Income and consumption inequality trends: a comparative analysis between paid employees and the self-employed

Sadaf Sadaf[1*]

Abstract

This paper aims to analyze trends in income and consumption inequality for paid and self-employed households and examine to what extent changes in aggregate consumption and income inequality can be explained by changes in their permanent and transitory components over time using data from the Italian Survey of Household Wealth (SHIW) covering the period 1989-2016. The results obtained from the Generalized Method of Moments (GMM) analysis reveal differences in consumption and income inequality, as well as their permanent and transitory components, between self-employed and payroll households. In particular, self-employed households experience higher levels of both income and consumption inequality, the increase in total income and consumption inequality is mainly driven by an increase in its transitory component. Furthermore, findings from other descriptive measures of inequality, such as the Gini coefficient, the variance of the log, 90th/10th, and 50th/10th percentile ratios, support the notion that income inequality is higher than consumption inequality across all groups, with self-employed households exhibiting a more pronounced difference.

Keywords Labour market, Self-employment, Permanent, Transitory income inequalities

JEL Classification J01, L26

1 Introduction

Over the last few decades, understanding the sources of rising inequality in household and individual income has become a key topic in economics. This interest has been mainly fuelled by the increase in income inequality experienced by many developed and developing countries over several decades. Particularly, over the last few decades developed countries like the US (Gottschalk et al. 1994), United Kingdom (Dickens 2000; Alessie et al. 2003), and Canada (Baker and Solon 2003) have experienced an upward trend in income inequality. To understand changes in income inequality we need to decompose it into permanent and transitory components. Transitory and permanent inequality depict short-term and longer-term variations in income among individuals or households over time. Permanent income inequality is influenced by factors such as human capital, education, occupation, technological advancements, job mobility, and promotions. It reflects the average income of individuals or households over their lifetime and is considered a more accurate measure of their economic status. In contrast, transitory income inequality captures short-term shocks and unexpected fluctuations in income resulting from events like lotteries, prizes, changes in employment, health shocks, labor market instability, and business cycles. The impact of transitory income inequality fades away relatively quickly and, due to its volatile nature, it is considered less indicative of long-term economic well-being. Taking into account both of these sources of inequality is crucial for

*Correspondence:
Sadaf Sadaf
sadaf_77@outlook.com
[1] School Of Business, Economics Division, University of Leicester, London Road, Leicester 266, UK

policymaking aimed at reducing income inequality and enhancing societal welfare. Policymakers utilize the concepts of permanent and transitory inequality to analyze income distribution and formulate appropriate policies. Studying these sources of inequality jointly has diverse welfare and policy implications for organizations and policymakers seeking to address income inequalities. For instance, an increase in transitory income inequality has only a short-term impact on incomes. Therefore, policies addressing this type of inequality may be less urgent and relatively less necessary. Options such as social security, transfers, unemployment benefits, and borrowing may be appropriate. On the other hand, in the case of rising permanent inequality, policymakers would need to examine the underlying reasons for these inequalities. Measures like investing in education and providing job training opportunities to improve long-term earning potential can be helpful in such cases.

The conventional approach to studying income dynamics traces back to the work of Friedman and Kuznets (1945), where they introduced the concept of decomposing income into its permanent and transitory components. The Permanent Income Hypothesis (PIH), presented by Friedman (1957), and the Life-Cycle Hypothesis, introduced by Franco Modigliani in the 1950 s and 1960 s, provide a theoretical framework for understanding the concepts of permanent and transitory income inequality. PIH suggests that individuals and households base their consumption decisions on the anticipation of permanent income, regarding temporary fluctuations in income (referred to as transitory income) as having no long-lasting impact on consumption patterns. While an increase in returns to permanent characteristics is expected to have a long-lasting impact on permanent income inequality Katz et al. (1999). Expanding on this analysis, the Life-Cycle Hypothesis considers an individual's entire economic lifespan. It proposes that individuals plan their consumption and savings decisions based on the expectation of their lifetime income rather than solely their permanent income. Throughout their lives, individuals aim to smooth out their consumption to maintain a consistent standard of living. The hypothesis recognizes that income fluctuates during a person's life, prompting individuals to save during their working years to support consumption during retirement. Consequently, temporary income fluctuations are smoothed out over time. These theories have significantly influenced the development of empirical research and policy discussions regarding income inequality and its underlying determinants.

The rise of self-employment, predominantly comprising craftsmen, freelancers, and shopkeepers, has been notable in many OECD countries (OECD 2020). This rapid growth in the self-employment rate has raised many questions regarding its impact on income distribution and the overall level of welfare in general. For example, policies designed to promote self-employment and address unemployment can inadvertently affect a country's overall inequality due to the volatile nature of income from self-employment. For instance, Jenkins (1995) found that self-employment was the primary factor contributing to the increase in income inequality in the early 1980 s, coinciding with a higher self-employment rate. Particularly, Torrini (2006) findings suggest that self-employment is responsible for the cross-countries differences in income inequality. Additionally, Parker (1999) showed that changes in occupational structure are responsible for trends in both wage employment and self-employed income inequality. Using Spanish household family expenditure panel data, Albarrán et al. (2009) identified significant differences in income inequality trends and risk between paid and self-employed heads of households, indicating the need for separate analysis of these two groups when examining income inequalities.

Despite the importance of self-employment for the economy, little research has documented the link between income/consumption inequality and self-employment. Existing empirical studies on income and consumption inequality often combine paid and self-employed workers into a homogeneous group, overlooking their distinct characteristics and motivations. There are many reasons to treat self-employed as a different group from that of paid employees. First, self-employed have different characteristics, and they face different motivations leading them to enter self-employment. Second, self-employed workers are quite different from paid employed workers in the risk they face (Albarrán et al. 2009), and income from self-employment is more volatile and subject to measurement errors. For instance, measurement errors might be more pronounced in self-employed households, as there is a common belief that individuals in self-employment tend to under-report incomes. Cannari and Violi (1995) discovered evidence of under-reporting of labor income and wealth, particularly among self-employed individuals. Additionally, Åstebro and Chen (2014) identified evidence of income under-reporting when analyzing earnings from entrepreneurship and paid employment. Self-employed individuals may under-report their incomes to evade taxes, a concern discussed in more detail in Hamilton (2000). Treating these two heterogeneous groups as one can potentially yield misleading results regarding their economic position and the overall situation of income inequality. Therefore, it is essential to analyze self-employed workers separately when studying inequalities.

Households with lower levels of income may face challenges accessing quality healthcare resources and educational opportunities, thereby limiting their career prospects. Apart from that, the uncertainty or volatility of incomes makes it difficult for households to budget effectively and plan for the future, ultimately resulting in financial instability. Thus, understanding the nature and extent of inequality is a crucial step towards its alleviation. Analyzing trends in consumption inequality can provide valuable insights, as consumption is often considered a better measure of household welfare and well-being compared to income. Households generally have more flexibility in smoothing consumption patterns by utilizing savings or borrowing throughout their life cycle. Additionally, state-contingent re-distributive policies, in the form of transfer payments, support low-income households in maintaining their level of consumption. Consequently, studying consumption can offer a clearer picture of inequality compared to income (Hassett and Mathur 2012).

The primary objective of this paper is to analyse trends in income/consumption inequality for paid and self-employed and to examine the separate roles played by the transitory and permanent inequality in determining total income/consumption inequality using Italian data from 1989-2016. For this analysis, I closely follow the GMM methodology outlined by Doris et al. (2010), which relies on more flexible assumptions and facilitates a more detailed analysis of the underlying factors influencing inequality over time. A similar analysis has been carried out by Albarrán et al. (2009), utilizing the Minimum Distance estimation technique and accounting for employment status (wage earners vs self-employed). However, as discussed earlier, the GMM estimation technique is more flexible, therefore, this analysis will primarily focus on that. Our primary empirical findings reveal that aggregate income and consumption inequality in Italy has risen between 1989 and 2016 across all groups (full sample, paid households, and self-employed households). Furthermore, the GMM results indicate notable differences in aggregate inequality and its permanent and transitory components between payroll and self-employed households. Both income and consumption inequality are significantly higher among the self-employed, primarily driven by an increase in the temporary component of inequality. Additional inequality measures (such as the Gini coefficient, variance of the log, P90/P10, and P50/P10 ratios) suggest that income inequality is considerably higher than consumption and more pronounced in the case of the self-employed sample.

The rest of the analysis is structured as follows: Sect. 2 provides a literature review on inequality. Section 3 describes the data used in this analysis and presents summary statistics for the selected sample. Section 4 outlines the model and estimation strategies employed to decompose income/consumption inequality into its permanent and transitory components. Section 5 discusses the main findings of the analysis, and finally, section 6 concludes the study.

2 Literature review

The existing body of research related to self-employment has attempted to offer various explanations for the income disparities between self-employed and paid employees. Some studies underscore the importance of greater workplace freedom associated with self-employment, such as the opportunity to "be your own boss" and enjoy "greater autonomy." Consequently, self-employed individuals may accept lower incomes in exchange for the non-pecuniary benefits of their job or business ownership (Evans and Leighton 1990; Blanchflower and Oswald 1992). In addition, several studies suggest that earning disparities may stem from differences in skills or abilities. For example, according to the matching model proposed by Roy (1951), earnings differences may arise from the mobility of low-ability workers into self-employment. However, according to the superstar models, as proposed by Rosen (1981), exceptional performers among the self-employed, often referred to as "stars," occupy the upper end of the earnings distribution and earn more than their counterpart-paid employees at the same percentile, while the lower end of the distribution is occupied by misfits who earn less than paid employees. Similarly, Åstebro et al. (2011) found that, despite individuals entering self-employment from both the upper and lower ends of the ability distribution, self-employment incomes tend to be skewed toward lower-income earners. MacDonald (1988) proposes that individuals who perceive themselves as unsuccessful in self-employment or realize they are not on a trajectory to become "rising stars" may choose to return to paid employment. Additionally, the Global Entrepreneurship Monitor Reynolds et al. (2005) differentiates between opportunity and necessity entrepreneurship.[1] There is a general observation that opportunity entrepreneurs earn more than necessity entrepreneurs. For instance, Block and Wagner (2010) based on panel data found that the opportunities pursued by opportunity entrepreneurs tend to yield higher profits compared to those pursued by necessity entrepreneurs in Germany. These differences in returns between "stars"

---

[1] Opportunity entrepreneurship involves individuals initiating business ventures to capitalize on identified business opportunities. On the other hand, necessity entrepreneurship occurs when individuals start businesses because they lack better employment options or face economic constraints (Reynolds et al. 2005).

and "misfits" and "opportunity" and "necessity" entrepreneurs among self-employed individuals may also account for a higher level of inequality among self-employed households or individuals.

Addressing the link between self-employment and income inequality, various studies have contributed to our understanding of how shifts in occupational structure and self-employment rates impact income disparities. Notably, Jenkins (1995) identified self-employment as a primary factor contributing to the rise in income inequality during the early 1980 s. Furthermore, Parker (1999) found that changes in occupational structure explain trends in income inequality among the self-employed and paid employed in the United Kingdom. Torrini (2006) utilized the European Commission Household Panel data to investigate the impact of self-employment incidence on income inequality in European countries (EU15). Torrini (2006) results suggest that affirms that self-employed workers and households whose main source of income is self-employment exhibit higher income inequality. Using U.S. state-level data, Atems and Shand (2018) estimates the relationship between income inequality and entrepreneurship, finding a positive relation between the two. Exploring the factors contributing to the earning inequality differential between self-employment and wage-employment in Switzerland during 1992, 1995, and 2000, Falter (2007) emphasizes the role of work experience and tenure in explaining inequality levels in both groups. This study contributes to the understanding of how various factors such as education, and age-related – work experience and tenure – variables contribute to earning disparities between self-employed and wage-employed individuals.

The evolution of income inequality has been extensively studied in the US and the UK. For instance, Gottschalk and Danziger (2005) utilized data from the Current Population Surveys (CPS) to investigate the distributions of hourly wage rates, annual earnings, and family income in the United States. Their findings indicated an increase in both male wage rate inequality and family income inequality during the early 1990 s, followed by a stabilization period in the early 2000 s. In the context of the United States, several studies have observed an increase in income instability among individuals during the 1970 s and 1980 s (Dynarski et al. 1997; Haider 2001). In challenging the prevailing notion that skill-biased technological change is the main contributor to increasing wage inequality in the United States, Kristal and Cohen (2017) offers a compelling alternative perspective. The findings, derived from data spanning 43 US industries between 1968 and 2012, reveal that the decline in unions and the real value of the minimum wage together account for roughly half of the observed increase in inequality, while

computerization explains about one-quarter. Examining the impact of skill-biased technological change, particularly computerization, on educational wage gaps in the United States from 1940 to 1996, Autor et al. (1998) provides valuable insights into the dynamics of skill upgrading in industries with higher levels of computerization. Their findings suggest that industries with higher levels of computerization experience a more pronounced rate of skill upgrading. Ramos (2003) analyzed the dynamic structure of earnings using data from the British Household Panel Study. Their results suggested that earnings inequality among males increased over the 1990 s in the United Kingdom.

Decomposing inequality into its transitory and permanent components allows us to better understand the underlying causes of inequality. In the context of Spain, Cervini-Plá and Ramos (2012) conducted a decomposition of the covariance structure of earnings into permanent and transitory components. Their findings indicated a decline in inequality during the latter half of the 1990 s, which they attributed to an increase in the permanent component of earnings and a decrease in earnings instability. Similarly, Biewen (2005) utilized the German Socio-Economic Panel (GSOEP) to examine the dynamics of income components in Germany. They found that the contribution of permanent inequality to overall inequality increased from 1990 to 1998, suggesting its growing significance. Moffitt and Gottschalk (2011) used data from the Panel Study of Income Dynamics (PSID) and found that the variance of both the transitory and permanent components of earnings increased in the United States during the 1970 s and 1980 s, contributing equally to overall earnings inequality among men. Dickens (2000) analyzed the dynamic structure of male wages in the Great Britain using the New Earnings Survey (NES) panel data from 1975 to 1995. His results indicated an increase in the variance of both permanent and transitory income components, with both components equally contributing to overall income inequality. In the case of Sweden, Gustavsson (2004) employed Longitudinal Individual Data to investigate the variances of permanent and transitory components of male earnings between 1960 and 1990. Their findings showed a downward trend in the variance of the permanent component throughout the sample period, while the transitory variance increased until the early 1970 s. Blundell and Preston (1995) used the British Family Expenditure Survey and found a significant increase in transitory income inequality during the 1980 s and 1990 s in the UK. Alessie et al. (2003) examined the variance-covariance structure of British men's incomes from 1975 to 2001, taking into account cohort effects. They found that the increase in overall cross-sectional inequality was primarily driven by an increase

in the variance of the transitory component. Similarly, Kalwij and Alessie (2007) using the same dataset for the UK, identified an upward trend in total income inequality, mainly driven by an increase in transitory income inequality.

Empirical research on inequality has predominantly focused on earnings inequality, primarily due to data availability. However, economists have increasingly emphasized the importance of analyzing consumption data when studying inequality, as consumption is considered a more comprehensive measure of welfare. The availability of consumption data has facilitated the examination of consumption inequality over time. For instance, Hassett and Mathur (2012) argues that consumption is a preferred measure of inequality and provides a better representation of household well-being. Using data from the Consumer Expenditure (CEX) Survey, they find that consumption inequality in the United States, measured by the Gini coefficient, has not increased significantly. In their analysis of income and consumption inequality in the United States, Meyer and Sullivan (2017) utilized data from the Current Population Survey (CPS) and various inequality measures (90/10, 90/50, and 50/10 ratios). Their findings indicate that over the last five decades, consumption inequality has increased at a slower rate compared to income inequality. Cutler and Katz (1992), analyzing data from the CEX and CPS, find similarities in the changes observed in the distribution of both income and consumption. Their findings suggest a correspondence between income and consumption inequality dynamics. On the other hand, several studies have investigated whether consumption inequality closely tracks income inequality. Jappelli and Pistaferri (2010), using SHIW data, employ various inequality measures such as the variance of the log, Gini coefficient, and percentile ratios. They find that income inequality has grown at a faster pace than consumption inequality in Italy. In contrast, Slesnick (1994) and Krueger and Perri (2006), utilizing data from the Consumer Expenditure (CEX) Survey, report a modest increase in consumption inequality compared to income inequality.

This analysis significantly contributes to the current literature on inequality decomposition in several ways. First, it examines trends in income and consumption inequality based on household employment status, distinguishing between those headed by paid workers and those headed by self-employed individuals. This distinction provides a more nuanced understanding of inequality dynamics within different employment contexts. Second, it employs a novel estimation technique proposed by Doris et al. (2010) to decompose income and consumption inequality into their permanent and transitory components. This technique, specifically designed for panel data, differs from those commonly used in previous literature, such as methods employed by Biewen (2005), Albarrán et al. (2009), and Dickens (2000). Furthermore, while existing research has primarily focused on income inequality, this analysis gives equal attention to the contribution of permanent and transitory components to total consumption inequality. Since consumption is a preferred measure of household well-being, analyzing consumption inequality offers a clearer perspective on overall inequality dynamics, as highlighted by Hassett and Mathur (2012). Therefore, this study places particular emphasis on examining consumption inequality and its permanent and transitory components, improving our understanding of inequality patterns and dynamics. The study hypothesizes that the rise in total income and consumption inequality is primarily driven by an increase in its transitory component. By examining the distinct roles played by permanent and transitory inequality, this study aims to provide valuable insights into the evolving dynamics of inequality within the paid and self-employed sectors.

3 Data and descriptive statistics

This analysis utilises the panel component of bi-annual data from the historical database of the Bank of Italy Survey on Household Income and Wealth (SHIW)[2] spanning the years 1989 to 2016. The SHIW data has widely been used in research related to income and consumption of households and is considered a good representative sample of the Italian population. On average, the survey includes approximately 8,000 households per year. The primary reason for selecting the SHIW data set is its comprehensive information on household income, wealth, consumption, and other demographic variables.

The sample is restricted to male and female heads of households between the ages of 18 and 60 who have participated in the survey for at least two years. The head of the household (reference person) in SHIW data is defined as the primary or main person responsible for the household budget or knowledgeable about the household budget. This individual provides all the information about the role of each individual within a household in their absence. For this variable, I have followed Jappelli and Pistaferri (2010). The sample is further categorized into self-employed and paid-employed households based on the employment status of the household head. Sample members working simultaneously at a paid job and as self-employed are assigned to the sector from which they earn the highest incomes. Paid-employed heads of

---

households constitute 78.28% of the total sample, while self-employed heads of households make up 21.72% of the total sample. The unit of analysis in this study is the household, which includes all family members residing in the same house.

In the SHIW data, household income comprises labor income from paid employment, pensions, net transfers, and labor income from self-employment. Since the main focus is on analyzing inequality patterns between paid and self-employed households, this study will concentrate solely on household labor income. Our measure of income is after-tax annual household labor income from self-employment and payroll employment earned by any members of the family, which includes business income received by self-employed, and fringe benefits (non monetary benefits) received by paid employees. Negative income values are converted into null values when business expenditures exceed revenues.[3] Total consumption, on the other hand, is defined as the sum of all household expenditures on durable goods (such as transportation, furniture, electronics, jewelry, and art) and non-durable goods (including expenditures on food and other household items) over the course of a year. To account for differences in household size and composition, I have converted income and consumption variables into equivalent units. This adjustment is necessary because it is not reasonable to compare income and consumption variables across households of varying sizes and compositions. For instance, household A may earn more than household B, but it cannot conclude that household A is better off than household B without considering the number of people living in each household. A couple with two children in household B may be better off than a couple with five children in household A. To address such differences, it is recommended to convert income and consumption variables into equivalent units.[4] Following the OECD modified scale provided in the SHIW data set, the household head is assigned a value of 1, each adult member is assigned a value of 0.5, and each child is assigned a value of 0.3. Alternatively, we can obtain equivalent household income and consumption by dividing these variables by the square root of the household size. Additionally, consumption and income variables are deflated using the household consumption deflator available in the data set.

Table 1 given below provides a brief overview of the selected variables. As shown in Table 1, self-employed heads of households on average have a higher level of

experience, are older, tend to live in North of Italy, and have larger families than paid employees. Furthermore, the total consumption expenditures of households headed by self-employed are higher than paid employed and that of the full sample of households.

3.1 Trends in consumption and income inequality

To gain a deeper understanding of consumption and income inequality trends, this study utilizes commonly used measures of inequality such as the variance of log consumption or income, the Gini coefficient, and 90/10 and 50/10 percentile ratios, which have been extensively used in previous studies of Krueger and Perri (2006), Jappelli and Pistaferri (2010), and Meyer and Sullivan (2017). These measures allow us to assess inequality at different points along the income/consumption distribution. The Gini coefficient is a comprehensive measure of inequality that provides insights into the entire consumption or income distribution. The variance of the log, on the other hand, is more sensitive to the lower end of the distribution, particularly the situation of the poorest 10%. In contrast, the Gini coefficient assigns greater weight to the middle part of the distribution. Therefore, this analysis also incorporates other measures of inequality, such as percentile ratios, which are less influenced by extreme values in the tails of the consumption or income distribution. Sample weights available at the household level are used to account for attrition and non-response rates.

Consumption and income inequality Figs. 1 and 2 illustrate the trends in consumption and income inequality over time for the four different measures of inequality (Gini, variance of log consumption, P90/P10, and P50/P10) as discussed in Sect. 3.1. The four panels of Fig. 1 report the variance of log consumption, the Gini coefficient, 90th-10th percentile ratios, and 50th-10th percentile ratios for the three selected groups. From this figure, it can be observed that for the full sample, the Gini coefficient ranges from 0.25 in 1989 to 0.28 in 2016. Similarly, for paid employed households, the Gini coefficient is slightly lower than that of the full sample, ranging from 0.24 in 1989 to 0.26 in 2016. In contrast, for the self-employed, the Gini coefficient is considerably higher, ranging from 0.26 in 1989 to 0.31 in 2016. The variance of log consumption is substantially higher for self-employed households (ranging between 19% and 41%) compared to the full sample (ranging between 19% and 29%) and paid employed households (ranging between 18% and 26%) between 1989 and 2016. Similar patterns are observed in the case of 90th-10th and 50th-10th percentile ratios. Figure 2 reports the results from different measures of income inequality. The Gini coefficients of household income are higher for the full sample (0.273), paid employed (0.261), and self-employed (0.310) groups

---

[3] To minimize the impact of outliers on measures of inequality, observations are trimmed at the top and bottom 0.25% level. However, only a few observations meet this criterion.

[4] For a more comprehensive discussion on the equivalence scale, refer to Deaton (1997).

Table 1 Summary statistics of selected sample

Variable	Mean	Std. Dev.	Min.	Max.
Full sample				
Real equivalized household income	14536.81	8585.557	262.805	223783.3
Real equivalized household consumption	15001.01	8762.707	395.984	221929.9
Age	43.467	8.611	18	60
Elementary school	0.104	0.305	0	1
Middle school	0.409	0.492	0	1
High school	0.351	0.477	0	1
Bachelor's degree	0.127	0.333	0	1
Post-graduate qualification	0.009	0.093	0	1
Years of experience	25.656	8.973	1	46
Male	0.763	0.425	0	1
North	0.504	0.500	0	1
Centre	0.191	0.393	0	1
South and Islands	0.305	0.461	0	1
Number of household members	3.174	1.296	1	9
Number of kids in household	1.303	1.048	0	7
Payroll Employed				
Real equivalized household income	14361.48	7416.542	262.805	94609.7
Real equivalized household consumption	14543.88	7923.51	395.984	191103.2
Age	43.334	8.555	18	60
Elementary school	0.096	0.295	0	1
Middle school	0.412	0.492	0	1
High school	0.359	0.48	0	1
Bachelor's degree	0.125	0.331	0	1
Post-graduate qualification	0.009	0.094	0	1
Years of experience	25.492	8.873	1	46
Male	0.749	0.433	0	1
North	0.506	0.5	0	1
Centre	0.188	0.391	0	1
South and Islands	0.306	0.461	0	1
Number of household members	3.155	1.298	1	9
Number of kids in household	1.295	1.046	0	7
Self-employed				
Real equivalized household income	15336.29	14276.87	157.683	532817.4
Real equivalized household consumption	16698.23	11186.53	2143.829	221929.9
Age	43.961	8.798	18	60
Elementary school	0.134	0.341	0	1
Middle school	0.399	0.49	0	1
High school	0.322	0.467	0	1
Bachelor's degree	0.136	0.343	0	1
Post-graduate qualification	0.008	0.091	0	1
Years of experience	26.267	9.312	1	46
Male	0.814	0.389	0	1
North	0.495	0.500	0	1
Centre	0.201	0.401	0	1
South and Islands	0.304	0.46	0	1
Number of kids in household	1.329	1.056	0	7

Sample weights are used in the above computations. Income and consumption are equivalent averages and expressed in 2010 euros
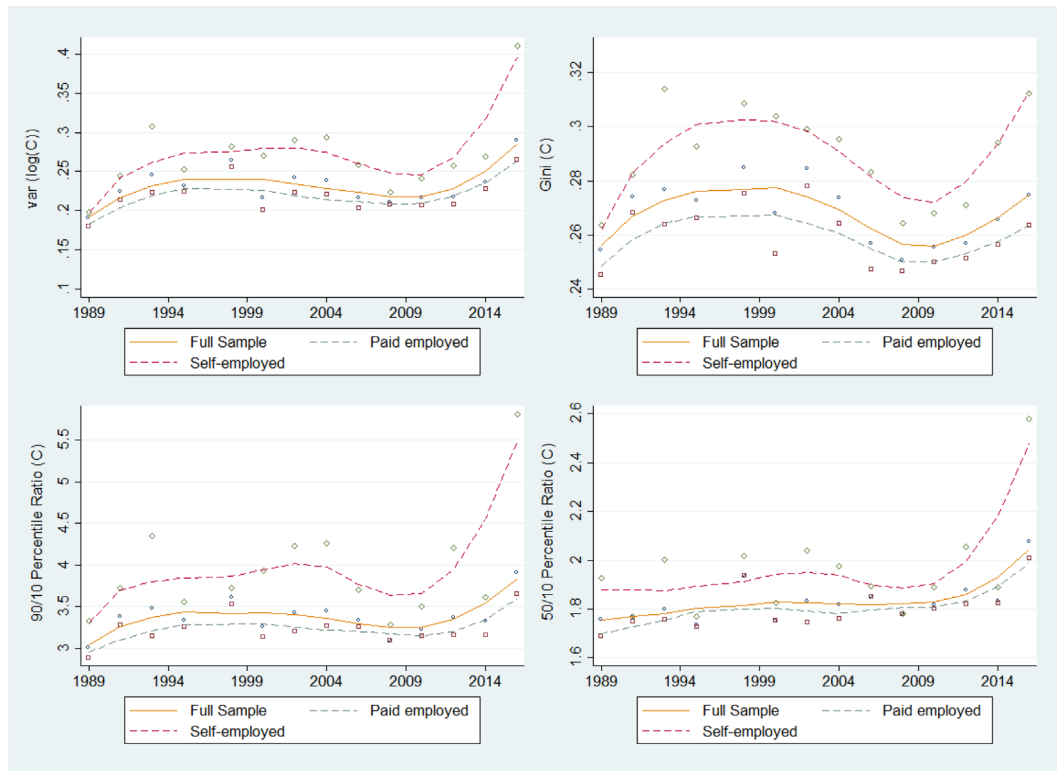
Consumption Inequality over 1989-2016

Fig. 1 Var(log(C)) shows the variance of log real equivalized consumption. All of the other calculations are based on households' real equivalized consumption. Sample weights are used in the calculation of all measures of inequality. All of the three lines are the locally weighted OLS interpolations of the original data points

compared to the Gini coefficients of consumption in 1989, and they have increased over time. Similarly, the variance of log household income, P90/P10, and P50/P10 ratios are considerably higher compared to the inequality estimates of consumption. Interestingly both Figures 1 and 2 show a much smaller gap between self-employed and paid employees in the 50/10-percentile lines, which suggests that income and consumption inequality at the bottom of the income distribution is not much different between self-employed individuals and paid employees. In addition, these figures show that income inequality is higher than consumption inequality for all of the selected groups. Both graphs show an increase in consumption and income inequality during the 1990 s, followed by a decrease after 2004 until the Great Recession of 2008. However, after 2008, an increase in both income and consumption inequality can be observed again. These results align with the findings of Jappelli and Pistaferri (2010). Employing measures of inequality similar to ours, their results indicate that income inequality is higher than consumption inequality in Italy, and its growth rate over the sample period is more rapid compared to

consumption inequality. This can be due to the effectiveness of effectiveness of the financial system, for example, Krueger and Perri (2006) and Blundell et al. (2008) found that households manage to smooth their consumption through various mechanisms, leading to a lower disparity in consumption levels compared to income levels.

4 Estimation strategy

4.1 Decomposition of income and consumption Inequality

In this analysis, I follow the procedure outlined in the studies by Doris et al. (2010) and Doris et al. (2010) to decompose both income and consumption inequality into their transitory and permanent components and identify their contribution to total inequality. This estimation technique allows for a more comprehensive examination of the factors contributing to inequality dynamics over time. This analysis begins with a simple equation presented in the following form:

$$Y_{it} = \beta X_{it} + u_{it} \quad i = 1, ..., N; t = 1, ..., T \tag{1}$$

The variable Y_{it} represents the natural logarithm of real equivalised labor income for household i at time t.
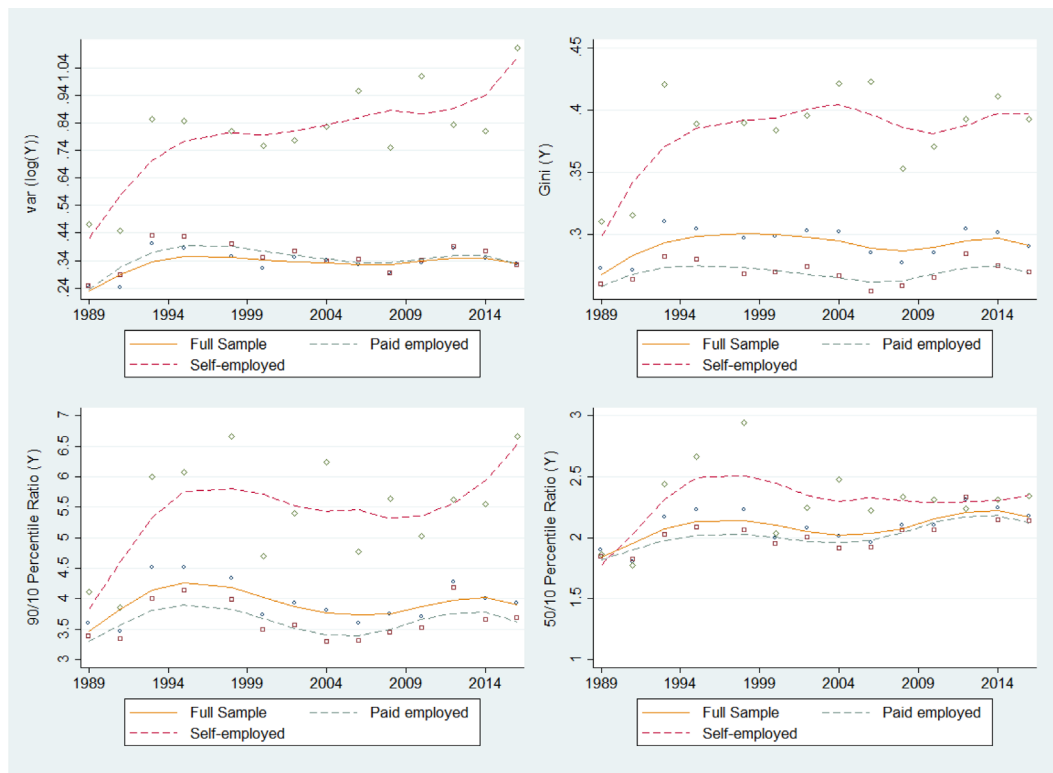
Income Inequality over 1989-2016

Fig. 2 Var(log(Y)) shows the variance of log real equivalized income. All of the other calculations are based on households' real equivalized income. Sample weights are used in the calculation of all measures of inequality. All of the three lines are the locally weighted OLS interpolations of the original data

The explanatory variables X_{it} include a range of factors such as education level indicators, number of children, household size, experience level and its square, a binary variable indicating the gender of the household head, a fourth-order age polynomial, and region-specific and time-specific indicators. These additional variables are included to control for observable characteristics and remove the deterministic effects of aggregate shocks on the dependent variable. The term u_{it} represents the residual income for household i at time t. It is assumed that the explanatory variables X_{it} are uncorrelated with the unobserved factors u_{it} that affect income – strict exogeniety between the explanatory variables and error term. Additionally, this equation assumes no correlation between explanatory variables X_{it} and unobserved individual-specific fixed effects such as company culture, industry-specific dynamics, or management practices that affect wages but are not directly observable. These fixed effects are included in the error term. This assumption implies that explanatory variables such as an employee's education level, work experience, and gender are not correlated with the unique characteristics of

individuals. However, if the strict exogeniety assumption is not met it can bias the relationship between the independent and dependent variables, leading to biased estimated coefficients which can compromise the validity of the regression results. Since Equation (1) assumes no correlation between explanatory variables X_{it} and u_{it}, it is estimated using the Pooled Ordinary Least Squares (POLS) separately for each of the three selected groups (i.e., the full sample, paid employees, and self-employed) to obtain residuals. Tables[5] A1 and A2 report the estimation results of equation (1).

The residuals[6] obtained from the POLS estimation are then decomposed into permanent and transitory components as follows:

---

[5] Table A1 presents the estimation results when the dependent variable is log real equivalized household labour income, while Table A2 presents the results when the dependent variable is log real equivalized household consumption. From these tables, residual income and residual consumption have been computed, which are subsequently used in the decomposition of income and consumption inequality.

[6] Using residual income for inequality decomposition allows us to focus on the part of income that cannot be explained by the right-hand side explanatory variables in Eq. 1, thereby providing a clearer picture of inequality.

$$u_{it} = \alpha_i + v_{it} \tag{2}$$

The residual term u_{it} is composed of two components: the permanent component α_i and the transitory component v_{it}. The permanent component represents the expected income over time, while the transitory component captures unexpected or sudden changes in income (such as lottery winnings, prizes, bonuses, etc). This analysis relies on the homogeneity assumption in life-cycle profiles, meaning that all individuals have similar patterns of income changes over their lifetimes, as represented by the term α_i. The assumption sounds more plausible because individuals generally undergo similar life-cycle patterns in terms of income. Moreover, it is reasonable to presume that individuals typically earn less in the early stages of their careers, witness income growth during mid-career, and encounter a decline in income during retirement. The credibility of this assumption depends on the socioeconomic and cultural homogeneity of the population being studied. In populations characterized by greater diversity, with substantial variations in education, occupation, and other socioeconomic factors, the assumption of homogeneity may be deemed less plausible. Many studies acknowledge the potential limitations of the homogeneity assumption and seek to relax it by allowing for heterogeneity in individual profiles by introducing random walk or random growth element in the permanent component as discussed in Haider (2001), MaCurdy (1982), and Baker and Benjamin (1997). Moreover, Dickens (2000) and Baker and Solon (2003) controlled for cohort effects in both transitory and permanent components. It is important to mention that SHIW data does not fit models with cohort specification and heterogeneity in individual profiles; therefore, I resort to the homogeneity assumption. Additionally, it is assumed that both the permanent and transitory components have zero means, in other words, over the entire sample, the expected values of both

$$E(\alpha_i) = E(v_{it}) = 0$$

Additionally, it is assumed that there is no covariance between the permanent (α_i) and transitory (v_{it}) components. This implies that changes in permanent income, stemming from permanent characteristics such as education or level of experience, remain unaffected by short-term shocks or transitory shocks.

$$Cov(\alpha_i, v_{it}) = 0$$

To account for some degree of persistence of transitory shocks on u_{it}, I model the transitory component as an auto-regressive process AR(1) following Lillard and Willis (1978).

$$v_{it} = \rho v_{it-1} + \epsilon_{it} \tag{3}$$

Here, ρ represents the persistence of the transitory shock, and ϵ_{it} is a random variable with variance σ_ϵ^2. The total variance of the residual term u_{it} can be expressed as:

$$var(u_{it}) = \sigma^2 = \sigma_\alpha^2 + \sigma_v^2 \tag{4}$$

In the above equation, the variance of the residual term $var(u_{it})$ represents the total inequality. The variance of the permanent component σ_α^2 reflects permanent inequality, while σ_v^2 represents transitory inequality or the variance of the transitory component. Permanent inequality captures the differences in income between groups, such as variations in relative returns to human capital, skills, job mobility, and other factors. On the other hand, transitory income inequality arises from sudden income fluctuations due to labor market instability, lotteries, technological changes, prizes, and similar factors. Since the main objective is to analyze the trends in inequality over time, both the permanent and transitory components are allowed to vary with calendar time. As a result, equation (2) takes the following form:

$$u_{it} = p_t \alpha_i + q_t v_{it} \tag{5}$$

The terms p_t and q_t denote factor loadings that allow permanent and transitory variances to evolve over time in the same way across all the individuals. The model specified by the above set of equations has a variance and covariance matrix of the following form:

$$\sigma_1^2 = p_1^2 \sigma_\alpha^2 + q_1^2 \sigma_{v1}^2, \quad \text{for t=1} \tag{6}$$

$$\sigma_t^2 = p_t^2 \sigma_\alpha^2 + q_t^2 (\rho^{2t^2} \sigma_{v1}^2 + \sigma_\epsilon^2 \sum_{w=0}^{t-2} \rho^{2w}), \quad \text{for } t > 1 \tag{7}$$

$$Cov(u_t, u_{t+s}) = p_t p_{t+s} \sigma_\alpha^2 + q_t q_{t+s} (\rho^s \sigma_{v1}^2), \quad \text{for } t = 1, s > 0 \tag{8}$$

$$Cov(u_t, u_{t+s}) = p_t p_{t+s} \sigma_\alpha^2 + q_t q_{t+s} (\rho^{2t+s-2} \sigma_{v_1}^2 + \rho^s \sigma_\epsilon^2 \sum_{w=0}^{t-2} \rho^{2w}), \quad \text{for } t > 1, s > 0 \tag{9}$$

Equations (6) and (7) represent the diagonal elements of the variance-covariance matrix, while equations (8) and (9) represent the off-diagonal elements. Equation (6) shows the aggregate inequality in the first year, while equation (7) depicts the aggregate inequality over time. The first term in both equations represents permanent inequality, while the second term represents transitory inequality. For instance, the total inequality in equation (6) is the sum of permanent inequality (σ_α^2) and transitory inequality ($\sigma_{v_1}^2$). The variance of the transitory component at the start of the survey, denoted as ($\sigma_{v_1}^2$), needs to be estimated. An increase in the parameters associated with permanent and transitory inequality, such as p_t and q_t respectively, indicates an increase in permanent and transitory inequality. As mentioned earlier, p_t represents the time-varying returns to human capital or skills. A steady increase in p_t would indicate that the return on human capital has increased, leading to an increase in permanent inequality. This suggests that individuals with higher levels of human capital or valuable skills experience a greater increase in their income, contributing to a widening gap between them and those with lower levels of human capital. Contrary to this changes in the value of stocks or assets, unforeseen expenses, health-related or economic shocks, and an unstable employment status are among the factors that can contribute to an increase in transitory income inequality, denoted as q_t, over time.

To estimate the model defined by the above set of equations, the GMM estimation technique is used, which matches the sample moments with the population moments. The parameter vector $A = (\sigma_\alpha^2, \rho, \sigma_\epsilon^2, \sigma_{v_1}^2, p_{1991}, \ldots, p_{2016}, q_{1991}, \ldots, q_{2016})$ is estimated separately for paid and self-employed individuals. For identification purposes, p_{1989} and q_{1989} are normalized and set equal to one in the first year of the survey. This parameter vector A is then used to calculate the permanent and transitory components of total income inequality. The above procedure is repeated for the decomposition of consumption inequality. The GMM results are presented in Tables 2 to 3 and are discussed in more detail in section 5.

5 Results and discussion

Decomposition of income inequality To conduct a more formal analysis of income inequality trends among payroll and self-employed households, the Generalized Method of Moments (GMM) estimation technique is used to estimate the parameters of the covariance structure discussed in Sect. 4 and characterized by equations 6 to 9. The model is estimated separately for the full sample, payroll group, and self-employed group. The estimation results are presented in Table 2 which provides the parameter estimates for the full sample, payroll group, and self-employed group, along with their associated

corrected standard errors. The coefficient of ρ represents the persistence of transitory income shocks. The coefficients of σ_α^2 and $\sigma^2 v_1$ indicate the levels of permanent and transitory income inequality, respectively, in the base year 1989. The factor loadings estimates (q_{1991} to q_{2016} and p_{1991} to p_{2016}) indicate changes in transitory and permanent income inequality over time. These factor loadings are later utilized in the computation of permanent and transitory income inequalities. From Table 2, it can be observed that the estimated parameter of ρ varies across the three groups: for the overall sample, $\rho = 0.457$; for the payroll group, $\rho = 0.535$; and for the self-employed group, $\rho = 0.307$. These estimates are highly significant. These results indicate that the persistence of transitory shocks is higher for the payroll group and the overall sample, while it is more moderate for the self-employed group. This difference could be attributed to the ability of self-employed households to quickly mitigate or offset transitory shocks. Given the more volatile nature of self-employment income, self-employed individuals often develop coping strategies over time to minimize the impact of these temporary fluctuations on their overall well-being. These strategies may include financial planning, savings, or alternative income sources, which help them remain relatively unaffected by such temporary shocks.

Regarding other parameters, the variance of the permanent income component (σ_α^2) is significant and relatively high (0.0594) for the full sample, compared to the payroll group (0.0431) and the self-employed group (0.000112). In contrast, for the self-employed group, the variance of the transitory income component in the base year ($\sigma_{v_1}^2$ =0.230) is notably higher than that of the full sample (0.113) and the payroll group (0.115). This discrepancy may be due to the greater dispersion and volatility of income from self-employment, which is reflected in the transitory component of inequality. The estimates of the factor loadings (q_{1991} to q_{2016} and p_{1991} to p_{2016}) indicate changes in transitory and permanent income inequality over time. In the case of the full sample, all estimates of q_t are significant. Notably, the permanent component of income inequality steadily increased until 1995, after which it started to decrease and reached its minimum in 2006. Similarly, the estimates of the permanent factor loadings (p_{1991} to p_{2016}) are significant and demonstrate an increase until 2005, followed by a downward trend. For the self-employed group, the estimates of q_t are significant and show an increase in the transitory component of inequality, while the estimates of p_t are not significant, indicating that the permanent income inequality components do not play a significant role in explaining total income inequality. To test the existence of time effects in the permanent components, a Wald test is conducted

Table 2 GMM estimation results

Dependent variable Residual income	Full sample (1)	Payroll (2)	Self-employed (3)
σ_α^2	0.0594***	0.0431**	0.000112
	(0.0195)	(0.0181)	(0.00175)
ρ	0.457***	0.535***	0.307***
	(0.0221)	(0.0273)	(0.0484)
$\sigma^2 v_1$	0.113***	0.115***	0.230***
	(0.0206)	(0.0182)	(0.0270)
σ_ϵ^2	0.0448***	0.0605***	0.00547
	(0.0126)	(0.0161)	(0.00442)
q1991	1.413***	1.081***	2.690***
	(0.170)	(0.123)	(0.561)
q1993	1.740***	1.069***	6.966***
	(0.261)	(0.174)	(2.541)
q1995	1.819***	1.203***	7.817**
	(0.266)	(0.174)	(3.172)
q1998	1.760***	1.252***	5.948**
	(0.250)	(0.173)	(2.793)
q2000	1.696***	1.281***	6.953**
	(0.255)	(0.188)	(2.759)
q2002	1.719***	1.302***	8.159**
	(0.250)	(0.183)	(3.306)
q2004	1.654***	1.213***	7.697**
	(0.243)	(0.174)	(3.337)
q2006	1.456***	1.064***	7.432**
	(0.221)	(0.160)	(2.979)
q2008	1.146***	0.753***	7.056**
	(0.195)	(0.185)	(2.886)
q2010	1.317***	0.877***	6.580**
	(0.221)	(0.181)	(2.696)
q2012	1.891***	1.454***	5.382**
	(0.271)	(0.201)	(2.306)
q2014	1.812***	1.511***	-1.336
	(0.259)	(0.212)	(2.108)
q2016	1.922***	1.391***	7.049**
	(0.278)	(0.197)	(2.945)
p1991	0.582***	0.941***	-3.958
	(0.116)	(0.178)	(34.21)
p1993	1.084***	1.386***	27.86
	(0.218)	(0.322)	(215.1)
p1995	0.958***	1.237***	23.01
	(0.206)	(0.278)	(177.3)
p1998	0.916***	0.989***	42.39
	(0.181)	(0.235)	(330.6)
p2000	1.123***	1.031***	38.81
	(0.210)	(0.243)	(302.5)
p2002	1.029***	1.068***	26.62
	(0.189)	(0.245)	(207.0)
p2004	1.081***	1.129***	37.19
	(0.198)	(0.261)	(290.4)

Table 2 (continued)

Dependent variable Residual income	Full sample (1)	Payroll (2)	Self-employed (3)
p2006	1.198***	1.294***	29.07
	(0.213)	(0.289)	(226.5)
p2008	1.384***	1.638***	29.24
	(0.241)	(0.362)	(228.2)
p2010	1.486***	1.696***	36.29
	(0.263)	(0.380)	(283.3)
p2012	1.171***	1.268***	51.26
	(0.214)	(0.301)	(400.2)
p2014	1.140***	0.926***	63.31
	(0.225)	(0.237)	(494.8)
p2016	0.768***	0.842***	41.65
	(0.171)	(0.225)	(325.3)
Wald test: (Prob > χ^2)	0.0000	0.0026	1.0000

Standard errors in parentheses

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

with the null hypothesis H_0: $p_{1991}, \ldots, p_{2016} = 1$. The Wald test results suggest rejecting the null hypothesis at a significant level for the full sample and the payroll group, confirming the presence of time effects. In contrast, these results do not confirm the existence of time effects for the self-employed group, indicating that the permanent components of inequality do not significantly contribute to overall inequality for this group.

The parameter estimates in Table 2 are used to calculate the permanent and transitory components of income inequality. The results presented in Table 6 and graphed in Fig. 3, show the levels of permanent, transitory, and aggregate income inequality from 1989 to 2016. Aggregate income inequality, reported in panel (C) of Table 6 is derived by combining the variance of the permanent component (panel A) and the variance of the transitory component (panel B). Examining Table 6 and column (1), it can be observed that for the full sample, there is an initial increase in the permanent component of income inequality, peaking in 2008 and 2010, and then decreasing. This increase during 2008 and 2010 may be attributed to the financial crises, which led to higher unemployment rates and reduced income growth, thus widening the income gap. Additionally, these crises resulted in persistent economic challenges that affected long-term income prospects for certain individuals or groups. Transitory income inequality also shows an upward trend, reaching its lowest point in 2008, followed by an increase. This trend may be explained by Italy's social welfare policies, including unemployment benefits and social assistance programs, which likely provided crucial support during

Table 3 GMM Estimation Results

Dependent variable: Residual consumption	Full sample (1)	Payroll (2)	Self-employed (3)
σ_α^2	0.0330**	0.0194*	0.0138
	(0.0130)	(0.0108)	(0.0167)
ρ	0.345***	0.317***	0.487***
	(0.0181)	(0.0213)	(0.0405)
$\sigma^2 v_1$	0.120***	0.115***	0.159***
	(0.0142)	(0.0116)	(0.0245)
σ_ϵ^2	0.0638***	0.0533***	0.0827***
	(0.0154)	(0.0148)	(0.0299)
q1991	1.329***	1.343***	1.261***
	(0.153)	(0.172)	(0.194)
q1993	1.328***	1.407***	1.251***
	(0.164)	(0.195)	(0.234)
q1995	1.314***	1.362***	1.218***
	(0.161)	(0.194)	(0.228)
q1998	1.415***	1.498***	1.226***
	(0.174)	(0.213)	(0.237)
q2000	1.217***	1.287***	-0.247
	(0.150)	(0.182)	(0.285)
q2002	1.364***	1.495***	1.140***
	(0.172)	(0.214)	(0.220)
q2004	1.320***	1.333***	1.213***
	(0.162)	(0.187)	(0.238)
q2006	0.966***	0.941***	1.041***
	(0.128)	(0.150)	(0.210)
q2008	0.978***	1.043***	1.120***
	(0.130)	(0.156)	(0.215)
q2010	1.128***	1.160***	1.087***
	(0.141)	(0.168)	(0.216)
q2012	1.291***	1.324***	1.307***
	(0.157)	(0.183)	(0.247)
q2014	1.380***	1.438***	1.329***
	(0.169)	(0.202)	(0.260)
q2016	1.559***	1.664***	1.439***
	(0.193)	(0.237)	(0.299)
p1991	0.898***	1.173***	0.809
	(0.179)	(0.318)	(0.556)
p1993	1.067***	1.316***	1.616
	(0.260)	(0.413)	(1.094)
p1995	0.996***	1.406***	1.137
	(0.233)	(0.424)	(0.776)
p1998	1.134***	1.377***	2.339
	(0.256)	(0.420)	(1.468)
p2000	1.149***	1.379***	3.814
	(0.259)	(0.417)	(2.322)
p2002	1.251***	1.521***	2.116
	(0.266)	(0.445)	(1.335)
p2004	1.022***	1.413***	1.697

Table 3 (continued)

Dependent variable: Residual consumption	Full sample (1)	Payroll (2)	Self-employed (3)
	(0.221)	(0.407)	(1.101)
p2006	1.422***	1.941***	1.648
	(0.289)	(0.547)	(1.068)
p2008	1.436***	1.829***	1.620
	(0.294)	(0.520)	(1.047)
p2010	1.259***	1.677***	1.753
	(0.264)	(0.484)	(1.120)
p2012	1.008***	1.426***	0.936
	(0.219)	(0.417)	(0.678)
p2014	1.097***	1.475***	1.487
	(0.253)	(0.447)	(1.097)
p2016	0.779***	0.905***	1.603
	(0.216)	(0.319)	(1.280)
Wald test: (Prob $> \chi^2$)	0.0004	0.0495	0.6876

Standard errors in parentheses.

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

the 2008 financial crisis, mitigating the impact of economic shocks on transitory income inequality. Both permanent and transitory components contribute to overall income inequality. For the full sample and payroll group, total income inequality shows an upward trend. For the self-employed group, the transitory component is higher than the permanent component, possibly due to measurement errors in self-employed income, which are included in the transitory component. Consequently, permanent income inequality is lower for the self-employed group compared to the payroll group and the full sample. In summary, the results indicate an increasing trend in total inequality for all three groups, with the self-employed group's total income inequality predominantly driven by the transitory component.

To analyze the relative contribution of each component to total income inequality, we can calculate the ratios: $\frac{p_t^2(\sigma_\alpha^2)}{\sigma_t^2}$, which represents the contribution of the permanent component, and $\frac{q_t^2(\sigma_v^2)}{\sigma_t^2}$, which represents the contribution of the transitory component. These ratios reported in Table 8 indicate the proportion of total inequality attributable to the permanent and transitory components, respectively. For the full sample, the relative contribution of permanent inequality starts at 0.344 in 1989, fluctuates, and peaks in 2008 before dropping in 2016. In contrast, transitory inequality starts higher at 0.654 in 1989, remains relatively stable, and peaks at 0.856 in 2016. For paid employees, permanent inequality

starts at 0.2719 in 1989, with significant fluctuations and peaks in 1993 and 2006, ending at 0.157 in 2016, while transitory inequality remains consistently high, peaking in 2016. For the self-employed, permanent inequality shows wide fluctuations, starting at 0.0005 in 1989 and peaking at 0.976 in 2014, whereas transitory inequality starts very high at 0.999 in 1989, trends downward with fluctuations, and recovers to 0.606 in 2016. It is worth mentioning that the contribution of permanent income inequality to total inequality is lower for the self-employed group compared to the payroll group and the overall sample in most of the years. The contribution of temporary inequality is substantially higher across all groups, indicating that the transitory component plays a larger role in determining total income inequality. This finding aligns with the research by Jappelli and Pistaferri (2010), who documented similar patterns of transitory and permanent inequality components for Italian households using SHIW data.

Decomposition of consumption inequality The same procedure as discussed above is used to decompose total consumption inequality into its transitory and permanent components. The parameters of the covariance structure are estimated using the GMM estimation technique, and the results are reported in Table 3 given in the main text. Using these GMM estimates, the permanent, transitory, and total consumption inequality are computed, which are reported in Table 7 and illustrated in Fig. 4 given in the appendix. From Panel (A) of Table 7,

it can be observed that the permanent consumption inequality for the full sample and paid employed households reached its highest level from 2006 to 2008, followed by a continuous decline. In the case of self-employed households, there was a rapid increase in the permanent component around 2000, but it has been declining since then (see Fig. 4). In contrast, Panel (B) of Table 7 reports the transitory consumption inequality. For the full sample and paid employed households, it is evident that transitory inequality decreased from 2006 to 2008, but it has been continuously increasing since then. In the case of self-employed households, transitory inequality increased from 0.159 to 0.224 log points from 1989 to 2016. Panel (C) of Table 7 presents the total consumption inequality by employment status, and we can observe variations in total inequality based on employment status. In 1989, total consumption inequality was higher for self-employed households compared to the full sample and paid-employed households. Over time, total consumption inequality has increased for all three selected groups.

Table 9 given in the appendix reports the relative contribution of permanent and transitory components to total consumption inequality. For the full sample, the relative contribution of permanent inequality starts low in 1989 (0.215), peaks around 2006 and 2008, and then drops notably in 2016. Conversely, the transitory component starts high and remains relatively high throughout the period, with a slight downward trend and the lowest values in 2006 and 2008, rising again towards 2016. The relative contribution of permanent inequality fluctuates for payroll employees but remains relatively stable, peaking in 2006 and falling continuously until 2016. The transitory component's contribution is consistently high, with minor fluctuations, and peaking in 2016. For the self-employed, the values of permanent inequality fluctuate widely, indicating less stability. The transitory component is very high in the early years, with the lowest value in 2000, followed by fluctuations, and trends towards higher values by 2016. Compared to the permanent contribution, the relative contribution of transitory inequality to total consumption inequality is higher for all three groups.

The main findings The main results suggest that total income and consumption inequality have increased in Italy over time for the three selected samples of households (full sample, paid employees, and self-employed). Notably, total income inequality is significantly higher than total consumption inequality for all groups, indicating the effectiveness of Italy's consumer credit system and financial markets. These findings align with the research conducted by Jappelli and Pistaferri (2010). Using SHIW

data and a different estimation technique, similar to our findings, they found an increase in total income inequality in Italy, attributing it to an increase in the variance of transitory shocks. Other empirical studies, such as Krueger and Perri (2006) and Slesnick (1994), have found similar results. Additional studies, such as Alessie et al. (2003) for the UK, Gustavsson (2004) for Sweden, and Moffitt and Gottschalk (2011) for the US, have reported similar evidence, indicating an increase in the transitory component. Furthermore, these results demonstrate that the contribution of transitory inequality to total inequality is higher, indicating labor market instability and sudden fluctuations in income and consumption. Income and consumption inequality are notably higher for self-employed individuals, primarily driven by an increase in the temporary component of inequality. This increase in transitory inequality may be attributed to the highly volatile nature of income from self-employment or measurement errors. The inclusion of measurement errors in the transitory component contributes to higher transitory income or consumption inequality. However, transitory shocks can be more easily insured through savings depletion and borrowing, compared to permanent shocks, which are influenced by differences in the relative returns to human capital. These findings related to the self-employed, similar to Albarrán et al. (2009), suggest that inequality in self-employed income is driven by an increase in the transitory component of variance. However, in contrast to their findings, this study did not find evidence that the increase in income inequality for paid employees is attributable to a rise in the permanent component.

6 Conclusion

This analysis utilized data from the Italian Survey of Household Income and Wealth (SHIW) to examine the separate roles played by transitory and permanent inequality in determining total income/consumption inequality from 1989-2016. Overall, the GMM results indicate that aggregate income and consumption inequality in Italy has risen during this period for the three selected groups of households (full sample, paid, and self-employed). The increase in total income and consumption inequality can primarily be attributed to a rise in the transitory component of inequality over time. Furthermore, the GMM results indicate notable differences in aggregate inequality and its permanent and transitory components between payroll and self-employed households. Both income and consumption inequality are notably higher among the self-employed, driven mainly by an increase in the temporary component of inequality. However, we can also observe a lower persistence of

transitory shocks among the self-employed, indicating that these shocks are quickly insured away. In contrast, for the paid employed sample, the trends in aggregate income and consumption inequality, as well as their components, closely mirror those of the full sample of households. Additionally, results from descriptive measures of inequality, such as the Gini coefficient, variance of log consumption, and percentile ratios, also support the notion that income inequality is higher than consumption inequality. These results suggest that income inequality has not perfectly translated into household consumption. This could be because consumption has an autonomous component that does not depend on household income, as every household needs basic necessities.

Apart from that this also shows the effectiveness of the financial system that enables households to protect their consumption from income shocks. Regardless of the specific measure of inequality employed, consumption and income inequality are notably higher among the self-employed and have experienced more pronounced growth over time compared to the other groups of households.

Appendix A
Income and consumption inequality over time
See Tables 4, 5, 6, 7, 8 and 9 and Figs. 3 and 4 here

Table 4 First stage POLS regression results of equation (1)

	Full sample	Payroll	Self-employed
Dependent variable Income	(1)	(2)	(3)
Year			
1991	− 0.0284	− 0.0404*	0.0176
	(0.0215)	(0.0242)	(0.0482)
1993	− 0.131***	− 0.0747***	− 0.297***
	(0.0250)	(0.0258)	(0.0622)
1995	− 0.173***	− 0.134***	− 0.317***
	(0.0247)	(0.0278)	(0.0544)
1998	− 0.154***	− 0.148***	− 0.220***
	(0.0231)	(0.0271)	(0.0560)
2000	− 0.122***	− 0.106***	− 0.169***
	(0.0223)	(0.0243)	(0.0525)
2002	− 0.128***	− 0.125***	− 0.154***
	(0.0245)	(0.0271)	(0.0582)
2004	− 0.0978***	− 0.0995***	− 0.0959
	(0.0238)	(0.0260)	(0.0601)
2006	− 0.0908***	− 0.101***	− 0.0394
	(0.0254)	(0.0278)	(0.0587)
2008	− 0.120***	− 0.120***	− 0.123**
	(0.0224)	(0.0247)	(0.0563)
2010	− 0.157***	− 0.153***	− 0.177***
	(0.0236)	(0.0259)	(0.0662)
2012	− 0.293***	− 0.291***	− 0.295***
	(0.0247)	(0.0269)	(0.0619)
2014	− 0.270***	− 0.263***	− 0.284***
	(0.0242)	(0.0262)	(0.0648)
2016	− 0.238***	− 0.237***	− 0.204***
	(0.0268)	(0.0284)	(0.0767)
Age	0.0180	0.155	− 0.251
	(0.121)	(0.127)	(0.359)
Age^2	− 0.000670	− 0.00581	0.00964
	(0.00458)	(0.00483)	(0.0133)
Age^3	0.0000216	0.000103	− 0.000150
	(0.0000754)	(0.0000796)	(0.000214)

Table 4 (continued)

Dependent variable Income	Full sample (1)	Payroll (2)	Self-employed (3)
Age^4	− 0.000000146	− 0.000000619	0.000000864
	(0.000000454)	(0.000000480)	(0.00000126)
Middle School	0.0720**	0.0909**	0.0519
	(0.0342)	(0.0371)	(0.0957)
High School	0.278***	0.304***	0.271**
	(0.0484)	(0.0522)	(0.136)
Bachelor's Degree	0.505***	0.529***	0.512***
	(0.0570)	(0.0614)	(0.159)
Post− Graduate Qualification	0.518***	0.553***	0.492**
	(0.0823)	(0.0922)	(0.199)
Experience Square	− 0.000525***	− 0.000487***	− 0.000327
	(0.000154)	(0.000168)	(0.000412)
Male	0.114***	0.114***	0.133***
	(0.0114)	(0.0121)	(0.0334)
North	0.365***	0.366***	0.402***
	(0.0104)	(0.0114)	(0.0270)
Centre	0.283***	0.270***	0.357***
	(0.0129)	(0.0135)	(0.0349)
Number of Household Members	− 0.0916***	− 0.0859***	− 0.0969***
	(0.00950)	(0.0104)	(0.0254)
Number of Kids in Household	− 0.0357***	− 0.0419***	− 0.0211
	(0.0116)	(0.0127)	(0.0300)
Constant	8.967***	7.616***	11.47***
	(1.166)	(1.222)	(3.556)

This table presents the estimation results of Equation (1) when the dependent variable is log real equivalized household labour income. Some variables such as Experience, and South and Islands are omitted due to collinearity

Standard errors in parentheses.

*** $p < 0.01$

** $p < 0.05$

* $p < 0.1$

Table 5 First stage POLS regression results of equation (1)

Dependent variable consumption	Full sample (1)	Payroll (2)	Self-employed (3)
Year			
1991	− 0.0608***	− 0.0458**	− 0.0824**
	(0.0186)	(0.0208)	(0.0380)
1993	− 0.120***	− 0.0898***	− 0.194***
	(0.0189)	(0.0210)	(0.0396)
1995	− 0.112***	− 0.0724***	− 0.214***
	(0.0187)	(0.0210)	(0.0377)
1998	− 0.171***	− 0.146***	− 0.225***
	(0.0201)	(0.0225)	(0.0411)
2000	− 0.129***	− 0.0907***	− 0.221***
	(0.0185)	(0.0206)	(0.0383)
2002	− 0.128***	− 0.107***	− 0.173***
	(0.0195)	(0.0219)	(0.0393)

Table 5 (continued)

Dependent variable consumption	Full sample (1)	Payroll (2)	Self-employed (3)
2004	− 0.101***	− 0.0772***	− 0.135***
	(0.0189)	(0.0208)	(0.0413)
2006	− 0.0982***	− 0.0662***	− 0.164***
	(0.0187)	(0.0206)	(0.0391)
2008	− 0.139***	− 0.0974***	− 0.236***
	(0.0183)	(0.0204)	(0.0390)
2010	− 0.130***	− 0.103***	− 0.169***
	(0.0189)	(0.0210)	(0.0401)
2012	− 0.186***	− 0.153***	− 0.236***
	(0.0189)	(0.0208)	(0.0431)
2014	− 0.331***	− 0.290***	− 0.424***
	(0.0200)	(0.0220)	(0.0468)
2016	− 0.289***	− 0.247***	− 0.391***
	(0.0241)	(0.0260)	(0.0614)
Age	0.0513	0.0353	0.148
	(0.0980)	(0.106)	(0.259)
Age^2	− 0.00211	− 0.00155	− 0.00559
	(0.00370)	(0.00402)	(0.00956)
Age^3	0.0000460	0.0000369	0.000106
	(0.0000607)	(0.0000661)	(0.000154)
Age^4	− 0.000000279	− 0.000000225	− 0.000000638
	(0.000000364)	(0.000000398)	(0.000000905)
Middle School	0.0139	0.0368	− 0.0920
	(0.0266)	(0.0291)	(0.0600)
High School	0.187***	0.219***	0.0241
	(0.0383)	(0.0419)	(0.0866)
Bachelor's Degree	0.369***	0.386***	0.226**
	(0.0452)	(0.0499)	(0.100)
Post -Graduate Qualification	0.456***	0.454***	0.383***
	(0.0690)	(0.0767)	(0.148)
Experience square	− 0.000581***	− 0.000570***	− 0.000889***
	(0.000121)	(0.000134)	(0.000267)
Male	0.0638***	0.0495***	0.0961***
	(0.00870)	(0.00953)	(0.0214)
North	0.318***	0.303***	0.371***
	(0.00804)	(0.00891)	(0.0183)
Centre	0.307***	0.293***	0.349***
	(0.0100)	(0.0111)	(0.0222)
Number of household members	− 0.0878***	− 0.0832***	− 0.110***
	(0.00723)	(0.00808)	(0.0157)
Number of kids in household	− 0.0309***	− 0.0331***	− 0.0144
	(0.00849)	(0.00945)	(0.0188)
Constant	8.921***	9.031***	8.125***
	(0.950)	(1.020)	(2.582)

This table presents the estimation results of Equation (1) when the dependent variable is log real equivalized household consumption. Some variables such as Experience, and South and Islands are omitted due to collinearity

Standard errors in parentheses.

*** $p < 0.01$

** $p < 0.05$

* $p < 0.1$

Table 6 Decomposition of income inequality over 1989–2016

	Full sample	Payroll	Self-employed
	(1)	(2)	(3)
A: Permanent Inequality			
Year			
1989	0.0593	0.04310	0.000112
1991	0.0201	0.0382	0.00176
1993	0.0698	0.0828	0.0871
1995	0.0546	0.0659	0.0594
1998	0.0499	0.0422	0.2017
2000	0.0749	0.0458	0.1690
2002	0.0628	0.0491	0.0795
2004	0.0694	0.0550	0.1552
2006	0.0852	0.0721	0.0948
2008	0.1138	0.1157	0.0959
2010	0.1311	0.1240	0.1478
2012	0.0814	0.0693	0.2948
2014	0.0772	0.0370	0.4497
2016	0.0350	0.0306	0.1946
B: Transitory Inequality			
Year			
1989	0.1127	0.1154	0.2300
1991	0.1365	0.1093	0.1961
1993	0.1790	0.0998	0.3892
1995	0.1893	0.1236	0.3806
1998	0.1759	0.1332	0.2144
2000	0.1631	0.1391	0.2922
2002	0.1675	0.1436	0.4022
2004	0.1551	0.1247	0.3580
2006	0.1202	0.0960	0.3338
2008	0.0744	0.0481	0.3009
2010	0.0983	0.0652	0.2616
2012	0.2027	0.1793	0.1750
2014	0.1862	0.1935	0.0108
2016	0.2094	0.1641	0.3002
C: Total Inequality			
Year			
1989	0.1721	0.1585	0.2301
1991	0.1566	0.1475	0.1978
1993	0.2487	0.1826	0.4764
1995	0.2439	0.1895	0.4400
1998	0.2258	0.1754	0.4161
2000	0.2380	0.1849	0.4612
2002	0.2303	0.1928	0.4817
2004	0.2245	0.1797	0.5132
2006	0.2054	0.1681	0.4286
2008	0.1882	0.1638	0.3968
2010	0.2294	0.1892	0.4094
2012	0.2841	0.2486	0.4698
2014	0.2634	0.2305	0.4605
2016	0.2445	0.1946	0.4949

Table 6 (continued)

Source: These calculations are based on GMM estimates reported in Table 2

Permanent inequality=$p_t^2(\sigma_\alpha^2)$

Transitory inequality=$q_t^2(\sigma^2 v_1)$

Total inequality=$\sigma_t^2 = p_t^2(\sigma_\alpha^2) + q_t^2(\sigma^2 v_1)$

Table 7 Decomposition of consumption Inequality over 1989–2016

	Full sample	Payroll	Self-employed
	(1)	(2)	(3)
A: Permanent Inequality			
Year			
1989	0.033	0.0194	0.0138
1991	0.0266	0.0267	0.009
1993	0.0376	0.0336	0.036
1995	0.0328	0.0384	0.0178
1998	0.0425	0.0369	0.0754
2000	0.0436	0.0369	0.2006
2002	0.0516	0.0449	0.0618
2004	0.0345	0.0388	0.0397
2006	0.0668	0.0732	0.0375
2008	0.0681	0.065	0.0362
2010	0.0524	0.0546	0.0424
2012	0.0336	0.0395	0.0121
2014	0.0397	0.0422	0.0305
2016	0.02004	0.0159	0.0354
B: Transitory Inequality			
Year			
1989	0.1204	0.1152	0.1592
1991	0.1379	0.117	0.1918
1993	0.1288	0.1184	0.1742
1995	0.125	0.11	0.162
1998	0.1448	0.133	0.1634
2000	0.1072	0.0981	0.0066
2002	0.1346	0.1323	0.141
2004	0.1261	0.1052	0.1597
2006	0.0674	0.0525	0.1175
2008	0.0692	0.0645	0.1362
2010	0.092	0.0797	0.1282
2012	0.1206	0.1038	0.1853
2014	0.1378	0.1225	0.1917
2016	0.1759	0.1639	0.2247
C: Total Inequality			
Year			
1989	0.1534	0.1346	0.173
1991	0.1645	0.1437	0.2008
1993	0.1664	0.152	0.2103
1995	0.1577	0.1484	0.1798
1998	0.1872	0.1699	0.2388
2000	0.1508	0.1351	0.2072
2002	0.1863	0.1773	0.2028
2004	0.1606	0.144	0.1995
2006	0.1342	0.1256	0.155

Table 7 (continued)

	Full sample	Payroll	Self-employed
	(1)	(2)	(3)
2008	0.1373	0.1294	0.1724
2010	0.1444	0.1344	0.1705
2012	0.1542	0.1433	0.1974
2014	0.1775	0.1647	0.2222
2016	0.1959	0.1799	0.2601

These calculations are based on GMM estimates reported in Table 3

Permanent inequality$=p_t^2(\sigma_\alpha^2)$

Transitory inequality$=q_t^2(\sigma^2 v_1)$

Total inequality$=\sigma_t^2 = p_t^2(\sigma_\alpha^2) + q_t^2(\sigma^2 v_1)$

Fig. 3 Decomposition of Income Inequality over 1989-2016. Note: This figure illustrates results reported in Table 6. Total income inequality is the sum of transitory and permanent income inequality
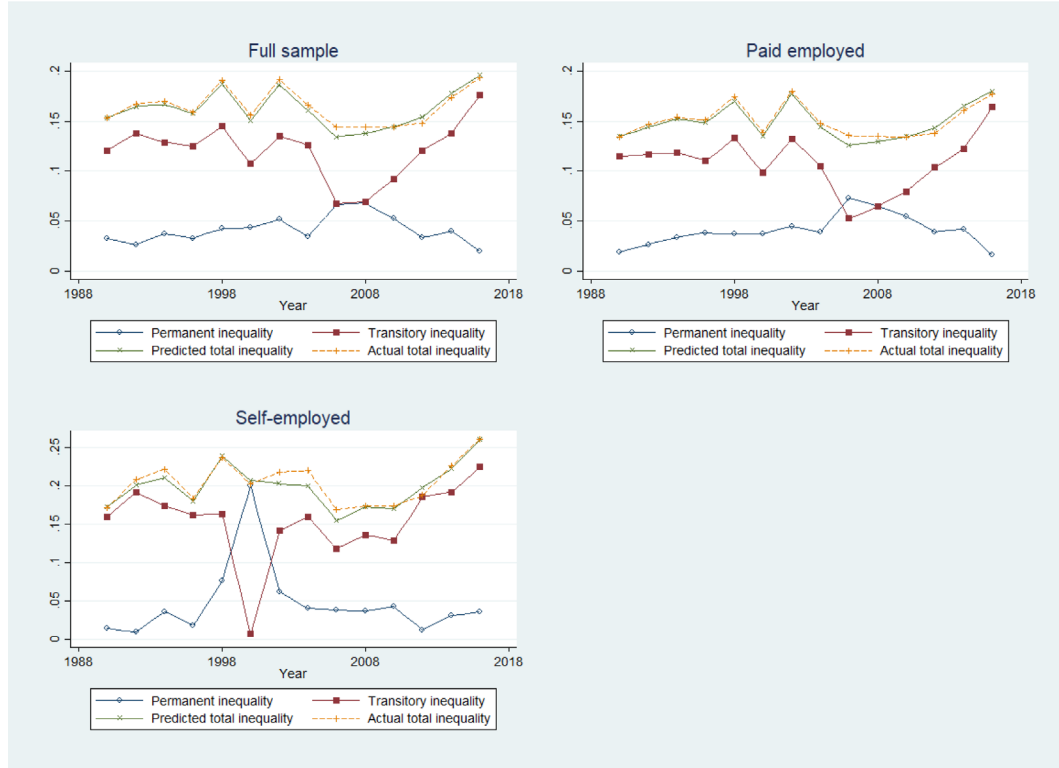
Fig. 4 Decomposition of Consumption Inequality over 1989-2016. Note: This figure illustrates results reported in Table 7. Total consumption inequality is the sum of transitory and permanent consumption inequality

Table 8 Permanent and transitory inequality as proportion of total income inequality

| | Full sample | Payroll | Self-employed |
	(1)	(2)	(3)
A: contribution of permanent Inequality			
Year			
1989	0.3446	0.2719	0.0005
1991	0.1284	0.2590	0.0089
1993	0.2807	0.4535	0.1828
1995	0.2239	0.3478	0.1350
1998	0.2210	0.2406	0.4847
2000	0.3147	0.2477	0.3664
2002	0.2727	0.2547	0.1650
2004	0.3091	0.3061	0.3024
2006	0.4148	0.4289	0.2212
2008	0.6047	0.7063	0.2417
2010	0.5715	0.6554	0.3610
2012	0.2865	0.2788	0.6275
2014	0.2931	0.1605	0.9765
2016	0.1431	0.1572	0.3932

Table 8 (continued)

	Full sample	Payroll	Self-employed
	(1)	(2)	(3)
B: Contribution of Transitory Inequality			
Year			
1989	0.6549	0.7281	0.9996
1991	0.8716	0.7410	0.9914
1993	0.7197	0.5465	0.8170
1995	0.7761	0.6522	0.8650
1998	0.7790	0.7594	0.5153
2000	0.6853	0.7523	0.6336
2002	0.7273	0.7448	0.8350
2004	0.6909	0.6939	0.6976
2006	0.5852	0.5711	0.7788
2008	0.3953	0.2937	0.7583
2010	0.4285	0.3446	0.6390
2012	0.7135	0.7212	0.3725
2014	0.7069	0.8395	0.0235
2016	0.8564	0.8433	0.6066

These calculations are based on Table 6.

Contribution of the permanent inequality to total income inequality is calculated as $= \frac{p_t^2 (\sigma_\alpha^2)}{\sigma_t^2}$

Contribution of the transitory inequality to total income inequality is calculated as $= \frac{q_t^2 (\sigma_v^2)}{\sigma_t^2}$

Table 9 Permanent and transitory inequality as proportion of total consumption inequality

	Full sample	Payroll	Self-employed
	(1)	(2)	(3)
A: Contribution of Permanent Inequality			
Year			
1989	0.2151	0.1441	0.0798
1991	0.1617	0.1858	0.0448
1993	0.2260	0.2211	0.1712
1995	0.2080	0.2588	0.0990
1998	0.2270	0.2172	0.3158
2000	0.2891	0.2731	0.9682
2002	0.2770	0.2532	0.3047
2004	0.2148	0.2694	0.1990
2006	0.4978	0.5828	0.2419
2008	0.4960	0.5023	0.2100
2010	0.3629	0.4063	0.2487
2012	0.2179	0.2757	0.0613
2014	0.2237	0.2562	0.1373
2016	0.1023	0.0884	0.1361
B: Contribution of Transitory Inequality			
Year			
1989	0.7849	0.8559	0.9202
1991	0.8383	0.8142	0.9552
1993	0.7740	0.7789	0.8283
1995	0.7926	0.7412	0.9010
1998	0.7735	0.7828	0.6843

Table 9 (continued)

	Full sample	Payroll	Self-employed
	(1)	(2)	(3)
2000	0.7109	0.7261	0.0319
2002	0.7225	0.7462	0.6953
2004	0.7852	0.7306	0.8005
2006	0.5022	0.4180	0.7581
2008	0.5040	0.4985	0.7900
2010	0.6371	0.5930	0.7519
2012	0.7821	0.7244	0.9387
2014	0.7763	0.7438	0.8627
2016	0.8979	0.9111	0.8639

These calculations are based on Table 7.

Contribution of the permanent inequality to total consumption inequality is calculated as $= \frac{p_t^2(\sigma_\alpha^2)}{\sigma_t^2}$

Contribution of the transitory inequality to total consumption inequality is calculated as $= \frac{q_t^2(\sigma_\nu^2)}{\sigma_t^2}$

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publications
Not applicable.

Competing interests
I have no Conflict of interest to declare.

References
Albarrán, P., Carrasco, R., Martinez-Granado, M.: Inequality for wage earners and self-employed: evidence from panel data. Oxf. Bull. Econ. Stat. **71**(4), 491–518 (2009)
Alessie, R., Kalwij, A., et al.: Permanent and transitory wage inequality of british men, 1975-2001: year, age and cohort effects. Discussion paper series/ Tjalling C. Koopmans Research Institute **3**(04) (2003)
Åstebro, T., Chen, J.: The entrepreneurial earnings puzzle: mismeasurement or real? J. Bus. Ventur **29**(1), 88–105 (2014)
Åstebro, T., Chen, J., Thompson, P.: Stars and misfits: self-employment and labor market frictions. Manag Sci. **57**(11), 1999–2017 (2011)

Atems, B., Shand, G.: An empirical analysis of the relationship between entrepreneurship and income inequality. Small Bus. Econ. **51**, 905–922 (2018)
Autor, D.H., Katz, L.F., Krueger, A.B.: Computing inequality: have computers changed the labor market? Quarterly J. Econ. **113**(4), 1169–1213 (1998)
Baker, M., Benjamin, D.: The role of the family in immigrants' labor-market activity: an evaluation of alternative explanations. Am. Econ. Rev., 705–727 (1997)
Baker, M., Solon, G.: Earnings dynamics and inequality among canadian men, 1976–1992: evidence from longitudinal income tax records. J. Labor Econ. **21**(2), 289–321 (2003)
Biewen, M.: The covariance structure of east and west German incomes and its implications for the persistence of poverty and inequality. German Econ. Rev. **6**(4), 445–469 (2005)
Blanchflower, D.G., Oswald, A.: Entrepreneurship, happiness and supernormal returns: evidence from Britain and the US. Mass. Cambridge, National bureau of economic research Cambridge (1992)
Block, J.H., Wagner, M.: Necessity and opportunity entrepreneurs in Germany: characteristics and earnings differentials. Schmalenbach Bus. Rev. **62**, 154–174 (2010)
Blundell, R., Preston, I.: Income, expenditure and the living standards of UK households. Fiscal Stud. **16**(3), 40–54 (1995)
Blundell, R., Pistaferri, L., Preston, I.: Consumption inequality and partial insurance. Am. Econ. Rev. **98**(5), 1887–1921 (2008)
Cannari, L., Violi, R.: Reporting behaviour in the bank of Italy's survey of Italian household income and wealth. Res. Econ. Inequal. **6**, 117–130 (1995)
Cervini-Plá, M., Ramos, X.: Long-term earnings inequality, earnings instability and temporary employment in Spain: 1993–2000. Br. J. Ind. Relations **50**(4), 714–736 (2012)
Cutler, D.M., Katz, L.F.: Rising Inequality? Changes in the Distribution of Income and Consumption in the 1980s. Mass. National Bureau of Economic Research Cambridge, Cambridge (1992)
Deaton, A.: The analysis of household surveys: a microeconometric approach to development policy. World Bank Publications, ??? (1997)
Dickens, R.: The evolution of individual male earnings in Great Britain: 1975–95. Econ. J. **110**(460), 27–49 (2000)
Doris, A., O'Neill, D., Sweetman, O.: Aggregate earnings inequality in Europe: permanent differences or transitory fluctuations? (2010)
Doris, A., O'Neill, D., Sweetman, O.: Gmmcovearn: A stata module for gmm estimation of the covariance structure of earnings. (2010)
Dynarski, S., Gruber, J., Moffitt, R.A., Burtless, G.: Can families smooth variable earnings? Brook. Papers Econ. Act. **1997**(1), 229–303 (1997)
Evans, D.S., Leighton, L.S.: Some empirical aspects of entrepreneurship. In: The Economics of Small Firms, pp. 79–99. Springer, ??? (1990)
Falter, J.-M.: Self-employment and earning inequality. J. Income Distr **16**(2), 106–127 (2007)
Friedman, M., Kuznets, S.: Income from independent professional. New York (1945)

Friedman, M.: A theory of the consumptionfunction, princeton (1957)

Gottschalk, P., Danziger, S.: Inequality of wage rates, earnings and family income in the United States, 1975–2002. Rev. Income Wealth **51**(2), 231–254 (2005)

Gottschalk, P., Moffitt, R., Katz, L.F., Dickens, W.T.: The growth of earnings instability in the us labor market. Brook Papers Econ. Act. **1994**(2), 217–272 (1994)

Gustavsson, M.: Trends in the transitory variance of earnings: evidence from sweden 1960-1990 and a comparison with the united states. Technical report, Working Paper (2004)

Haider, S.J.: Earnings instability and earnings inequality of males in the united states: 1967–1991. J. Labor Econ. **19**(4), 799–836 (2001)

Hamilton, B.H.: Does entrepreneurship pay? an empirical analysis of the returns to self-employment. J. Political Econ. **108**(3), 604–631 (2000)

Hassett, K.A., Mathur, A.: A new measure of consumption inequality. AEI Econ. Stud. (2) (2012)

Jappelli, T., Pistaferri, L.: Does consumption inequality track income inequality in Italy? Rev. Econ. Dyn. **13**(1), 133–153 (2010)

Jenkins, S.P.: Accounting for inequality trends: decomposition analyses for the uk, 1971-86. Economica, 29–63 (1995)

Kalwij, A.S., Alessie, R.: Permanent and transitory wages of British men, 1975–2001: year, age and cohort effects. J. Appl. Econ. **22**(6), 1063–1093 (2007)

Katz, L.F., *et al*.: Changes in the wage structure and earnings inequality. In: Handbook of Labor Economics vol. 3, pp. 1463–1555. Elsevier, ??? (1999)

Kristal, T., Cohen, Y.: The causes of rising wage inequality: the race between institutions and technology. Socio-Econ. Rev. **15**(1), 187–212 (2017)

Krueger, D., Perri, F.: Does income inequality lead to consumption inequality? evidence and theory. Rev. Econ. Stud. **73**(1), 163–193 (2006)

Lillard, L.A., Willis, R.J.: Dynamic aspects of earning mobility. Econometrica: Journal of the Econometric Society, 985–1012 (1978)

MacDonald, G.M.: The economics of rising stars. The American Economic Review, 155–166 (1988)

MaCurdy, T.E.: The use of time series processes to model the error structure of earnings in a longitudinal data analysis. J. Econ. **18**(1), 83–114 (1982)

Meyer, B.D., Sullivan, J.X.: Consumption and income inequality in the US since the 1960s. Technical report. National Bureau of Economic Research, Cambridge (2017)

Moffitt, R.A., Gottschalk, P.: Trends in the transitory variance of male earnings in the us, 1970–2004. Technical report. National Bureau of Economic Research, Germany (2011)

OECD: Self-employment rate (indicator) (2020)

Parker, S.C.: The inequality of employment and self-employment incomes: a decomposition analysis for the UK. Rev. Income Wealth **45**(2), 263–274 (1999)

Ramos, X.: The covariance structure of earnings in great britain, 1991–1999. Economica **70**(278), 353–374 (2003)

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, I., Lopez-Garcia, P., Chin, N.: Global entrepreneurship monitor: Data collection design and implementation 1998–2003. Small Bus. Econ. **24**, 205–231 (2005)

Rosen, S.: The economics of superstars. Am. Econ. Rev. **71**(5), 845–858 (1981)

Roy, A.D.: Some thoughts on the distribution of earnings. Oxf. Econ. Papers **3**(2), 135–146 (1951)

Slesnick, D.T.: Consumption, needs and inequality. International Economic Review, 677–703 (1994)

Torrini, R.: Self-employment incidence, overall income inequality and wage compression. In: 29th General Conference of the International Association for Research in Income and Wealth, Joensuu, Finland, pp. 20–26 (2006)

Publisher's Note