), which attributes the average payroll income $\bar{Y}_{pa}$ of the entire sample (in every year) to represent the maximum value that the labor income component can take. If individual i's net self-employment income is less than $\bar{Y}_{pa}$ (i.e., $Y_s < \bar{Y}_{pa}$), then this quantity is accounted as her labor component of net self-employment income. On the contrary, if i's net self-employment income is greater than $\bar{Y}_{pa}$, then we regard the amount $Y_{s\pi} - \bar{Y}_{pa}$ as her capital component of net self-employment income.

[5] Payroll income is composed of net wages and salaries and fringe benefits, while pensions and net transfers comprise pensions, arrears, financial assistance scholarships, alimony payments and gifts. Net-self employed income is computed as the sum of self-employment income and entrepreneurial income, while property income is the sum of income from real-estate and financial assets. Income from real estate includes actual rents and imputed rents, while income from financial assets includes interest on deposits, interest on government securities and income from other sources.

To analyze the functional distribution of income, we rely on the national accounts, specifically on the European System of National and Regional Accounts (ESA).[6] The series of capital and labor share that we obtain from the ESA are first compared with the survey of capital and labor share from the $SHIW$, to identify possible discrepancies between the two data sources, and then combined with the $SHIW$ to obtain alternative estimates of the IFC index.

From a technical perspective, we consider the functional distribution of gross value added at factor costs. First, we define capital income as value added minus employee compensation. To account for self-employed workers, we assume, as in Torrini (2016), that their earnings are the same as those of waged employees in all sectors.[7] In a second step, we split the two components of self-employment income in light of the estimates $Y_{s\pi}$ and Y_{sw} previously derived with the micro data. Finally, the different estimates of the IFC index, which reflect the different definitions of capital and labor income that we adopt, are related to the estimates of the capital and labor shares of income.

3 Main results

This section reports the main results of the paper and lays the foundations for the policy recommendations that will be provided in Section 5. Let us begin with the stylized facts about the factor income shares in Italy in the period 1989 – 2016.

We begin by adopting as a benchmark the series obtained from the ESA national accounts, which is represented by the dotted blue line in Figure 2 (labeled *ESA 2010*). Regarding the survey data, as explained in detail in Section 2, we employ two different definitions of labor

[6] We consider the 2010 release.

[7] Precisely, this definition relates to the second series of capital income built by Torrini (2016).

(and, hence, total) income W_1 and W_2, with the former including income from pensions and net transfers. This implies that the capital/labor share of total income corresponding to W_1 will be lower/higher than for W_2. Figure 2 also plots the computed series of the capital share of total income, where the dotted red series $SHIW1$ corresponds to the broader definition of total income that includes pensions and net transfers (based on W_1), whereas the dotted green series $SHIW2$ (based on W_2) has the smallest denominator. In line with the results obtained by Torrini (2016), we find (by examining the dotted green series $SHIW2$) that in Italy, the capital share rises in the periods 1995 – 2000 and 2010 – 2016, whereas it falls between 2000 and 2010.

The trend for both the $SHIW1$ and $SHIW2$ series is stationary, with the red series $SHIW1$ fluctuating around 0.3 points throughout the period considered. The green series $SHIW2$ shows instead an increase of slightly less than 10 percent throughout the period, from approximately 0.36 points in the early 1990s to approximately 0.44 in 2014.

To evaluate the reliability of the capital share series from the Bank of Italy's $SHIW$, notice that the green line is similar in both levels and trend to the *ESA 2010* series, with the exception of the year 2010. The proximity between the green and the blue line is explained by the fact that both series do not include pensions or transfers in their denominators, which is standard practice in the computation of the official measures of the capital share, normally calculated as the share of employees' compensation in total value added.

Let us now turn to the core of the analysis, introducing the estimations of the degree of income composition inequality in Italy. As illustrated in Section 2, Figure 1 plots a one-year (1989) snapshot of the decomposition of the Lorenz Curve (in red) into the concentration curves for capital (in blue) and labor (the latter does not appear in Figure 1 since it can be

derived from the other concentration curve, while holding the Lorenz curve constant). The concentration curve for capital lies below the zero-concentration curve, indicating that in 1989, capital income was concentrated at the top of the population (displayed in deciles and ranked with respect to income), whereas labor was inevitably concentrated among the bottom of the population.

For each year in the period 1989 – 2016, we then compute the level of the IFC index, precisely as shown in equation 1 in Section 2. Once again, the IFC index is represented by the ratio between the area given by the difference between the concentration curve for capital and the zero-concentration curve ($\mathscr{A}$) and the area between the zero-concentration curve and the maximum-concentration curve ($\mathscr{B}$). Figure 3 conveys one of the results of the paper, by plotting the 1989 – 2016 series of the IFC index, as a measure of the degree of income composition inequality in Italy. As in Figure 2, Figure 3 depicts both a red series labeled IFC_1 (computed by using the $SHIW1$ series of factor shares) and a green series labeled IFC_2 (from the $SHIW2$ series of factor income shares).

This result can be summarized as follows: Italy experienced decreasing income composition inequality throughout the period 1989 – 2016, and this is robust to different definitions of capital and labor income. The gap between the two series, represented by the effect of the redistribution policy comprising pensions and net transfers, remains roughly constant throughout the period. Regarding IFC_1, the degree of income composition inequality decreases from approximately 0.6 to below 0.4. Regarding IFC_2, the degree of income composition inequality decreases steadily from 0.3 to a level close to (or even below) zero.[8]

[8]The lower level of the IFC_2 series reflects the fact that the second definition of labor income we adopt does not necessarily characterize the incomes at the bottom of the distribution. However, we believe the latter result to be driven primarily by data issues (such as the underestimation of the capital income at the top of the income ranking) rather than Italian society being structured as such. Indeed, it is difficult to believe that capital income

How can this result be interpreted? Regardless of the definitions of capital and labor incomes in use, this result goes in the direction of claiming that Italy is approaching becoming a society in which a larger share of individuals earn *multiple* sources of income. A *lower* degree of income composition inequality indicates that, in aggregate, the two sources of income are *more equally* distributed across the population and along the income ranking. In other words, representing Italy as a society in which social classes and sources of income perfectly coincide (for instance, with capital owners at the top and wage earners at the bottom) is not in line with the evidence in Figure 3. Although Barbieri and Bloise (2018) highlight in their recent work that the Italian economy is moving towards a society in which traditional labor income earners enjoy a larger share of capital income gains, we contend that the evidence presented in our paper is novel insofar as it provides a precise estimation of the trend of income composition inequality in Italy in recent decades.

To disentangle the mechanisms at work that give rise to the evidence in Figure 3, Figures 4 and 5 show the series of the areas of the concentration curves for capital and labor constructed using the *SHIW* data, each of which is plotted for both definitions of total income. A remark is in order here regarding the comparison of the green and the red series. Since pensions and net transfers enter into the definition of labor income, the gap between the red and green series is larger in Figure 5, in which the areas of the concentration curve for labor are plotted. In other words, the effect of redistributing total income (by presumably taxing at the top of the distribution) to labor income is clearly visible by comparing how the gap between the red and the green series changes from Figure 4 to Figure 5.

is well distributed across the Italian population. For this reason, in the absence of valid techniques capable of better estimating the marginal distributions of capital and labor, we instead focus our attention on the trend of this indicator instead of its absolute level; this trend appears to be confirmed by several estimation techniques, as will be shown in the next sections.

Let us now look at the trends. While the series of the area of the concentration curve for labor (Figure 5) declined in the early 1990s but remained rather stable thereafter, a clear increasing trend can be observed in Figure 4 for both the green and the red series. This implies a larger area below the concentration curve for capital, indicating that since the early 1990s, capital incomes have gradually accumulated more among the bottom of the population. In other words, when considering the distribution of the two income factors separately (and focusing on one definition of total income at a time), it appears that capital incomes have indeed been partially redistributed across the Italian population, whereas no similar pattern can be observed for labor income. As illustrated in equation 2 of Section 2, such an increase in the area of the concentration curve for capital, for given factor shares, implies a lower IFC index. In other words, one can conclude that the evidence in Figure 4 is the reason for the steady decline in the aggregate degree of income composition inequality in Italy seen in Figure 3.

Additional insights can be gained from Figures 6 and 7, in which the red series of Figures 4 and 5 have been plotted again, this time jointly with each of their three main components (that sum to 1 when normalized for the share of factor income related to each component). Let us start with Figure 6, for which it is straightforward to infer that the overall increasing dynamics of the red series has been driven primarily by the non-decreasing capital component of self-employment income and by real estate (housing rents). These two components have jointly implied a steady redistribution of capital incomes in Italy throughout the period, regardless of the counteracting trend from the financial assets component, which became more unequally distributed. In other words, the financial assets component of the concentration curve for capital has not decisively contributed to the overall dynamics, mainly due to its limited fraction

of the total capital share of income. This evidence indicates that, if one intends to further redistribute aggregate capital incomes in Italy, targeting financial assets might not necessarily lead to a large overall effect. On the other hand, if one is targeting the component of capital incomes with the less unequal distribution, financial assets are the clear choice.

Focusing instead on Figure 7 in which the concentration curve for labor is now plotted jointly with its three components (payroll income, labor component of self-employment income and pensions and net transfers), we observe rather stable dynamics. An interesting observation is the decline in income from pensions and net transfers in the early 1990s, which stabilizes at a lower level from 1995 onwards. Overall, the findings indicate that both the overall trends of the concentration curves and those of their main components do not appear to be volatile or prone to shocks throughout the period considered. It is also remarkable, for instance as regards Figure 6, that none of the main components of the red series intersect with one another throughout the period, confirming the hypothesis of rather stable trends.

Let us turn now to the linkage between the functional and personal income distribution in Italy, which represent the main focus of our paper. Figure 8 plots the two series of the Gini coefficient constructed using the $SHIW$ data, clearly demonstrating that including pensions and net transfers in the definition of total income reduces the level of income inequality in each year. Income inequality was increasing in Italy in the early 1990s and then stabilized from then onwards at approximately 0.55 for the green series and approximately 0.4 for the red series.

Now, the research question reduces to the following: To what extent have changes in the factor income shares (as plotted in Figure 2) been transmitted into the level of personal income inequality ? To answer this question, recall equation 3 from Section 2. For each percentage

increase in the capital share of income, the right-hand side of equation 3 indicates that the effect on personal income inequality will be given by two times the difference between the area of the concentration curves. Now, recall further that the actual series of the Gini coefficient is not determined solely by the dynamics of the factor shares, and hence, the evidence in Figure 8 (a stable level of income inequality from the early 1990s onwards) might be a net effect of a set of different forces. Regardless of this limitation, we can safely argue that the degree to which changes in the capital income shares yield a jump in the level of income inequality has been steadily *decreasing* for the Italian economy.

As previously stated in the Introduction, the work of Milanovic (2017) on the transmission of changes in the capital share of income to inter-personal income inequality can be regarded as very close in focus to our own. However, the methodology adopted is rather different. To technically test the strength of the link between the functional and inter-personal distribution, Milanovic (2017) exploits the correlation ratio between capital and total income $\mathscr{R}_\pi = \frac{cov(r(y),\pi)}{cov(r(\pi),\pi)}$, where $r(y)$ and $r(\pi)$ are an individual's ranks according to total income and source π respectively. As Figures 9 and 10 (related to the first and the second definitions of income, respectively) demonstrate, the IFC index and the correlation coefficient are highly correlated (the correlation is approximately 0.95 for both income definitions). However, while the value of the IFC index ranges approximately between -0.1 and 0.5, that of the correlation coefficient ranges between 0.7 and 0.8. These differences in scale can be easily understood in light of how these two metrics are designed. The correlation ratio, which is a function of individuals' ranks according to total and capital income, tends to fluctuate less than the IFC index, which is a function of individuals' relative shares of both sources. Indeed, a change in the relative share of capital owned by individual i does not necessarily change her relative

position to the other individuals in the population. This is a clear example of how the two metrics differently respond to shocks in the marginal distributions. Nevertheless, we believe the two approaches to be complementary for the assessment of the link between the functional and personal income distribution, and we argue in favor of their joint use.

In the next subsection, we provide a more thorough analysis of the mechanisms through which the dynamics of factor income shares lead to variations in personal income inequality. Further details on how the concept of income composition inequality can be crucial to the effectiveness of redistribution policies will be provided in Section 5.

3.1 A correlation test

In this section, by means of an illustrative pooled OLS exercise, we further document the role played by income composition inequality in shaping the overall dynamics of income inequality, as measured by the Gini coefficient $\mathscr{G}$. In particular, we separately discuss the impact of income composition inequality on income inequality due to its *variation* from that due to its *level*. To provide a more thorough methodological foundation for the analysis that follows, we adopt the analytical decomposition of income inequality variation proposed in Ranaldi (2018b). This method, which is is based on the Lerman-Yitzhaki (LY) decomposition of the Gini coefficient in factor components (Lerman and Yitzhaki, 1985), affirms that variation in income inequality can be interpreted as a result of three types of movements: (a) movements in the functional income distribution, (b) movements in the income-factor concentration, and (c) movements in income-factor inequality. This decomposition suggests that such movements explain a large part of the variance in income inequality.

These three motions are operationalized below by changes in the capital share of income (movement (a) and first term on the right-hand side), changes in the IFC index (movement (b) and second term) and changes in the Gini of capital income (movement (c) and third term). Because of the limited sample size (12 observations), this exercise is solely meant to provide the reader with correlation trends and additional points of discussion for a comprehensive analysis of the dynamics involved. The first model specification we consider is, thus, the following:

$$\Delta\mathscr{G} = \alpha_1 \times \Delta\pi + \alpha_2 \times \Delta.\mathscr{I}_f(\boldsymbol{\pi}) + \alpha_3 \times \Delta\mathscr{G}_\pi + \epsilon, \tag{4}$$

where Δ refers to absolute changes (first differences), $\mathscr{G}_\pi$ is the Gini of capital income, and ϵ is the *iid* error term. The results of this regression exercise are shown in column (1) in Table 1.

	(1)	(2)
Variables	$\Delta\mathscr{G}$	$\Delta\mathscr{G}$
$\Delta\pi$	0.274	
	(0.232)	
$2(\tilde{\mu}_w - \tilde{\mu}_\pi)\Delta\pi$		4.065*
		(2.207)
$\Delta\mathscr{I}_f(\boldsymbol{\pi})$	-0.252***	-0.238***
	(0.0591)	(0.0551)
$\Delta\mathscr{G}_\pi$	1.526***	1.407***
	(0.236)	(0.228)
Observations	12	12
R-squared	0.857	0.880

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 1: Correlation test between Income inequality variation and movements a, b, and c.

Column (1) of Table 1 shows that, while changes in the capital share do not seem to significantly affect variation in income inequality, changes in income composition inequality and in capital income inequality are rather significant in this respect. In particular and most important, variation in income composition inequality is *negatively* associated with variation in income inequality, whereas variation in capital inequality is positively associated with it.

Before commenting on these results, we set up an alternative model specification (shown in column 2 of Table 1) in which the absolute change in capital income (movement (a)) is replaced by its product with the elasticity $2(\tilde{\mu}_w - \tilde{\mu}_\pi)$, as in equation 3. This modification can be interpreted as introducing a weight on $\Delta\pi$ that reflects the degree of its *condition of transmission*. Formally, this modified regression reads:

$$\Delta\mathscr{G} = \beta_1 \times 2(\tilde{\mu}_w - \tilde{\mu}_\pi)\Delta\pi + \beta_2 \times \Delta\mathscr{I}_f(\boldsymbol{\pi}) + \beta_3 \times \Delta\mathscr{G}_\pi + \epsilon. \tag{5}$$

The results reported in column (2) of Table 1 show that, although the coefficients of the second and third terms ($\Delta\mathscr{I}_f(\boldsymbol{\pi})$ and $\Delta\mathscr{G}_\pi$) are close to those of the first regression, the newly introduced term $2(\tilde{\mu}_w - \tilde{\mu}_\pi)\Delta\pi$ appears to be more significant than $\Delta\pi$. Additionally, the latter term is positively associated with variation in income inequality, which is in line with equation 3. In fact, equation 3 predicts that if the IFC index is positive (which is indeed the case here), then an increase in the capital share positively affects the Gini coefficient.

The results from Table 1 can be interpreted as follows. First, they highlight how changes in the degree of income composition inequality (movement (b), the second term in both model specifications) determine changes in income inequality. Specifically, the negative relationship between the variation in these two variables stresses a very important aspect: The reduction in income inequality caused by redistribution policies designed to transfer income from the top

to the bottom of the distribution in the form of labor income simultaneously leads to a rise in income composition inequality. The latter happens because such policies hamper the degree of concentration of both labor income at the bottom and of capital income at the top of the income distribution, as shown by the areas of the concentration curves for capital and labor in the previous subsection.

Second, these results illustrate the relevance of the *level* of income composition inequality (measured here by the elasticity $2(\tilde{\mu}_w - \tilde{\mu}_\pi)$) in determining the impact of capital share changes (movement (a)) on variation in income inequality, as shown by the increase in the statistical significance of the first term between the first and second regressions.

3.2 North-South divide

The origins of the regional divide between Northern-Center and Southern Italy (including the islands) can be considered "one of the oldest and most controversial issues in Italian economics and politics" (Federico et al., 2017). The long-lasting backwardness of the southern part of the country is well documented in the economic history literature (for an overview, see Felice, 2018) and supported by the vast range of statistical indicators reflecting low regional performance, for example: lower per capita disposable income (13.512 euros against 21.307 euros in the North); a lower share of individuals having completed tertiary education (20.7% against 28.6% in the North); and a lower employment rate (47% against 70.6% in the North)[9]

Figure 13 reports the evolution of the Gini coefficient under the first definition of income employed in this work. The three regions or macro areas (North, Center and South) display a rather similar *pattern* of income inequality, with a sharp increase in 1991 due to the currency

[9]These data refer to 2016 and can be found at the official ISTAT webpage (www.istat.it).

and financial crisis that occurred at that time, and a stable decline from 1995 onwards. On the other hand, when we consider the second definition of income (Figure 14), the South registers relatively higher values than those displayed by the Center and the North. The latter evidence underlines the role played by pensions and net transfers in reducing income dispersion in the South compared to the other two macro areas.

Although the patterns of income dispersion within each area show very similar dynamics, the movement of income *composition* inequality highlights important differences across Italy. Figure 15 shows the evolution of the IFC_1 series over the time period considered. Interestingly, the level of income composition inequality is lower in the South than in the Center and the North throughout the period considered. However, its decreasing trends for all areas perfectly reflect the national trend. The entire Italian economy is hence moving towards a new type of capitalism, characterized by multiple sources of income for an increasing number of individuals. The dynamics of IFC_2 are similar to those of IFC_1, although the income composition inequality gap between North and South is slightly decreased.

How can this evidence be interpreted? The series portray a dichotomous Italy, with higher *concentration* of income sources in the North and Center areas. Borrowing again the definitions from Milanovic (2017) as done in Section 2, the evidence in this section indicates that Italy is divided into a *Northern Classical Capitalism* and a *Southern New Capitalism*. This suggests that the effect of changes in the capital share of income on personal inequality would be stronger in the former than in the latter area.

In conclusion, an aspect that can be relevant for future research, although it lies outside the scope of this paper, is as follows: *Low* levels of income composition inequality are associated with *high* levels of the unemployment rate, as illustrated in Figure 21 for Y_1, and in Figure 22

for Y_2 (note that the second relationship appears less robust than the first one). The causality behind this association has to be more properly understood in future research.

4 Robustness

In what follows, we provide alternative estimates of both the factor shares and income composition inequality by combining the survey data with the national accounts. Our major objective here is to check the consistency of the decreasing trend of income composition inequality in Italy over the past three decades. To this end, we first construct a new series of the functional income distribution in Italy, and then we consider the latter series, jointly with the ESA 2010 series, to obtain new estimates of the degree of income composition inequality for Italy.

To propose an alternative series of the functional income distribution in Italy, and specifically of the capital share of income, we combine information from both the national accounts and the Bank of Italy's SHIW. Specifically, the new series (the dotted purple line in Figure 23) is an adjustment of the ESA 2010 series in light of the estimates of the capital and labor components of self-employment income from the survey. [10] Denote by π_t^s the survey capital share at time t and by $\pi_t^{na_1}$ and $\pi_t^{na_2}$ the capital shares from the original and the adjusted ESA 2010 series, respectively. Formally, if we denote by $Y_{s\pi}$ and Y_{sw} the total survey capital and labor components of self-employment income, respectively, we can define the adjusted capital

[10] Recall that the two components of self-employment income were obtained from the micro data by adopting the imputation strategy in Glyn (2011), which can be formally written as follows. We define the total income from self-employment Y_s of individual i as $Y_{s,i} = Y_{s\pi,i} + Y_{sw,i}$, where $Y_{sw,i} = \begin{cases} Y_{s,i} & \text{if } Y_{s,i} \leq \bar{Y}_{pa} \\ \bar{Y}_{pa} & \text{if } Y_{s,i} > \bar{Y}_{pa} \end{cases}$, while $Y_{s\pi,i} = \begin{cases} 0 & \text{if } Y_{s,i} \leq \bar{Y}_{pa} \\ Y_{s,i} - \bar{Y}_{pa} & \text{if } Y_{s,i} > \bar{Y}_{pa} \end{cases}$, where $\bar{Y}_{pa}$ is the average payroll income in the sample.

share series π^{na_2} as:

$$\pi^{na_2} = \frac{VA - CE - Y_{sw} \times VA}{VA}, \tag{6}$$

where VA is value added, and CE is employee compensation.

The evidence in Figure 23 shows that the trend of π^{na_2} is rather similar to that of the *non-adjusted* ESA 2010 series, although its level is nearly 0.1 points higher throughout the period considered. This result entails that the capital component of self-employed income accounts for 10% of total value added.

Now, to construct a different series of the IFC index, we replace the total level of the survey capital and labor shares with that of the two previously discussed series from the national accounts ($\pi_t^{na_1}$ and $\pi_t^{na_2}$). For this purpose, we multiply each individual i's relative share of capital income at time t by the level of the capital share obtained from the two ESA series at the same time. Formally, if we denote by $\alpha_i = \frac{\Pi_1}{\Pi^s}$ the relative share of capital of individual i, we can define the adjusted concentration curves for capital as $\mathscr{L}_t^{na_1}(\boldsymbol{\pi}, p) = \pi_t^{na_1} \sum_{j=1}^{i} \alpha_j \; \forall i = 1, \ldots, n$ and $\mathscr{L}_t^{na_2}(\boldsymbol{\pi}, p) = \pi_t^{na_2} \sum_{j=1}^{i} \alpha_j \; \forall i = 1, \ldots, n$. Note that while the aggregate level of the capital share in the survey is replaced by that of the two national account series, each individual's relative share of capital remains the same, as the denominator of α_i is still the survey's total amount of capital. In other words, while we modify the aggregate level of π, we leave unchanged the two marginal distributions.[11]

In a similar manner, we modify the zero- and maximum-concentration curves and thereby obtain the two novel series of the income-factor concentration index, which we call IFC^{adj_1} and IFC^{adj_2}. Each of these adjustments is made for every income definition adopted, and thus,

[11] Although it would be preferable to also modify the marginal distributions, and thus correct for the capital income not captured by the survey, there is no consensus in the literature on how to adjust them.

we have four new series of the IFC index in total, $IFC_1^{adj_1}$, $IFC_2^{adj_1}$, $IFC_1^{adj_2}$ and $IFC_2^{adj_2}$. Figures 11 and 12 show all the results.

These new estimates confirm, for both adjustments and for every definition of income, the decreasing trend of income composition inequality in Italy over the last twenty years. If we focus on the first definition of income (Figure 11), we observe that the IFC series (red line) is scaled up by approximately by 0.03 points after the first adjustment (blue line) and 0.1 points after the second (purple line) for the entire period. To better understand these adjustments, let us consider the following property of the IFC index.

Given the same concentration levels of capital at the top and labor at the bottom of the distribution (i.e., given the two concentration curves of capital and labor) and for the case of the $IFC \neq \{-1, 0, 1\}$, the areas of the two concentration curves are simultaneously maximized when $\pi = w$, thus when they are equally weighted by the respective total factor share. This maximization problem is the same as maximizing the function $f = \alpha(1 - \alpha)$ with $\alpha \in [0, 1]$. Indeed, if we examine in detail the formulation of the IFC index provided by equation 2, we see that the term πw is the same as function f, and it is maximized when $\pi = w$. If we then return to Figure 11, considering that $\pi_t^{na_2} > \pi_t^{na_1} > \pi_t^s \ \forall t$ (increasing capital share) and that $\pi_t^s < \frac{1}{2} \ \forall t$, the IFC is meant to increase once we adjust for the new series of the capital share. Although the same reasoning can also be applied to the second definition of income, we clearly see from Figure 12 that the same increase in the capital share has a lower impact on the IFC index. This aspect is explained by the fact that the second series is on average closer to 0, so that changes in the factor shares have a weaker impact on the level of the indicator.

5 Getting redistribution right

This section introduces the second and final contribution of this work. Imagine an economic policy maker is seeking to reduce income inequality to maximize social welfare and that, to that end, she designs a classic redistribution (income taxation and transfer) policy. This section clarifies how a better understanding of the linkage between the functional and personal distribution of income can enhance the effectiveness of classic redistribution policies in terms of inequality reduction.

We argue that, while a classical redistribution policy does not necessarily require the policy maker to know the current (and expected future) level of income composition inequality, the same is not necessarily true once the same policy is also intended to be effective in the longer run. To grasp the intuition behind this statement, we introduce the following stylized example.

Consider two different countries, labeled for simplicity Italy 1 and Italy 2. The two definitions of income previously discussed in Section 2 (Y_1 and Y_2) are correspondingly the total income of Italy 1 and Italy 2. Italy 1's population is composed of workers earning payroll income, the self-employed earning self-employment income, capital owners earning property income and a group of pensioners and unemployed individuals earning pensions and transfers. In contrast, Italy 2's population is comprises only workers, the self-employed and capital owners, making the absence of pensioners and unemployed individuals in Italy 2 the only difference between the two countries. For simplicity, assume that the pension and transfer system is financed solely by income tax revenues and, hence, that the government maintains a balanced budget in each period. Specifically, one can assume, for instance, that the government progressively taxes the average total income at the top of the distribution, and it transfers the

entire sum of tax revenues to the poor and elderly in the form of income transfers and pensions. For the sake of simplicity, time index $t = 1$ symbolizes the current period or the short run, whereas $t = 2$ represents the longer run.

First, we report comparative statics of the two countries. Clearly, at $t = 1$, the level of income inequality would be lower in Italy 1 than in Italy 2, due to the equalizing effect produced by the Italian pension and transfer system. On the other hand, at $t = 1$ the level of income *composition* inequality in Italy 1 would be higher than that in Italy 2, as the introduction of pensioners and unemployed individuals boosts the concentration of capital at the top (since pensioners and the unemployed receive a limited amount of capital income) and that of labor at the bottom of the income distribution (pensions and net transfers count as labor incomes that are mainly targeted to the poor).

Now, let us turn to the core of our example. The policy maker of Italy 1 expects the effect of her redistribution policy (which implied lower inequality with respect to Italy 2 at $t = 1$) to also be in place in the longer run, namely at $t = 2$. She is however unaware of the role played by income *composition* inequality, in the case of a shift in the factor shares of total income (our exogenous shock in this stylized example). Assume that, *ceteris paribus*,[12] the level of capital income share in the economy grows by $x\%$ points from $t = 1$ until $t = 2$. As the term $2(\tilde{\mu}_w - \tilde{\mu}_\pi)$, which is the exact elasticity of changes in the capital share of income to changes in personal income inequality, is lower for Italy 2 (due to its lower degree of income composition inequality), such an increase in the capital share will not have a significant impact on the level of income inequality for Italy 2. On the contrary, the same increase in the capital

[12]The drawbacks of this assumption should be further analyzed, as an increase in the capital share of income has in turn an impact on the level of income composition inequality.

share will substantially increase the Gini coefficient in Italy 1 at $t = 2$, due to a higher level of the elasticity of changes in the factor income distribution to the personal income distribution. As a consequence, the difference in the level of inequality between the two stylized countries at $t = 1$ will be reduced or eventually inverted.

Illustratively, assume that elasticity $2(\tilde{\mu}_w - \tilde{\mu}_\pi)$ equals 0.3 in Italy 1 and 0.1 in Italy 2 at time $t = 1$, with a Gini coefficient of 0.35 for Italy 1 and 0.55 for Italy 2. Imagine then that the levels of capital income share in both economies grow by 10 percentage points from $t = 1$ until $t = 2$. How will this affect the level of income inequality in the next period? Knowledge of the elasticity $2(\tilde{\mu}_w - \tilde{\mu}_\pi)$ allows us to claim that the same increase in the capital share of income in the two stylized countries will hamper income inequality at time $t = 2$ *three* times more in Italy 1 than in Italy 2. In other words, the positive variation in the Gini coefficient will be 3% for Italy 1 and 1% for Italy 2, reducing the effect of the redistribution policy designed in the previous period.

Although the previous example obviously oversimplifies reality, it helps to clarify the role that both income composition inequality and the fluctuations in the factor shares have in affecting income inequality in the long run. In practice, to avoid the emergence of a scenario like that depicted in the numerical example, the policy maker should identify at $t = 1$ the *correct* type of income source to redistribute. The following proposition provides a simple *rule of thumb* that the policy maker should adopt to do so:

Proposition 5.1. *If the expected sign at $t+k$ of the factor share z's variation coincides with the expected sign of $\mathscr{I}_f(\mathbf{z})$ over the interval $[t, t+k]$, i.e., $\mathbb{E}(sign(z_{t+k} - z_t)) = \mathbb{E}(sign(\mathscr{I}_{f,[t,t+k]}(\mathbf{z})))$, with $z = \pi, w$, then it is preferable to redistribute source z to reduce inequality in the long run.*

The intuition behind this proposition is as follows. As long as the level of income composition inequality is positive at $t = 1$ (e.g., capital income is mainly concentrated at the top and labor income at the bottom of the distribution) and the *capital* income share is expected to rise in the coming years up to $t = 2$, it is preferable to redistribute income in the form of *capital* (such as housing or financial assets, depending on their share of capital income) so that the expected rise in the capital income share will not have a strong impact on income inequality. The same will be true in the opposite case: For a negative level of income composition inequality (e.g., capital incomes mostly accruing at the bottom and labor income at the top of the distribution), an expected increase in the *labor* share in the coming years will signal that it is indeed *labor* income that has to be redistributed to reduce inequality in the longer run. For the sake of completeness, consider two further scenarios that might arise. Specifically, when the two signs in the above proposition differ, this means that the expected change in income source z is already acting in favor of the redistribution of income in the long run. In the latter case, then, knowledge of the degree of income composition inequality does not generate further insights for the policy maker. The four scenarios are summarized in Figure 24.

In summary, we argue that, in the event of an expected variation in a given factor share of income, a policy maker should consider the sign of the degree of income composition inequality to design effective redistribution policies. Choosing to redistribute the *correct* factor share will efficiently and more permanently reduce the burden of income inequality in the economy.

6 Conclusion

This paper analyzes the relationship between the functional and personal distribution of income. To study this relationship, this paper builds on the novel concept of income *composition* inequality, formally developed in Ranaldi (2017, 2018). The lower/higher the degree of income composition inequality is, the weaker/stronger the link between movements in factor income shares and personal income inequality. This nexus provides an important background for economic policies intended to redistribute income to effectively reduce the level of inequality. Hence, the focus of the paper is to highlight the relevance of the inequality of income composition to obtain a more advanced understanding of income and economic inequality.

Our main contribution to the economic literature is twofold. First, we conduct an empirical analysis of the dynamics of income composition inequality for Italy, between 1989 and 2016. By doing so, this study also contributes to the Italian economic debate by providing the first estimates of the level of income composition inequality in the country. The take-home message for the Italian debate is that Italy is steadily moving towards becoming a multiple sources of income society. The result of a decreasing trend in the IFC index in Italy is indeed a country-specific result. However, note that the inverse relationship between the variation (approximated by first differences in this paper) in the IFC index and the variation in the income inequality derived in the paper builds on the analytical results in Ranaldi (2018b) and is therefore robust to the choice of country. In conclusion, the results of the empirical analysis of this paper are consistent with different definitions of capital and labor and different estimation techniques of income composition inequality.

Second, we conceptualize a simple rule of thumb that relates fluctuations in the total factor

shares and the level of income composition inequality to the specific income source to be re-distributed. We argue that, in the event of expected variation in a given factor share of income, a policy maker should consider the sign of the degree of income composition inequality to design redistribution policies with long-term efficacy.

We consider this article a part of a broader research agenda on the issue of income *composition* inequality and specifically that on the link between factor shares and income inequality. We believe the technical assessment of this link introduces a novel dimension to the study of the income distribution. Understanding the relationship between the macro-level dynamics of economic aggregates such as the capital and labor shares of income and the micro-level changes in the dispersion of income across the population can further emphasize the political economy character of the issue of income distribution. As stated in Section 5, understanding this link is fundamental to design effective redistribution policies that pursue a lower level of income inequality in society. As such policies are the responsibility of the incumbent policy maker, the role politics plays in this setting should be considered with greater care in future research than what has been done in this study.

To conclude, given the relevance of a correct assessment of the marginal distributions of capital and labor across the population, the estimates of which are at the core of the study on the link between functional and personal distribution of income, we call for the development and design of better techniques that can improve the quality of these data, which remain rather inaccurate and imprecise.

References

[1] Atkinson, A. B., 2009. *Factor shares: the principal problem of political economy?* Oxford Review of Economic Policy, Vol. 25, Number 1, 3-16.

[2] Atkinson, A. B., Lakner, C., 2017. *Capital and Labor. The Factor Income Composition of Top Incomes in the United States, 1962-2006*. Policy Research Working Paper 8268. World Bank.

[3] Barbieri T. and Bloise F., 2018. *La disuguaglianza dei redditi di mercato: una scomposizione per fattori*. Published in: "Il mercato rende diseguali? La disuguaglianza dei redditi in Italia". Chapter 3. Edited by Franzini M. and Raitano M.. Il Mulino.

[4] Bengtsson E., Waldenstrom, D., 2018. *Capital shares and income inequality: Evidence from the long run*. Forthcoming, Journal of Econonimc History.

[5] Brandolini, A., Gambacorta, R., Rosolia, A., 2018. *Inequality amid income stagnation: Italy over the last quarter of a century*. Occasional papers (Questioni di Economia e Finanza), N. 442. Bank of Italy.

[6] Federico, G., Nuvolari, A., Vasta, M., 2017. *The origins of the Italian regional divide: Evidence from real wages, 1861, 1913*.

[7] Felice E., 2018. *The roots of a dual equilibrium: GDP, productivity, and structural change in the Italian regions in the long run (1871?2011)* European Review of Economic History, hey018, https://doi.org/10.1093/ereh/hey018

[8] Gabbuti, G., 2018. *Labour Shares and Income Inequality: Insights from Italian Economic History, 1895-2015*. HHB Working Paper Series, No.13, October.

[9] Glyn, A., 2011. *Functional Distribution and Inequality*. The Oxford Handbook of Economic Inequality. Edited by Nolan, B., Salverda, W., and Smeeding, T. M.

[10] Kakwani, N. C., 1977a. *Applications of Lorenz Curves in Economic Analysis*. Econometrica, Vol. 45, No. 3, pp. 719-728

[11] Kakwani, N. C., 1977b. *Measurement of Tax Progressivity: An International Comparison*. The Economic Journal, Vol. 87, No. 345, pp. 71-8

[12] Lerman, R. I., Yitzhaki, S. 1985. *Income Inequality Effects by Income Source: A New Approach and Applications to the United States*. The Review of Economics and Statistics. Vol. 67, No. 1, pp. 151-156.

[13] Milanovic, B., 2017. *Increasing Capital Income Share and its Effect on Personal Income Inequality*. In *After Piketty. The Agenda for Economics and Inequality*. Edited by Heather Boushey, J. Bradford DeLong, Marshall Steinbaum. Ch. 10.

[14] Piketty T., 2014. *Capital in the 21st century*. Harvard University Press.

[15] Piketty T, Zucman, G., 2014. *Capital is Back: Wealth-Income Ratios in Rich Countries 1700-2010*. The Quarterly Journal of Economics, Volume 129, Issue 3, Pages 1255-1310.

[16] Ranaldi, M., 2017. *Income-Factor Concentration: A Methodological Approach*. Documents de travail du Centre d'Economie de la Sorbonne 2017.54 - ISSN : 1955-611X.

[17] Ranaldi, M., 2018. *On the Measurement of Functional Income Distribution*. Documents de travail du Centre d'Economie de la Sorbonne.

[18] Ranaldi, M., 2018b. *On the Determinants of Income Inequality Variation*. Forthcoming.

[19] Torrini, R., 2016. *Labour, profit and housing rent shares in Italian GDP: long-run trends and recent patterns*. Occasional Papers, Bank of Italy, Number 318.

7 List of figures

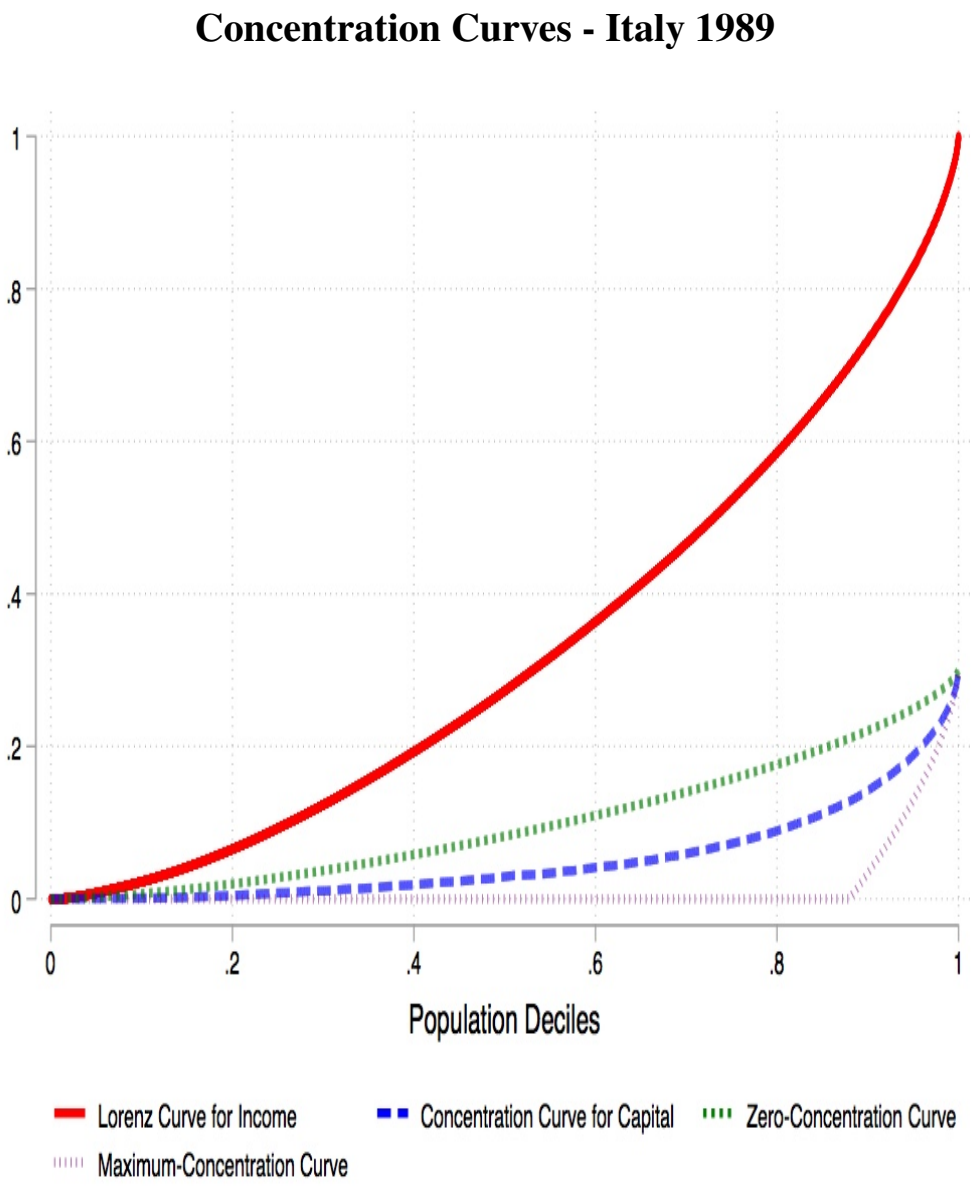

Figure 1: The concentration curve for capital (blue line), the zero-concentration curve (green line), the Lorenz curve for income (red line) and the maximum-concentration curve (purple line) for Italy in 1989 are presented using data from the 1989 *Survey on Household Income and Wealth* (SHIW) carried out by the Bank of Italy. Capital income is defined as the sum of property income and the capital component of net-self employment income. Labor income is instead defined as the sum of payroll income, pensions, net transfers and the labor component of mixed income. Both the capital and labor components of self-employment income are imputed following Glyn (2011).

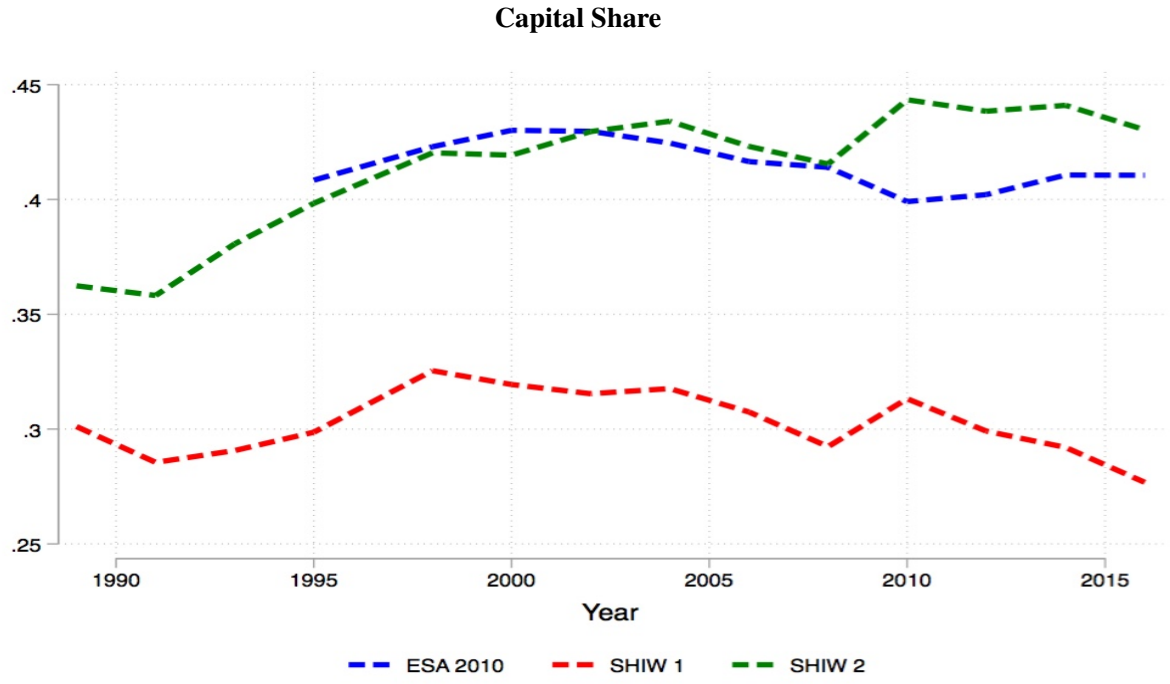

Figure 2: Three different series of the capital income share in Italy are presented here. The first series (ESA 2010), which runs from 1995 to 2016, is constructed from the ESA 2010 National Accounts and is calculated as the difference between value added at factor prices minus employee compensation. To account for self-employed workers, we assume that they earn the same as waged employees in all sectors. The second (SHIW 1) and the third (SHIW 2) series, which cover the period between 1989 and 2016, are built from the Survey of Household Income and Wealth (SHIW) prepared by the Bank of Italy. Total income in the first series is the sum of payroll income, net-self employment income, transfers and pensions and property income, while that in the second series excludes transfer and pensions from the previous definition. Capital income, instead, is the same for both series and equals property income plus the capital component of net self-employment income. The latter is imputed following Glyn (2011).

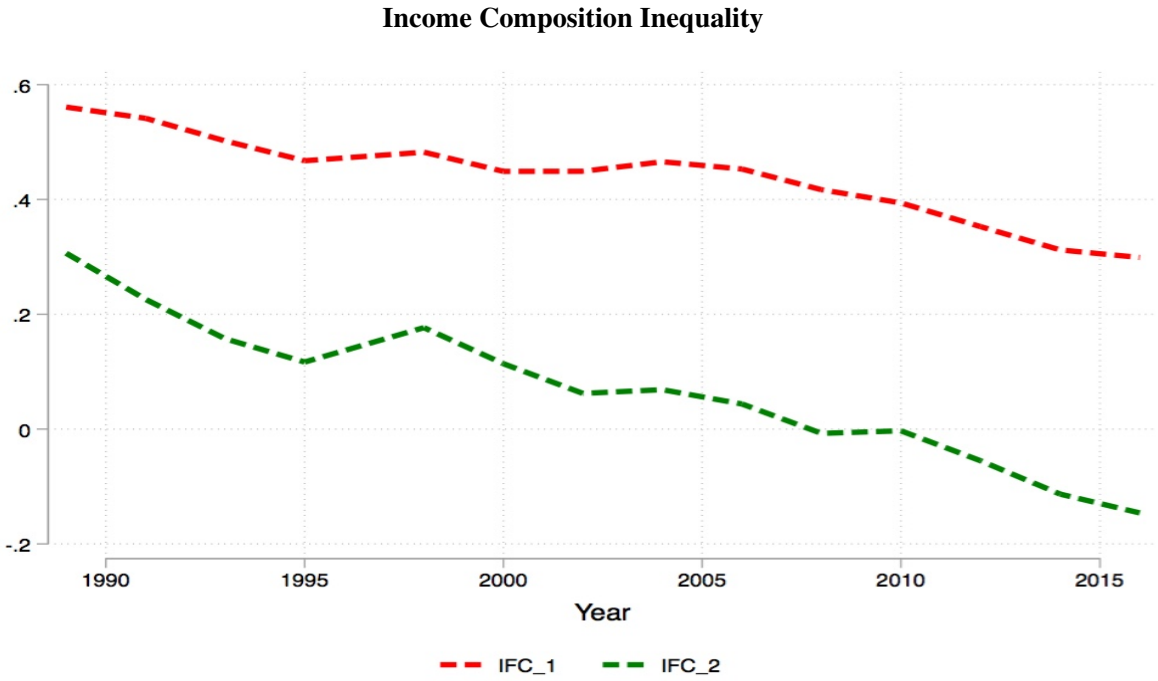

Figure 3: The two series of the income factor concentration index are constructed using the SHIW data. The first series (IFC_1) considers capital income as the sum of property income and the capital component of net self-employment income and labor income as the sum of payroll income, the labor component of net self-employment income, transfers and pensions. The second series (IFC_2), which considers the same definition of capital income as that given in the previous series, defines labor income as the sum of payroll income and the labor component of net self-employment income only.

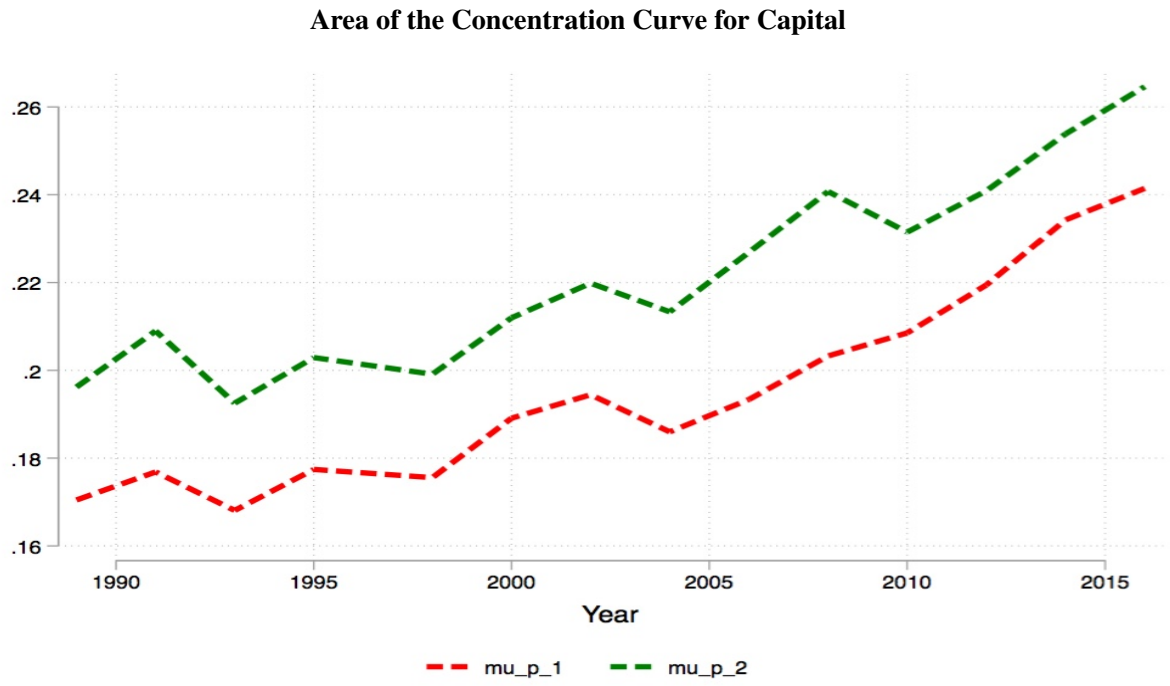

Figure 4: The two series of the area of the concentration curve for capital constructed using the SHIW data. The first series ($\tilde{\mu}_{\pi_1}$) considers total income as the sum of payroll income, net self-employment income, property income, pensions and transfers and capital income as the sum of property income and the capital component of self-employment income. The second series ($\tilde{\mu}_{\pi_2}$) considers total income as the sum of payroll income, net self-employment income and property income and capital income as the sum of property income and the capital component of self-employment income.

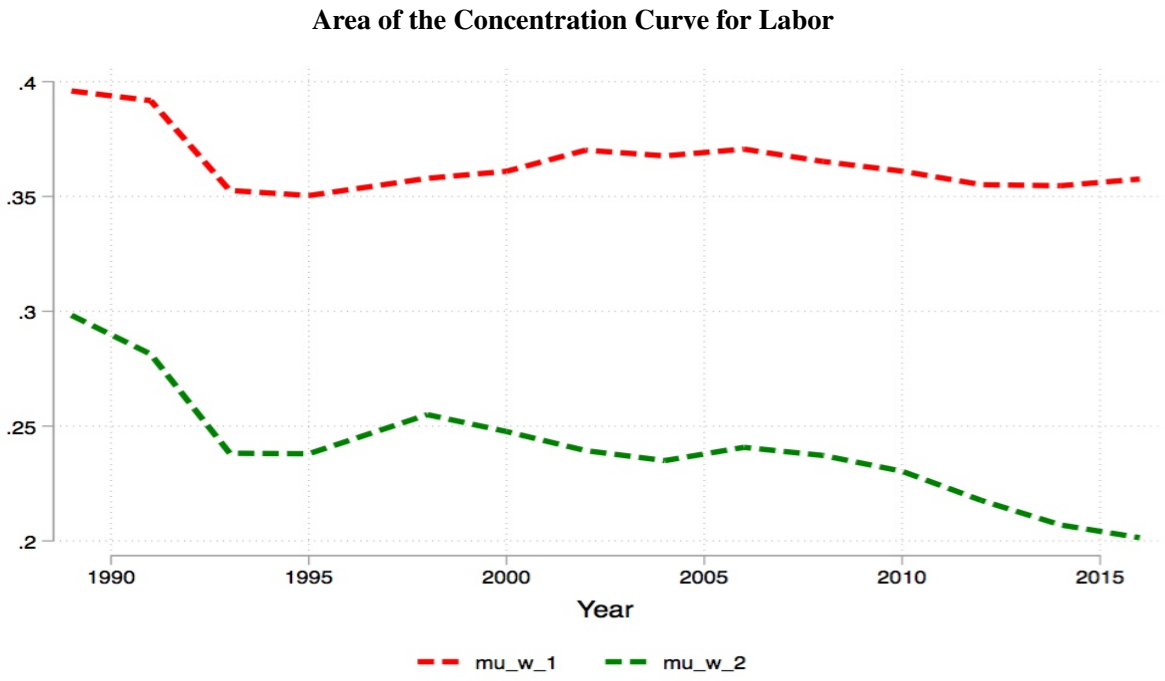

Figure 5: The two series of the area of the concentration curve for labor constructed using the SHIW data. The first series ($\tilde{\mu}_{w_1}$) considers total income as the sum of payroll income, net self-employment income, property income, pensions and transfers and labor income as the sum of payroll income the labor component of net self-employment income, pensions and transfers. The second series ($\tilde{\mu}_{w_2}$) considers total income as the sum of payroll income, net self-employment income and property income and labor income as the sum of payroll income and the labor component of net self-employment income.

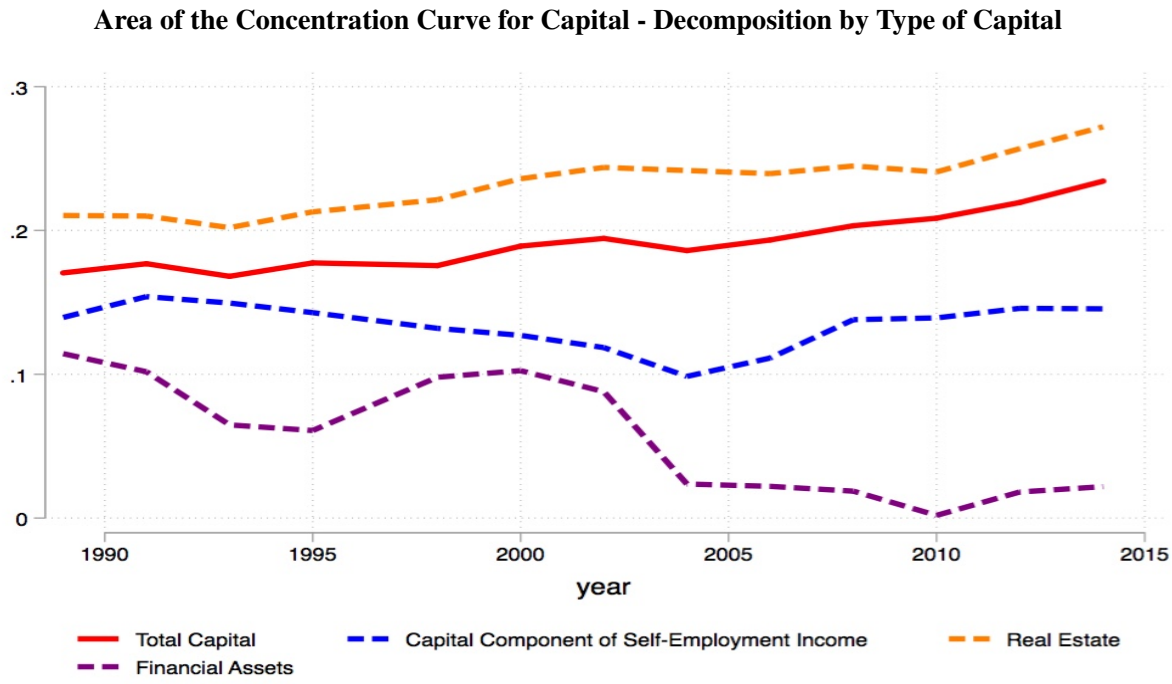

Figure 6: The series of the area of the concentration curve for capital (red line), together with the area of the concentration curves for the capital component of self-employment income (blue line), real estate (orange line) and financial assets (purple line) constructed using the SHIW data. The definition of income considered here is Y_1 (i.e., individuals are ranked according to Y_1).

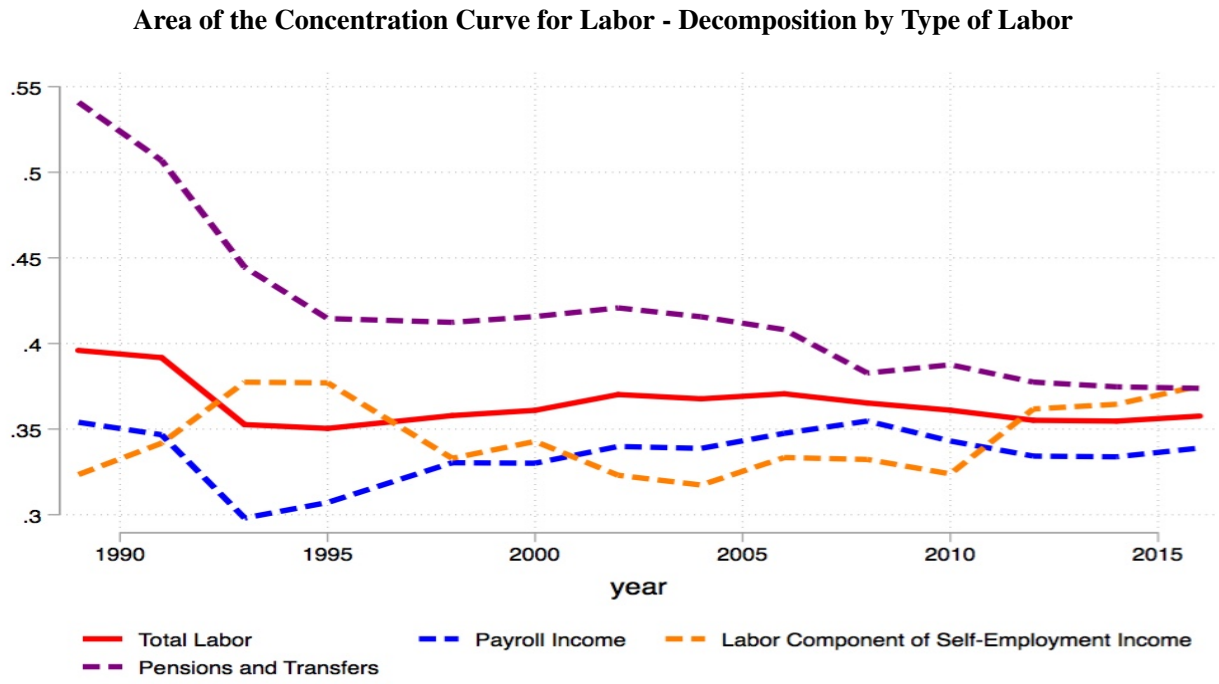

Figure 7: The series of the area of the concentration curve for labor (red line), together with the area of the concentration curves for payroll income (blue line), the labor component of self-employment income (orange line), and pensions and transfers (purple line) constructed using the SHIW data. The definition of income considered here is Y_1 (i.e., individuals are ranked according to Y_1).

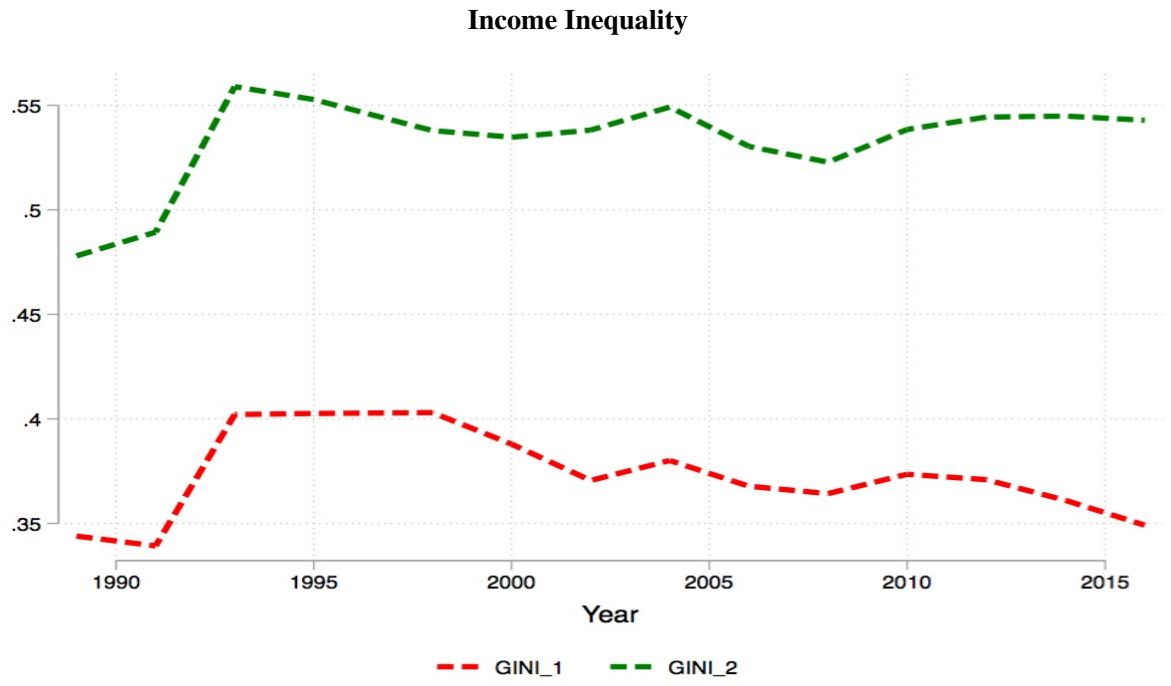

Figure 8: The two series of the Gini coefficient constructed using the SHIW data. The first series ($Gini_1$) defines total income as the sum of payroll income, net self-employment income, property income, pensions and transfers. The second series ($Gini_2$), instead, defines total income as the sum of payroll income, net self-employment income and property income

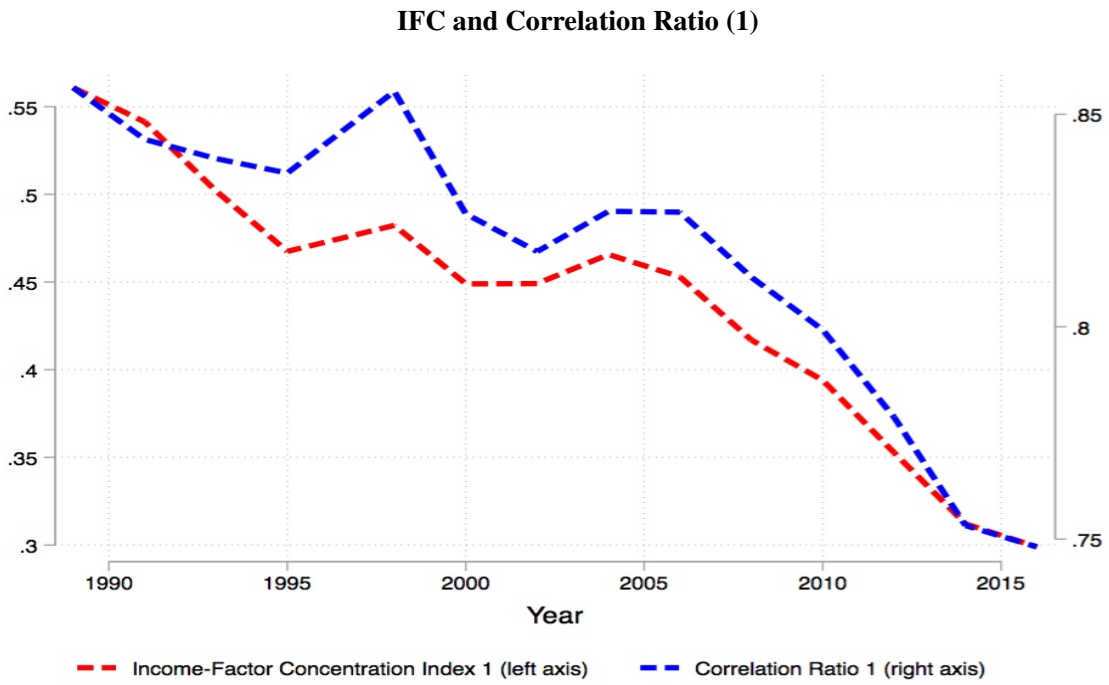

Figure 9: The two series of the income factor concentration index (red line, left axis) and the correlation ratio (blue line, right axis) constructed using data from SHIW. The definition of income considered here is Y_1 (i.e., individuals are ranked according to Y_1). The correlation ratio is defined as $\mathscr{R}_\pi = \frac{cov(r(y),\pi)}{cov(r(\pi),\pi)}$, where $r(y)$ and $r(\pi)$ are the individual's ranks according to total income and source π, respectively.

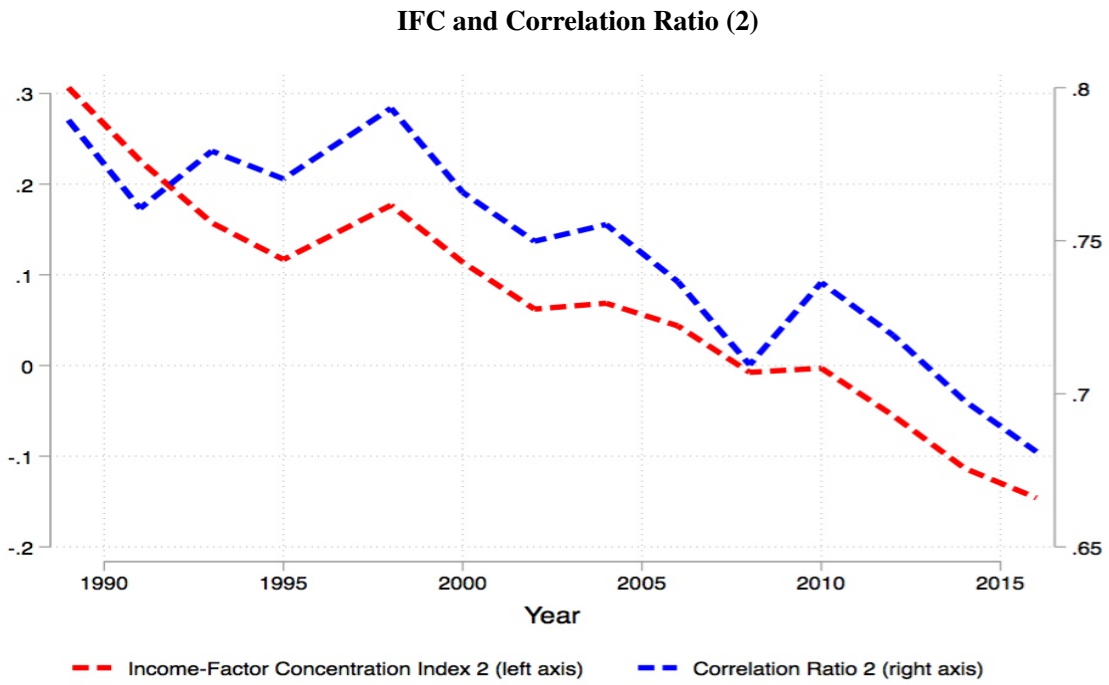

Figure 10: The two series of the income factor concentration index (red line, left axis) and the correlation ratio (blue line, right axis) constructed using data from SHIW. The definition of income considered here is Y_2 (i.e., individuals are ranked according to Y_2). The correlation ratio is defined as $\mathscr{R}_\pi = \frac{cov(r(y),\pi)}{cov(r(\pi),\pi)}$, where $r(y)$ and $r(\pi)$ are the individual's ranks according to total income and source π, respectively.

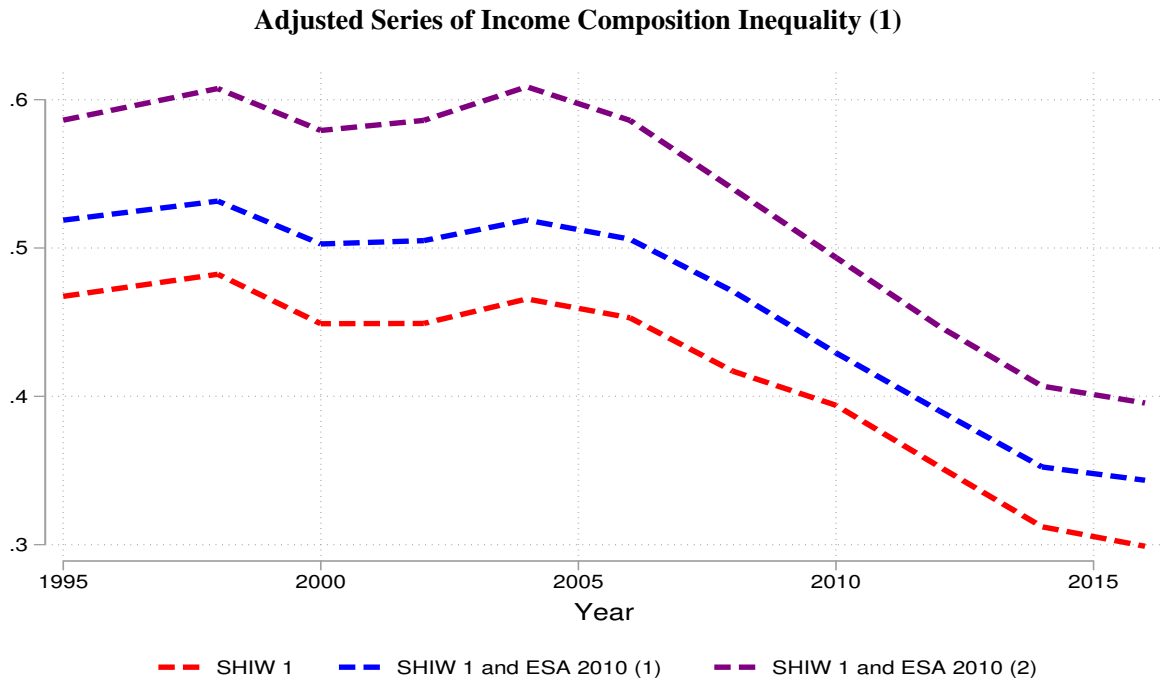

Figure 11: The series of income composition inequality constructed using data from SHIW (red line) is compared with (i) the series of income composition inequality when the survey capital and labor shares are replaced by those from ESA 2010 (blue line) and with (ii) the series of income composition inequality when the survey capital and labor shares are replaced by those from the adjusted ESA 2010 (purple line). The adjusted ESA 2010 series is obtained by combining information on the capital and labor components of self-employment income from SHIW with information from the national accounts. The definition of income here considered is Y_1 (i.e., individuals are ranked according to Y_1).

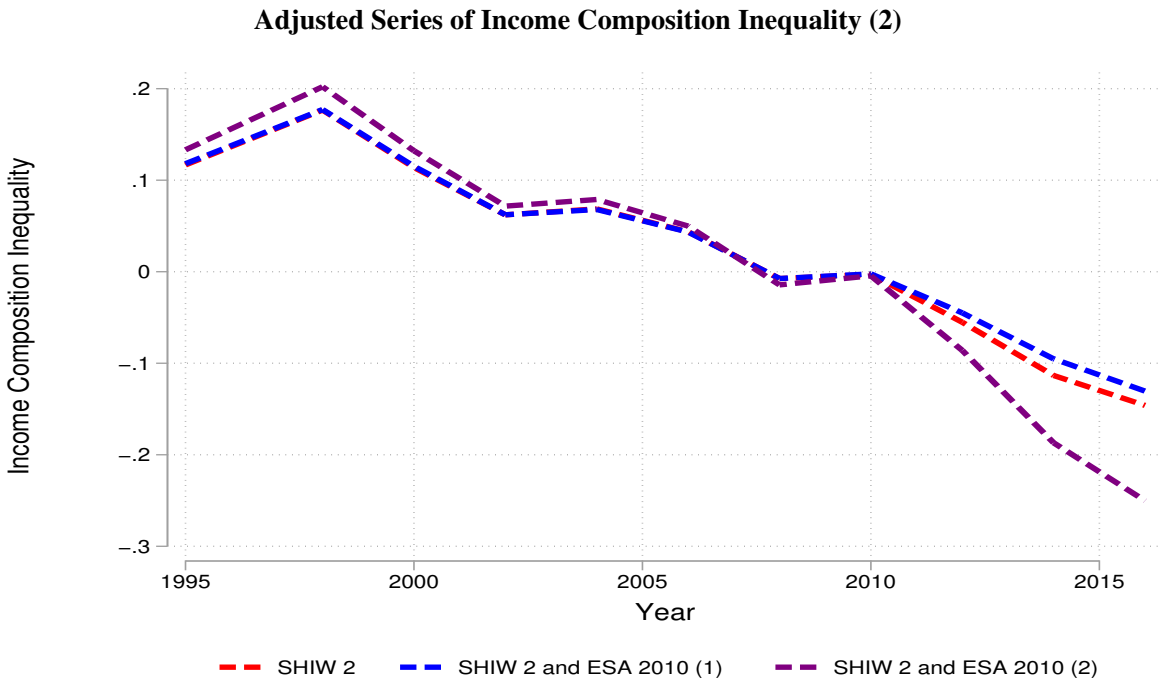

Figure 12: The series of income composition inequality constructed using data from SHIW (red line) is compared with (i) the series of income composition inequality when the survey capital and labor shares are replaced by those from ESA 2010 (blue line) and with (ii) the series of income composition inequality when the survey capital and labor shares are replaced by those from the adjusted ESA 2010 (purple line). The adjusted ESA 2010 series is obtained by combining information on the capital and labor components of self-employment income from SHIW with information from the national accounts. The definition of income here considered is Y_2 (i.e., individuals are ranked according to Y_2).

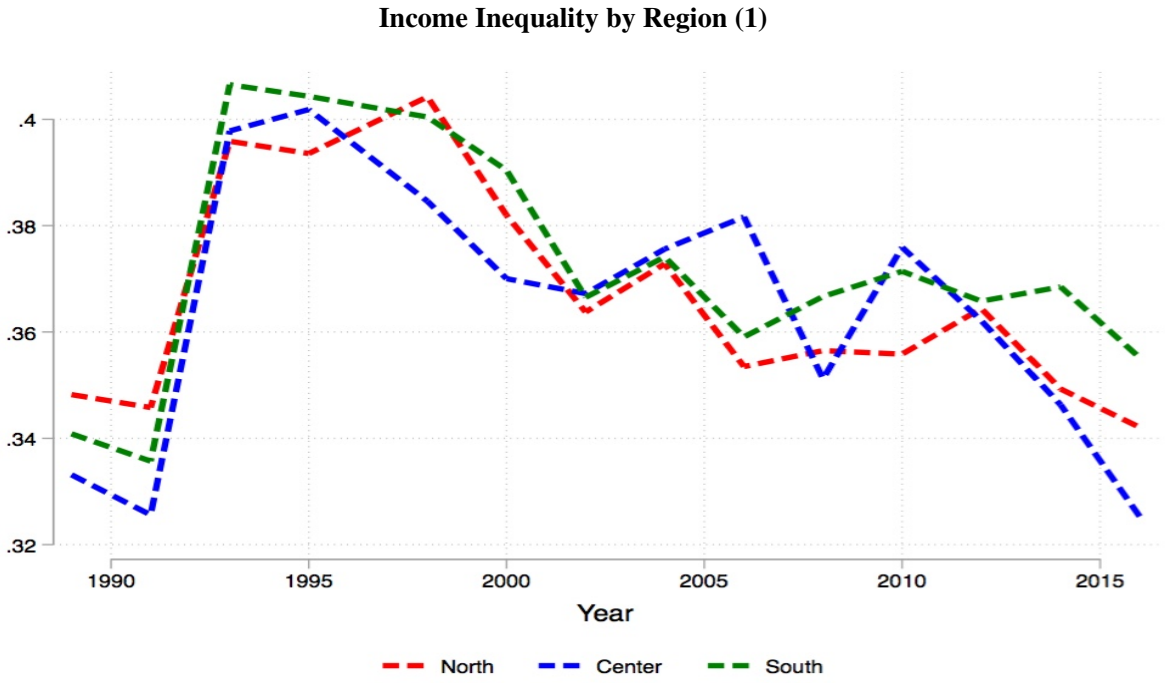

Figure 13: The series of the net income Gini coefficient for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_1.

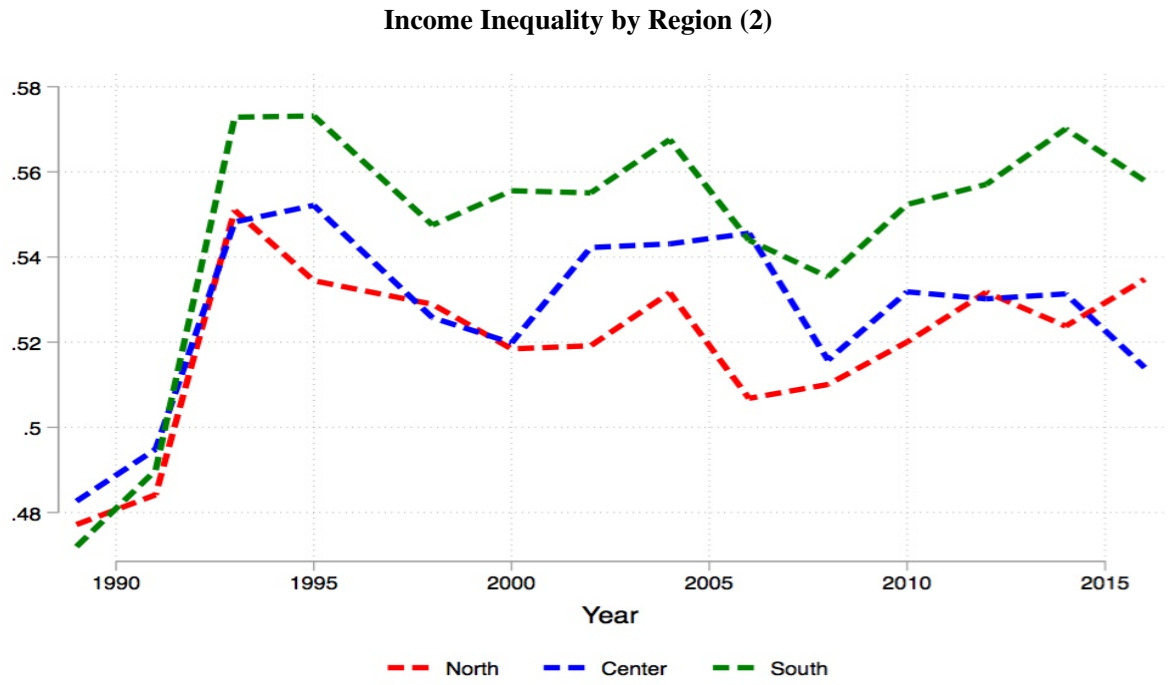

Figure 14: The series of the net income Gini coefficient for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_2.

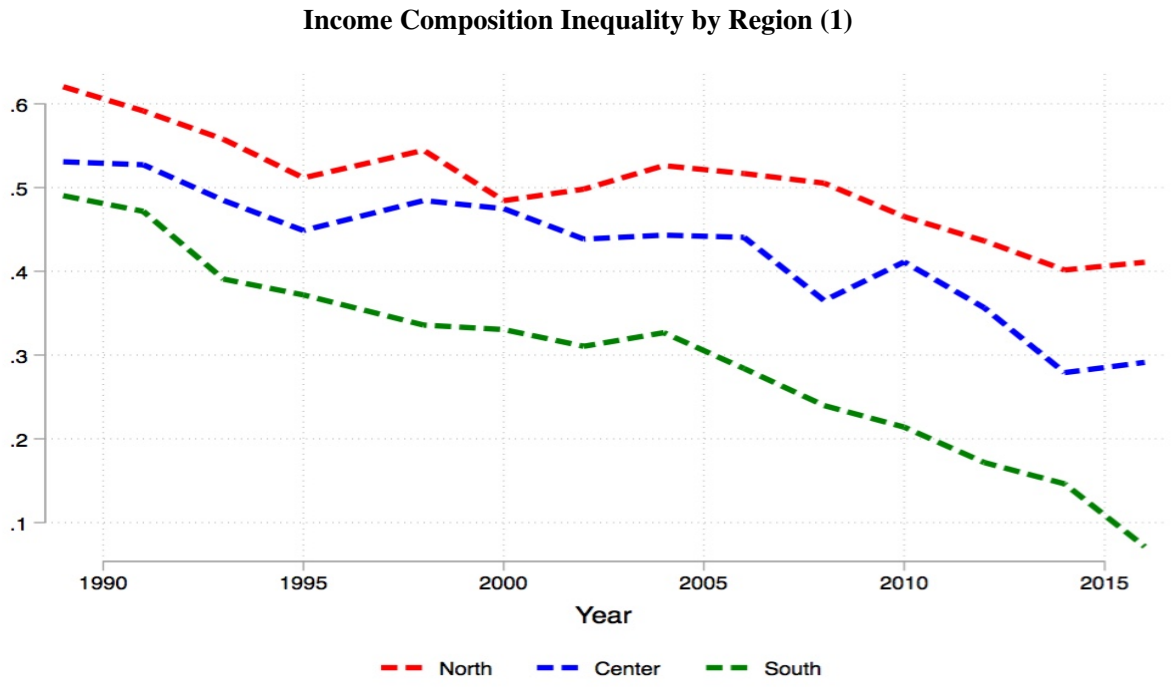

Figure 15: The series of the income factor concentration index for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_1 (i.e., individuals are ranked according to Y_1).

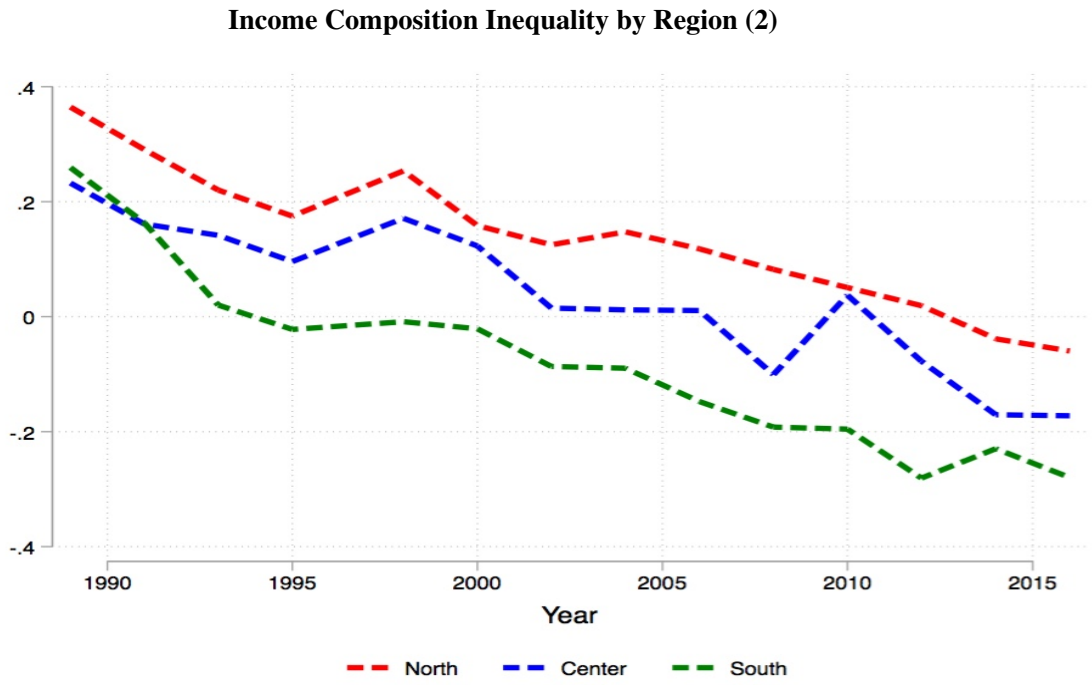

Figure 16: The series of the income factor concentration index for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_2 (i.e., individuals are ranked according to Y_2).

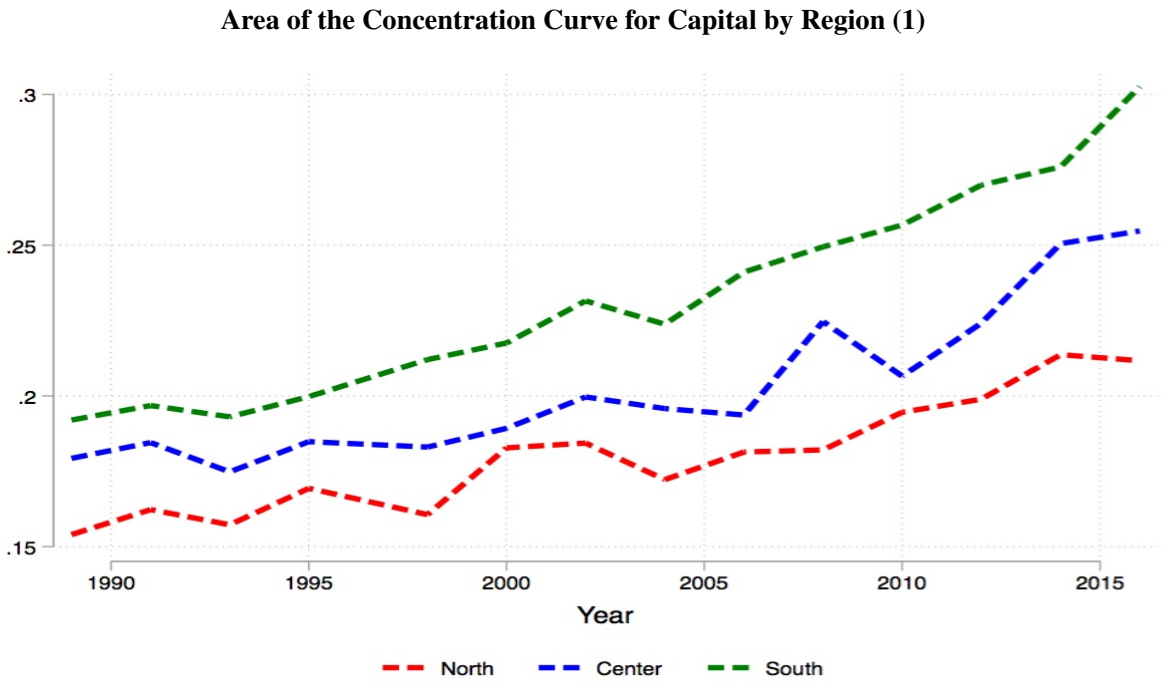

Figure 17: The series of the area of the concentration curve for capital for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_1 (i.e., individuals are ranked according to Y_1).

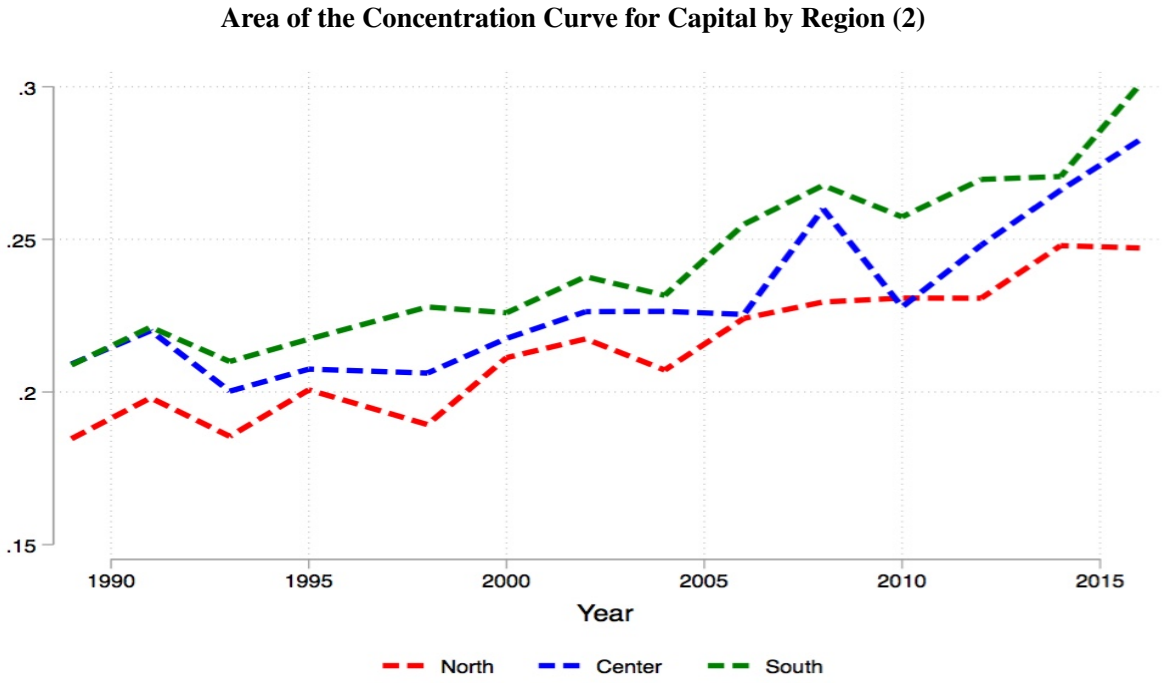

Figure 18: The series of the area of the concentration curve for capital for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_2 (i.e., individuals are ranked according to Y_2).

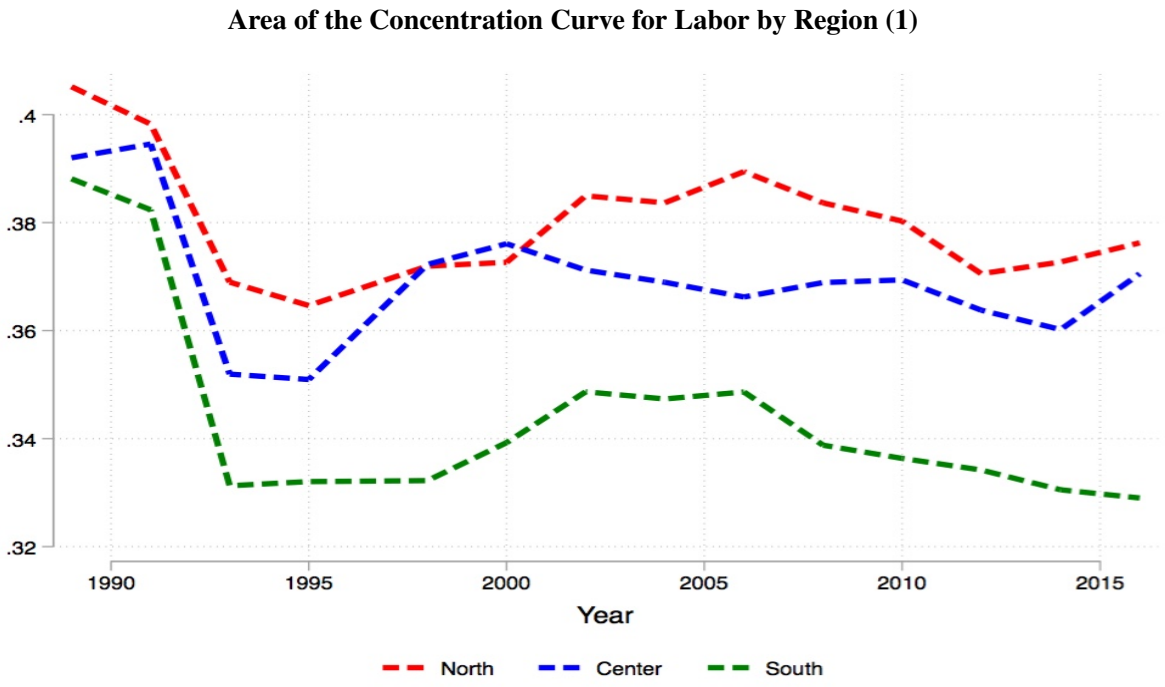

Figure 19: The series of the area of the concentration curve for labor for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_1 (i.e., individuals are ranked according to Y_1).

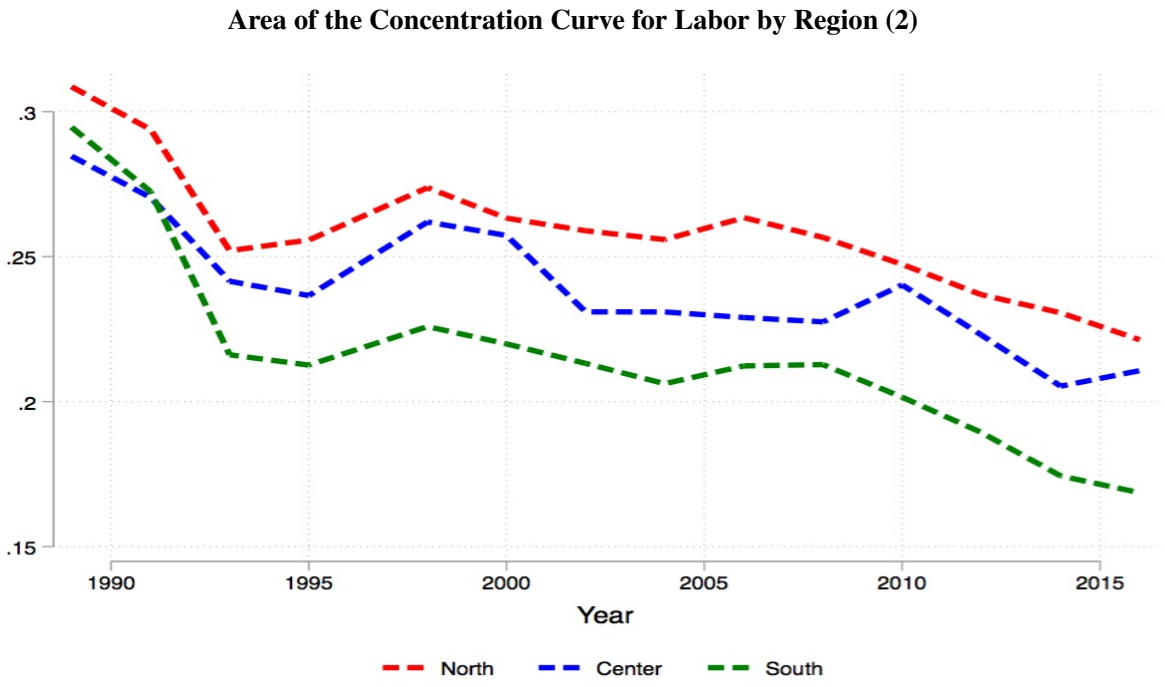

Figure 20: The series of the area of the concentration curve for labor for North, Center and South Italy, 1989-2016, constructed using data from SHIW. The definition of income considered here is Y_2 (i.e., individuals are ranked according to Y_2).

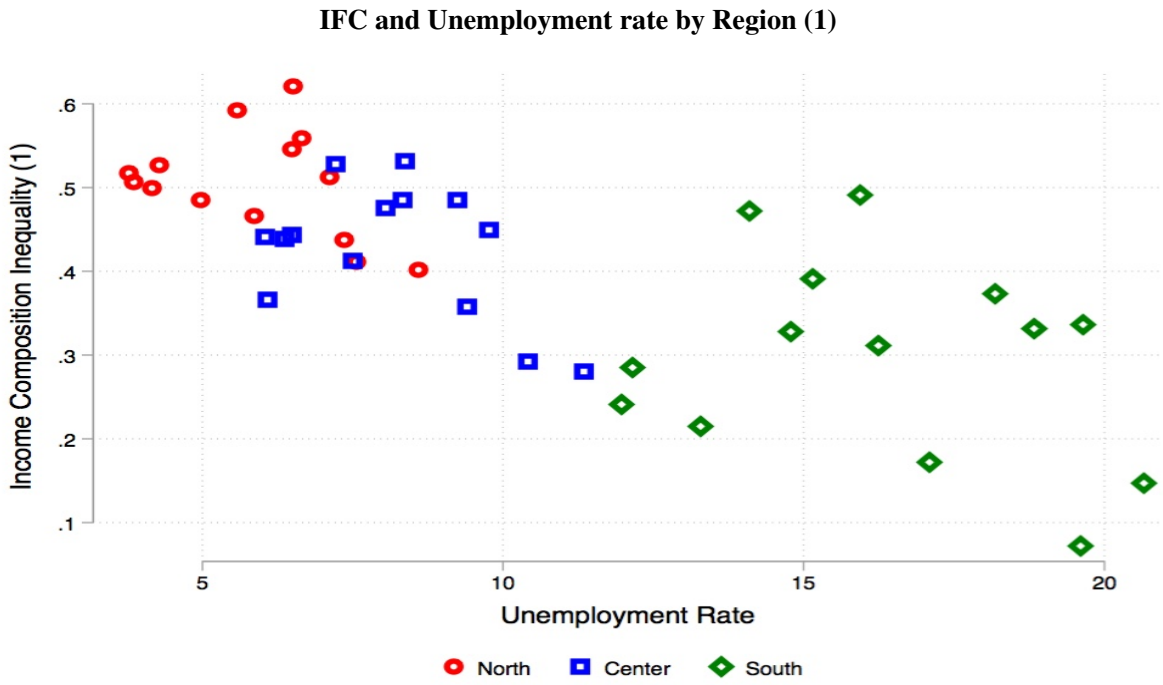

Figure 21: The scatter plot of the income-factor concentration index and unemployment rate for North, Center and South Italy. The definition of income considered here is Y_1.

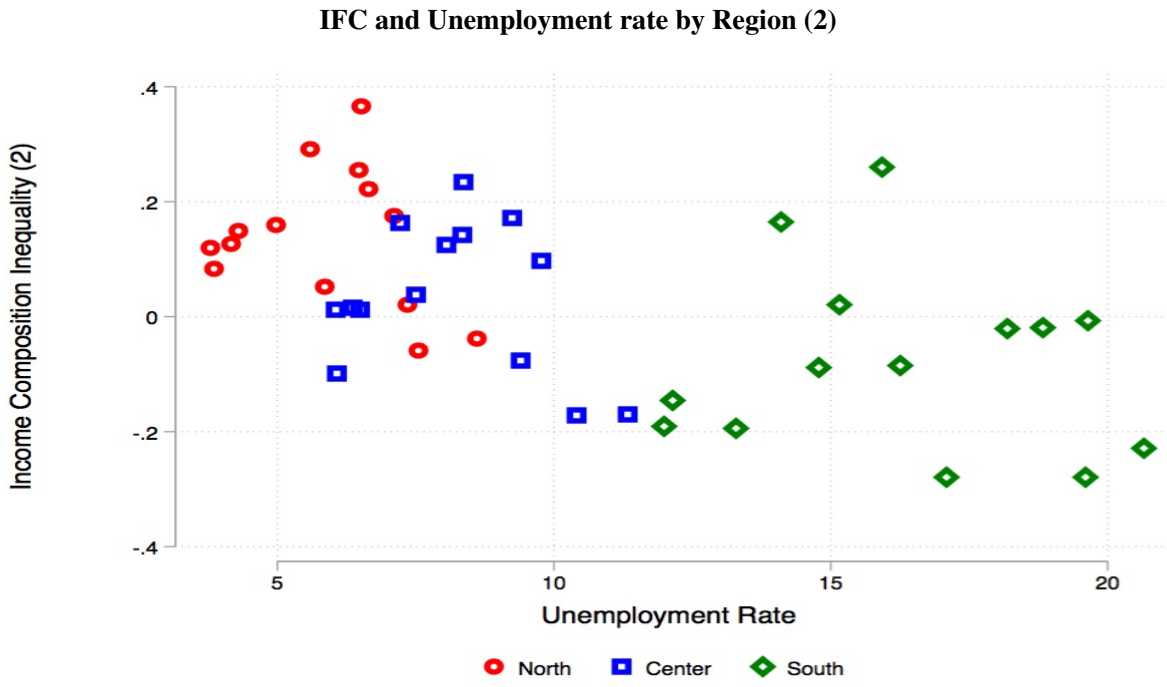

Figure 22: The scatter plot of the income-factor concentration index and unemployment rate for North, Center and South Italy. The definition of income considered here is Y_2.

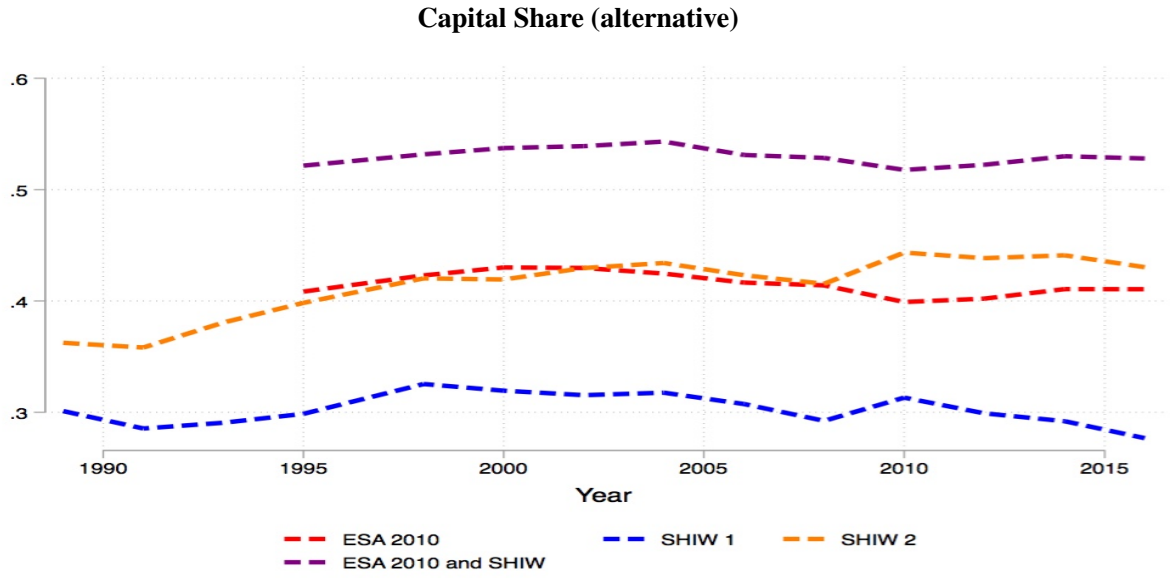

Figure 23: Four different series of the capital income share in Italy are presented here. The first series (ESA 2010), which runs from 1995 to 2016, is constructed from the ESA 2010 National Accounts and is calculated as the difference between value added at factor prices minus employee compensation. To account for self-employed workers, we assume that they earn the same as waged employees in all sectors. The second (SHIW 1) and the third (SHIW 2) series, which cover the period between 1989 and 2016, are built from the Survey of Household Income and Wealth (SHIW) prepared by the Bank of Italy. Total income in the first series is the sum of payroll income, net-self employment income, transfers and pensions and property income, while the second series is identical except that it excludes transfer and pensions. Capital income, instead, is the same for both series, and equals property income plus the capital component of net self-employment income. The latter is imputed following Glyn (2011). The fourth series is built by combining information on the capital and labor component of self-employment income and the national accounts.

Getting Redistribution Right

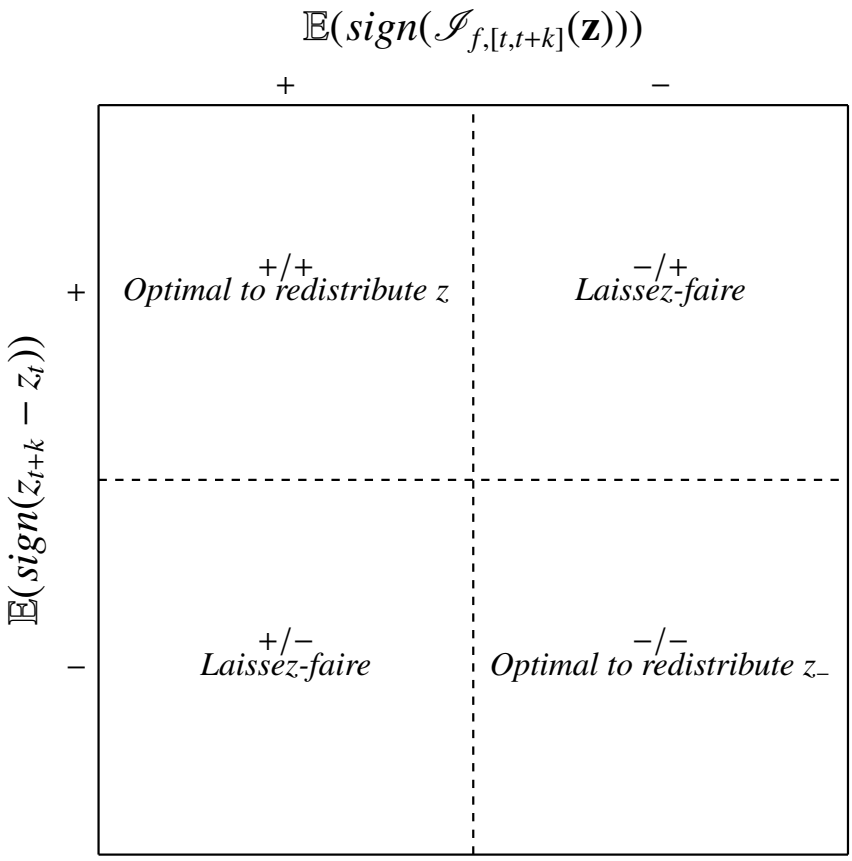

Figure 24: This figure shows the four different scenarios behind Proposition 5.1 in Section 5. **Scenario 1**: As long as the level of income composition inequality (at top of the table) is expected to be positive (e.g., capital income is concentrated primarily at the top and labor income at the bottom of the distribution) and the *capital* income share (on the left of the table) is expected to rise, it is preferable to redistribute income in the form of *capital* (such as housing or financial assets) so that the expected increase in the capital income share will not have a strong impact on income inequality. **Scenario 2:** this scenario depicts the opposite case. For a negative level of income composition inequality (e.g., capital incomes mostly accruing at the bottom and labor income at the top of the distribution), an expected increase in the *labor* share in the upcoming years will signal that it is indeed *labor* income that has to be redistributed to reduce inequality in the longer run. **Scenarios 3 and 4:** for the sake of completeness, we consider two further scenarios that might arise. Precisely, when the two signs in the above proposition differ, this means that the expected change in the income source z is already acting in favor of the redistribution of income in the long run.