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THE INCREASE IN EARNINGS INEQUALITY AND VOLATILITY IN ITALY: THE ROLE AND PERSISTENCE OF ATYPICAL CONTRACTS

by Domenico Depalo* and Salvatore Lattanzio*

Abstract

This paper investigates earnings inequality in Italy between 1990 and 2021 using administrative matched employer-employee data from the Italian Social Security Institute (INPS). It shows that the inequality and volatility of annual earnings have risen steadily over time according to various measures, such as the Gini index, the interquartile ranges, and the variance. It also explores the mechanisms behind this increase, showing that the rise in inequality was driven by the number of weeks worked per year, which varied heterogeneously across workers, as atypical contracts (e.g. part-time and fixed-term) became widespread in the economy. We compare these measures based on the annual compensation of workers with those based on full-time equivalent weekly wages, which display a much less dispersed evolution over time, except during the double-dip recession of 2008-2012. Finally, we document a high degree of persistence, increasing over time, in atypical contracts both in the short and in the long term.

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1. Introduction[1]

While substantially stable over the last decades (Brandolini et al., 2018), the level of income inequality in Italy is higher than in other EU countries like France and Germany, and comparable to that in Spain, as documented in Bovini et al. (2023). According to a survey of the OECD (2021a), in 2019, 93 per cent of the Italian population perceived income disparities as being too large (compared to 80 per cent in OECD countries). The respondents identified earnings disparities as one of the main motivations behind their perceptions. This paper provides evidence on individual earnings inequality in Italy over a long period of time, covering more than three decades since 1990. Crucially, we inform on the most recent developments in the evolution of earnings inequality, comprising the pandemic years. We measure inequality across employees in the non-agricultural private sector and investigate underlying heterogeneity by worker subgroups, based on contract types, work schedules, sectors, and firms. The analysis leverages detailed Social Security Institute (INPS) data for the period 1990-2021.

We proceed in three steps. First, we document the increase of various measures of inequality, including the Gini index, the interquartile ranges, and the variance of annual earnings. Second, we assess how much of the increase in inequality is driven by the quantity of work, distinguishing between annual earnings and full-time equivalent weekly wages, and the role played by the diffusion of atypical contracts, like part-time or fixed-term, which feature a lower number of hours worked per year with respect to standard permanent full-time jobs (see also Hoffmann et al., 2022). Workers with atypical contracts, who usually have lower annual earnings and discontinuous careers, account for a large share of the so-called "working poor" (D'Amuri, 2017). Third, we assess the persistence of these conditions in the short-run (1 year ahead) and in the long-run (5 and 10 years), for selected worker subgroups more likely to be employed with atypical contracts.

We provide two contributions to the existing literature. This is the first paper based on administrative data that investigates how the Covid-19 pandemic affected earnings inequality in Italy. Second, whilst the literature has investigated persistence for the working poor (D'Amuri, 2017; Bavaro, 2022), we are the first to provide comprehensive measures of persistence for all groups of disadvantaged workers (part-time, part-year, fixed-term, and working poors). These simple measures provide new insights on the risk of a poverty trap for such workers.

Our results highlight stark differences between annual earnings and weekly wages, for both inequality and volatility of workers' compensation. On the one hand, inequality and volatility display a much higher sensitivity to the business cycle if measured with annual earnings than with weekly wages. On the other hand, both inequality and volatility in annual earnings increased between 1990 and 2021, with some heterogeneity over time: they peaked during the double dip recession over 2008-2012 and experienced a large spike in 2020 during the Covid-19 pandemic, but decreased remarkably in 2021. In contrast, inequality in weekly wages remained constant, except for a temporary steep increase around the time of the sovereign debt crisis. Differences between indicators based on annual and weekly compensation depend on the amount of work (i.e., full-time equivalent weeks worked), which heterogeneously declined for workers in different positions of the earnings distribution between 1990

and 2021. Such heterogeneity reflects the increasing share of atypical contracts and their unequal use among different groups of workers (Hoffmann et al., 2022). Accordingly, when we analyse the sources of the volatility of annual earnings, we find that it mostly stems from the dispersion of weeks worked. Furthermore, when separately investigating the role of employers, we show that between-firm pay differentials, either between- or within-sector, account for 75 per cent of the total variance.

Individuals in disadvantaged positions (in terms of job contract and/or compensation) remain in that state for long periods and are more likely to leave employment than workers with a full-time and permanent contract. For workers who had a part-time contract or worked part of the year in 2010, the probability of having a contract with the same characteristics or to be non-employed in 2020 was 2-3 times higher than for those who were full-time or full-year workers; for fixed-term contracts the odds are smaller but the gap with respect to open-ended contracts is still sizeable. Similarly, we document high persistence in the working poor status — jobs paying less than 60 per cent of the median compensation — which is itself linked to the diffusion and persistence of atypical contracts.

The persistence of disadvantaged positions has increased in recent years, though we also generally observe a decline in the probability of non-employment for disadvantaged workers, suggesting the presence of a trade-off between employment and the stability of labour market careers.

The paper is organized as follows. In Section 2, we review the existing literature on earnings inequality, focusing specifically on the evidence based on administrative data. In Section 3, we describe the data and present some descriptive statistics for our sample. Section 4 presents our results on inequality and volatility. Section 5 considers the role of atypical contracts as a possible mechanism behind the main results, whereas Section 6 focuses on the working poor. Finally, Section 7 concludes.

2. Earnings inequality in Italy: a review of the existing evidence

The rise in inequality observed in several countries (Chancel and Piketty, 2021) and the economic downturn following the Covid-19 pandemic, with its potentially unequal effects across space and individuals, further increased the interest in the topic. Inequality has negative effects both at the individual and at the aggregate level. With respect to the former, it may hamper skills development at the bottom of the income distribution (Cingano, 2014), intergenerational mobility (Barone and Mocetti, 2021; Halvorsen et al, 2022), and labour market participation of low-wage workers if their incentives to supply labour are reduced by high inequality (Albanesi and Prados, 2022). Whereas at the aggregate level, inequality can affect both economic and political stability (Galbraith, 2012).

In this section we consider inequality in terms of individual earnings. This clearly affects household income inequality (Blau and Kahn, 2012), but the link between the latter and individual earnings is not straightforward. In fact, the overall household labour income depends on both the level of individual earnings and the number of adult components actually working, so that household income inequality is affected by the distribution of both earnings levels and the number of workers per household.

A large body of research has been conducted over the past two decades on individual earnings inequality (see Song et al., 2019). Most of the early literature is based on survey data (Moffitt et al., 2023). The relatively recent availability of administrative data greatly enriched our understanding of the causes of inequality, providing important insights to researchers and policymakers.[2] Moffitt et al. (2023) document important differences between survey- and administrative-based results.

A rich strand of the literature has investigated earnings inequality in Italy, which is an interesting case study for several reasons. In the last decades, the country underwent different business-cycle phases of different natures, that led to different consequences. Brandolini et al. (2018) show that, for household income, inequality rose sharply during the currency crisis of the early 1990s but much less during the double-dip recession between 2008 and 2013. The Covid-19 pandemic hit the country harder than other EU member states (Italian GDP declined by 9.0 per cent, compared to an average drop of 5.6 in the European Union). The associated effects were however more severe for workers with unstable labour market positions, e.g., with temporary contracts (Carta and De Philippis, 2021). The existing papers on Italy report a significant rise in measures of individual earnings inequality and volatility, related to a variety of firm-, sector-, job- and individual-specific factors, which intrinsically interact with each other.

Various studies have investigated the role of sectors and firms in accounting for the overall increase in earnings inequality observed in different contexts (Card et al., 2013; Barth et al., 2016; Devicienti et al., 2019; Song et al., 2019; Briskar et al., 2022; Bingley and Cappellari, 2022). According to Card et al. (2018), many analyses find that firm wage effects contribute by approximately 20 per cent to the overall variance of wages, even after controlling for workers' characteristics. Card et al. (2013) use matched employer-employee data for West Germany between 1985 and 2009 and find that the increasing dispersion of wages was mainly due to rising variability in the wage premia at different establishments, and increasing assortative matching between workers and plants. A similar approach has been applied to other countries, including the US (Song et al., 2019; Haltiwanger, 2022), the UK (Faggio et al., 2010), and Sweden (Håkanson et al, 2021). For Italy, Briskar et al. (2022), using detailed matched employer-employee data on the universe of private-sector employees, show that the sector of occupation is a critical component to explain the evolution of the variance of earnings. They find that, for full-time workers aged 20 to 60 and working in firms with at least 10 employees, earnings inequality increased between 1985 and 2018, mainly due to a rise in pay differentials between firms in different industries. When decomposing wage inequality into the separate contributions of worker and firm components, Di Addario et al. (2023) further show that job-to-job transitions also play a role: for movers, the "destination" firm contributes more to the variance of wages than the "origin" firm.

Considering the characteristics of workers, the literature has investigated three key factors that can affect earnings dynamics: (i) the increased female labour force participation, (ii) the ageing of the population and the diverging patterns of young and old workers, and (iii) the higher educational endowment of the workforce. First, between 1984 and 2019, the gender employment gap halved from

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almost 40 percentage points to less than 20, thanks to the higher participation rates of women (De Philippis and Lo Bello, 2022; De Philippis, 2017). Nevertheless, women still lag behind men in terms of wages and careers (Eurostat, 2021). Casarico and Lattanzio (2023a) estimate that gender differences in firm pay policies explain a sizable portion of the average gender pay gap, mainly due to between-firm components, related to differential sorting of women and men across firms, finding similar results for Italy to those that Card et al. (2016) report for Portugal. Within-firm differences are more important for top earners and increasingly relevant over time. A second important demographic evolution is related to age. In the last 20 years, the old-age dependency ratio (defined as the population older than 64 years over that between 15 and 64) increased by 10 percentage points in Italy, reaching 37.5 per cent (the EU average is 33.0, up by about 9.5 points). Rosolia and Torrini (2007, 2016) and Naticchioni et al. (2016) show that the younger cohorts in the labour market suffer from large and persistent earnings penalty with respect to older cohorts, especially among highly educated individuals. Bianchi et al. (2022) and Bianchi and Paradisi (2022) document that the age wage gaps are a by-product of limited career progression in internal labour markets, with old individuals hampering the advancement of young workers within firms. As for the skill distribution – the third important evolution in individual characteristics –, the share of graduates in the age range 15-64 years almost doubled between 2004 and 2020 (from 10.0 to 17.8 per cent). Franzini and Raitano (2019) conclude that the increasing wage inequality depends only to a very limited extent on skill-premia: wages are widely dispersed even within tertiary graduates, pointing to the high riskiness of the investment in education. A potential explanation of this result pertains to the centralized system of industrial relations in Italy (Adamopoulou and Villanueva, 2022). The contribution of the latter to overall earnings inequality is investigated in Devicienti et al. (2019), who find that the growth in pay dispersion has mainly occurred between job titles (*livelli di inquadramento*), that are defined by national industry-wide collective bargaining agreements. Rosolia (2010) investigates the role of some socio-demographic characteristics (gender, age, citizenship, and geographical area) along the entire *wage distribution* between 1985 and 2004, and concludes that the returns to such characteristics had a larger impact on weekly wage growth in the bottom and top quantiles rather than in the central ones.

In terms of the changing characteristics of jobs and contracts, several authors emphasized the increasing relevance of atypical contracts, such as temporary and part-time (e.g. Brandolini et al., 2018). Hoffmann et al. (2022) explore the role played by structural labour market reforms that increased the share of these contracts and the labour market duality between the highly protected permanent workers, and temporary workers, who have lower wages and social protection. The authors show that the increase in part-time work explains much of the rise in earnings inequality, while that in fixed-term contracts explains much of the rise in volatility; both of them operate through the *amount* of work. Moreover, in the long-run, temporary workers might suffer from a penalty, as they receive less on-the-job training, due to the lower incentives of employers to invest resources on firm-specific human capital for them (Garibaldi and Taddei, 2013).

Other relevant dimensions of earnings inequality, investigated in the literature, are the geographical location (Acciari and Mocetti, 2013; Boeri et al., 2021; Briskar et al., 2022; Ciani and Torrini, 2019), market power (OECD, 2021b), and the financial channel (Acabbi et al., 2022).

In this paper, we provide additional and novel evidence on key aspects related to earnings inequality. In particular, our focus on atypical contracts adds upon an established literature: our contribution

derives from the time span we focus on, which allows us to compare how earnings inequality has evolved over the business cycle, crucially informing on the most recent developments during the pandemic, also in comparison with previous recessions.

3. The INPS data

Data description. We use administrative data from the Italian Social Security Institute (INPS), which manages social security payments for *all* private sector firms with at least one employee in Italy. INPS provides information on the work and pay history between 1990 and 2021 of a random sample of employees, linked with the identifiers of the firms where they work, i.e. a matched employer-employee dataset.[3] Our data represent more than 6.5 per cent of all Italian employees. For the period of the analysis, for each combination of individuals and contracts, we observe all the relevant information related to the social security contributions on a yearly base, and some demographic characteristics.

The contract information includes the annual gross earnings,[4] the number of weeks and days worked, whether the schedule is part-time or full-time, whether the contract is fixed-term or open-ended (since 1998), the occupation at an aggregate level (apprentice, blue-collar, white-collar, middle manager, executive), and the starting and the ending date of the contract. The demographic information is limited to the year of birth, gender and region of residence.

An important limitation of the data is that we have no information on education or the household structure. Moreover, differently from survey data like EU-SILC (see Bovini et al., 2023), we are unable to capture informal work, which in Italy is estimated to be about 12 per cent of total employment, according to the Italian National Statistical Institute (Istat).[5]

Besides the individual-level data, INPS provides a firm-level archive, collecting aggregate data on the universe of firms included in the INPS archives and based on the whole firms' workforce. From this dataset, we gather information on the sector of employment (based on 6-digit NACE Rev. 2 codes), and on the workforce, such as the yearly average number of employees and the average firm monthly earnings.

Sample restrictions. We perform a number of sample restrictions. For each individual we maintain only one observation per year. For workers holding multiple contracts, we retain the contract information on the main job, that we conventionally define as the one with the highest earnings. However, their annual earnings and amount of work are obtained as the sum over all the existing contracts in any given year. From this sample, we focus on the population between 15 and 64 years, in the non-agricultural private sector.[6] We also exclude individuals with less than 5 weeks worked in

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[3] The sampling is based on 24 birth dates of employees. Specifically, those born on the 1st and 9th of each month and year in the INPS archives are included in the sample.

[4] This measure of earnings includes all kinds of pecuniary compensation, grossed up with labour income taxes and social security contributions on the employee.

[5] Notice, however, that administrative data do not suffer from item-/unit-non-response, thus neutralizing an important potential source of bias (Eurostat, 2019).

[6] We drop NACE codes 1 to 3, 84 to 88 and 97 to 99, corresponding to agriculture, public sector and families as employers. This selection is standard for the Italian data, as these sectors are only partially represented in the INPS archives (see, for

a year, as in Hoffmann et al. (2022), and with annual earnings below the 0.5 and above the 99.5 percentiles of the yearly distribution (our conclusions are not sensitive to this selection).

From the original data we derive further information. We define as part-year the individuals who work less than 52 weeks in any given year. Weeks worked are then converted in full-time equivalent (FTE) units, thus making all the individuals comparable, regardless of their time schedule.[7] We then derive the FTE *weekly wage* as the ratio between annual earnings and FTE weeks. We also express all the monetary definitions in real terms, using the consumer price index provided by the OECD. Finally, we derive two indicators of working poor (D'Amuri, 2017), for those who earn less than 60 per cent of median annual earnings or of median weekly wages, respectively.

The reliability of INPS data: a comparison with other data sources. Figure A1 in the Appendix reports a comparison of nominal earnings and wages, and the amount of work measured in INPS and in other data sources, using 2010 as a base year (as the levels between different data are not comparable). INPS information on annual earnings matches quite accurately that from the National Accounts (NA), as well as that on the total amount of labour supplied, measured as the number of FTE weeks worked and compared with hours per employee in NA. The evolution of unitary wages—FTE weekly wages in INPS, hourly wages in NA—is also roughly comparable across the two sources, although there is a wedge at the beginning and at the end of the sample period. The series for annual earnings is also comparable to that measured in EU-SILC and SHIW,[8] although some differences emerge when focusing on unitary wages, especially in more recent years, because of a divergence in the quantity of labour (measured as FTE months worked in EU-SILC and hours per employee in SHIW). The latter is related to different patterns of part-time work, which we discuss more thoroughly in Appendix B. Overall, we believe that INPS represent a reliable source to study earnings inequality in Italy, given that the dynamics of the relevant quantities (earnings, wages and weeks) mirror quite well those in the National Accounts. Rosolia (2010) reaches the same conclusion.

Summary statistics. Descriptive statistics over the whole sample period are in Table 1. About two thirds of Italian employees are male and, on average, almost 40 years old, with men older than women by almost 2 years. The annual earnings are about 22,000 euros, with women receiving 25 per cent less than men (about 6,000 euros); the gender pay gap in weekly wages is smaller (15 per cent). On average Italian employees work 42 weeks in a year and 17 per cent are employed with part-time contracts, with large differences by gender. Around 15 per cent of workers have fixed-term contracts. Finally, more than half of employees are in services—among women, this number rises to two thirds.

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example, Rosolia, 2010). To avoid inconsistencies over time, we further drop employees in Ferrovie dello Stato (the national rail company) and Poste Italiane (the national postal company), because their employees were included in the INPS archives only from the mid-1990s.

[7] The conversion is possible thanks to a variable provided by INPS on full-time equivalent weeks for workers with part-time contracts. This measure is computed by multiplying the number of actual weeks worked by the ratio between the number of hours worked in a month and the number of contractual hours for the full-time equivalent position.

[8] The EU statistics on income and living conditions (EU-SILC) is a survey of the European Union that aims to collect timely and comparable cross-sectional and longitudinal data on income, poverty, social exclusion, and living conditions. The Survey on Household Income and Wealth (SHIW) is a survey of the Bank of Italy that aims to gather data on the incomes and savings of Italian households.

Table 1. Descriptive statistics over the whole period 1990-2021

	Women		Men		All	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Female	-	-	-	-	0.35	0.48
Age	37.14	10.81	38.84	11.23	38.25	11.12
Young (Age<30)	0.29	0.45	0.24	0.43	0.26	0.44
Middle (Age 30-49)	0.56	0.50	0.56	0.50	0.56	0.50
Old (Age>49)	0.16	0.36	0.20	0.40	0.19	0.39
Tot. annual earnings	17,949.12	12,683.26	24,220.20	16,191.76	22,047.50	15,361.58
Tot. weekly wages	449.41	214.71	531.54	291.17	503.09	270.01
Working poor (yearly)	0.36	0.48	0.22	0.41	0.27	0.44
Working poor (weekly)	0.08	0.28	0.05	0.22	0.06	0.24
Weeks	37.93	15.76	43.44	14.41	41.53	15.12
Part-time	0.33	0.47	0.08	0.28	0.17	0.38
Part-year	0.39	0.49	0.36	0.48	0.37	0.48
Fixed-term	0.16	0.36	0.14	0.35	0.15	0.35
Seasonal jobs	0.02	0.15	0.01	0.11	0.02	0.13
Manufacturing	0.31	0.46	0.42	0.49	0.38	0.49
Construction	0.02	0.12	0.13	0.34	0.09	0.29
Services	0.67	0.47	0.44	0.50	0.52	0.50
Observations	9,014,482		17,004,074		26,018,556	

Notes: The table reports aggregate and gender-specific means and standard deviations of worker characteristics over the whole sample period. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure 1 shows the evolution of selected worker characteristics over time. The composition of the workforce (panel a) has undergone a process of profound changes in the last three decades, both in terms of demographic and job characteristics. The share of women increased from 30 to 35 per cent between 1990 and 2021, though on a declining trend in the last 5 years, and jobs in services increased from 38 to 62 per cent. Both part-time contracts—which, at least partially, may also reflect an under-declaration of the weekly hours worked (as we discuss in Appendix B)—and fixed term contracts recorded large increases, fostered by labour market policies that removed restrictions on their use (see Hoffmann et al., 2022, and Sestito and Viviano, 2018). The increased use of atypical contractual forms is reflected in a steep decline (about 13 per cent) in the average number of FTE weeks worked (panel b). At the same time, the number of contracts per worker has increased, signalling a higher fragmentation of workers' careers. Figure A2 reports employment shares, and the number of weeks and contracts by gender. In general, women have higher employment shares in services although the dynamics over time is similar across gender. They are more likely to work part-time and even more in more recent years: as a consequence, they have a stronger decline in FTE weeks worked.

Figure 1. Selected trends in the labour market: employment shares and amount of work

(a) Employment shares   (b) Amount of work
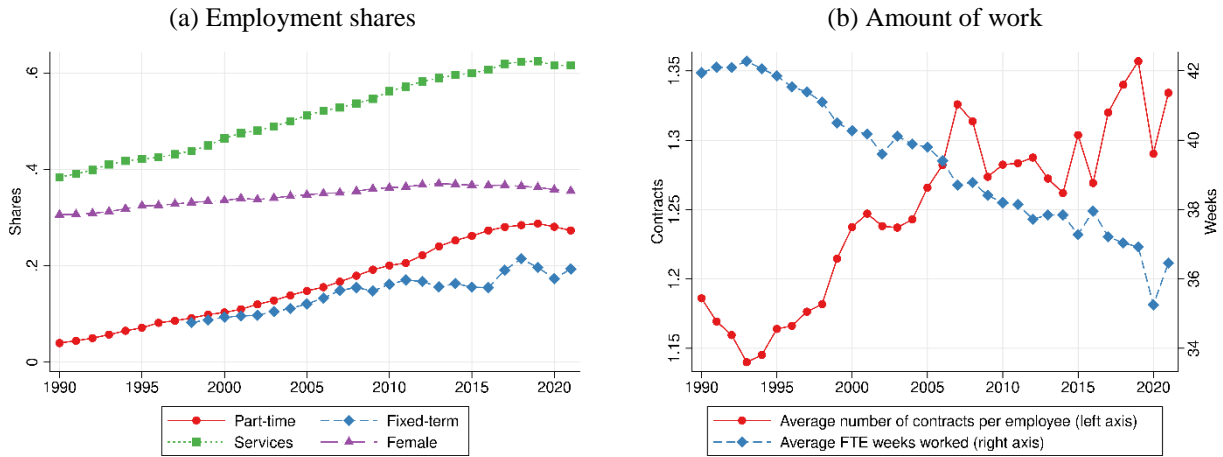
Notes: The figure reports the average shares of part-time, fixed-term, service and female workers in panel (a); the average FTE weeks worked and the average number of contracts per employee in panel (b). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

4. The evolution of earnings and wage inequality

### 4.1 The distributional dynamics of annual earnings and weekly wages

Figure 2 reports the dynamics of the mean and of selected percentiles of log (real) annual earnings (obtained by dividing annual earnings by the consumer price index; panel a) and log (real) FTE weekly wages (panel b), in deviations from 1990. The two distributions display very different patterns. Average annual earnings have declined by approximately 13 per cent[9] between 1990 and 2021, dragged down by a considerable reduction in the earnings of workers at the bottom of the distribution: those at the 10th percentile experienced a 32 per cent decline.[10] Workers at the top of the earnings distribution experienced, instead, gains of around 2 and 6 per cent at the 90th and 99th percentile, respectively. Even at the top of the distribution, however, the growth in earnings has been almost null after the mid-1990s. The patterns are remarkably different if one focuses on the log of FTE weekly wages, hence by netting labour earnings of the dynamics of the number of weeks worked and adjusting for part-time work. Mean log weekly wages and all the selected quantiles of the distribution have been on the rise. Interestingly, wage growth has been stronger at the top of the distribution until the early 2010s. After the sovereign debt crisis, the 10th percentile has experienced stronger wage gains (7 per cent) than the rest of the distribution.[11] Hence, by comparing the evolution of earnings and wages, we reach different conclusions on the evolution of inequality: while we observe a steep increase in inequality in annual earnings, the opposite holds true when focusing on weekly wages. This clearly highlights that the rise in earnings inequality was driven by increasing differences in the quantity of work across workers, rather than an increase in the dispersion of weekly compensation of workers.

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[9] We approximate per cent variations with the log change.

[10] Similar conclusions hold for other percentiles in the bottom half of the distribution (not shown in the graph): workers at the 5th and 25th percentiles experienced a 27 and 32 per cent decline in annual earnings.

[11] The growth rate in weekly wages is even stronger at the 5th percentile (15 per cent) and lower, but still in line with that at the median, at the 25th percentile (1.7 vs 1.4 per cent).

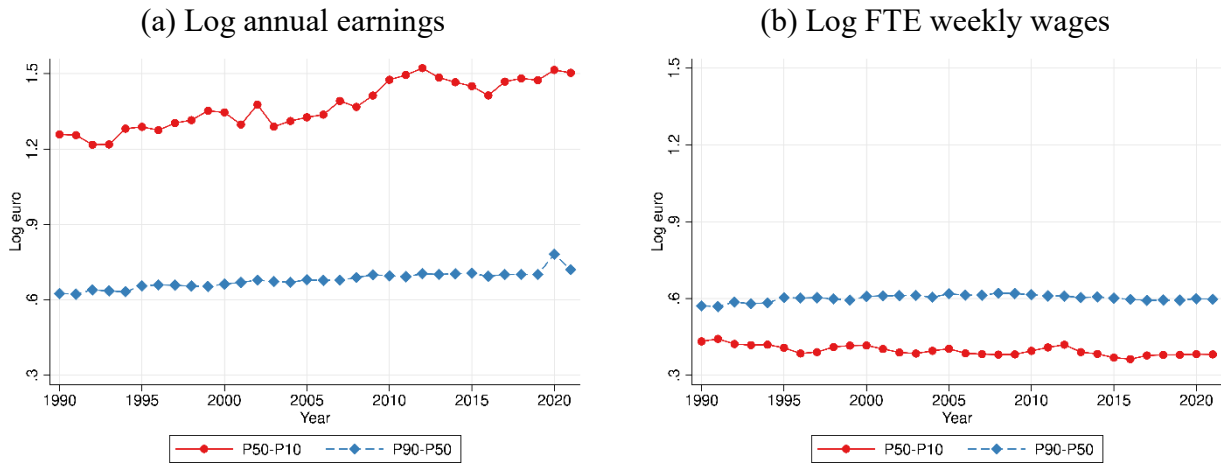**Figure 2. Log annual earnings and weekly wages, deviations from 1990**

(a) Log annual earnings   (b) Log FTE weekly wages
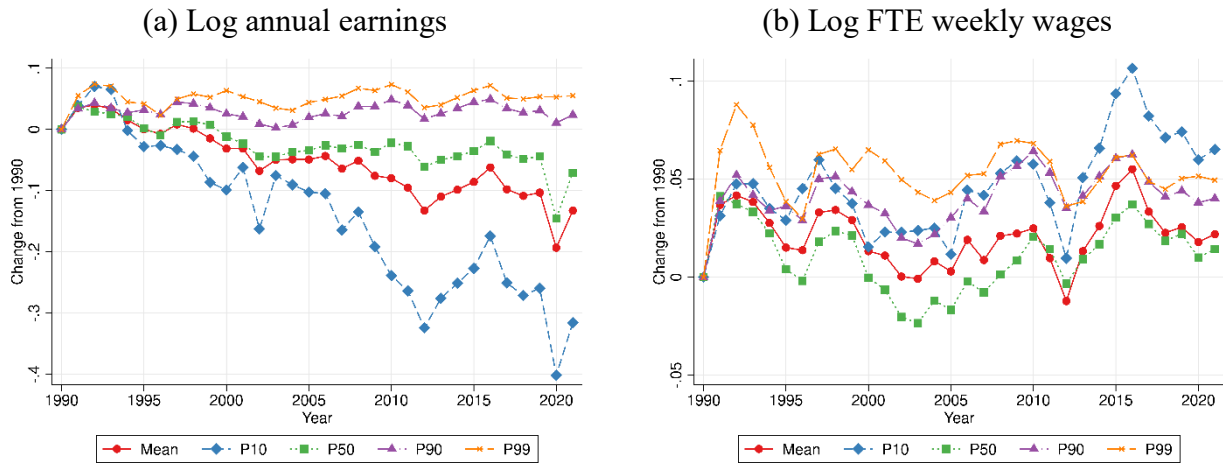
Notes: The figure shows the evolution of selected quantiles of the distribution of log annual earnings (panel a) and log FTE weekly wages (panel b) in deviations from 1990. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

The differences observed between panel (a) and panel (b) do not stem from different composition of workers in the selected percentiles of the log annual earnings and log weekly wage distribution. Figure A3 in the Appendix classifies workers in quintiles of the log annual earnings distribution by year and plots the evolution of average log annual earnings, average log weeks worked and average log weekly wages in each quintile. Given that log annual earnings are the sum of log weeks worked and log weekly wages, the figure provides a decomposition of the evolution of earnings into the separate contribution of wages and weeks for each quintile of the earnings distribution. Average weekly wages are either growing or remaining broadly constant across the whole distribution. The drop in annual earnings at the bottom and middle of the distribution—stronger for the first two quintiles and considerably less marked for the third quintile—is entirely driven by a drop in the quantity of work supplied. These findings are consistent with the aforementioned changes in the composition of employment: the shift towards atypical contracts implies a lower number of weeks worked in the year and generally more intermittent careers.

Figure 3 shows the interquantile ranges P50-P10 and P90-P50 for both measures of annual and weekly compensation in panel (a) and (b). Again, the figure suggests an increase in inequality in annual earnings (the slope of both lines is positive, panel a). The distribution is however extremely asymmetric. Both the level and the change over time are indeed larger for the gap between the median and the 10th percentile, coherently with the stark decline experienced by the bottom of the distribution, shown in Figure 2, panel (a). Interestingly, when focusing on FTE weekly wages, the gap between the 90th and 50th percentile, albeit slightly lower, is around the same levels as that observed for log annual earnings. In contrast, the gap between the 50th and 10th percentile is significantly lower, consistently with the fact the most of the P50-P10 gap in annual earnings is due to differences in weeks worked.

Figure 3. Interquantile ranges

(a) Log annual earnings

(b) Log FTE weekly wages

Notes: The figure shows the P50-P10 and P90-P50 gaps for log annual earnings (panel a) and log FTE weekly wages (panle b). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

To better investigate this point, we plot in Figure 4 the average weeks worked for workers between the 5th and 15th, the 45th and the 55th, and the 85th and the 95th percentiles of the annual earnings distribution. The graph shows that workers around the median are in fact full-year workers, with only small differences with respect to those at the top of the distribution. Those at the bottom are part-year workers, consistently with the evidence in Figure 3. Average weeks worked also decline over time more for workers around the 10th percentile than they do for workers around the median (by 12 and 4 per cent between 1990 and 2021, respectively), while they are constant for workers at the top: this is fully consistent with the stronger upward sloping trend in the P50-P10 gap than in the P90-P50 gap observed in Figure 3, panel (a).

Figure 4. Average weeks worked across the distribution of log annual earnings
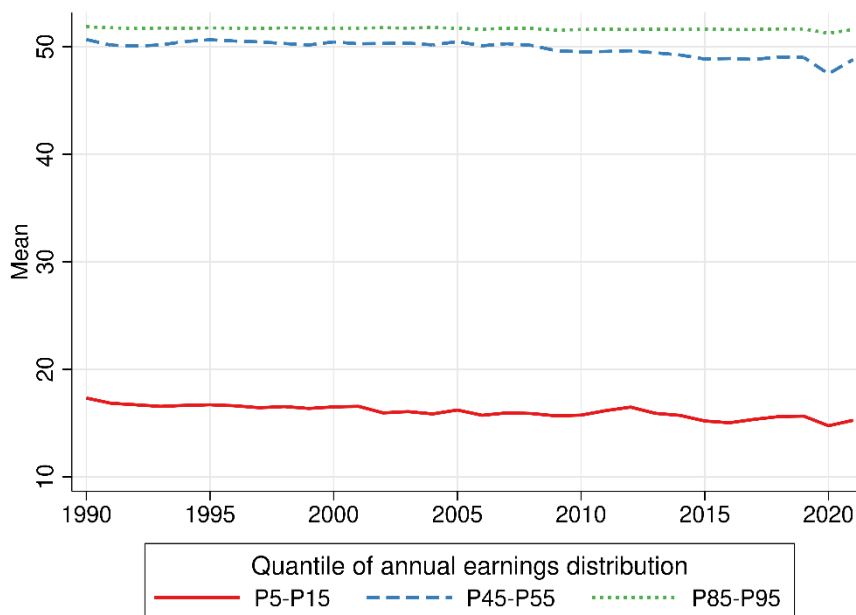
Notes: The figure shows the average number of weeks worked in groups defined by the percentiles of the log annual earnings distribution in each year. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

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4.2 The dynamics of the Gini index

Figure 5 reports the evolution of the Gini index for both levels of annual earnings and weekly wages. A Gini coefficient equal to 0 indicates perfect equality, where all workers have the same earnings, while a Gini close to 1 indicates a very concentrated distribution among just few individuals (in the extreme case, just one). Therefore, an increase of the Gini index signals an increase in inequality. The Gini increased from values around 0.33 in 1990 to 0.38 in 2021 when focusing on annual earnings; it remained almost constant for the distribution of weekly wages, with values ranging between 0.24 and 0.25 in the entire period. However, we observe a rise in the index during the double dip recession in both annual earnings and weekly wages. In particular, the period 2008-2012 is the only one in which we observe an increase in inequality in weekly compensation of workers. During the Covid-19 pandemic, annual earnings inequality recorded a steep increase (from 0.38 to 0.40 between 2019 and 2020), reflecting the different effect of the health emergency on the employment probability of open-ended and fixed-term contracts (Basso et al., 2023), but already in 2021 it declined due to a rapid recovery of employment levels. Inequality based on weekly wages remained instead broadly constant.
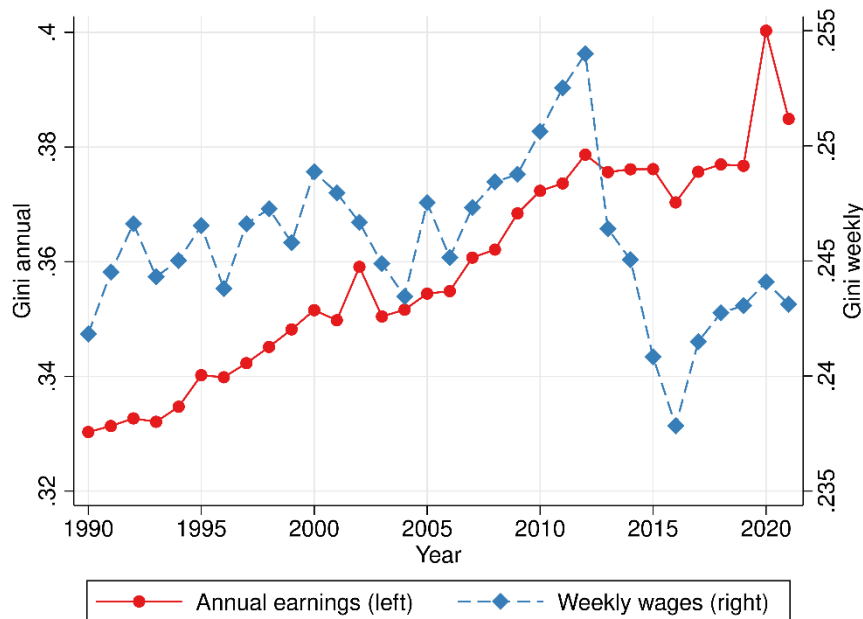
Figure 5. Gini index

Notes: The figure shows the Gini index computed in each year for annual earnings (left axis) and FTE weekly wages (right axis). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure 6 characterizes the observed increase in the Gini coefficient for annual compensations (in deviations from 1990), showing the heterogeneous dynamics for workers with different work schedules and contracts. The figure shows that the increase observed for all workers is mirrored by that of part-time workers. When focusing on full-time workers only, the Gini is approximately at the same level in 1990 and 2019, and then increases during the pandemic. Among full-time workers the index also spiked during the 2008-2012 period, highlighting that the increase in earnings inequality observed in that period is a phenomenon that affected workers within contract types. When considering full-time full-year workers, the Gini is substantially constant over time, with the pandemic-related increase during 2020 being completely absorbed in 2021. This evidence highlights once again the role of the intensive margin of employment in driving inequality in Italy in the last

three decades. Inequality did not increase among *stable* workers, i.e. those with full-time contracts and working without interruptions in a year. The increase in inequality is instead entirely driven by part-time and, to a lesser extent, part-year workers. We further investigate the role of weeks worked in the next section in which we analyse the variance of earnings.

Figure 6. Gini index in annual earnings for different worker subgroups, deviations from 1990
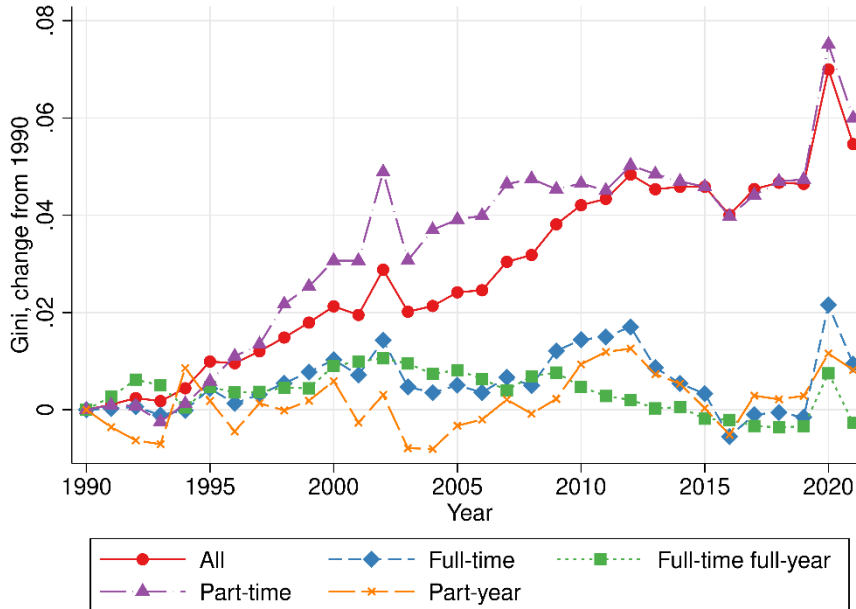
Notes: The figure shows the Gini index computed in each year for annual earnings for all workers, those with full-time and part-time contracts, those with full-time contracts working 52 weeks in any given year (full-year), and part-year workers. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

4.3 The dynamics of the variance of earnings

The contribution of wages and weeks to the overall variance of earnings. Exploiting the properties of the variance and the fact that the log of annual earnings can be expressed as the sum of log weekly wages and log weeks worked, we can decompose the variance of log annual earnings in each year as:

$$Var(\ln E) = Var(\ln w + \ln h) = Var(\ln w) + Var(\ln h) + 2 \cdot Cov(\ln w, \ln h),$$

where E, w, and h are annual earnings, FTE weekly wages and the FTE weeks worked in each year, respectively. Hence, we analyse how much of the earnings inequality stems from inequality in the compensation per unit of work, in the number of weeks worked, and in the covariance between weekly wages and weeks worked. The latter term, in particular, depending on its sign, can reinforce or hamper earnings inequality. If the covariance term is positive, a more unequal distribution of weeks worked across employees increases earnings inequality, while the opposite is true if the covariance is negative. Figure 7 reports the decomposition. First, the variance of earnings mirrors that of inequality. It has increased by approximately 33 per cent between 1990 and 2021 (from 0.60 to 0.80). This increase is driven by a rise in the variance of weeks worked and in the covariance between wages and weeks, which grew by 36 and 64 per cent, respectively. The latter two components explain a larger share of the overall variance of earnings in 2021 than in 1990, while the share explained by the variance of weekly wages is lower (percentages are reported in the graph).

Figure 7. Variance of log annual earnings
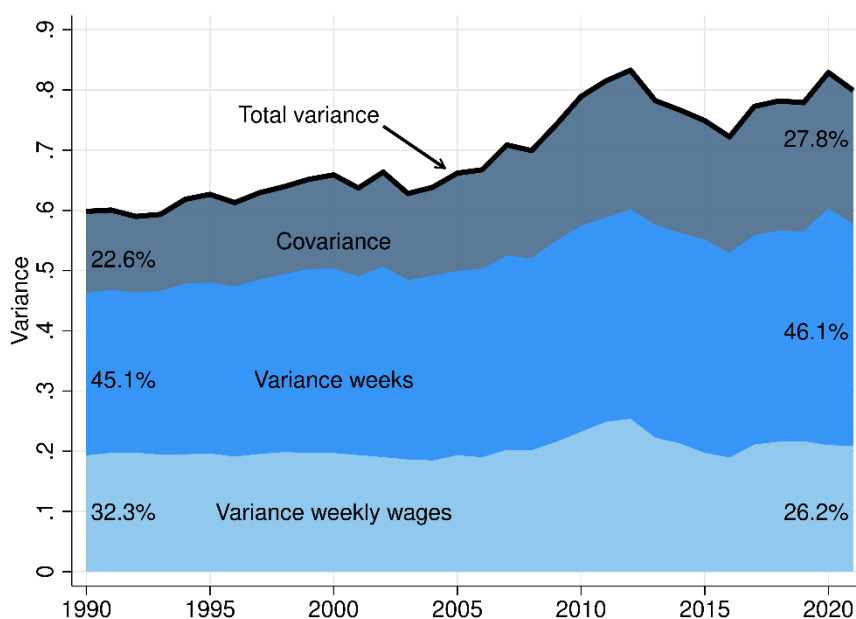
Notes: The figure reports the variance of log annual earnings in each year and its decomposition into the separate contributions of the variance of log weekly wages, the variance of log weeks worked, and twice the covariance between log weekly wages and log weeks worked. The figure reports the share of total variance explained by each component in 1990 (numbers on the left) and in 2021 (numbers of the right). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

The increasing share of variance explained by the covariance between wages and weeks suggests a strengthening of the correlation between these two quantities over time. Figure A4 in the Appendix focuses on such correlation. Panel (a) shows a binned scatter plot of average log weekly wages against log weeks worked in 1990 and 2021. The relationship is clearly positive and convex, implying disproportionately higher returns for full-time and full-year workers (i.e., those at the top of the distribution of weeks). Interestingly, employees in the top half of the distribution had the highest gains in terms of the wage returns to weeks worked between 1990 and 2021, while those at the bottom did not experience almost any change. Panel (b) provides a long-run perspective on the evolution of the elasticity between wages and weeks worked. The figure shows two different estimates of the elasticity. The raw correlation and the one conditional on a set of worker and job characteristics: the number of contracts held by a worker, a quadratic polynomial in age, a dummy for females and for part-time workers and firm fixed effects.[12] For both sets of estimates, we find similar dynamics over time: until approximately 2005 the elasticity is relatively flat and then it increases to a higher level in the last 15 years. The rise in the elasticity is particularly concentrated around the period of the two crises, consistently with that found in the variance decomposition. The levels of the unconditional and conditional elasticities are quite different, highlighting that part of the correlation between compensation and the intensive margin of employment is captured by worker- and job-specific characteristics. Even after controlling for these covariates we estimate an elasticity of 0.1, signalling

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[12] In other terms, we estimate the following OLS regressions in each year between 1990 and 2021: $\ln w_i = \alpha + \beta \ln h_i + \gamma X_i + \psi_{J(i)} + \varepsilon_i$, where the parameter of interest, which measures the wage-week elasticity, is β. w_i and h_i are FTE weekly wages and FTE weeks worked by individual i in any given year. X_i is the matrix of control variables. $\psi_{J(i)}$ are firm fixed effects ($J(i)$ indexes the firm employing individual i). ε_i is an error term. The unconditional estimates set $\gamma = \psi = 0$.

that a 10 per cent increase in weeks worked is associated with a 1 per cent increase in weekly wages. These estimates are larger than those provided for example in Checchi et al. (2016), who report the correlation between *hourly* wages and hours worked for the US, the UK, Germany and France between 1989 and 2012, for the whole economy (recall that our estimates refer, instead, to the non-agricultural private sector).

The contribution of sectors and firms. Part of the increase in the dispersion of earnings can be related to either increasing differences in pay between sectors and firms or to different wage setting for workers within firms. We provide here a decomposition of the variance of annual earnings and weekly wages into the separate contribution of (i) between-sector differences, (ii) within-sector between-firm differences, and (iii) within-firm differences. The first component captures the share of the variance due to sectors paying higher earnings than others. The second component measures the differences in compensation between firms belonging to the same 6-digit sector. The third component reflects differences in pay within firm, due to employers having a more dispersed earnings distribution. More in detail, following Briskar et al. (2022), we decompose the overall variance of pay as follows:

$$\underbrace{Var(P_i)}_{total\ variance} = \underbrace{Var(\bar{P}_s - \bar{P})}_{\substack{between-sector \\ variance}} + \underbrace{Var(\bar{P}_j - \bar{P}_s)}_{\substack{within-sector \\ between-firm \\ variance}} + \underbrace{Var(P_i - \bar{P}_j)}_{\substack{within-firm \\ variance}},$$

where $P = \{E, w\}$, i indexes workers, s indexes sectors, and j indexes firms. Hence, in any given year P_i is the compensation (annual earnings or weekly wage) of a worker. $\bar{P}$ is the average compensation across all workers, and $\bar{P}_s$ and $\bar{P}_j$ are the average pay in the sector and firm where the worker is employed, respectively. Figure 8 reports in panel (a) the decomposition for log annual earnings and in panel (b) the one for log FTE weekly wages. First, for both earnings and wages, the majority of the variance is explained by between-firm inequality, either between or within sector. The within-firm variance accounts for approximately a quarter of the total variance in earnings or wages. Second, the increase in earnings inequality observed between 1990 and 2021 is mainly a between-sector phenomenon: the share of variance explained by the latter increases from 20 to 33 per cent and, in general, the variance of average sector earnings more than doubled over time (even using 2019 as endpoint, in order to avoid possible confounding effects of the pandemic). Third, the increase in earnings inequality observed during the Great Recession and the sovereign debt crisis is mostly a within-sector between-firm phenomenon: the share of variance explained by average differences in pay between firms within sectors increased from 46 to 50 per cent between the early 2000s and 2009 and remained high until 2013, when it gradually started to decline. Figure 7 highlights that the covariance between wages and weeks increased in importance over the same period. Hence, combining the evidence from the two decompositions and the estimated elasticity between wages and weeks worked, it is likely that average differences in pay between firms exacerbated because of different wage rewards to a higher amount of work; an alternative explanation relates to a different use of job retention policies across firms during the crises that determined larger inequality between firms. In contrast, the increase in the variance observed in 2020, during the pandemic, is entirely driven by the between-sector variance, likely as a consequence of the mandated business closures that affected only specific sectors in the economy (mainly concentrated in services).[13] In Appendix C we

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[13] The relative importance of the within-firm component in explaining the overall variance of earnings is slightly lower in our estimates than in Briskar et al. (2022), who use administrative matched employer-employee data similar to ours,

provide a robustness exercise showing that the volatility measured with our sample data is consistent with that from the universe of firms.

The broad patterns observed for earnings are valid for weekly wages in terms of the relative importance of sectors and firms in explaining the overall variance (Figure 8, panel b). Focusing on the dynamics, except for the period between the two crises, wage dispersion has remained relatively flat, coherently with that found for the Gini index. Still, we observe that the increase in inequality across the two decades in the 2010s is mostly a between-sector and, to a lesser extent, between-firm phenomenon.

Figure 8. Between-within variance decomposition
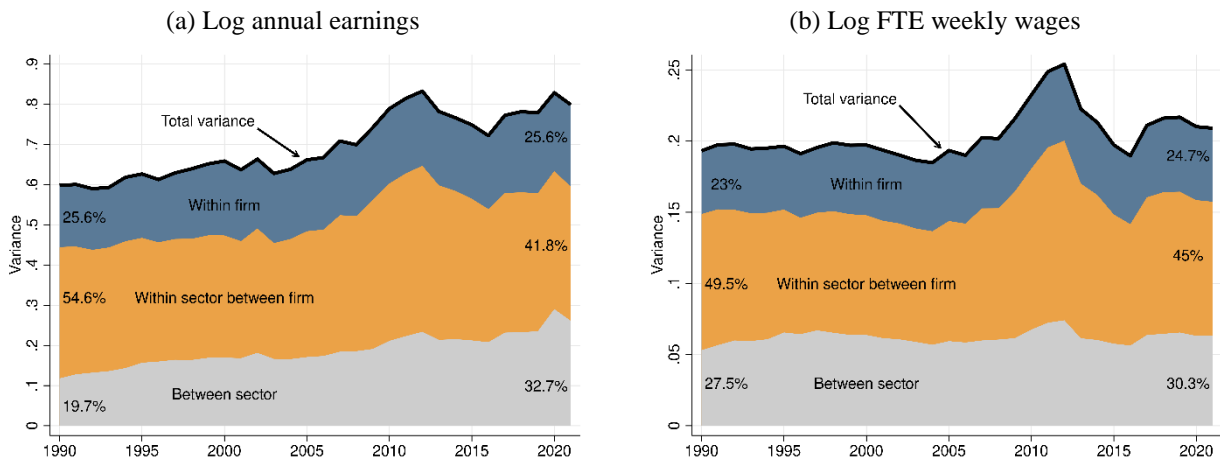
(a) Log annual earnings

(b) Log FTE weekly wages

Notes: The figure reports the variance of log annual earnings in each year and its decomposition into the separate contributions of the between-sector variance (variance of average sector earnings), the within-sector between-firm variance (variance of the difference between average firm earnings and average sector earnings), and the within-firm variance (variance of the difference between individual earnings and average firm earnings). The figure reports the share of total variance explained by each component in 1990 (numbers on the left) and in 2021 (numbers of the right). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

5. Potential motivations behind the rise in earnings inequality: the role of contracts and work schedules

So far, the analyses of administrative data have shown that the heterogeneous development of the total amount of work among workers is one of the main causes of the increase in earnings inequality. In this section, we focus on the potential motivations behind the reductions of the amount of work, investigating in particular fixed-term, part-time and part-year workers. During the period that we analyse the shares of such workers over total employment increased, as highlighted in Figure 2. This

but referred to the universe of employees in the private sector. We do find, coherently with their conclusions, that the increase in total variance has mainly happened between firms and sectors. The differences between our and their results can be due to different sample selections: they focus on full-time workers between the ages of 20 and 60, on firms employing at least 10 such workers and they drop in each year workers in the bottom 5 percentiles of the earnings distribution. We therefore compute the variance of earnings and its between-within decomposition using the same sample restrictions as in Briskar et al. (2022). Figure A5 in the Appendix compares the variances from the two samples and shows that the overall variance decreases when focusing on the restricted sample. This is not surprising as it focuses on a sample of workers with more stable contracts and careers. The reduction in the variance is entirely driven by a reduction in the between-sector and between-firm components. Hence, consistently with Briskar et al. (2022), the relative importance of the within-firm component increases, as its level is almost unaffected by the additional sample restrictions.

increase partly captures the changing composition of employment: if, in a counterfactual exercise, we maintain the distribution of employment across sectors fixed as in 1990, the increase in the share of part-time, fixed-term and, to a lesser extent, part-year workers is lower than the one actually recorded in the data (see Figure A6 in the Appendix). Table 2 shows further descriptive statistics about these "marginal" workers (columns 1 to 3), and compares them with workers with stable jobs (full-time, full-year and open-ended). Marginal workers are employed for around half of a year in FTE units. Part-time contracts are especially widespread among women. Around a third of part-year workers have fixed-term contracts and 80 per cent of temporary workers are classified as part-year. Almost half of part-year workers are entrants in a firm,[14] while 24 per cent of them move to non-employment in the next year. These workers are also employed in firms that are smaller, have lower average earnings and are younger than firms employing workers with stable contracts. They also have lower annual earnings, as shown in Table 2 and, more formally, in Figure A7 in the Appendix. The unconditional earnings gap has increased for all worker types, particularly so for fixed-term relative to open-ended workers, also due to a penalty in terms of FTE weekly wages increasing over time: even after controlling for worker characteristics,[15] the gap in 2021 reached 20 per cent. A similar penalty affects weekly wages of part-year with respect to full-year workers, while the part-time penalty is lower and almost null when controlling for worker and job characteristics.

The increase in the fraction of employees with unstable contracts and careers can partly depend on an increased persistence of these states over time. We therefore analyse how the probability of being employed in such precarious contractual forms has evolved. Specifically, for each year $t = \{\tau, \dots, T\}$ we compute (i) the probability of being employed in the same state as in t, (ii) the probability of being employed in a different state than in t, and (iii) the probability of being non-employed,[16] at the time windows $t + 1$, $t + 5$, and $t + 10$.[17] We consider eight different initial states: (1) fixed-term, (2) open-ended, (3) part-time, (4) full-time, (5) part-year, (6) full-year, (7) part-time part-year, (8) not part-time part-year.[18]

Figure 9 and 10 show the probabilities for each state, distinguishing respectively between workers with stable contracts (open-ended, full-time, full-year, non-part-time/part-year) and marginal workers (fixed-term, part-time, part-year, part-time/part-year; Table A1 reports the corresponding figures for selected years).[19]

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[14] We drop entrants among part-year in the rest of the analyses, as being part-year in the first year of tenure is just a mechanical effect.

[15] The conditional estimates control for a quadratic polynomial in age, and dummies for women, 2-digit sector, province and job occupations.

[16] Non-employment spells comprise unemployment, employment in the informal sector, self-employment or employment in the public sector. The nature of the data does not allow to distinguish between each of these states.

[17] The starting point τ varies depending on the variable taken into consideration: for fixed-term vs open-ended, $\tau = 1998$ (as the information on the contract type is not available in the years before); for part-time vs full-time, $\tau = 1990$; for part-year vs full-year, $\tau = 1991$ (for each individual we exclude the observation corresponding to the first year in the firm to avoid inflating the count of part-year workers with those of job-to-job movers: this restriction removes the first year in the data, 1990). The ending point T varies depending on the horizon: 2021 when analysing probabilities at $t + 1$; 2016 when analysing probabilities at $t + 5$; 2011 when analysing probabilities at $t + 10$.

[18] We drop workers who are older than 64 at each horizon in the future, in order to avoid misclassification of retirement into non-employment.

[19] The graphs are organized with the columns reporting labour market states at time t, and the rows reporting labour market states at time $t + k$, with $k = \{1, 5, 10\}$.

Table 2. Descriptive statistics on marginal workers

	(1) Part-time	(2) Part-year	(3) Fixed-term	(4) Full-time full-year open-ended
Annual earnings	10,797.18	11,545.37	11,644.30	30,709.87
	(7,049.06)	(9,075.67)	(9,114.47)	(14789.31)
Weekly wage	408.62	399.50	391.98	589.26
	(148.87)	(230.93)	(169.66)	(283.67)
Weeks worked	25.67	28.11	28.32	52.14
	(12.26)	(15.01)	(16.47)	(1.99)
Age	38.15	35.59	34.93	39.87
	(10.98)	(11.73)	(11.04)	(10.42)
Female	0.68	0.37	0.38	0.26
	(0.47)	(0.48)	(0.49)	(0.44)
Number of contracts	1.36	1.39	1.66	1.14
	(0.69)	(0.72)	(0.95)	(0.40)
Entrant	0.31	0.48	0.63	0.12
	(0.46)	(0.50)	(0.48)	(0.32)
E-NE rate	0.14	0.24	0.20	0.02
	(0.35)	(0.43)	(0.40)	(0.13)
Part-time	1.00	0.21	0.27	0.00
	(0.00)	(0.41)	(0.45)	(0.00)
Part-year	0.47	1.00	0.80	0.00
	(0.50)	(0.00)	(0.40)	(0.00)
Fixed-term	0.20	0.32	1.00	0.00
	(0.40)	(0.47)	(0.00)	(0.00)
Seasonal	0.02	0.04	0.00	0.00
	(0.14)	(0.21)	(0.00)	(0.02)
North	0.51	0.51	0.53	0.61
	(0.50)	(0.50)	(0.50)	(0.49)
Centre	0.22	0.19	0.20	0.19
	(0.42)	(0.39)	(0.40)	(0.39)
South	0.23	0.26	0.23	0.17
	(0.42)	(0.44)	(0.42)	(0.38)
Industry excl. constr.	0.16	0.30	0.21	0.48
	(0.36)	(0.46)	(0.41)	(0.50)
Construction	0.03	0.14	0.09	0.07
	(0.17)	(0.35)	(0.28)	(0.25)
Services	0.81	0.55	0.70	0.45
	(0.39)	(0.50)	(0.46)	(0.50)
Firm size	1,354.97	1,604.76	3,565.14	2,014.26
	(5,574.28)	(7,636.36)	(10,397.54)	(8,345.75)
Firm earnings	15,853.48	18,913.42	19,066.24	28,926.87
	(9,156.60)	(9,928.82)	(9,794.96)	(12,568.38)
Age of the firm	12.55	12.05	12.02	17.67
	(11.62)	(11.34)	(11.25)	(12.71)
Observations	4,414,285	9,587,273	3,007,439	13,629,739

Notes. The table reports means and standard deviations (in parentheses) of variables for part-time, part-year and fixed-term workers (columns 1 to 3) and for workers that are full-time, full-year and open-ended (column 4). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Not surprisingly, open-ended workers display large persistence in their jobs for all the time windows (reported in different lines within each graph) and a declining non-employment probability in more recent years (especially after 2010 at the 5- and 10-year windows). One exception is the conversion of full-time contracts into part-time ones (third row, second column), which has increased over time: this can be seen from the upward-sloping lines in the graphs or from Table A1, which indicates that the probability of switching from full- to part-time has increased from 0.9 per cent in 1990 to 2.6 per cent in 2020 at the 1-year horizon, from 2.5 per cent in 1990 to 6.9 per cent in 2010 at the 5-year

horizon, and from 3.8 per cent in 1990 to 8.3 per cent in 2010 at the 10-year horizon.[20] This result partly reflects the increased female employment and the switch to part-time of women after the birth of the first child, as shown for the Italian case by Casarico and Lattanzio (2023b).[21]

Workers with unstable jobs have, in contrast, witnessed a deterioration of their employment prospects over time. Figure 10, first column, shows that employees on fixed-term contracts have both higher non-employment probabilities over time and, if employed, they are more likely to remain in fixed-term positions than in the past, highlighting the increasing dualism in the Italian labour market. As an example, the 1-year ahead non-employment probability for a temporary worker increased from 15 to 19 per cent between 1998 and 2020 (or by 27 to 42 per cent between 1998 and 2010 if one focuses on the 5-year time window). The 1-year ahead conversion probability to open-ended contracts decreased by almost 15 percentage points in the last three decades.

Figure 10, second column, shows that the non-employment probability of part-time workers has decreased over time at each time window, although such decline has reversed in more recent calendar years. For example, the 5-year non-employment probability was 38 per cent for workers observed in 1990, 31 per cent for those in 2000, and 34 per cent for those part time in 2010. At the same time, the persistence into part-time jobs has been on a steep rise: the 5-year ahead part-time probability increased from 42 to 51 per cent between 1990 and 2010 (and from 31 to 39 per cent at the 10-year horizon).

Figure 10, third column, shows that non-employment probabilities for part-year workers remain almost constant over calendar time (except for the pandemic years): for example, the 5-year non-employment probability declines between 1991 and 2000 (at 39 per cent) and increases again between 2000 and 2010 (at 42 per cent). These dynamics are mirrored by the probability of remaining part-year, which at the 5-year horizon stands at 20 per cent in both 1991 and 2010.

Figure 10, fourth column, reports the transition probabilities for part-time *and* part-year workers against the rest of the population (which can either be full-time full-year, part-time full-year or full-time part-year).[22] The non-employment probability is high among these workers: it stands at 44 per cent in the 5-year time window for those observed in 2010 – 3 percentage points higher than in 2000. Those that remain employed are more likely to move out from the status of part-time part-year, though persistence in that status has increased over time (from 1991 until 2020) at each time window: for example, the 5-year ahead probability increased from 11 to 16 per cent for workers initially observed in 1991 and in 2010 (see Table A1, panel D).

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[20] We report statistics referred to the reference year t and the time window in which we measure the transition probabilities, i.e. $t+1$, $t+5$ or $t+10$. For example, when we refer to the non-employment probability in 2010 at the 5-year window for a full-time worker, we refer to workers that at $t = 2010$ have full-time contracts and measure their non-employment probability at $t+5 = 2015$ (the latter being the number reported on the horizontal axis in the figures).
[21] Coherently, we find that the share of full-time workers switching to part-time is higher among women than among men at each horizon. See Figure A8 in the Appendix.
[22] Among non-part-time part-year workers, 59 per cent are full-time full-year, 31 per cent are full-time part-year, and 10 per cent are part-time full-year.

Figure 9. Transition probabilities for workers with stable contracts
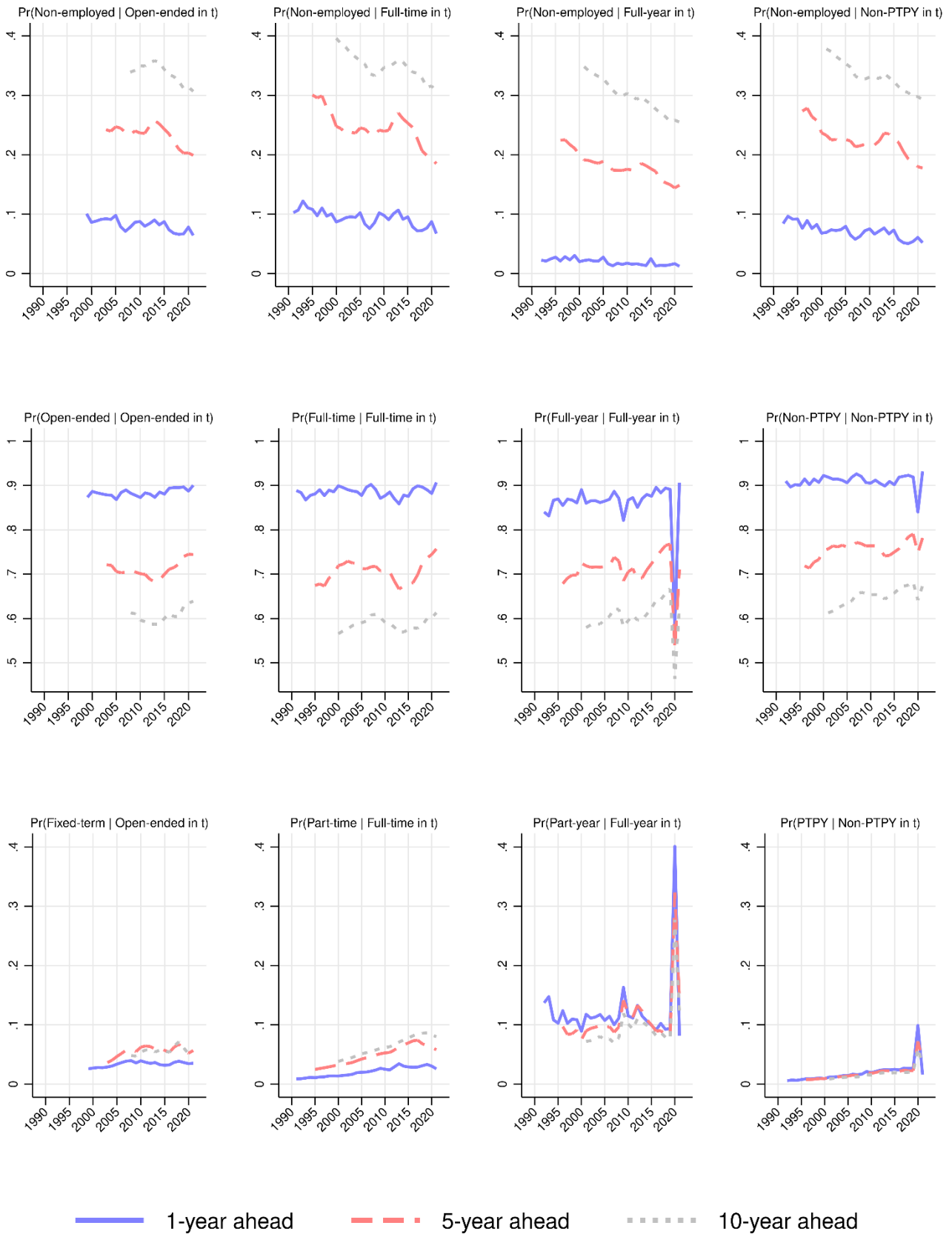
Notes: The figure reports the transition probabilities to non-employment and employment for different worker groups and at different time horizons. The first column shows, for each year reported on the horizontal axis, the probability for workers with open-ended contracts of being non-employed (first row), employed open-ended (second row), employed fixed-term (third row) given that 1, 5 or 10 years before they were open-ended. The second, third, and fourth columns report similar transition probabilities for full-time, full-year, and non-part-time/part-year (Non-PTPY) workers. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure 10. Transition probabilities for marginal workers
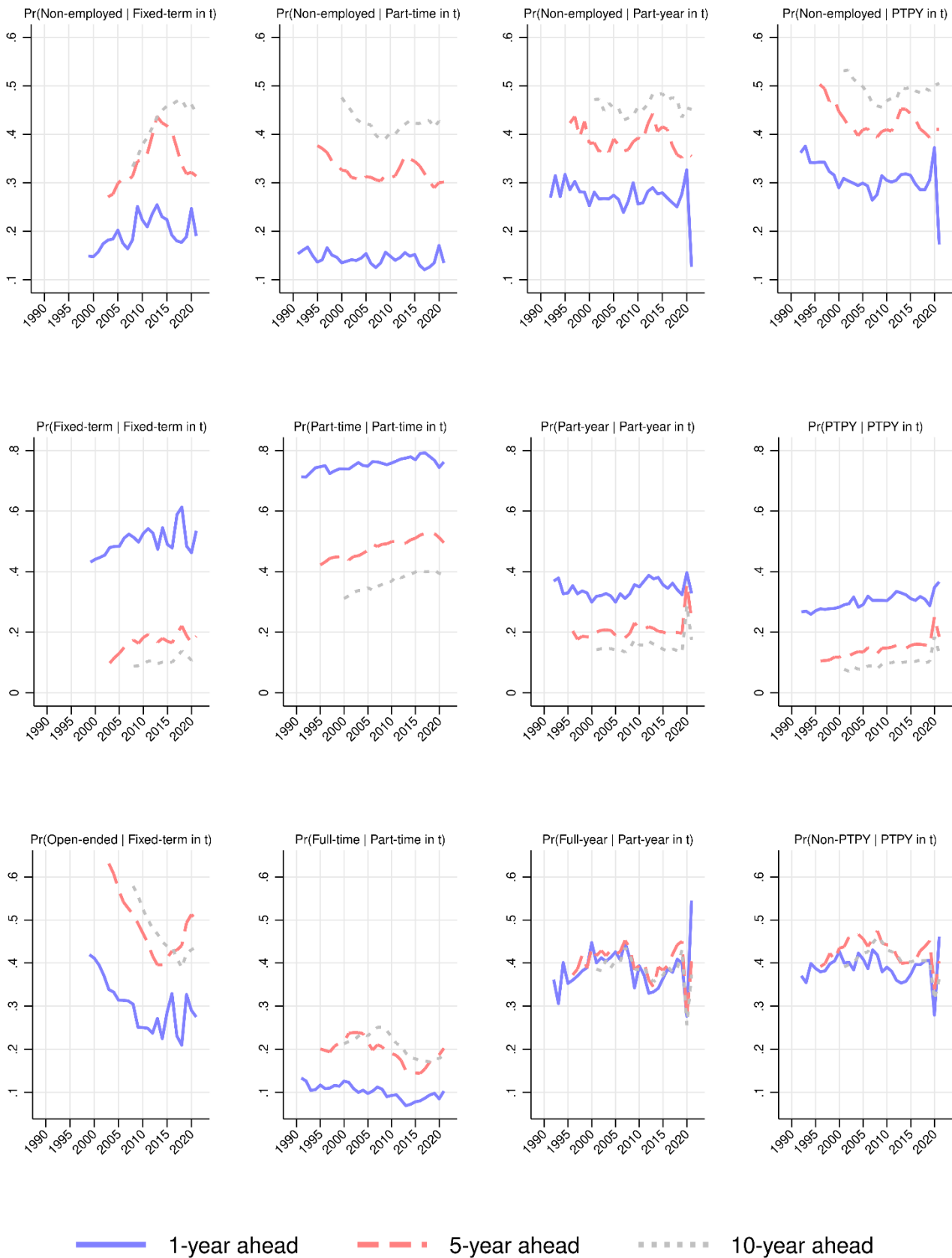
Notes: The figure reports the transition probabilities to non-employment and employment for different worker groups and at different time horizons. The first column shows, for each year reported on the horizontal axis, the probability for workers with fixed-term contracts of being non-employed (first row), employed fixed-term (second row), employed open-ended (third row) given that 1, 5 or 10 years before they were fixed-term. The second, third, and fourth columns report similar transition probabilities for part-time, part-year, and part-time/part-year (PTPY) workers. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

These results may partly be biased by early retirement of individuals with different contract types and work schedules. To ease this concern, we replicate the analysis focusing only on the age group 20-50 in Table A2. The non-employment probabilities are slightly lower, but the overall patterns of persistence are very similar to those found in the full sample of workers.

In summary, this evidence highlights two results. First, for all worker types—except fixed-term contracts—non-employment probability has generally become lower over time or has remained constant. Second, the persistence of unstable contractual statuses has considerably increased, exacerbating labour market duality and plausibly contributing to the increase in earnings inequality. However, note that the reduction in non-employment probability indicates that the overall inequality, factoring in employed and non-employed individuals, is actually lower, as the likelihood of having positive earnings is larger in more recent years. We here abstract from such considerations as we only focus on employed individuals. Such duality also affects the resilience of workers to negative macroeconomic shocks. Basso et al. (2023) show that the recovery after the pandemic shock has been highly heterogeneous between workers with stable and unstable employment: while the former were able to remain employed throughout the recession induced by the pandemic, the latter were displaced and only partially recovered after almost two years since the beginning of the pandemic.

The persistence into marginal employment may also reflect preferences of workers or constraints that affect workers' labour supply. We provide suggestive evidence on this point by exploiting the Italian Labour Force Survey, which helps to describe the characteristics of employees in involuntary part-time or temporary contract. About two-thirds of part-time workers would prefer a full-time job. The mismatch is larger for individuals who are younger and with low educational attainment, in Southern Italy, in hospitality and transportation, and in blue-collar jobs; interestingly, the mismatch is larger for men than for women, highlighting that supply factors are more likely to determine the part-time status for the latter than for the former. Almost all temporary workers would instead prefer an open-ended contract, and we still find that fixed-term workers are more likely to prefer a permanent contract if they live in Southern Italy and if they are younger.

6. Potential consequences of the rise in earnings inequality: the case of working poors

In this section, we provide evidence on working poors based on both definitions related to annual earnings and weekly wages (see Section 3). The share of working poors (employees whose compensation stands below 60 per cent of the median) is directly related to earnings inequality and its determinants, such as the aforementioned increase in the diffusion of unstable contractual positions and interrupted careers.[23] Figure 11 reports the share of working poors over total employees, according to the definition based on annual earnings (panel a) and on FTE weekly wages (panel b). The figure further distinguishes working poors among men and women. The working poor share is considerably different if one focuses on annual earnings or weekly wages: the former stands at 30 per cent in 2021, whilst the latter is slightly more than 5 per cent. Interestingly, this difference has

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[23] The presence of working poors is also related to the characteristics of the labour market, the tax system and the incidence of self-employment (D'Amuri, 2017). Industrial relations based on a centralized system and with high coverage levels have more compressed wage distributions, limiting the incidence of low-wage positions (Adamopoulou and Villanueva, 2022). Moreover, a progressive tax system and substantial tax rebates at the bottom of the pay distribution can increase the participation rate of low-wage workers, contributing to a higher working poor incidence. Finally, a higher self-employment share can affect the presence of working poors if low-wage jobs are concentrated among the self-employed.

increased over time: since 1990 the share of working poors in terms of annual earnings has *increased* by approximately 7 percentage points, while that based on weekly wages has *decreased* by 2 percentage points. The share of working poors is larger among women who hold more frequently atypical contracts (Table 1), and increasing at a faster rate than among men when looking at the definition in terms of annual earnings. In contrast, the gender gap in the share of working poors based on weekly wages is almost halved in 2021 with respect to 1990.

Figure 11. Share of working poors over time

(a) Definition based on annual earnings (b) Definition based on FTE weekly wages
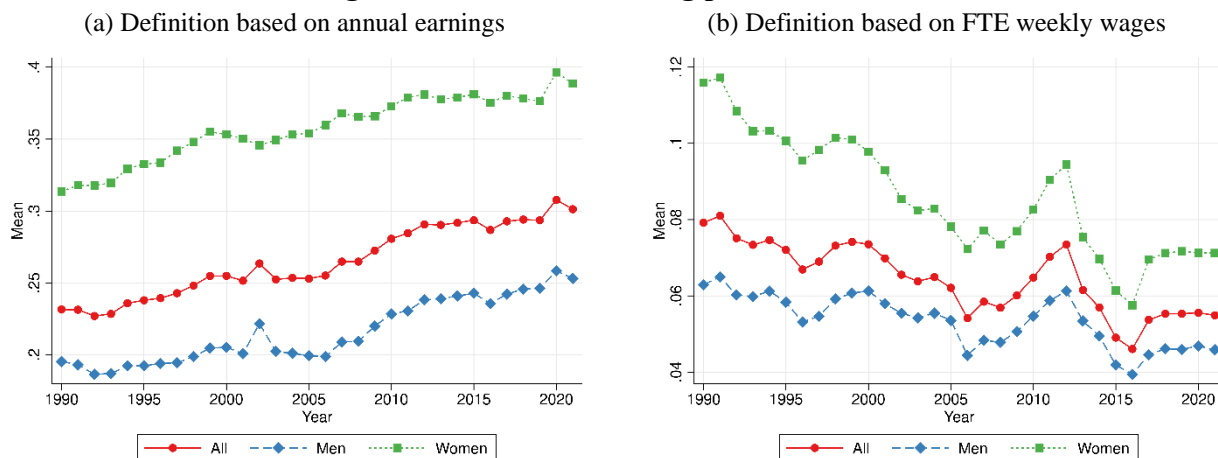
Notes: The figure reports the share of working poors, defined as workers with annual earnings (panel a) or weekly wages (panel b) below 60 per cent of the median of the yearly or weekly distribution, respectively. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Table 3 reports further descriptive statistics on working poors, comparing them with workers earning more than 60 per cent of the median (which we call "non-working poors"). The table shows cross-sectional averages taken over the whole period 1990-2021. Columns (1) and (2) refer to the definition based on annual earnings; columns (3) and (4) refer to that based on weekly wages. Working poors are considerably younger than the rest of the employees, signalling that the phenomenon may be concentrated in entry jobs (see D'Amuri, 2017). They have a substantially lower attachment to the labour market, working less than 30 weeks against more than 40 for non-working poors. Moreover, low-wage workers have more fragmented careers and flexible work schedules: they hold more job contracts in a year, they are more frequently employed for less than 52 weeks and more likely to be on fixed-term and seasonal contracts. Around half of them are new entrants in a firm and about a quarter moves to non-employment in the following year. The part-time share is larger among working poors only if one focuses on the definition based on annual earnings (40 vs. 9 per cent). They are disproportionately employed in the South and in services. Finally, working poors are sorted in smaller and younger firms, with lower average earnings.

Figure A9 in the Appendix shows that working poors are in fact employees with a low number of FTE weeks worked. Focusing on panel (a), which provides the decomposition of the share of working poors based on annual earnings, almost all of them are classified as part-year. At the beginning of the observation period, these workers were mainly employed with full-time contracts, while over time the share of part-time workers has considerably increased (from being close to a tenth of all working poors to more than half). Only a small share is instead made of workers with full-year positions. Among working poors based on weekly wages, the share with part-year positions and full-time contracts is the largest, even in the last decade.

Table 3. Descriptive statistics on working poors and non working poors

	(1) Working poor (annual)	(2) Non-working poor (annual)	(3) Working poor (weekly)	(4) Non-working poor (weekly)
Annual earnings	6,507.97	27,704.79	5,780.10	23,156.23
	(3,268.36)	(14,074.17)	(4,053.37)	(15,220.92)
Weekly wage	335.83	563.98	191.02	524.35
	(124.42)	(282.71)	(58.35)	(265.62)
Weeks worked	20.70	49.11	29.44	42.35
	(11.65)	(6.85)	(17.82)	(14.56)
Age	34.60	39.58	31.42	38.72
	(11.81)	(10.54)	(12.14)	(10.89)
Female	0.47	0.30	0.46	0.34
	(0.50)	(0.46)	(0.50)	(0.47)
Number of contracts	1.36	1.22	1.39	1.25
	(0.71)	(0.54)	(0.85)	(0.57)
Entrant	0.50	0.17	0.49	0.24
	(0.50)	(0.37)	(0.50)	(0.43)
E-NE rate	0.26	0.04	0.25	0.09
	(0.44)	(0.20)	(0.43)	(0.29)
Part-time	0.40	0.09	0.12	0.17
	(0.49)	(0.28)	(0.33)	(0.38)
Part-year	0.83	0.20	0.78	0.34
	(0.38)	(0.40)	(0.41)	(0.47)
Fixed-term	0.31	0.08	0.24	0.14
	(0.46)	(0.28)	(0.43)	(0.35)
Seasonal	0.05	0.01	0.03	0.02
	(0.21)	(0.07)	(0.17)	(0.13)
North	0.47	0.60	0.47	0.57
	(0.50)	(0.49)	(0.50)	(0.49)
Centre	0.20	0.19	0.21	0.19
	(0.40)	(0.39)	(0.40)	(0.40)
South	0.29	0.18	0.28	0.20
	(0.45)	(0.38)	(0.45)	(0.40)
Industry excl. constr.	0.24	0.43	0.30	0.39
	(0.43)	(0.50)	(0.46)	(0.49)
Construction	0.12	0.08	0.12	0.09
	(0.32)	(0.27)	(0.32)	(0.29)
Services	0.64	0.48	0.58	0.52
	(0.48)	(0.50)	(0.49)	(0.50)
Firm size	1077.44	2094.19	500.35	1912.96
	(5680.11)	(8532.50)	(3820.26)	(8080.99)
Firm earnings	15268.16	27392.46	12451.28	24954.22
	(7659.66)	(12344.79)	(6306.95)	(12413.60)
Age of the firm	10.68	16.93	9.82	15.63
	(10.42)	(12.69)	(9.65)	(12.52)
Observations	6,944,178	19,074,378	1,660,182	24,358,374

Notes. The table reports means and standard deviations (in parentheses) of variables for workers with annual earnings below and above 60 per cent of the median in each year (columns 1 and 2) and for workers with FTE weekly wages below and above 60 per cent of the median in each year (columns 3 and 4). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Similar to what done in Section 5, we measure the persistence into the working poor state. Figures 12 and 13 report the transition probabilities at 1, 5 and 10-year time windows between working poor, non-working poor and non-employment for workers that, at time t, are non-working poors or working poors, respectively (Table A3 reports the numbers for selected years). Figure 12 shows that non-working poors have small probabilities over calendar time of being non-employed or of becoming working poors at each window, both focusing on the definition based on annual earnings (left panel) and on that based on weekly wages (right panel). In particular, the non-employment probability drops in more recent years, especially at longer time windows: the 5-year non-employment probability in 2010 stands at 20 per cent, 5 percentage points lower than in 1990. For working poors (Figure 13), the picture changes dramatically. Although lower in more recent years, the 1-year ahead non-employment probability is larger than 20 per cent at each calendar time (left panel, first row; see also panel A of Table A3). At the 10-year window, around half of such workers are non-employed, with little differences across calendar years. The persistence into the working poor state has also increased. For instance, 56 per cent of working poors remain in the same condition after a year among those initially observed in 2020, against 53 per cent among those in 2010 and 44 per cent among those in 1990. For working poors in terms of weekly wages (right panel), the non-employment probability is also remarkably high at each time window (although not increasing over calendar time). The persistence of the condition is instead actually declining: 48 per cent of working poors were still in the same state in 1990 after a year, against 36 per cent in 2020. This partly explains why the share of "weekly" working poors has declined over time, whilst that of "annual" working poors is on a steady positive trend. This pattern is fully consistent with the larger volatility over time in annual earnings and the much more compressed distribution for the weekly wages. Table A4 shows that these results are largely unaffected if one focuses on the age group 20-50.

7. Concluding remarks

This paper provides a variety of measures, both in terms of annual and weekly worker compensation, of inequality and volatility in Italy in the last three decades based on detailed administrative matched employer-employee data. We derive different indications depending on the measure being analysed: inequality in annual earnings, which also displays a high cyclicality, has steeply increased between 1990 and 2021, whilst that in weekly wages remained fairly constant, except for an increase during the double dip recession. The diverging behaviour of the two indicators reflects the quantity of work, i.e., the number of full-time equivalent weeks worked in a year, that has decreased constantly over time, mirroring the widespread diffusion of atypical contracts, such as fixed-term and part-time. We are among the first to provide evidence on the evolution of inequality in Italy using administrative data during the Covid-19 pandemic, confirming the different patterns of earnings inequality, which increased momentarily, and weekly wages, which remained unaffected.

The longitudinal dimension of our data allows us to introduce new simple measures of persistence in disadvantaged job positions—fixed-term, part-time, part-year, and working poors. We find that this persistence is high and increasing over time. Workers in these positions have on average lower human capital and are younger. Overall, these figures imply potential long-lasting negative consequences, especially in the resilience to adverse macroeconomic shocks.

Figure 12. Transition probabilities, non-working poors
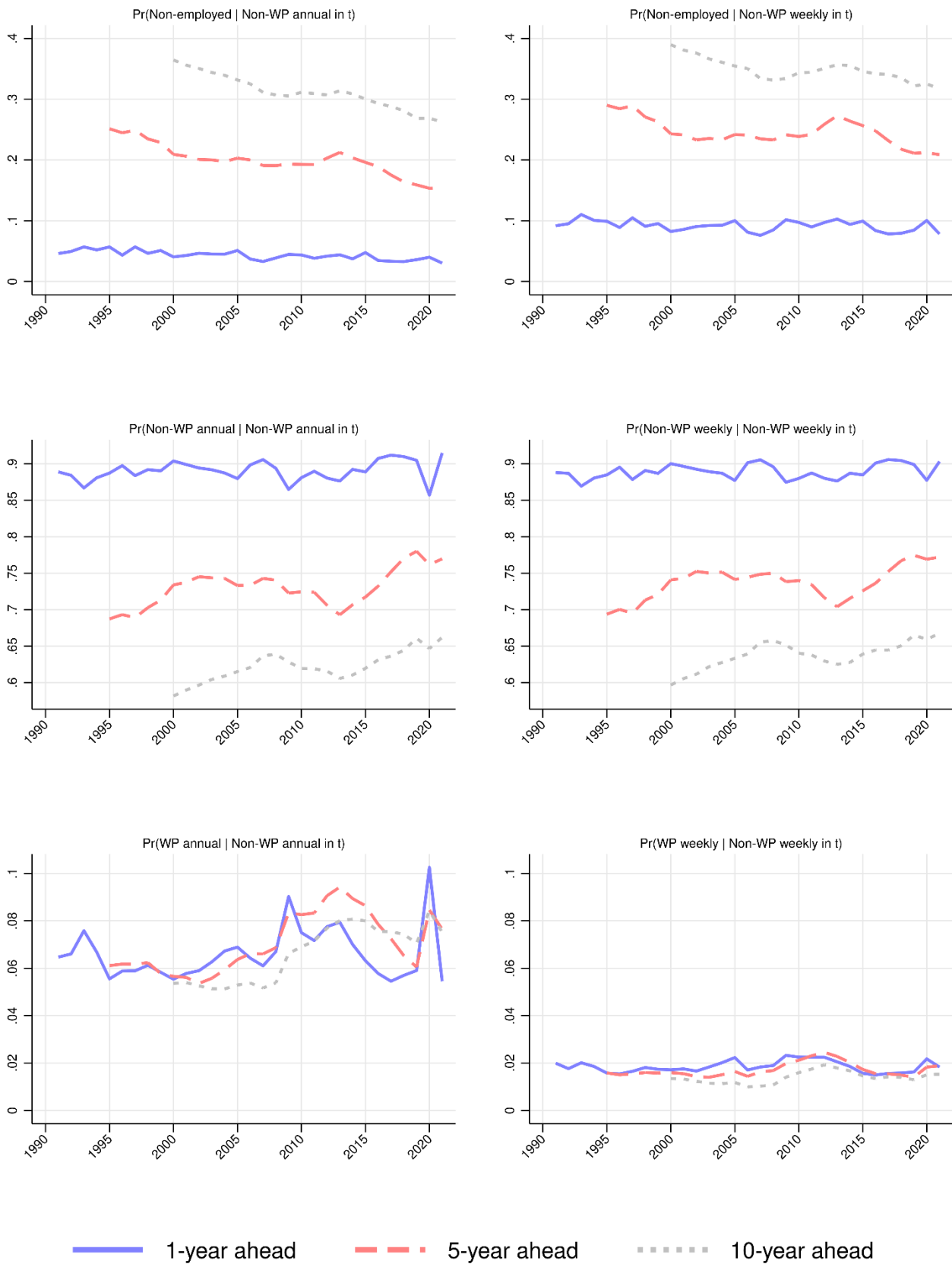
Notes: The figure reports the transition probabilities to non-employment and employment for non-working poors (Non-WP; according to the annual and weekly definition in the left and right panels, respectively). As an example, the left panels show, for each year reported on the horizontal axis, the probability for non-working poors of being non-employed (first row), employed working poor (second row), employed non-working poor (third row) given that 1, 5 or 10 years before they were not working poors. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure 13. Transition probabilities, working poors
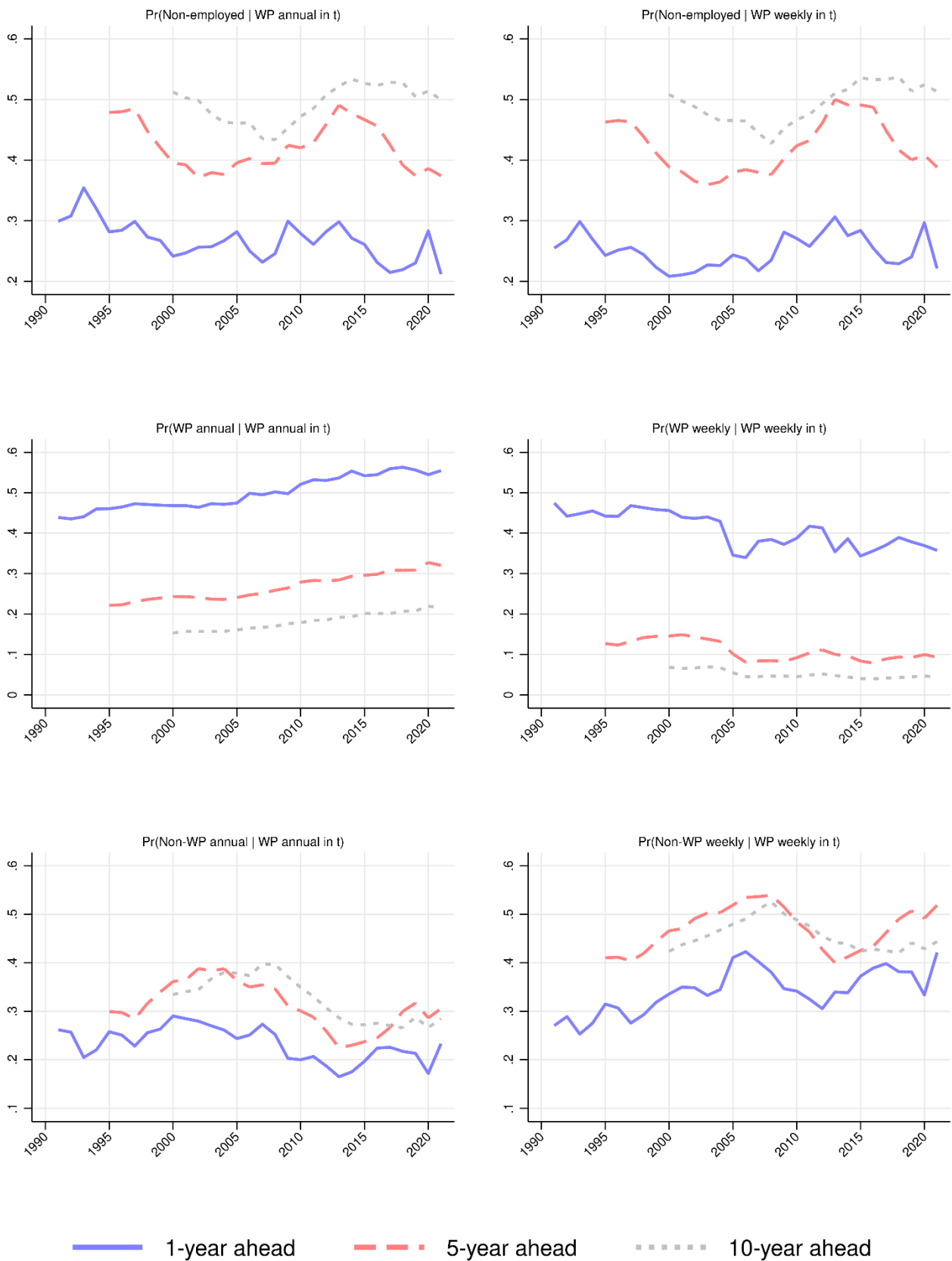
Notes: The figure reports the transition probabilities to non-employment and employment for working poors (WP; according to the annual and weekly definition in the left and right panels, respectively). As an example, the left panels show, for each year reported on the horizontal axis, the probability for working poors of being non-employed (first row), employed working poor (second row), employed non-working poor (third row) given that 1, 5 or 10 years before they were not working poors. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

We are aware of some limitations of our study, that—although common to all the existing literature that uses administrative data—should be kept in mind when interpreting the results. First of all, we only observe employees. This is our population of interest, and we do not attempt to generalize the results beyond it. Second, for this population we do not observe variables that are likely to be drivers of inequality and volatility, e.g. educational attainment or household type.

Nonetheless, the richness of the data and the precision of the administrative source render this analysis a starting point to better understand the most recent evolutions of earnings inequality and volatility in Italy.

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Appendix A. Additional Tables and Figures

Table A1. Transition probabilities by contract type, work schedule type and amount of work

			$t+1$			$t+5$			$t+10$	
[A] Contract type										
	t	Non-employed	Fixed-term	Open-ended	Non-employed	Fixed-term	Open-ended	Non-employed	Fixed-term	Open-ended
Open-ended in t	1998	10.1	2.6	87.3	24.2	3.6	72.1	33.9	4.8	61.3
Open-ended in t	2000	8.8	2.8	88.4	24.7	4.7	70.6	35.0	5.4	59.6
Open-ended in t	2010	8.0	3.7	88.3	24.3	5.7	70.0	31.4	5.1	63.5
Open-ended in t	2020	6.4	3.5	90.1						
Fixed-term in t	1998	14.9	43.1	42.0	27.1	9.8	63.1	33.3	8.8	57.9
Fixed-term in t	2000	15.7	44.7	39.5	29.9	13.0	57.1	37.9	9.6	52.6
Fixed-term in t	2010	20.9	54.2	24.9	41.8	17.0	41.2	46.2	10.7	43.1
Fixed-term in t	2020	19.0	53.5	27.5						
[B] Work schedule type										
	t	Non-employed	Part-time	Full-time	Non-employed	Part-time	Full-time	Non-employed	Part-time	Full-time
Full-time in t	1990	10.3	0.9	88.9	30.1	2.5	67.5	39.6	3.8	56.6
Full-time in t	2000	9.0	1.5	89.5	24.5	4.2	71.3	34.7	6.2	59.2
Full-time in t	2010	9.1	2.4	88.5	25.3	6.9	67.7	31.6	8.3	60.1
Full-time in t	2020	6.7	2.6	90.7						
Part-time in t	1990	15.3	71.3	13.3	37.7	42.2	20.1	47.6	31.1	21.3
Part-time in t	2000	13.8	73.9	12.3	31.3	47.1	21.7	40.3	36.8	22.9
Part-time in t	2010	14.0	76.5	9.4	34.4	51.0	14.5	42.7	39.4	17.8
Part-time in t	2020	13.5	76.2	10.3						
[C] Amount of work										
	t	Non-employed	Part-year	Full-year	Non-employed	Part-year	Full-year	Non-employed	Part-year	Full-year
Full-year in t	1991	2.3	13.7	84.0	22.5	9.7	67.8	34.8	7.2	58.0
Full-year in t	2000	2.2	11.8	86.0	18.9	9.4	71.7	30.3	10.1	59.5
Full-year in t	2010	1.6	11.2	87.3	17.7	10.0	72.4	25.8	27.8	46.4
Full-year in t	2020	1.2	8.1	90.6						
Part-year in t	1991	26.9	36.9	36.2	42.4	20.4	37.3	47.2	14.2	38.6
Part-year in t	2000	28.1	31.9	40.1	39.1	19.0	41.9	45.7	15.8	38.5
Part-year in t	2010	25.9	36.9	37.2	41.6	20.1	38.4	45.5	29.0	25.6
Part-year in t	2020	12.7	32.8	54.5						
[D] Work schedule and amount of work										
	t	Non-employed	PT/PY	Non PT/PY	Non-employed	PT/PY	Non PT/PY	Non-employed	PT/PY	Non PT/PY
Non PT/PY in t	1991	8.4	0.6	91.0	27.4	0.8	71.9	37.8	0.9	61.3
Non PT/PY in t	2000	6.9	1.2	91.9	22.6	1.4	76.1	33.1	1.5	65.4
Non PT/PY in t	2010	6.7	2.1	91.2	22.7	2.3	75.0	29.8	6.0	64.2
Non PT/PY in t	2020	5.2	1.6	93.2						
PT/PY in t	1991	36.2	26.7	37.1	50.3	10.5	39.2	53.1	7.8	39.1
PT/PY in t	2000	30.9	29.1	40.0	41.0	13.4	45.6	46.9	10.0	43.1
PT/PY in t	2010	30.2	31.7	38.1	44.3	15.6	40.1	50.0	18.5	31.5
PT/PY in t	2020	17.3	36.6	46.1						

Notes: The table reports the transition probabilities to non-employment and employment for different worker groups and at different time horizons. Panel A shows, for each year t, the probability for workers with open-ended or fixed-term contracts of being non-employed, employed open-ended, employed fixed-term after 1, 5 or 10 years. Panels B, C and D report similar transition probabilities for full-time, part-time, full-year, part-year, part-time/part-year and non part-time/part-year workers. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Table A2. Transition probabilities by contract type, work schedule type and amount of work; age group 20-50

		$t+1$			$t+5$			$t+10$		
[A] Contract type										
	t	Non-employed	Fixed-term	Open-ended	Non-employed	Fixed-term	Open-ended	Non-employed	Fixed-term	Open-ended
Open-ended in t	1998	8.2	2.8	89.0	19.5	3.7	76.8	29.8	4.9	65.3
Open-ended in t	2000	7.7	3.0	89.4	20.2	4.8	75.0	30.5	5.5	64.0
Open-ended in t	2010	7.1	3.9	89.0	21.6	6.0	72.3	28.5	5.3	66.2
Open-ended in t	2020	5.9	4.1	90.1						
Fixed-term in t	1998	14.2	43.5	42.2	26.2	9.6	64.2	32.5	8.8	58.8
Fixed-term in t	2000	15.0	44.7	40.3	29.0	12.9	58.2	37.2	9.5	53.3
Fixed-term in t	2010	20.3	54.2	25.5	40.5	17.1	42.3	45.3	10.8	43.9
Fixed-term in t	2020	18.8	53.3	28.0						

		$t+1$			$t+5$			$t+10$		
[B] Work schedule type										
	t	Non-employed	Part-time	Full-time	Non-employed	Part-time	Full-time	Non-employed	Part-time	Full-time
Full-time in t	1990	8.7	1.0	90.3	25.0	2.7	72.3	36.2	4.0	59.8
Full-time in t	2000	7.8	1.6	90.6	20.1	4.5	75.4	30.3	6.5	63.2
Full-time in t	2010	8.2	2.6	89.3	22.6	7.4	70.0	28.7	8.6	62.7
Full-time in t	2020	6.2	2.9	90.9						
Part-time in t	1990	14.6	72.0	13.3	35.4	44.2	20.4	45.8	32.7	21.5
Part-time in t	2000	13.5	73.8	12.7	29.3	48.3	22.4	38.0	38.5	23.5
Part-time in t	2010	13.8	76.4	9.8	33.4	51.5	15.2	41.5	40.2	18.3
Part-time in t	2020	13.7	74.9	11.4						

		$t+1$			$t+5$			$t+10$		
[C] Amount of work										
	t	Non-employed	Part-year	Full-year	Non-employed	Part-year	Full-year	Non-employed	Part-year	Full-year
Full-year in t	1991	1.6	12.5	86.0	16.4	11.3	72.3	30.1	10.1	59.7
Full-year in t	2000	1.4	11.2	87.4	12.9	11.6	75.5	24.2	14.6	61.2
Full-year in t	2010	0.8	10.9	88.3	12.9	13.2	73.9	20.1	31.9	48.0
Full-year in t	2020	0.8	7.4	91.9						
Part-year in t	1991	21.2	43.7	35.1	36.1	28.1	35.8	43.6	20.9	35.6
Part-year in t	2000	19.4	47.4	33.2	31.4	33.9	34.7	39.8	29.5	30.8
Part-year in t	2010	16.6	56.3	27.1	33.3	38.5	28.2	39.9	40.1	20.0
Part-year in t	2020	10.2	49.1	40.7						

		$t+1$			$t+5$			$t+10$		
[D] Work schedule and amount of work										
	t	Non-employed	PT/PY	Non PT/PY	Non-employed	PT/PY	Non PT/PY	Non-employed	PT/PY	Non PT/PY
Non PT/PY in t	1991	6.8	0.6	92.6	21.5	2.3	76.3	33.5	3.4	63.1
Non PT/PY in t	2000	5.9	0.8	93.3	17.2	3.4	79.4	27.8	5.1	67.0
Non PT/PY in t	2010	6.2	1.2	92.6	19.1	5.2	75.7	25.7	6.8	67.5
Non PT/PY in t	2020	4.8	1.1	94.1						
PT/PY in t	1991	12.9	70.5	16.6	31.9	45.3	22.8	42.3	32.5	25.2
PT/PY in t	2000	10.9	70.5	18.7	25.6	48.1	26.3	34.8	38.4	26.8
PT/PY in t	2010	11.0	73.6	15.4	29.0	50.4	20.6	37.7	40.1	22.2
PT/PY in t	2020	11.9	70.4	17.6						

Notes: The table reports the transition probabilities to non-employment and employment for different worker groups and at different time horizons, for workers that at time t are between 20 and 50 years old. Panel A shows, for each year t, the probability for workers with open-ended or fixed-term contracts of being non-employed, employed open-ended, employed fixed-term after 1, 5 or 10 years. Panels B, C and D report similar transition probabilities for full-time, part-time, full-year, part-year, part-time/part-year and non part-time/part-year workers. *Source*: INPS, employees between 20 and 50 years of age in the private non-agricultural sector, 1990-2021.

Table A3. Transition probabilities by working poor status

[A] Annual definition

	t	$t+1$ Non-employed	$t+1$ Working poor	$t+1$ Non working poor	$t+5$ Non-employed	$t+5$ Working poor	$t+5$ Non working poor	$t+10$ Non-employed	$t+10$ Working poor	$t+10$ Non working poor
Non working poor in t	1990	4.6	6.5	88.9	25.1	6.1	68.8	36.5	5.4	58.2
Non working poor in t	2000	4.3	5.8	89.9	20.3	6.4	73.3	31.1	6.9	61.9
Non working poor in t	2010	3.8	7.2	89.0	19.6	8.6	71.7	26.9	8.4	64.7
Non working poor in t	2020	3.0	5.4	91.5						
Working poor in t	1990	29.9	43.9	26.2	47.9	22.2	29.9	51.2	15.3	33.5
Working poor in t	2000	24.7	46.8	28.5	39.6	24.1	36.4	47.2	17.9	34.9
Working poor in t	2010	26.1	53.2	20.7	46.7	29.6	23.7	51.4	22.0	26.6
Working poor in t	2020	21.2	55.5	23.3						

[B] Weekly definition

	t	$t+1$ Non-employed	$t+1$ Working poor	$t+1$ Non working poor	$t+5$ Non-employed	$t+5$ Working poor	$t+5$ Non working poor	$t+10$ Non-employed	$t+10$ Working poor	$t+10$ Non working poor
Non working poor in t	1990	9.2	2.0	88.8	29.0	1.6	69.4	39.0	1.3	59.7
Non working poor in t	2000	8.6	1.8	89.7	24.2	1.6	74.2	34.4	1.6	64.1
Non working poor in t	2010	9.0	2.2	88.8	25.7	1.7	72.6	32.5	1.5	66.0
Non working poor in t	2020	7.8	1.8	90.3						
Working poor in t	1990	25.5	47.5	27.1	46.3	12.7	41.0	50.8	6.8	42.4
Working poor in t	2000	21.1	44.0	35.0	38.0	10.1	51.9	46.7	4.5	48.9
Working poor in t	2010	25.8	41.7	32.5	49.1	8.4	42.5	52.5	4.7	42.9
Working poor in t	2020	22.1	35.7	42.1						

Notes: The table reports the transition probabilities to non-employment and employment for different worker groups and at different time horizons. It shows, for each year t, the probability for working poors or non working poors of being non-employed, employed working poor, employed non working poor after 1, 5 or 10 years. Panels A and B use the definitions of working poors based on annual earnings and weekly wages, respectively. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Table A4. Transition probabilities by working poor status, age group 20-50

|		t + 1			t + 5			t + 10		
[A] Annual definition										
	t	Non-employed	Working poor	Non working poor	Non-employed	Working poor	Non working poor	Non-employed	Working poor	Non working poor
Non working poor in t	1990	3.6	5.8	90.6	19.5	6.2	74.2	32.5	5.4	62.1
Non working poor in t	2000	3.3	5.6	91.1	15.2	6.5	78.2	26.0	7.2	66.8
Non working poor in t	2010	3.0	7.3	89.7	16.6	8.9	74.5	23.6	8.5	67.9
Non working poor in t	2020	2.4	5.6	92.0						
Working poor in t	1990	29.9	41.5	28.6	48.4	23.3	28.3	52.6	16.3	31.1
Working poor in t	2000	24.0	45.9	30.1	39.0	24.4	36.6	46.9	18.5	34.7
Working poor in t	2010	25.2	53.1	21.7	45.6	29.7	24.7	50.9	22.1	27.0
Working poor in t	2020	20.6	55.0	24.5						
[B] Weekly definition										
	t	Non-employed	Working poor	Non working poor	Non-employed	Working poor	Non working poor	Non-employed	Working poor	Non working poor
Non working poor in t	1990	7.9	1.8	90.3	24.0	1.6	74.3	35.5	1.3	63.2
Non working poor in t	2000	7.5	1.7	90.8	19.8	1.7	78.5	30.0	1.6	68.4
Non working poor in t	2010	8.3	2.3	89.4	23.2	1.8	75.0	29.9	1.5	68.6
Non working poor in t	2020	7.5	2.0	90.5						
Working poor in t	1990	28.0	42.3	29.7	50.5	16.2	33.3	56.1	9.0	34.9
Working poor in t	2000	21.3	42.1	36.6	39.3	10.0	50.7	48.0	4.6	47.4
Working poor in t	2010	25.1	40.0	34.9	48.5	8.0	43.5	52.5	4.6	42.8
Working poor in t	2020	21.7	34.2	44.1						

Notes: The table reports the transition probabilities to non-employment and employment for different worker groups and at different time horizons, for workers that at time t are between 20 and 50 years old. It shows, for each year t, the probability for working poors or non working poors of being non-employed, employed working poor, employed non working poor after 1, 5 or 10 years. Panels A and B use the definitions of working poors based on annual earnings and weekly wages, respectively. *Source*: INPS, employees between 20 and 50 years of age in the private non-agricultural sector, 1990-2021.

## Figure A1. A comparison between INPS, National Accounts, EU-SILC and LFS
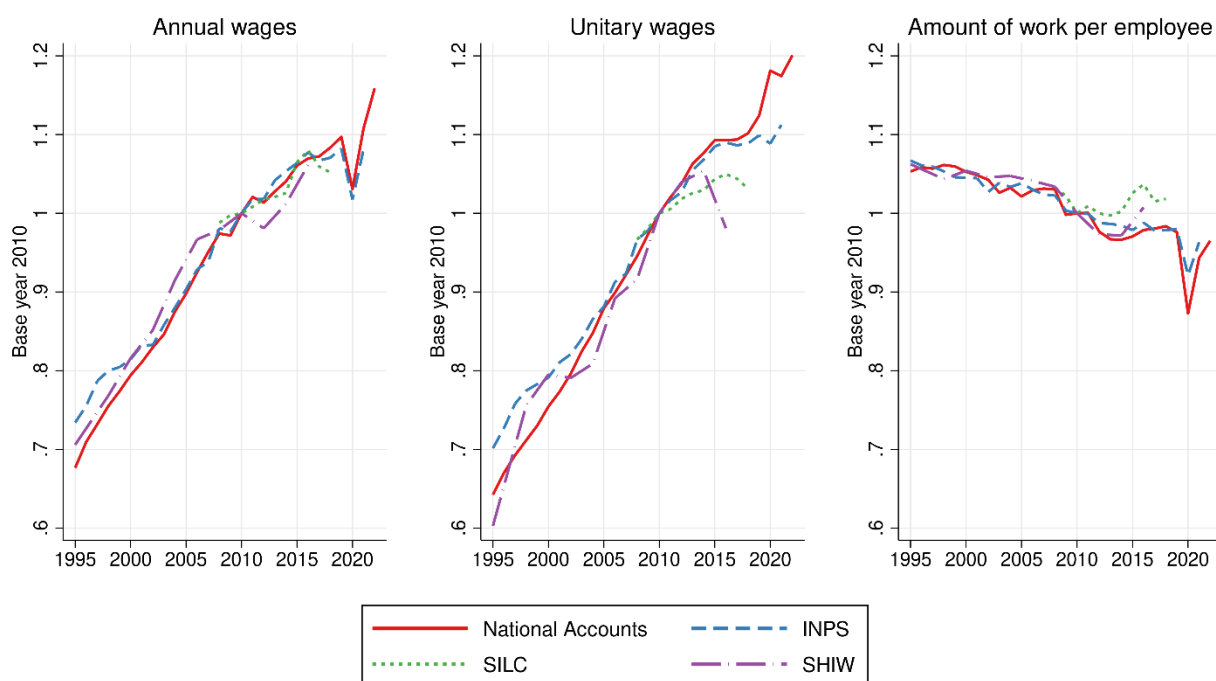
Notes: The left panel reports the annual compensation per employee for National Accounts, and gross annual earnings for INPS, EU-SILC and SHIW. The central panel shows hourly compensation for National Accounts, FTE weekly wages for INPS, FTE monthly wages for EU-SILC, and hourly wages for SHIW. The right panel shows average hours per employee for National Accounts; FTE weeks worked for INPS; FTE months worked for EU-SILC, and average hours per employee for SHIW. All measures refer to employees in the non-agricultural private sector. All values are normalized to 1 in 2010. *Source:* author's elaborations on INPS, National Accounts, EU-SILC, and SHIW.

Figure A2. Trends in the labour market: employment shares and amount of work by gender

(a) Employment shares

(b) Amount of work
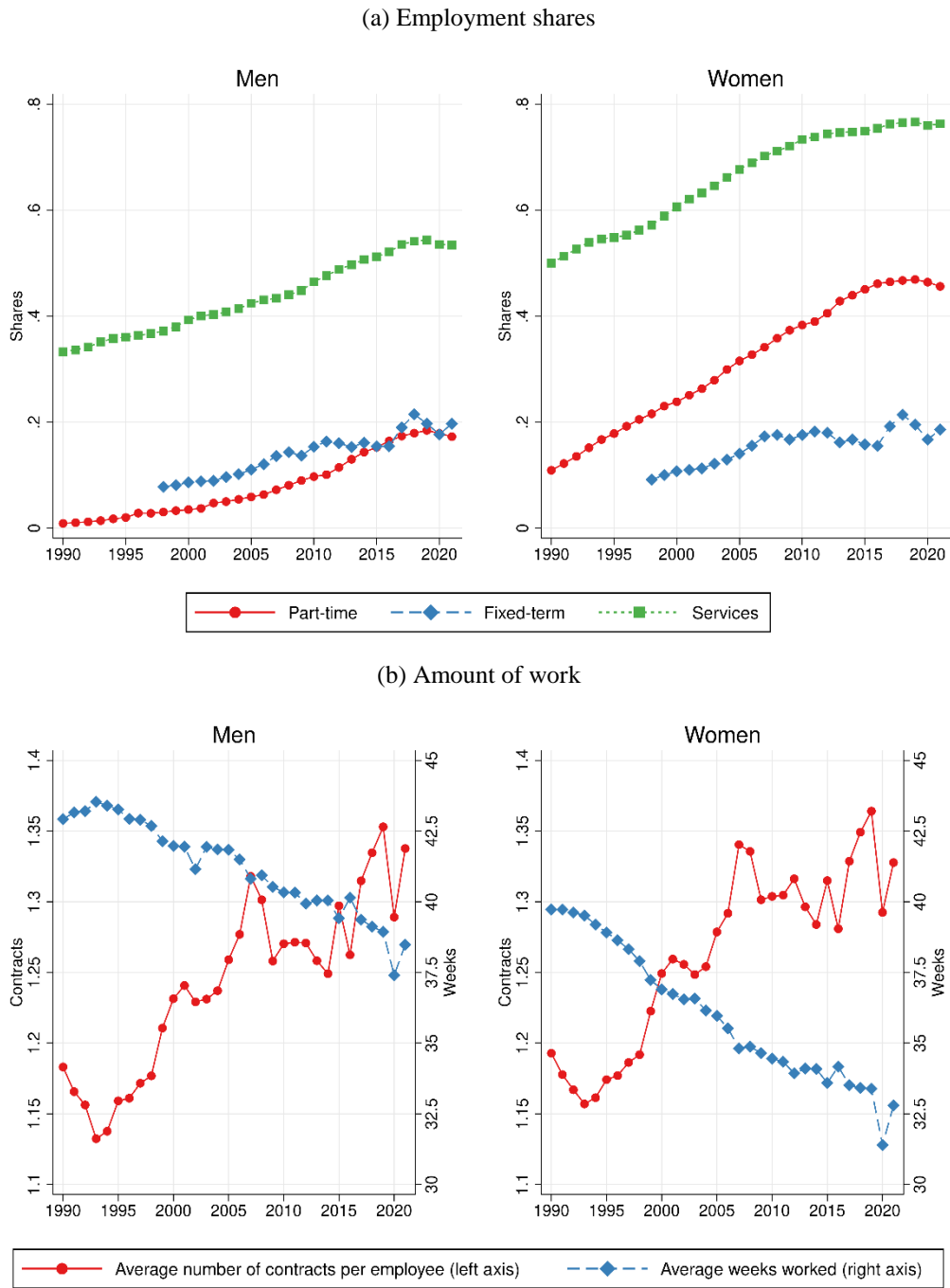
Notes: The figure reports, separately by gender, the average shares of part-time, fixed-term, and service workers in panel (a); the average FTE weeks worked and the average number of contracts per employee in panel (b). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure A3. Change in log annual earnings, log weekly wages, log weeks worked by quintiles of the distribution of log annual earnings by year
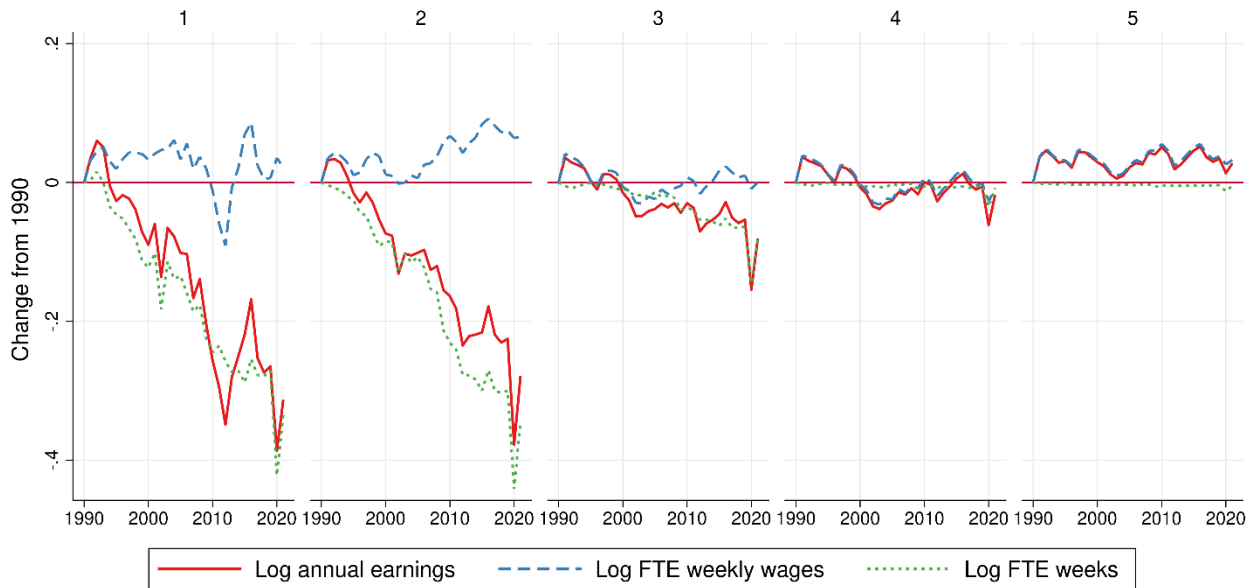
Notes: The figure reports the average log annual earnings, the average log FTE weekly wages, and the average log weeks worked in deviations from 1990 within the quintiles of the yearly log annual earnings distribution. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure A4. The correlation between weekly wages and weeks worked

(a) Raw correlation in 1990 and 2021   (b) Evolution of the wage-to-week elasticity
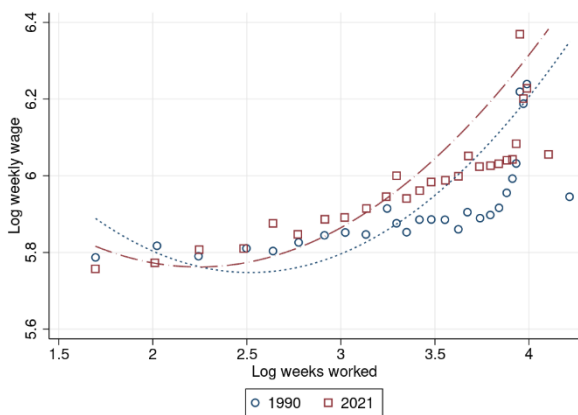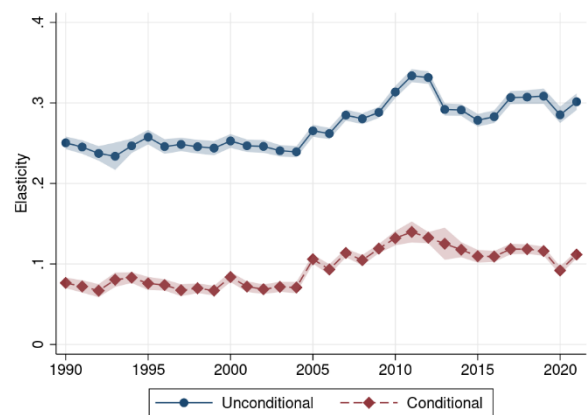
Notes: Panel (a) reports a scatter plot of log weekly wages against log weeks worked in 1990 and 2021, alongside a quadratic fit. Panel (b) shows the elasticity of weekly wages to weeks worked, obtained from unconditional and conditional OLS regressions. The latter control for the number of contracts held by a worker, a quadratic polynomial in age, a dummy for females and for part-time workers and firm fixed effects. Shaded areas are 95 per cent confidence interval, obtained from standard errors clustered at the firm-level. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

**Figure A5. Comparison between variance decompositions, full and restricted sample**
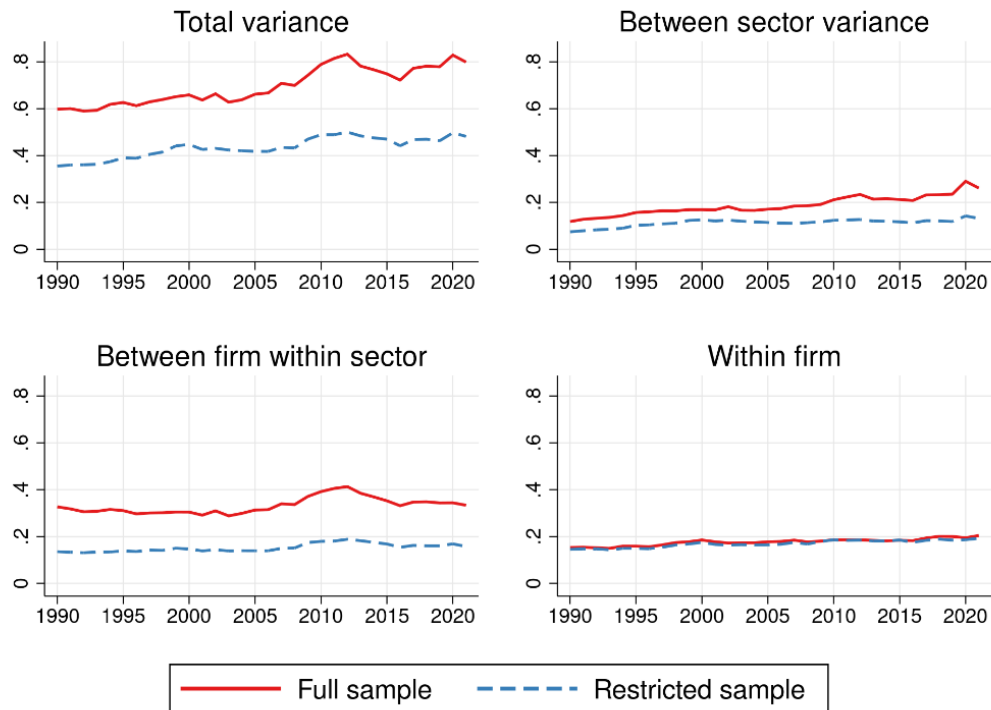
Notes: The figure shows the variance of log annual earnings and its between-sector (variance of average sector earnings), within-sector between-firm (variance of the difference between average firm earnings and average sector earnings), and within-firm components (variance of the difference between individual earnings and average firm earnings). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021 for the full sample; the restricted sample is limited to full-time workers between the ages of 20 and 60, on firms employing at least 10 such workers, and drops in each year workers in the bottom 5 percentiles of the earnings distribution.

Figure A6. Share of marginal workers
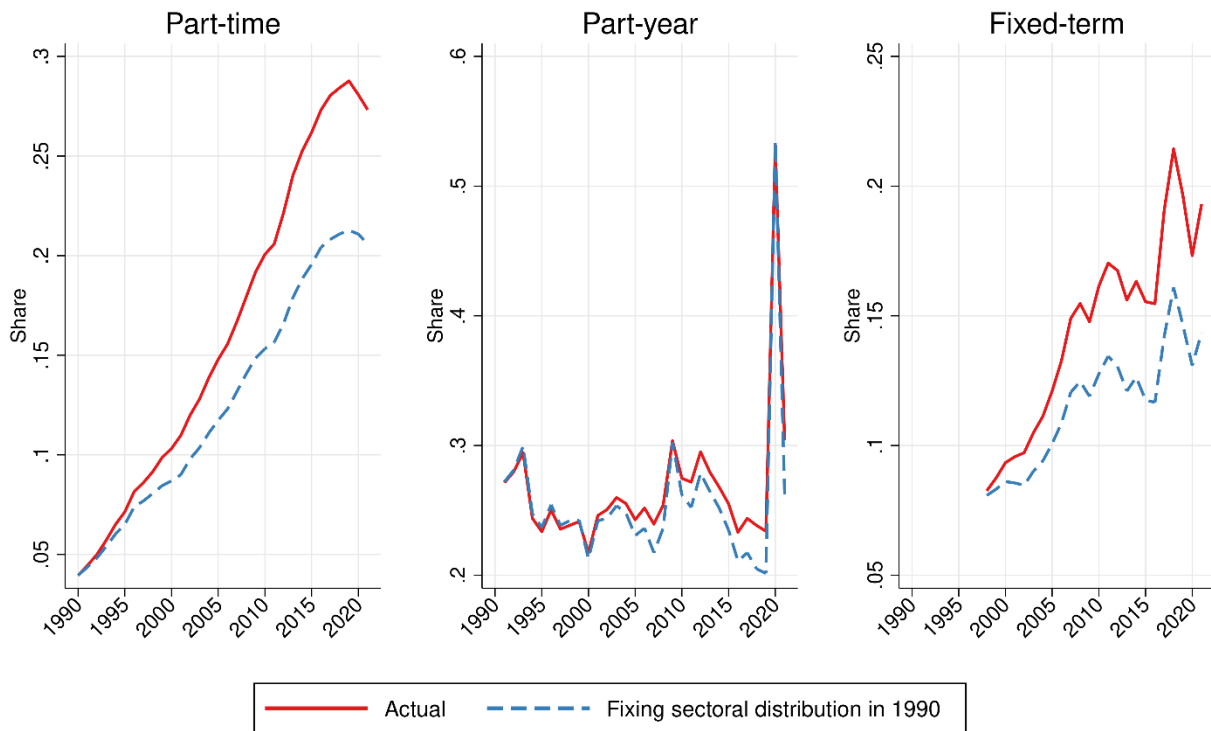
Notes: The figure reports the actual share of part-time, part-year and fixed-term workers and the one obtained by fixing the employment shares in each 2-digit sector at the 1990 level (i.e., a weighted average of sector-specific part-time/part-year/fixed-term shares with weights given by the sector-specific employment shares in 1990). *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure A7. Gaps in log annual earnings and log weekly wages
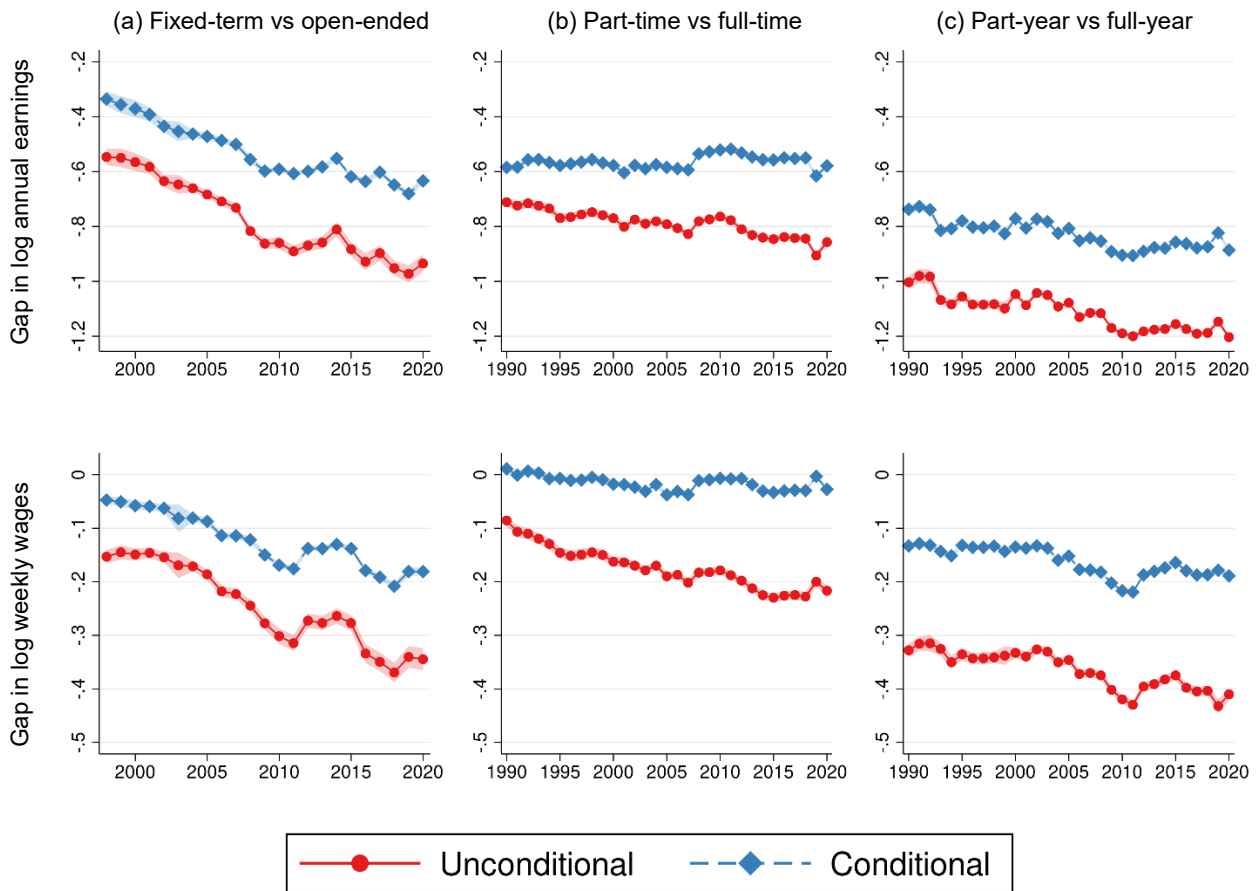
Notes: The figure reports the gap in log annual earnings (upper panels) and log FTE weekly wages (lower panels) between fixed-term and open-ended workers (panel a), part-time and full-time workers (panel b), part-year and full-year workers (panel c). The estimates are obtained from cross-sectional OLS regressions where the dependent variable is the log of annual earnings or weekly wages and the main explanatory variable is a dummy for fixed-term/part-time/part-year. The conditional regressions include controls for a quadratic polynomial in age, and dummies for women, 2-digit sector, province and broad occupation. Shaded areas are 95 per cent confidence interval, obtained from standard errors clustered at the firm-level. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.

Figure A8. Probability of switching from full-time to part-time by gender
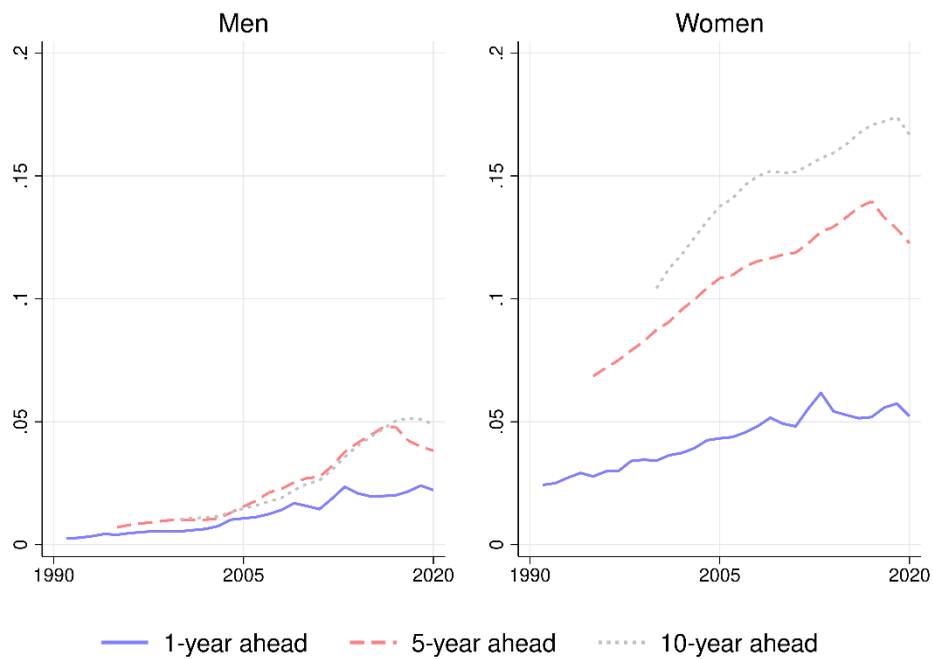

Notes: The figure reports the transition probabilities to part-time for full-time workers at different time horizons, and separately by gender. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.
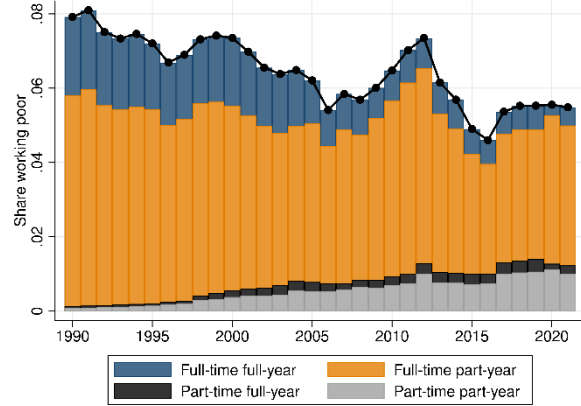
Figure A9. Decomposition of the share of working poors

(a) Definition based on annual earnings   (b) Definition based on FTE weekly wages
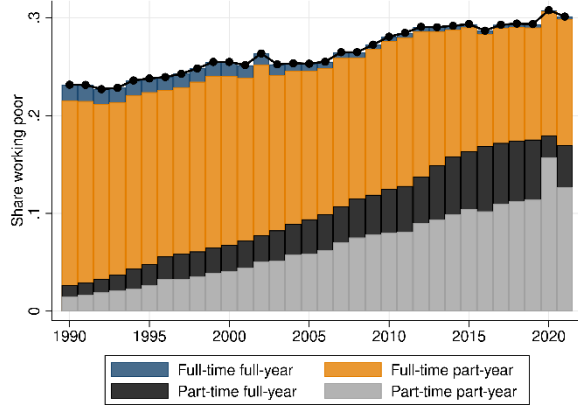
Notes: The figure shows a decomposition of the share of working poors, according to the definition based on annual earnings in panel (a) and FTE weekly wages in panel (b), into full-time full-year workers, full-time part-year workers, part-time full-year workers, and part-time part-year workers. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021.
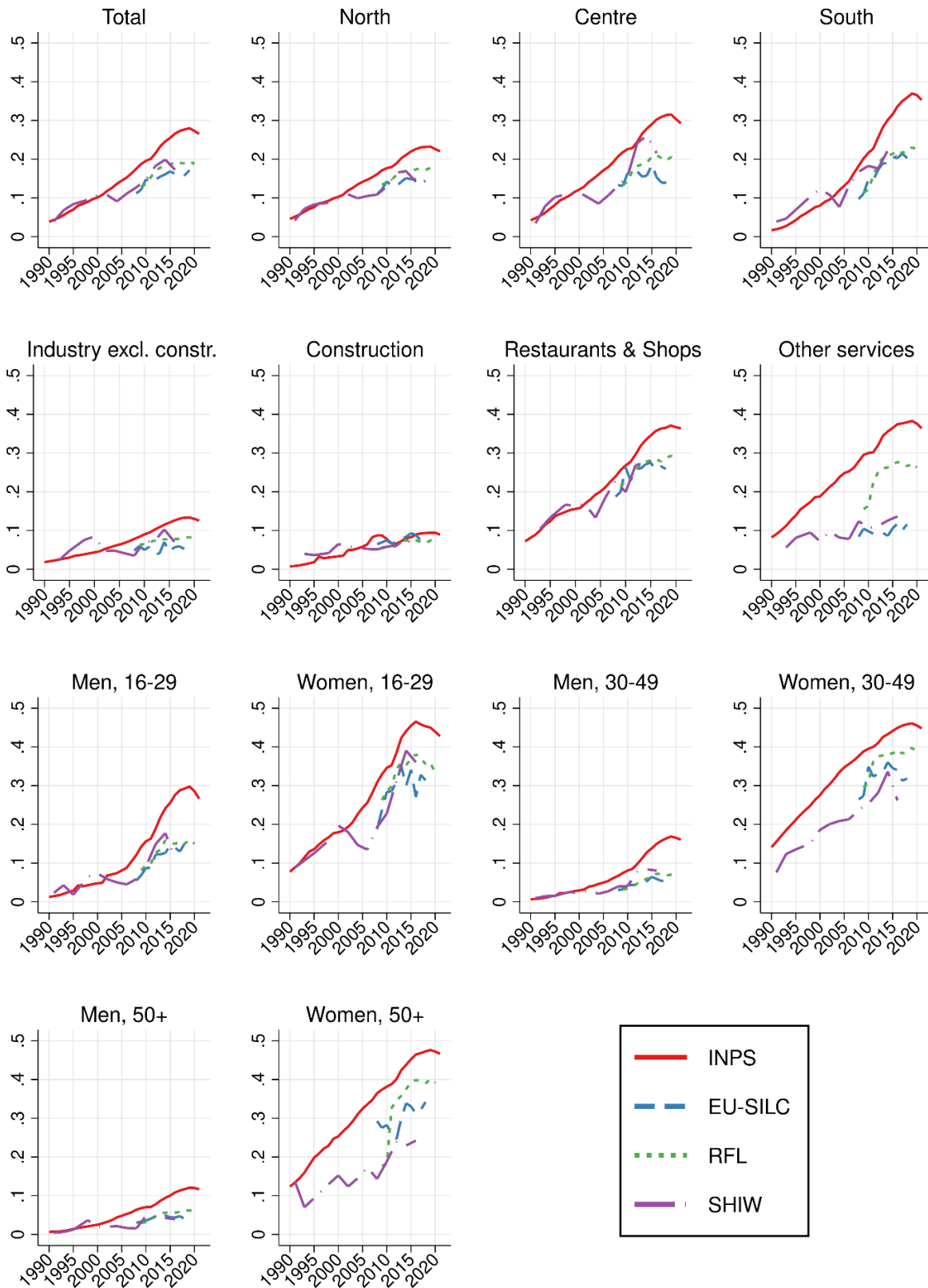
Appendix B. The share of part-time workers in INPS

The large increase in part-time positions in INPS has to be interpreted with caution. Figure B1 in the Appendix compares the dynamics of the share of part-time contracts in INPS administrative data and in various surveys: EU-SILC, the Survey of Household Income and Wealth (SHIW), and the Labour Force Survey (LFS). The part-time share is significantly higher in INPS than in survey data, at least from 2004, with varying differences according to the data source: in the private non-agricultural sectors,[24] it stands at 27 per cent in INPS, 19 per cent in the LFS, and 17 per cent in the SHIW and in EU-SILC in 2020. The differences are hardly stemming from errors in survey data. More likely, the over-representation in INPS signals the presence of misreporting, i.e., workers that are formally recorded as part-time but that are actually working full-time. The figure also shows that the over-representation is generally stronger for younger workers of either gender, in services and in the Centre and South of Italy, where informality is higher, according to official estimates from Istat. Unfortunately, there is no easy workaround to adjust for these differences, without making strong assumptions about the direction of the bias in the administrative or survey data. Given that the dynamics of weeks worked in INPS mirrors quite well that of hours in the National Accounts (see Figure A1), the paper takes as accurate the measure of part-time provided by INPS records.

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[24] Because sector information is not uniform across data sources, we conventionally select sections B to N of the NACE Rev. 2 classification to have a consistent sample selection in both administrative and survey data.

**Figure B1. The share of part-time workers in different data sources**

Notes: The figure reports the share of part-time workers on aggregate and by subgroups defined by region, sector, gender and age. Only NACE rev. 2 sectors B-N are considered. *Source*: INPS, Survery of Household Income and Wealth (SHIW), Labour Force Survey (LFS), Survey of Income and Living Conditions (EU-SILC).

Appendix C. Variance of earnings and wages in the sample data and in the universe of firms

In the main analysis, we only observe a sample of workers in each firm. Therefore, one could argue that we do not have enough observations to properly measure average firm earnings, especially in smaller firms. To ease this concern, we exploit the firm-level data on the universe of firms in the non-agricultural private sector. These data record average monthly earnings and the number of employees in different job occupations (blue-collar, white-collar, middle manager, executives). We compute firm earnings as the weighted average of occupation-specific earnings using the occupation-specific shares as weights. We then compute the between-sector and between-firm variance using this measure of average firm earnings and compare them with those based on the worker-level data. In this case, we report the variance for the level of earnings, without the log transformation, as the log of the average firm earnings is not equal to the average of log earnings at the firm level, which is the measure used to compute the variance decompositions in Figure 8. Figure C1 reports variances computed with both measures of earnings and shows that there are only small differences in the between-firm component, while the between-sector one is almost unaffected. Nonetheless, the main conclusions on the evolution of the variance over time and the relative importance of each component do not change.

Figure C1. Comparison between variance decompositions, 24 dates and universe of firms
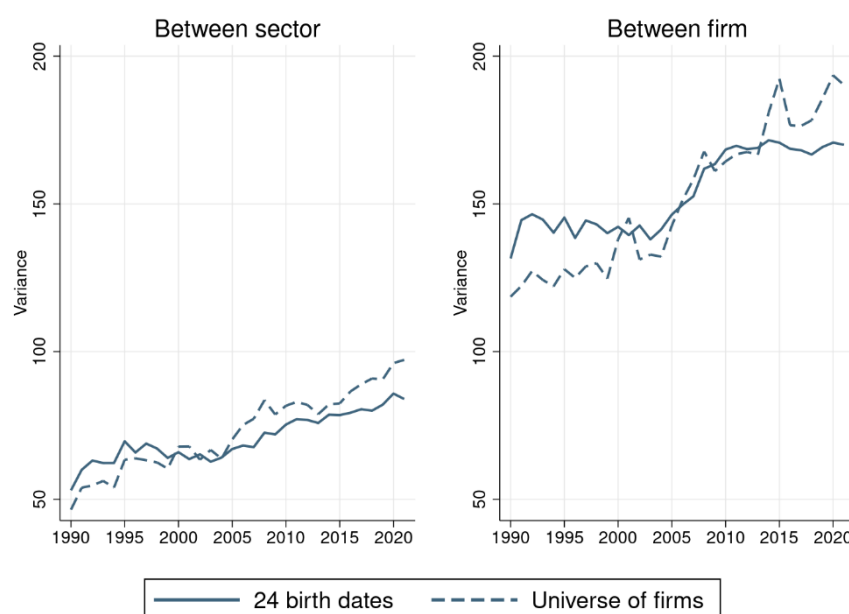
Notes: The figure shows the between-sector and betwee-firm variances using to measures of average sector/firm earnings. The line labelled "24 birth dates" refers to the INPS data used in the main analysis. The line labelled "Universe of firms" uses average firm earnings from the aggregate data on firms in the non-agricultural private sector. Firm earnings are computed as the weighted average of occupation-specific earnings using the occupation-specific shares as weights. *Source*: INPS, employees between 15 and 64 years of age in the private non-agricultural sector, 1990-2021 for the "24 birth dates"; INPS, firm-level aggregate data for "Universe of firms".