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Timely Indicators for Inequality and Poverty Using the Italian Labour Force Survey

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Abstract
Income distribution measures obtained from standard household income surveys are usually published with a significant delay, of about 2 years. In this paper we propose a methodology for obtaining timelier indicators using the Italian Labour Force Survey (ILFS), a database which collects detailed information not only on individuals' labour market status, but also on their households and wages. We develop a framework to estimate household labour income and we use it to construct distributional indicators that are available 1 year and half before the standard measures. After discussing the limitations of our approach, we show that the ILFS-based indicators closely track those calculated on standard household income surveys. The suggested indicators are not meant to substitute standard income measures but can offer up-to-date information, with the aim of better monitoring the distributional impact of changing macroeconomic conditions.

Keywords Inequality · Poverty · Employment · Nowcasting

JEL Classification C53 · D31 · I32 · J21

1 Introduction

Although significant changes in the income distribution occur only in the long run, both economists and policymakers are increasingly valuing the availability of timely information on the developments of inequality and poverty. Such information would allow monitoring the effectiveness of redistributive policies and the distributional impact of changing macroeconomic conditions. However, the survey data required to construct statistics on the distribution of income, in Italy as well as in other countries, are usually available with a significant delay, of about 2 years.

Tracking the evolution of inequality and poverty has become especially relevant in the aftermath of the Great Recession. In the period 2008–2016, average income inequality remained rather stable in the European Union, but with high within-country heterogeneity

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(Jenkins et al. 2012; Vacas-Soriano and Fernández-Macías 2018). Poverty rates reached high levels, especially in those countries mostly hit by the sovereign debt crisis (European Parliament 2016).[1] These trends have challenged the ability of the European Welfare States to provide insurance against economic shocks, and have raised the need to monitor poverty and distributional conditions on a more frequent basis. Nowcasting[2] of distributional indicators has become a priority for the European Commission. In 2016, it started publishing flash estimates of the at-risk-of-poverty rate and of the income quintile share ratio, obtained by using EUROMOD [Navicke et al. (2014); Gasior and Rastrigina (2017)], the microsimulation model based on the EU-SILC data (the EU Statistics on Income and Living Conditions).[3] Nowcasting of the main distributional indicators is also flourishing in some European countries by using microsimulation models developed by the national institutes of statistics (for instance, Fontaine and Fourcot (2015) in France and Stoyanova and Tonkin (2016) in the UK). The methodology mainly consists in uprating income survey data observed in previous years by using key information on macroeconomic variables (i.e. average wage growth) and incorporating changes in the tax-benefit system in the microsimulation model. Changes to labour market participation and the demographic structure of the population are considered through calibration weighting or modelling labour market transitions. The average delay of the indicators developed using microsimulation models is of about one year.

In this paper, we propose a methodology to provide timely distributional indicators by using a different data source from standard household income surveys and without recurring to a microsimulation model. We use the microdata of the Italian Labour Force Survey (ILFS) focusing only on labour income, which is, however, the main source of income for Italian households and one of the main drivers of income inequality in this country.[4] To build a measure of household labour income, we develop a methodology that relies on detailed available information on hours of work and monthly wages. Since we observe monthly wages only for employees, we impute self-employed income by estimating a *Mincerian* equation of hourly wages, and then we exploit additional information on self-employed income inferred from other data sources. Then, after running a bunch of robustness checks to validate the proposed methodology, we present up-to-date indicators for labour income inequality and poverty.

The proposed methodology has at least two advantages with respect to existing methods based on microsimulation models. First, while previous studies use current information to uprate past income data, our methodology directly draws on promptly available data. Thus, we directly observe the effects of changes in macroeconomic conditions and in the tax-benefit system on household labour income, including the related behavioural responses, otherwise not captured in microsimulation models. To our knowledge, this is the first attempt of using labour force survey data for the analysis of income distribution. Second, since the ILFS data are released four times a year with a delay of just five–six months

[1] Italy followed a similar pattern: while overall income inequality did not change much, individuals along the entire income distribution became poorer (Brandolini 2014).

[2] Nowcasting is the prediction of the present, the very near future and the very recent past. Nowcasting techniques rely on timely information in order to nowcast key economic variables, such as e.g. GDP, that are typically collected at low frequency and published with long delays (BańBura et al. 2013).

[3] The survey is harmonized across European countries but run by national institutes of statistics, thus the date of the release differs across countries.

[4] Moreover, the trends in Gini index on equivalised labour income are similar to those observed for the Gini index on equivalised disposable income.

from the reference period, we are able to halve the delay of the indicators developed with microsimulation models and to provide statistics even on a quarterly basis. Moreover, by being the main data source for labour market statistics, the ILFS also represents the ideal venue for the analysis of the links between labour market developments and distributional issues. The methodology is not restricted only to Italian data, since we exploit information that are common also in other labour force surveys (not only in the EU). However, our approach has some limitations. First, it only looks at the distribution of labour income without including transfers or capital income. Second, self-employed income is not available in the ILFS and we impute it using contemporaneous (rather than past) information on employees' wages. Given these limitations, the proposed indicators are meant not to substitute standard income measures but to complement them, by providing timelier information on the most recent changes in the income distribution. Moreover, they indicate how much inequality and poverty are arising because of labour market dynamics.

The paper is organized as follows. Section 2 explores the different data sources and indicators usually employed to investigate the distributional issues in Italy. Section 3 first discusses the challenges of using the ILFS to predict distributional indicators of household labour income, and then it illustrates the methodology followed to obtain its measure in the ILFS. Section 4 provides inequality and relative poverty indicators for the ILFS measure of household labour income, which are then compared with those based on standard household income surveys. Section 5 provides further additional analyses that can be carried out having updated information both on employment and labour income. Finally, Sect. 6 concludes.

2 The Measurement of Income Inequality and Poverty in Italy

In Italy the analysis of income inequality and poverty (see "Appendix A" for definitions) is traditionally based on three data sources: the Survey on Household Income and Wealth (SHIW), administered by the Bank of Italy, the EU-SILC, collected by the Italian National Institute of Statistics (Istat), and the Household Budget Survey (HBS), also run by the Istat.

The SHIW[5] provides the longest record of household income data for Italy, and it is available since 1977. Since 2010 it has become part of Eurosystem's Household Finance and Consumption Survey (HFCS), coordinated by the European Central Bank, that provides a harmonized dataset for some Euro-area countries as for income, wealth and consumption data. Previously, the SHIW was also part of the Luxembourg Income Study (LIS). The EU-SILC is available since 2006 and provides net and gross income data for the previous year relatively to the survey. It is the main data source to compare income and inequality across European countries.

Despite some differences in income concepts (mainly related to the imputation of rents for owner-occupied dwellings, fringe benefits and other non-cash compensation), sampling methods and sample size, the Gini index for equivalised[6] disposable income calculated on

[5] Works that used the SHIW for the analysis of income inequality are Brandolini et al. (2002) and Jappelli and Pistaferri (2010) among the others; for a comparison across the different datasets see Galbraith et al. (2016).

[6] Equivalised disposable income is equal to family income divided by an equivalence scale (that can be equal to the square root of the household size or the OECD-modified equivalence scale); this normalization allows taking into account the existence of economies of scale within the household.

the two datasets shows a rather similar pattern (Fig. 1). The latest available information refers to the year 2016. The SHIW released this information in March 2018 (with about 1 year of delay) and the EU-SILC released it in December 2018 (two-year delay). In the following, we will mainly refer to the SHIW, which has the disadvantage of not being available every year, but, when available, has a shorter delay.

As for poverty, the main indicators are inferred by the HBS, which collects all the expenditures incurred by resident households in a given month to purchase goods and services exclusively devoted to household consumption. The latest available data refer to 2018, released in June 2019. These indicators, which measure the incidence of absolute and relative poverty (see "Appendix A" for definitions), are based on consumption expenditure (not on income).[7] Consumption-based indicators are usually preferred, when available, to the ones based on income since they refer to the poor's conditions in terms of inability to afford a given level of expenditure considered necessary for a decent life. We can compute income poverty indicators by using the SHIW and the EU-SILC data.[8]

The overall picture provided by the different data sources suggests that in Italy income inequality has raised very modestly during the Great Recession and its aftermath, but poverty dramatically increased (Sestito 2016), especially among households whose primary earner is young or foreign born (Brandolini et al. 2018). The incidence of absolute poverty among individuals more than doubled since 2006, from 2.9 to 8.4% in 2018.[9]

To have some indications for the most recent period, 2017–2018, we exploit the available information in the ILFS, currently updated at the second quarter of 2019. We may have also some indications for the first half of 2019.

3 A Methodology for Recovering Family Labour Income in the ILFS

3.1 Conceptual Challenges in the Estimation of Distributional Indicators Using the ILFS

The ILFS is a quarterly rolling panel dataset collected by the Istat. The dataset contains detailed information on labor market status, family structure and other socio-economic characteristics for about 250,000 households and 600,000 individuals per year. The ILFS is the main dataset used to provide the official statistics on the labour market and is part of the European Labor Force Survey. Despite it is not a household income survey, since 2009 employees are asked about their net regular salary earned 1 month before (no 13th or 14th

[7] Poverty indicators similarly to the ones provided by Istat are not available at international level.

[8] The share of individuals at risk of poverty or social exclusion is the leading indicator within the Europe 2020 framework and used for comparisons among European countries. See "Appendix A" for definitions.

[9] The absolute poverty rate increased from 2.1% in 2007 to 6.1 in 2018 among households whose head of the family is employed, if the reference person is unemployed, the incidence of absolute poverty rose from 7.0 to 27.6 over the same considered period. This evidence suggests that being employed seems to no longer ensure against the risk of poverty. However, some caveats are important. First, headcount employment provides only a partial picture of labour market developments (Brandolini and Viviano 2015): being simply the proportion of working-age people who have been working for at least 1 h in the reference week (ILO definition), it does not consider working times and contract duration, as well as important determinants of earnings. Second, employment is measured at individual level, while welfare at family level: labour supply interactions within the household affects family welfare and are not detected by the simple employment rate.

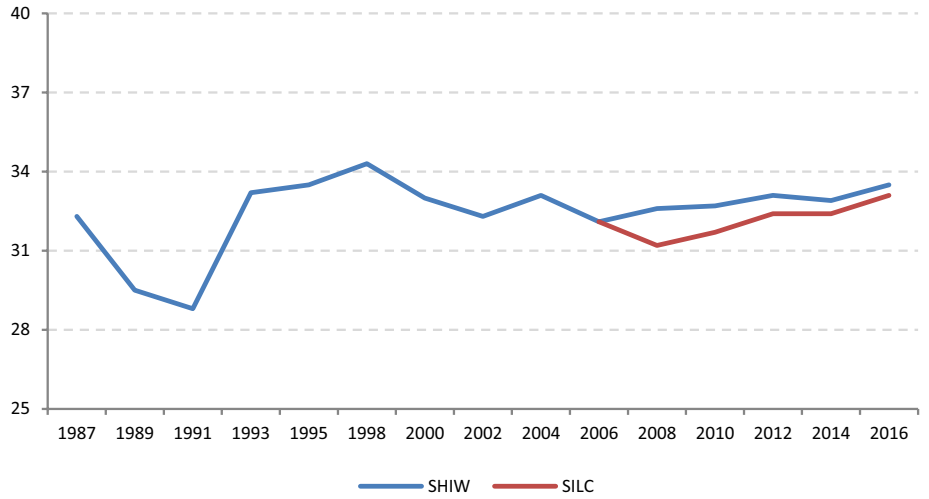

Fig. 1 Gini index on equivalised disposable income. *Source*: EU-SILC and SHIW, sample weights are used. Equivalised disposable income is equal to family disposable income divided by the OECD-modified equivalence scale. As for the EU-SILC, we consider only those years in which the SHIW is available

month's salary), excluding those extra-payments that are not commonly included in the monthly pay (see "Appendix B" for more details). This is the key variable in order to measure monthly family and equivalised labour income. The same information are also available in the other labour force surveys of the EU (in some case they are collected but subject to restricted access) or even in similar surveys for non-EU countries. Thus, the methodology developed in the paper can be run for other countries than Italy.

The validity of the ILFS to consistently predict indicators of the income distribution is subject to the satisfaction of three conditions.

First, the use of the ILFS restricts the analysis only to labour income, since no indications on other incomes (transfers, capital income) can be inferred. However, labour income is not only a large share of disposable income for the Italian population (in terms of equivalised person, Fig. 2), but the dispersion of its distribution, measured by the Gini index on equivalised income, closely resembles the dispersion of the distribution of disposable income, both in levels and in trends (Fig. 3).[10] A decomposition of the Gini index on equivalised disposable income by income source (Shorrocks 1982) confirms this evidence (see also Raitano 2016). Intuitively, the decomposition shows that labour income[11] is one of the main drivers of income inequality; it contributes to income inequality by 57% (Table 1).

[10] Levels of the Gini index on equivalised labour and disposable income are largely similar when focusing on "younger" families, those where there are not retirees and the Reference Person is 15–64 years old. These families are less likely to rely on pension income. These represent 60% of Italian families, involving around 70% of the population. Levels of the Gini index differ when looking at all families; the Gini index on equivalised labour income is higher that the Gini index on equivalised disposable income since families relying on other incomes than labour income are counted as having zero income. However, trends are largely similar (Fig. 3).

[11] Labour income is referred to all the population, thus it takes into account also those who are not employed (labour income is equal to zero).

Thus, labour income inequality is an important contributor to the distribution of total income.

Second, even restricting the analysis only to labour income, indicators predicted in the ILFS may diverge from those obtained from standard household income surveys (SHIW or SILC) because of differences in the accounting period over which the various income components are measured. While in the ILFS the accounting period for wages is the month, in the SHIW and EU-SILC it is the year for all the income sources. Depending on the differences in months worked along the labour income distribution, the level of inequality estimated on monthly income can significantly diverge from that measured on yearly income. For example, if at the bottom of the distribution jobs are more unstable and it is less likely to work for the full year, inequality and poverty are underestimated when looking at monthly rather than yearly incomes. However, comparing the distribution of monthly and yearly equivalised labour income in the SHIW,[12] we find that the Gini index for most recent years are similar in levels and trends (Fig. 4). Moreover, according to Böheim and Jenkins (2006), differences in the accounting period (month vs. year) do not remarkably affect the shape of the income distribution and its trends. This is due to at least two explanations: (1) current income, as measured by the ILFS, refers to "regular pay" rather than simply the last pay; (2) changes in employment or in the demographic composition of the household are rather small or random over the month/year.[13]

Third, self-employed income is not provided in the ILFS and has to be estimated. In Sect. 3.2 we suggest an imputation method based on standard methodologies using contemporaneous information on employees' wages. This imputation involves around 23% of total employment; moreover, considering that even in standard household income surveys self-employed incomes are hardly measurable in a reliable way (Brandolini 2000), we believe that imputing self-employed income is a minor limitation of our work. In Sect. 4, we provide evidence of how imputation fits the data taken from the SHIW.

3.2 The Data

In order to recover a measure of family labour income in the ILFS we mainly rely on two pieces of information: employees' monthly wages and weekly hours of work.

Information on monthly wages is available only since 2009; then, we use data for the period from 2009 to 2018 (the ILFS has been collected since 1992). The salary is reported in bin of 10 euros for amounts between 250 and 3000 euros; for lower and higher levels, there are two categories, respectively: 250− euros and 3000 + euros. Thus, the variable is not very detailed at the bottom and at the top of the monthly wage distribution.[14]

Hours worked are collected for all workers (including self-employed) and refer to the number of weekly hours usually worked in the last 4 weeks. Thus, we can calculate a proxy for hourly wages (described in the next subsection) under the assumption that

[12] Monthly labour income in the SHIW is obtained by the ratio between yearly labour income and months worked over the year.

[13] The SHIW refers to the yearly economic conditions of households and the reported employment condition is the prevalent employment status over the year. The ILFS reports current wage, which is the last regular monthly wage at the time of the interview.

[14] However, in years 2008–2016, the shares of employees who reported monthly wages below 250 and above 3000 are, respectively, on average 1.2 and 1.8% by year (from the SHIW; monthly wage is obtained as the ratio between annual earnings and months worked in 1 year).

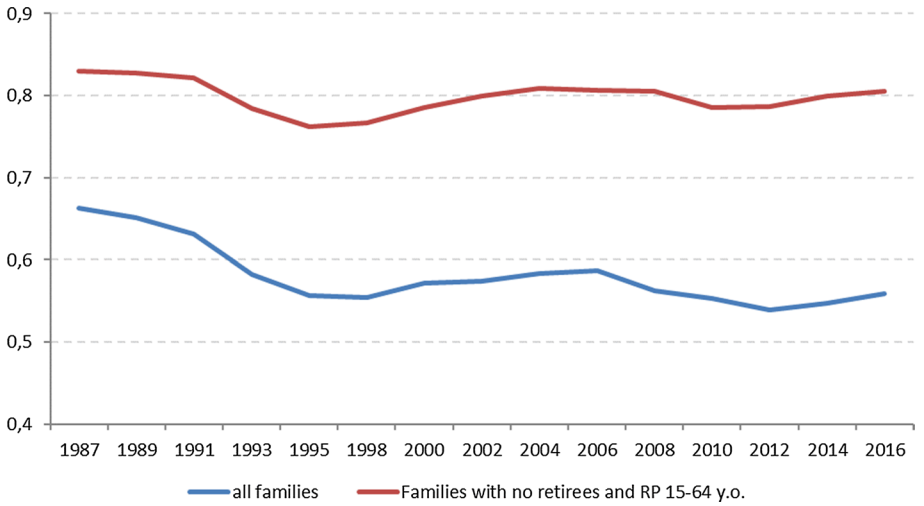

Fig. 2 Equivalised labour income as share of equivalised disposable income. *Source*: SHIW, sample weights are used. Equivalised disposable income is equal to family disposable income divided by the OECD-modified equivalence scale; equivalised labour income is analogously defined with respect to family labour income. We consider both all families, without any restriction, and those families in which there are not retirees and whose Reference Person is between 15 and 64 years old

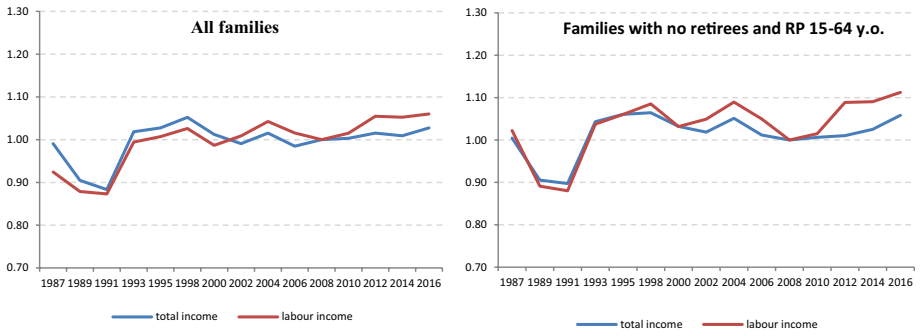

Fig. 3 Gini index on equivalised disposable income and on equivalised labour income. *Source*: SHIW, sample weights are used. Equivalised disposable income is equal to family disposable income divided by the OECD-modified equivalence scale; equivalised labour income is analogously defined with respect to family labour income. Indices are normalized with respect to the 2008 value. In the left panel we consider all families, without any sample restrictions. In the right panel we focus on those families in which there are not retirees and whose Reference Person is between 15 and 64 years old

individuals work for the full month. Despite monthly wage and weekly hours worked refer to two different time periods, the fact that questions are referred to "regularly" earned wage and "usually" worked hours is reassuring that the information is internally consistent.

Table 1 Decomposition of the Gini index on equivalised income by income source, 2016. *Source*: SHIW, sample weights are used.

	Share	Gini coefficient	Gini correlation	Contribution	Contribution (%)
Variable	S_k	G_k	R_k	$S_k{*}G_k{*}R_k$	$S_k{*}G_k{*}R_k/G$
Labour	0.557	0.520	0.648	0.188	0.569
Transfers	0.251	0.719	0.406	0.073	0.219
Capital	0.192	0.514	0.742	0.073	0.219
Total	1	0.334	1	0.334	1

Share S_k is is the component k's share of total income; G_k is the Gini index for a component k; R_k is the Gini correlation between income component and the total income. Product $S_k{*}G_k{*}R_k$ is the absolute contribution of k component to income inequality. For positive values of R_k, the necessary condition for inequality to increase as a result of a growing concentration within component k is G_k is greater than G. The Table shows that increased labour income inequality is associated to higher total income inequality; labour income inequality contributes to income inequality by 57%

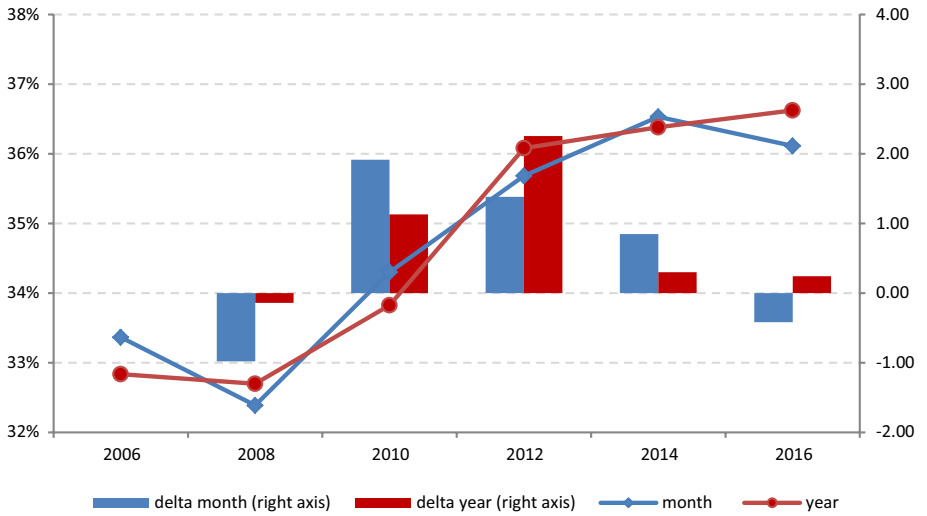

Fig. 4 Gini index on equivalised monthly and yearly labour income in the SHIW, most recent years. *Source*: SHIW, sample weights are used. Equivalised labour income is equal to family labour income divided by the OECD-modified equivalence scale. "month" refers to monthly equivalised labour income, obtained as the ratio between yearly labour income and the number of months worked, then aggregated at family level; "year" refers to yearly equivalised labour income; "delta month" is the difference between the Gini index on monthly equivalised labour income computed in a given year (i.e. 2010) and that in the two-year before (i.e. 2008); "delta year" is analogously defined. We consider households with no retirees and in which the reference person is 15–64 years

3.3 Estimating Family Labour Income

We propose a simulation exercise aimed at estimating family labour income by exploiting the detailed information on labour markets status and family background of the respondents. We proceed by steps.

First, we only have information on employees' wage. To estimate the monthly labour income of self-employed workers we follow a methodology in the spirit of the one used in the National Accounts (Istat 2014). We impute the employees' hourly wage (w_{it})[15] to self-employed workers by means of a simple linear regression model *a la Mincer*. We regress the logarithm of hourly wage on a set of standard regressing variables (X_{it}): those related to the individual (i.e. sex, age, level of education, civil status and citizenship) and her working status (working time schedule, sector), and those related to her family background (number of children, province of residence):

$$\log\left(w_{it}\right) = X'_{it}\beta_t + \varepsilon_{it} \quad \text{for } t = 2009/2018. \tag{1}$$

Main results are reported in Table 2. Hourly wages are positively correlated with education and age, negatively with being female or migrant. Coefficients are stable across the considered years. Full-time employees earned an hourly wage lower than the mean, especially in most recent years (2013–2018).

The regression model only explains a fraction (between 29.2 and 32.0%) of the wage distribution. Hence, the distribution of the imputed log wages $\widehat{\log\left(w_{it}\right)} = X'_{it}\widehat{\beta}_t$ for $t = 2009/2018$ is less dispersed than that of the observed variable. To correct for this, we add to the predicted mean values an error term (η_{it}), randomly drawn from a Normal distribution with zero mean and variance equal to the residual variance of the estimated regression model (*RMSE*)[16]:

$$\widehat{\log\left(w_{it}\right)}^{ADJ} = \widehat{\log\left(w_{it}\right)} + \eta_{it}, \eta_{it} \sim N\left(0, \widehat{RMSE}_t\right) \quad \text{for } t = 2009/2018 \tag{2}$$

Finally, in order to take into account that, even controlling for observable characteristics, the self-employed hourly income might statistically differ from employees' hourly wage, we estimate a Mincer equation model as the one above for all workers, both employees and self-employed, by using the SHIW data. In Table 3 we detect that over the period 2010–2016 being an employee was associated to an hourly wage "premium" of about 10.0%, on average; the premium was increasing over time. On the contrary, in 2008 it was associated to a penalty of about 4%.[17] To account for this, we correct the predicted hourly wage of self-employed as follows[18]:

$$\widehat{w}^{g}_{it} = \frac{exp\left(\widehat{\log\left(w_{it}\right)}^{ADJ}\right)}{1 + g_t} \quad \text{for } t = 2009/2018 \tag{3}$$

where g_t the coefficient associated to the dummy "employee" in Table 3.

[15] This is obtained as the ratio between monthly wage and weekly working hours times the average number of working weeks in one month, 4.3.

[16] We preferred this correction with respect to one based on the variance of self-employed income estimated in the SHIW; however, results look similar and are available upon request.

[17] These developments would reflect the fact that self-employed income is more cyclical than wages and that in Italy self-employment is on a decreasing trend (Bovini and Viviano 2018); thus, it is possible that some negative not-observed selection into self-employment would play a role in explaining this evidence.

[18] For those years in which SHIW is not available (odd years) we take the average gap among the closest available years.

Table 2 Mincer equation of employees' hourly wage, ILFS 2009–2018

Dependent variable:logarithm of hourly wage	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Female	−0.084***	−0.089***	−0.089***	−0.080***	−0.076***	−0.071***	−0.071***	−0.065***	−0.076***	−0.072***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
Female*married	−0.037***	−0.039***	−0.036***	−0.034***	−0.045***	−0.035***	−0.034***	−0.033***	−0.031***	−0.031***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Female*n children	0.000	0.005**	0.005**	0.004**	0.007***	0.004*	0.008***	0.007***	0.008***	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
25–34	0.126***	0.125***	0.127***	0.129***	0.125***	0.136***	0.134***	0.128***	0.123***	0.125***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
35–44	0.228***	0.219***	0.220***	0.231***	0.227***	0.244***	0.241***	0.237***	0.230***	0.229***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
45–54	0.281***	0.275***	0.275***	0.284***	0.275***	0.296***	0.287***	0.286***	0.283***	0.272***
	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
55–64	0.336***	0.329***	0.324***	0.331***	0.329***	0.350***	0.339***	0.334***	0.321***	0.312***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
64+	0.333***	0.341***	0.311***	0.336***	0.322***	0.334***	0.291***	0.292***	0.324***	0.323***
	(0.014)	(0.015)	(0.014)	(0.014)	(0.013)	(0.013)	(0.012)	(0.011)	(0.010)	(0.009)
1 child	−0.001	−0.006**	−0.012***	−0.003	−0.001	−0.004	−0.004	−0.006**	−0.008***	−0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
2 children	0.013***	0.006*	0.002	0.009***	0.014***	0.011***	0.010***	0.010***	0.004	0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
3 children	0.021***	0.010**	0.012**	0.018***	0.014***	0.023***	0.003	0.014***	0.014***	−0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
4 or more children	0.025***	0.012	−0.001	0.006	0.018*	0.013	−0.005	0.007	0.010	−0.006
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)

Table 2 (continued)

Dependent variable:logarithm of hourly wage	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Married	0.101***	0.106***	0.101***	0.092***	0.100***	0.091***	0.089***	0.084***	0.087***	0.084***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Foreign	−0.151***	−0.159***	−0.152***	−0.145***	−0.145***	−0.150***	−0.162***	−0.150***	−0.150***	−0.145***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Lower secondary education	0.081***	0.075***	0.050***	0.055***	0.065***	0.070***	0.061***	0.067***	0.063***	0.067***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Upper secondary education	0.205***	0.198***	0.175***	0.175***	0.181***	0.180***	0.171***	0.180***	0.173***	0.174***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Tertiary education	0.436***	0.423***	0.393***	0.374***	0.388***	0.381***	0.366***	0.378***	0.355***	0.354***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Full-time job	−0.042***	−0.047***	−0.049***	−0.051***	−0.066***	−0.058***	−0.068***	−0.064***	−0.052***	−0.055***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	1.403***	1.410***	1.445***	1.451***	1.488***	1.495***	1.533***	1.563***	1.582***	1.570***
	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sectoral dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	154,344	154,778	152,635	139,991	138,656	136,560	136,566	137,933	140,348	131,848
R-squared	0.307	0.310	0.320	0.296	0.292	0.302	0.301	0.315	0.304	0.303

Source: ILFS, sample weights are used. Standard errors in parentheses. Coefficients are statistically significant with probability: ***$p<0.01$, **$p<0.05$, *$p<0.1$

Table 3 Mincer equation of workers' hourly wage, SHIW 2008–2016 *Source*: SHIW, sample weights are used.

Dependent variable:logarithm of hourly wage	2008	2010	2012	2014	2016
Female	−0.094***	−0.079***	−0.035*	−0.064***	−0.076***
	(0.018)	(0.019)	(0.019)	(0.018)	(0.021)
Age	0.009***	0.008***	0.009***	0.007***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1 child	−0.012	0.024*	0.003	−0.035**	−0.009
	(0.013)	(0.014)	(0.014)	(0.014)	(0.016)
2 children	0.011	0.019	0.031*	0.004	0.019
	(0.015)	(0.016)	(0.017)	(0.016)	(0.019)
3 children	0.036	0.066***	0.059**	0.022	−0.021
	(0.022)	(0.025)	(0.025)	(0.024)	(0.028)
4 or more children	0.073	0.017	0.020	−0.070	0.019
	(0.046)	(0.048)	(0.048)	(0.049)	(0.072)
Married	0.139***	0.130***	0.160***	0.170***	0.103***
	(0.014)	(0.015)	(0.016)	(0.015)	(0.018)
Female*married	−0.108***	−0.105***	−0.187***	−0.159***	−0.102***
	(0.020)	(0.021)	(0.022)	(0.020)	(0.024)
Female*n children	−0.027***	−0.025**	−0.019*	−0.006	−0.005
	(0.010)	(0.010)	(0.011)	(0.010)	(0.012)
Foreigner	−0.076***	−0.140***	−0.175***	−0.164***	−0.159***
	(0.017)	(0.017)	(0.016)	(0.015)	(0.019)
Lower secondary	−0.106	0.048	0.148*	0.138	0.022
	(0.083)	(0.095)	(0.087)	(0.093)	(0.127)
Upper secondary	0.009	0.148	0.291***	0.235***	0.154
	(0.081)	(0.093)	(0.083)	(0.090)	(0.123)
College	0.182**	0.316***	0.471***	0.391***	0.352***
	(0.081)	(0.093)	(0.084)	(0.090)	(0.123)
Tertiary	0.348***	0.586***	0.598***	0.538***	0.476***
	(0.093)	(0.100)	(0.092)	(0.098)	(0.131)
Public	0.199**	0.284***	−0.107	0.325***	0.271**
	(0.095)	(0.094)	(0.081)	(0.093)	(0.134)
Employee	−0.038***	0.019	0.088***	0.106***	0.185***
	(0.014)	(0.015)	(0.015)	(0.014)	(0.017)
Constant	2.275***	1.970***	1.805***	1.845***	1.737***
	(0.095)	(0.108)	(0.097)	(0.104)	(0.138)
Province dummies	Yes	Yes	Yes	Yes	Yes
Sectoral dummies	Yes	Yes	Yes	Yes	Yes
Observations	6710	6445	6222	5792	4995
R-squared	0.380	0.325	0.389	0.380	0.345

Standard errors in parentheses. Coefficients are statistically significant with probability: ***$p<0.01$, **$p<0.05$, *$p<0.1$

Given the predicted hourly income, the monthly income of self-employed is then obtained as the product of the predicted hourly income times hours worked in one month (that is, hours usually worked in one week times the average number of weeks per month, 4.3).

Second, since the focus of the analysis is on labour income, we exclude those families who are less likely to rely on labour as main source of income. Thus, we drop those households in which there is at least one retiree; moreover, we select only households whose Reference Person (RP) is between 15 and 64 years old. This selection is necessary to avoid classifying as zero-income those households with income from pension, which would upwards bias the number of individuals with no income. These selected families are 60% of Italian families, involving around 70% of the population and almost all minors.

Third, individuals' labour income is aggregated at the family level. In order to account for family size and the age of its members, we also normalized family income by adopting the OECD-modified equivalence scale.[19] In this way, we obtain a measure of welfare that is comparable across individuals.

4 Results and Robustness Checks

Figures 5, 6 and 7 compare the distribution of different income measures computed in the ILFS and in the SHIW across those years currently available for both surveys (from 2010 to 2016). The ILFS income measures would have been available on a yearly basis and six months before those obtained from the SHIW. Figure 5 compares monthly wages; the ILFS measure is computed from the raw data available in the survey, that is censored from above and from below; the SHIW variable is obtained by dividing annual earnings by the number of months worked in the reference year. Despite censoring of the ILFS wage, the two distributions look pretty similar; the ILFS wage distribution is rather more shifted towards the left, mainly because reported wages exclude bonuses, overtime and extra-salary. Also the different nature of the surveys—the yearly basis in the case of the SHIW, quarterly for the ILFS with last month regular pay data—contributes to explain the higher share of the "poor" in the ILFS. Figure 6 compares the distribution of the imputed self-employed income in the ILFS and the observed self-employed income in the SHIW. It is visible that the imputation performs well in replicating the distribution of self-employed income observed in the SHIW, which shows a larger share of low self-employed incomes because we kept those reporting zero or small amount of income. Finally, Fig. 7 shows that the distribution of monthly equivalised labour income is largely similar in the SHIW and in the ILFS. The share of individuals with zero income is higher in the ILFS than in the SHIW, reflecting the same evidence observed for wages in Fig. 5; some individuals may be able to earn a positive labour income over the entire year but not in a given month, as measured by the ILFS.

Figure 8 compares the Gini index computed on monthly equivalised labour income in the SHIW and in the ILFS on the selected sample of individuals. Both the developments and the levels of the indices are rather aligned, suggesting that the methodology provides a

[19] The OECD-modified equivalence scale is a factor computed on the basis of the size of the family and on the age of its members. It represents the needs of the family allowing for the presence of economies of scale in consumption. The OECD-modified scale assigns a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child.

good fit for the measurement of labour income inequality. This is even more evident comparing the bi-annual changes in the indices. We also provide an indicator for labour income poverty, measuring those individuals with an equivalised labour income lower than 60% the annual median equivalised labour income. The indicator computed in the ILFS is not much accurate in levels (Fig. 9), mainly due to the different accounting period of the surveys. Since the ILFS reports monthly wages and not annual earnings as the SHIW, it is more likely to observe smaller values in the ILFS and obtaining higher values of the poverty rate (as also inferred from the inspection of Fig. 7). While this features does not affect much the inequality measure, since the Gini index is less sensitive to changes taking place at the extremes of the distribution (Jenkins 2009), it may be more relevant as for indicators that look at the bottom of the distribution. However, the trend in the labour income poverty indicator computed on the ILFS and the SHIW is similar and suggests that it is still rather at high levels despite the employment recovery started in 2014.

Since the ILFS monthly wage is censored both from below and from above, respectively at thresholds 250 and 3000 euros, the presence of censoring may underestimate both income inequality and poverty measures in the ILFS. We run the following checks in order to address the robustness of our results.

First, we assume that within the interval [0–250], employees' monthly wages are distributed according to a uniform distribution and we give the mean value to those monthly wages lower than 250, i.e. 125 rather than the censored value. For values higher than 3000, we assume a Pareto distribution. Figure 10 shows that the developments of the Gini index for the corrected income variable and for the observed variable are the same. While in some years, the levels of the Gini on the corrected variable are more diverging from the Gini computed on the SHIW income, the correction for censoring allow to proxy slightly better the bi-annual changes (the variable "delta" in the figure). The labour income poverty rate for the corrected income variable is only slightly higher than that computed for the censored variable.

Second, we apply the same censoring of the ILFS variable to monthly labour income in the SHIW. Figure 11 shows that Gini index computed in the SHIW starting from censored monthly wages is closer to the Gini index in the ILFS; however, changes in the index over time do not differ from those observed for the original distribution of equivalised labour income.

Scenario Simulation Finally, we evaluate how the ILFS-based indicators relate to those provided by using microsimulation models. As for Italy, the only available estimates for nowcasted distributional indicators are the ones provided by Eurostat based on the EUROMOD microsimulation model: the at-risk-of-poverty rate and the income quintile share ratio ("Appendix A" for definitions). As for inequality (Fig. 12, left panel),[20] the ILFS indicator suggests a decline from 2014, in line with what observed in the SHIW. However, this is not visible in the EU-SILC and in the predicted indicator (SILC/EUROMOD). The discrepancy is attributable to the fact that different indices are considered. As stated before, the Gini index is less sensitive to changes in income values at the extreme of the distribution, captured instead by the income quintile share ratio. In the latest years, the recovery in employment did not seem to involve the bottom of the distribution, as suggested by the observed high levels of poverty. On the other hand, given the limitations of our data,

[20] For comparability, we normalize the indicators such that the value in 2008 is set equal to 1.

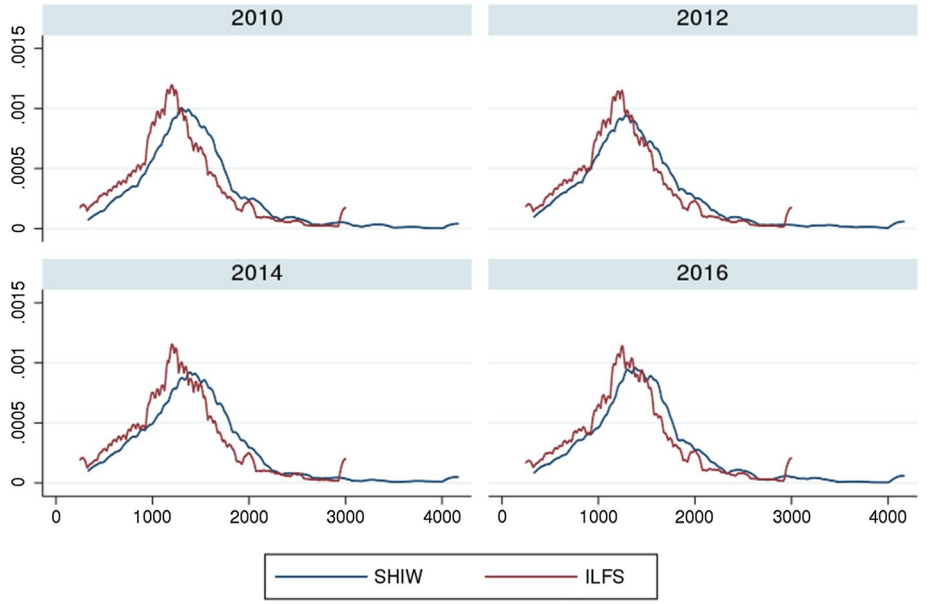

Fig. 5 Monthly wage distribution in the ILFS and in the SHIW by year. *Source*: ILFS and SHIW, sample weights are used. The ILFS wage is the net regular salary earned one month before (no 13th or 14th month's salary), excluding those extra-payments that are not commonly included in the monthly pay. The salary is reported in bin of 10 euros for amounts between 250 and 3000 euros; for lower and higher levels, there are two categories, respectively: 250- euros and 3000 + euros. The SHIW monthly wage is obtained as the ratio between annual earnings and months worked in the reference year (for employees only). Extremes values for the SHIW variable are winsorized at level 1 and 99% levels for each year

computing the same indicator in the ILFS would overestimate inequality levels. As for poverty (right panel), instead, the ILFS more closely follows the EU-SILC and SILC/EUROMOD indicators. It is important to remember that the ILFS-based indicators would allow policy-makers to have information on the income distribution at least half a year before those based on microsimulation models, 1 year and half with respect to income survey data. Thus, policy actions can be timelier with respect to the economic outlook. Finally, the ILFS-based indicators allow policy-makers to have a deeper and more updated knowledge of how much inequality is originated from labour market developments, which is informative for the design of redistributive policies.

5 Other Possible Uses of the Dataset

5.1 Labour Market Developments and Inequality

The availability, within the same dataset, of detailed labour market information and family labour income allows to closely linking labour market developments, regarding wages and employment, and individuals' wellbeing.

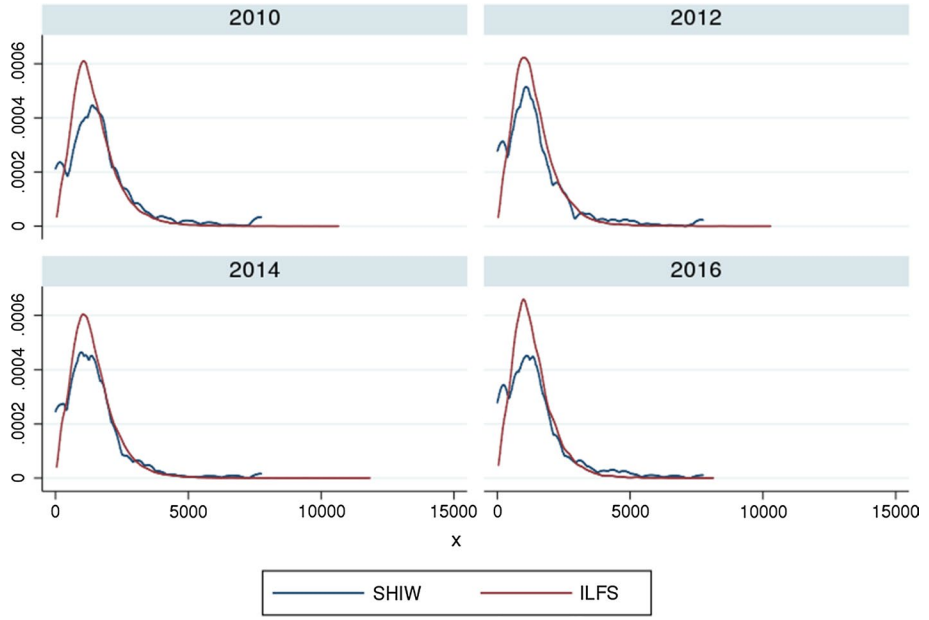

Fig. 6 Monthly self-employed income in the ILFS (obtained by imputation) and in the SHIW. *Source*: ILFS and SHIW, sample weights are used. The ILFS self-employed income has been imputed as described in Sect. 3, by estimating a Mincerian equation of hourly wage on observable individual and family characteristics. The SHIW self-employed income is obtained as the ratio between annual income and months worked in the reference year (for self-employed only). Extremes values are winsorized at level 1 and 99% levels for each year

Following Atkinson and Brandolini (2006),[21] we can write the Gini index on equivalised labour income (G) as the sum of two components. The first component is the share of individuals living in households with no labour income ($1-e$), which measures how many individuals cannot rely on it (despite being in an "active" household).[22] The second component is the dispersion of equivalised labour income among individuals living in households with at least one employed member (G_e), weighted by their share over the reference population:

$$G = 1 - e + e^{*}G_e = 1 - \left(1 - G_e\right)e. \tag{4}$$

Expression (4) shows that the inequality of equivalised labour income is *negatively* associated to the share of individuals in households where there is at least one employed person (e)., while *positively* related to the dispersion of equivalised labour income among those individuals who can rely on it (G_e; see also "Appendix A"). The change over time in the Gini index lends itself to the simple decomposition:

[21] Their decomposition look at the Gini index on individual earnings. The first component is the share of non-employed individuals; the second component is the dispersion of labour income among employed individuals. In this paper, we discuss the analogue of this decomposition looking at the Gini index on equivalised labour income.

[22] It is useful to remind that the analysis focuses only on those households who are more likely to rely on labour income—those with no retirees and whose reference person is 15–64 years old.

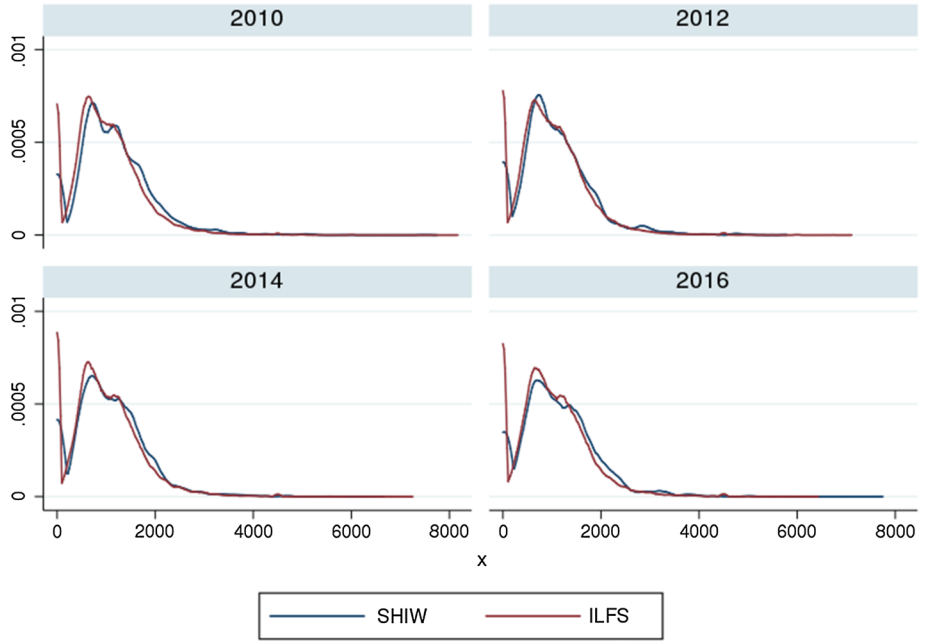

Fig. 7 Monthly equivalised labour income in the ILFS and in the SHIW. *Source*: ILFS and SHIW, sample weights are used. The ILFS monthly equivalised labour income is obtained by aggregating labour incomes at household level, divided by the OECD-modified equivalence scale to take into account economies of scale within the household. The SHIW monthly equivalised labour income is analogously defined. Extremes values are winsorized at level 1 and 99% levels for each year

$$\Delta G \cong e\Delta G_e + \left(G_e - 1\right)\Delta e. \tag{5}$$

The first term in (5) captures the "labour income effect", that is the change in the Gini index driven by the change in the distribution of equivalised labour income across people having it. The second term the "family-employment effect", which expresses how much inequality is associated to changes in the share of individuals living in families with at least one employed member. Figure 13 points out that during the period 2009–2014 the increase of the Gini index on equivalised labour income (by 3.1 p.p.) among individuals living in "active households" was almost entirely driven by the increase in the share of individuals in households without labour income. In the period from 2014 to 2018, the decline in the share of individuals leaving in households with no employed individuals and, to a less extent, the reduction in the dispersion of equivalised labour income among those living in households with positive earnings contributed to the reduction of the Gini index by 1.4 p.p., at 35.4 in 2018.

We detect similar developments across Italian macro-areas. Over the overall period 2009–2018, the Gini index on equivalised labour income rose by 3.6 p.p. in the Southern Regions, only by 1.1 p.p. in Centre-North of Italy. Lower employment rate is the main responsible for the higher level of inequality registered in the South. The low employment rate is associated to a higher number of families without labour income and to a lower share of families with at least one employed member (Ciani and Torrini 2019).

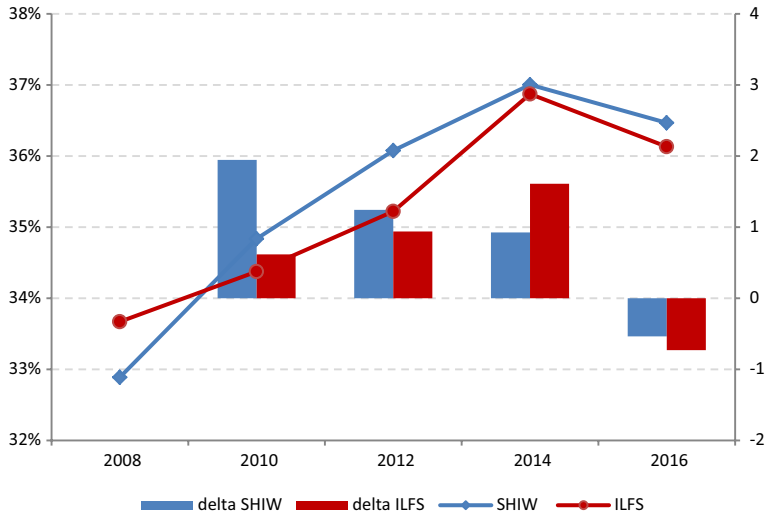

Fig. 8 Comparison of the Gini index computed on monthly equivalised labour income in the ILFS and in the SHIW. *Source*: ILFS and SHIW, sample weights are used. Gini index computed on equivalised labour incomes. We consider only those years in which both ILFS and SHIW are available. "delta SHIW"(right axis) is the difference between the Gini index computed in a given year (i.e. 2010) and that in the two-year before (i.e. 2008); "delta ILFS" is analogously defined. "delta ILFS" in 2010 is the difference between the Gini index in 2010 and that in 2009 since the value for 2008 is not available. Gini index computed in the ILFS in 2008 refers to 2009 incomes. We consider households with no retirees and in which the reference person is 15–64 years

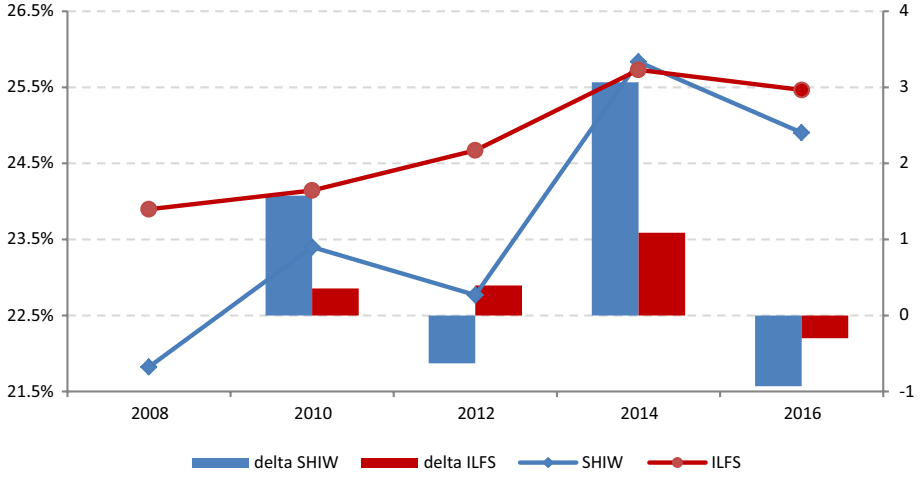

Fig. 9 Comparison of the labour income poverty rate in the ILFS and in the SHIW. *Source*: ILFS and SHIW, sample weights are used. Labour Income Poverty Rate (LIPR): share of individuals with equivalised monthly labour income lower than the 60% of the national median value. We consider only those years in which both ILFA and SHIW are available. "delta SHIW" (right axis) is the difference between the LIPR computed in a given year (i.e. 2010) and that in the two-year before (i.e. 2008); "delta ILFS" is analogously defined. "delta ILFS" in 2010 is the difference between the corresponding LIPR in 2010 and that in 2009 since the value for 2008 is not available. LIPR computed in the ILFS in 2008 refers to 2009 incomes. We consider households with no retirees and in which the reference person is 15–64 years

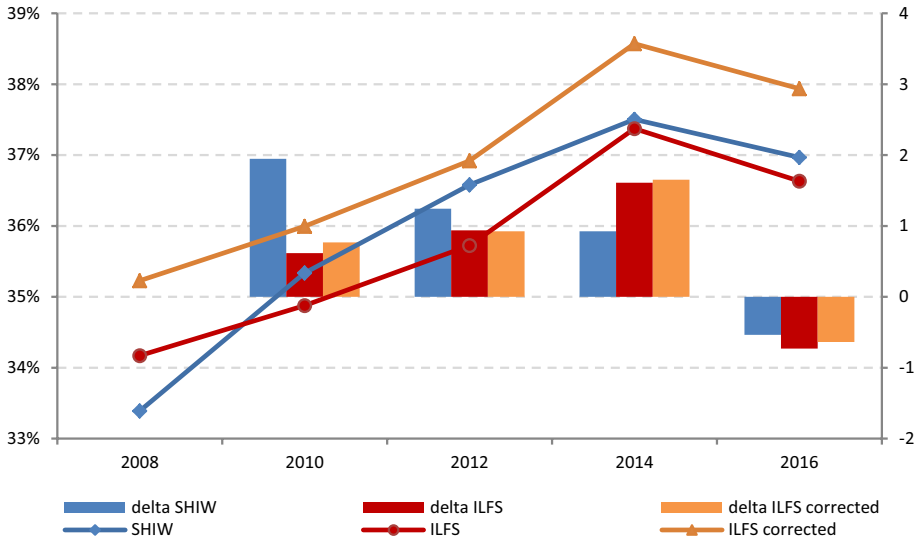

Fig. 10 Comparison of Gini index computed on monthly equivalised labour income in the ILFS, in the ILFS with correction for censoring and in the SHIW. *Source*: ILFS and SHIW, sample weights are used. Gini index computed on equivalised labour incomes. Monthly wage in the ILFS is corrected for censoring: we assume that employees' monthly wages censored at 250 euros are distributed according to a uniform distribution [0;250] and assign them the mean value, i.e. 125 rather than 250. For values censored at 3000 euros, we assume that monthly wages are distributed according to a Pareto distribution. "delta SHIW" (right axis) is the difference between the Gini index computed in a given year (i.e. 2010) and that in the two-year before (i.e. 2008); "delta ILFS" and "delta ILFS corrected" are analogously defined. "delta ILFS" and "delta ILFS corrected" in 2010 are the difference between the respective Gini index in 2010 and that in 2009 since the value for 2008 is not available. Gini index computed in the ILFS in 2008 refers to 2009 incomes. We consider households with no retirees and in which the reference person is 15–64 years

5.2 Jobless Households

Eurostat provides an indicator strictly linked to the employment status and based on the EU Labour Force Survey. This is the proportion of people living in jobless households, distinguishing between children (0–17) and adults (18–59). A household is jobless if no working age (18–59 years old) adult is employed (see "Appendix A" for a more detailed definition). Since labour is the primary source of income for the working age population, researchers usually interpret these indicators as proxies for poverty.[23]

In Fig. 14, we report the two indicators.[24] We compare them to the labour income poverty rate computed in the ILFS and the relative and absolute poverty rate provided by Istat and based on consumption expenditure. For comparability, we normalize the indicators such that the value in 2009 is set equal to 1. All the indicators jumped during the sovereign debt crisis. While the shares of people living in jobless households have started to slowly decline since 2014, poverty rates measured in the HBS persist at high levels; we

[23] This definition of jobless household is slightly different from the one used in Sect. 5.1; however, observed patterns are broadly the same.

[24] For a detailed discussion about jobless households see Mocetti et al. (2011).

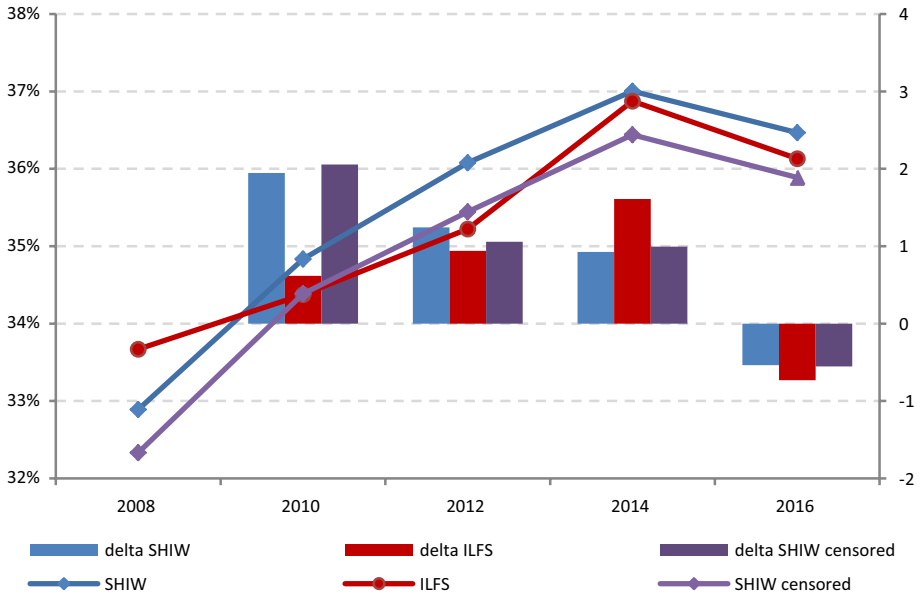

Fig. 11 Comparison of Gini index computed on monthly equivalised labour income in the ILFS, in the SHIW and in the SHIW with censored monthly wage. *Source*: ILFS and SHIW, sample weights are used. Gini index computed on equivalised monthly labour incomes. Monthly wage in the SHIW is censored censored from below (at 250) and from above (at 3000), analogously as in the ILFS. "delta SHIW" (right axis) is the difference between the Gini index computed in a given year (i.e. 2010) and that in the two-year before (i.e. 2008); "delta ILFS" and "delta SHIW censored" are analogously defined. "delta ILFS" in 2010 is the difference between the respective Gini index in 2010 and that in 2009 since the value for 2008 is not available. Gini index computed in the ILFS in 2008 refers to 2009 incomes. We consider households with no retirees and in which the reference person is 15–64 years

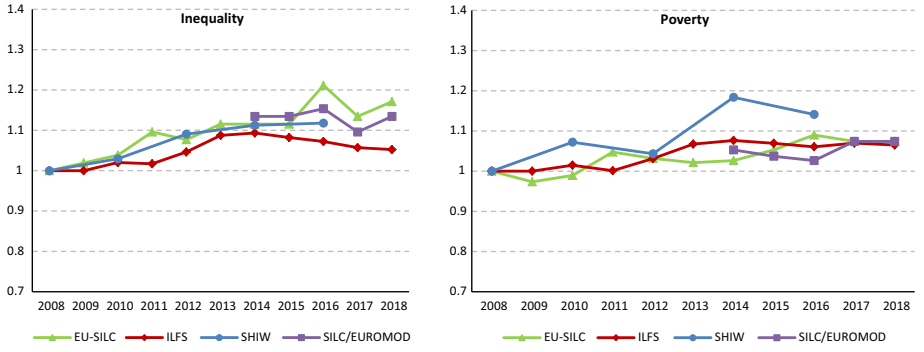

Fig. 12 Evolution of inequality and poverty indicators according to different data sources. *Source*: ILFS and SHIW, sample weights are used. Eurostat provides indicators based on EU-SILC and SILC/EUROMOD. As for ILFS and SHIW indicators, we consider households with no retirees and in which the reference person is 15–64 years. Information on wages in the ILFS are available only from 2009; we consider in 2008 the value observed in 2009. The SHIW survey is run every two years and it is available with one year of delay with respect to the survey period. EU-SILC and SILC/EUROMOD refer to income data of 1 year before the survey year

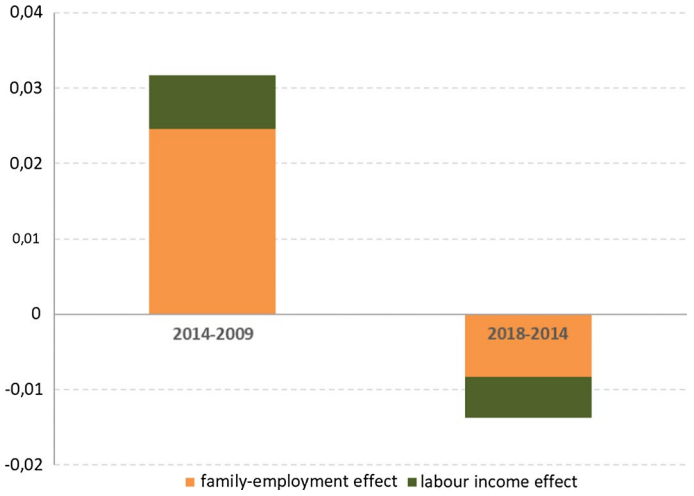

Fig. 13 Changes in the Gini index on equivalised labour income. *Source*: ILFS, sample weights are used. We consider households with no retirees and in which the reference person is 15–64 years. The "labour income effect" is the change in the Gini index driven by the change in the distribution of equivalised labour income across people having it. The "family-employment effect" expresses how much inequality is associated to changes in the share of individuals living in families with at least one employed member. The decomposition of the change over time in the Gini index on equivalised labour income (including zero values) is based on the formula: $\Delta G \cong e\Delta G\_e + (G\_e\text{-}1)\Delta e$ (Atkinson and Brandolini (2006); see also "Appendix A")

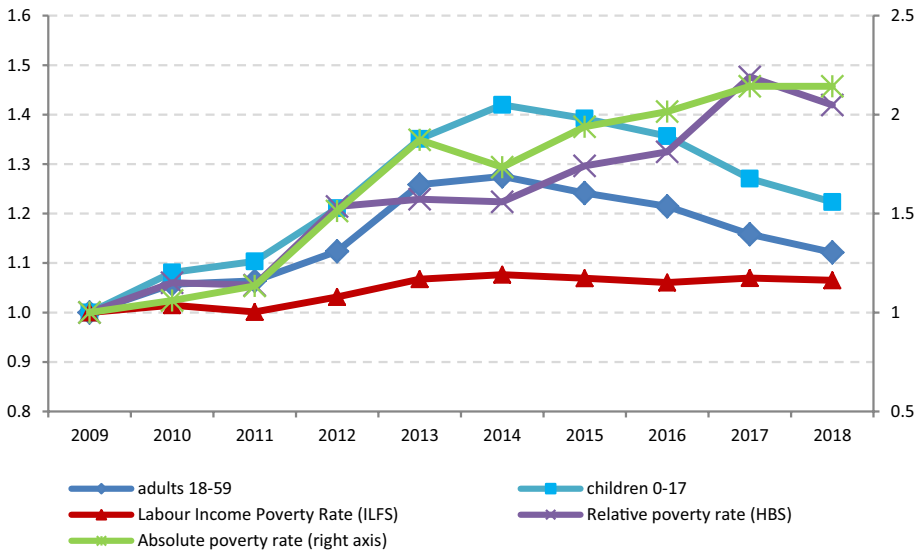

Fig. 14 Different measures of poverty. *Source*: ILFS and HBS, sample weights are used. Adults 18–59 and children 0–17 are the share of people living in jobless households, distinguishing by age. Labour Income Poverty Rate (ILFS) is the share of individuals with equivalised monthly labour income lower than the 60% of the national median value computed in the ILFS. Incidence of relative poverty (HBS) is the share of individuals whose consumption expenditure is lower than the relative poverty line, measured in the HBS. Incidence of absolute poverty rate (HBS) is the share of individuals whose consumption expenditure is lower than the absolute poverty line, measured in the HBS

draw similar indications looking at the labour income poverty rate in the ILFS, even for 2018. The overall evidence suggests that the recent employment recovery is not translating into better economic conditions; behind this, the large increase of temporary and less stable jobs in the most recent years may have played only a marginal role in raising family labour income and consumption expenditure. Indeed, individuals classified as absolute poor not only are less likely to be employed than non-poor (only 40.0%, rather than 57.0% of 15–64 year-olds), but they are more represented among temporary and part-time contracts.

6 Conclusions

The aim of the paper is to build timely indicators for labour income inequality, used to draw indications for overall income inequality and poverty. Distributional indicators are usually observed with one or two-year lag and, depending on the household income survey used, not even available on a yearly frequency. This limits the ability of policy makers in evaluating how current macroeconomic conditions affect households' standards of living and the distributional impact.

In this paper we take advantage of the available information in the ILFS to build up a measure of family and equivalised labour income and we focus on those families who are not likely to rely on pension income (the Reference Person is 15–64 years old and there are not retirees in the family). The selected sample of families represents 60% of overall Italian households, in which 70% of the population lives. Then, we provide the Gini index and the labour income poverty indicator computed on the monthly equivalised labour income in the ILFS with a lag of only five–six months with respect to the reference period. The indicators are not meant to substitute standard measures of the income distribution – typically measured in household income surveys—, but to provide preliminary and more up-to-date updated indications, in line with the growing need of nowcasting key economic variable. We show that focusing on labour income does not impair the possibility to infer overall income inequality developments. Moreover, the ILFS-based indicators give information on how much labour income inequality is arising due to variations in the employment rates, in line with an economic outlook perspective.

The distribution of the income measure obtained in the ILFS looks pretty similar to the one observed in the SHIW (the more updated household income survey but run every 2 years), suggesting that, overall, the ILFS could provide reliable and robust information on this variable. The Gini index of equivalised labour income in the ILFS traces the same pattern observed for the Gini index of the same income definition measured in the SHIW; in most recent years, their values are also very similar. When we compare the labour income poverty indicator across the different data sources, results are less precise. The level of the indicator is usually higher in the ILFS, mainly due to the different nature of the surveys: the SHIW reports annual earnings, the ILFS the last month of pay. Thus, it is more likely to observe zero values of labour income in the ILFS and to obtain higher values of the poverty indicator. However, dynamics are rather similar and show that labour income poverty is still at high levels despite the labour market recovery started in 2014.

The ILFS, augmented with the information on the household income, offers also the opportunity to study more accurately the links between labour market dynamics and labour income distribution, which remains one of the main drivers of the dispersion of disposable income. Finally, the ILFS is representative at the region level, and it would be possible to

compute the distributional indicators also at this level of aggregation; this avenue is left for future research.

Appendix A: Definitions

Indicators

Absolute poverty (provided by Istat based on the HBS): A household is in absolute poverty if its consumption expenditure is lower or equal to the monetary value of a basket of goods and services considered as essential to avoid severe forms of social exclusion. The monetary value of the basket of absolute poverty is reviewed every year in the light of trend in prices; it differs across household's composition, age structure, macro-area and place of residence.

Gini index (provided by Istat based on the EU-SILC and by the Bank of Italy based on the SHIW): It measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. The Gini index measures the area between the Lorenz curve and the hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. A Gini index of zero represents perfect equality and 100, perfect inequality.

Income quintile share ratio (also called the "S80/S20 ratio" based on EU-SILC): It is calculated as the ratio of the total income received by the 20% of the population with the highest income (= 1st or top quintile) to that income received by the 20% of the population with the lowest (= 5th or bottom quintile).

Decomposition of the Gini index by subgroups is not an easy task. However, when the income distribution of the groups do not overlap and are distinct, the decomposition by group is intuitive (the rank correlation of the income distribution is zero; P. Lambert e J. Aronson, Inequality Decomposition Analysis and the Gini Coefficient Revisited, *Economic Journal*, 103, issue 420, 1993). This condition is met when we split the population between those who live in households without labour income and individuals in families with positive labour earnings.

Share of adults (18–59 y.o.) or children (0–17 y.o.) living in jobless households (provided by Eurostat based on the European LFS): A household is jobless if no working age adult is employed (see "Appendix A" for a more detailed definition). The reference population is made of those families in which there is at least one working age adult; for example, families composed by only retirees are not considered. A working age adult has to meet the following conditions: (1) she is between 18 and 59 years old; (2) she is not a full-time student with less than 25 years old living with parents. Eurostat provides two statistics: the proportion of children (0–17 y.o.) and that of individuals (18–59 y.o.) living in jobless households.

Relative poverty (provided by Istat based on the HBS): A household is in relative poverty if its consumption expenditure is lower or equal a poverty line. The poverty line is set such that it defines as poor a household of two components with a consumption expenditure level lower or equal to the mean per-capita consumption expenditure. To define the relative poverty line for different household sizes an equivalence scale is used (Carbonaro equivalence scale) to take into account different needs and economies/diseconomies of scale that can be achieved in bigger/smaller households.

Risk of poverty or social exclusion (provided by Eurostat based on the EU-SILC): People at risk of poverty or social exclusion were in at least one of the following situations:

- at risk of poverty after social transfers (income poverty), or
- severely materially deprived; or
- living in households with very low work intensity.

Income poverty Equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60% of the national median equivalised disposable income after social transfers.

Severely materially deprivation: Inability to pay for at least four of the following items (1) to pay their rent, mortgage or utility bills; (2) to keep their home adequately warm; (3) to face unexpected expenses; (4) to eat meat or proteins regularly; (5) to go on holiday; (6) a television set; (7) a washing machine; (8) a car; (9) a telephone.

Household with very low work intensity Household where working age (18–59 y.o.) individuals worked less than 20% of their total potential during the previous 12 months. The work intensity of a household is the ratio of the total number of months that all working-age household members have worked during the income reference year and the total number of months the same household members theoretically could have worked in the same period. Students in the age group between 18 and 24 years are not considered at working age. Households composed only of children, of students aged less than 25 and/or people aged 60 or more are completely excluded from the indicator calculation.

Appendix B: Data Definitions

Monthly wage (definition from the questionnaire, variable RETRIC): Net salary earned last month with the exception of other monthly payments (13th or 14th month's salary, etc.) and those extra-payments not regularly included in the monthly pay (productivity premium, extraordinary overtime, overdue, etc.).

Italian wording: Retribuzione netta del mese scorso escluse altre mensilità (tredicesima, quattordicesima, ecc.) e voci accessorie non percepite regolarmente tutti i mesi (premi di produttività annuali, arretrati, indennità per missioni, straordinari non abituali, ecc.)

- Fino a 250 euro
- 260
- 270
- ----------
- ----------
- ----------
- 2980
- 2990
- 3000 euro o più

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