Scarring effects of the COVID-19 pandemic on the Italian labor market

May 5, 2022

Abstract

The COVID-19 pandemic raised the share of inactive individuals in most developed countries, with asymmetric effects across categories of individuals, defined on the basis of gender, age and regions. In Italy, the pandemic disproportionately affected females and, among those, more severely the ones living in large households in the North and Center of Italy. These findings find a rationale both in the presence of young children, which imposes strong constraints to the female labor force participation, and in the worse labor market opportunities in the South, which lead to strong self-selection of women in the labor market. Despite the short period of observation after the burst of the COVID-19 pandemic (four quarters of 2020), the identified effects appear large and persistent. These findings raise awareness about the likely long-lasting scarring effects of the COVID-19 pandemic on the labor market choices and opportunities of women across the world.

1 Introduction

The COVID-19 pandemic disrupted many lives and businesses (Bachelet, 2020). Governments around the world imposed unprecedented measures to contain the spread of the virus, which often took the form of full lockdown. The policies implemented to contain the pandemic as well as the volume and the unbalanced shares of home production were likely to have consequences for the gender distribution of work. On one hand, women are over-represented in sectors that have been defined as essential and in occupations that cannot be performed from home (OECD, 2021). On the other hand, women tend to be over-represented in service industries, such as retail, tourism, and hospitality, which have been either subject to lockdown or to strict restrictions for some time (Hupkau and Petrongolo, 2020; Farré et al., 2020). Women are also more likely than men to be employed in the informal sector, compensated in cash with no official oversight, and no eligibility to benefits, such as the furlough scheme (European Parliament, 2021). Finally, even when working from home, women on average perform most of home production tasks, e.g., childcare, and more in general they bear a large share of the earning penalty associated with childbearing (Sevilla and Smith, 2020; Kleven et al., 2019; Yildirim and Eslen-Ziya, 2021). The overall perception is that women have been hurt by the pandemic disproportionately more compared to men, but there seems to be evidence of large heterogeneity across countries (Bluedorn et al., 2021).

We investigate the labor market dynamics in Italy in the period 2013-2020, i.e., before and during the pandemic, using longitudinal quarterly labor force data, with a focus on gender, age and geographical differences. Italy was the first country in Europe to be hit by the COVID-19 pandemic and the first to implement a national lockdown in the beginning of March, 2020 (Saglietto et al., 2020). To mitigate its effect on the labor market, the Italian Government pro-actively implemented two aggressive policies: a ban on layoffs and the extension of a pre-existing furlough scheme (Barbieri et al., 2021). The Italian case is also particularly interesting as the labor market is largely heterogeneous, with vast, well-known and persistent regional disparities: industrial activities are mostly concentrated in the North and in the Center, while food industry and tourism are mainly concentrated in Southern regions (OECD, 2019). In addition, Italy ranks among the weakest of OECD countries regarding job quantity, defined as employment, unemployment and underemployment (OECD, 2018), reflecting persistently

large gender employment gaps and a remarkably low female labor force participation rate, particularly in the South (Agovino et al., 2019). Due to these very different conditions at the outburst of the pandemic, we find that the COVID-19 shock had sizable asymmetric effects across categories of individuals but, less expected, are their size and persistence over time.

In particular, we first document how the shares of individuals across seven labor market states (permanent, temporary and self-employment, furlough scheme, unemployment, education and inactivity) before the pandemic differed across ages, gender and geographical areas. The shares of individuals in education was comparable in the Northern-Center and the Southern part of Italy among the 15-24 age cohort, but while in the North and Center the transitions from education were predominantly towards the labor force, in the South the transitions towards inactivity were already much higher. This phenomenon was particularly large among females in the South, leading to an inactivity share of above 50% among the 40-49 age cohort. The COVID-19 pandemic shock lead to an increased flow of discouraged workers moving from unemployment to inactivity, across age cohorts, gender and geographical areas. We also show evidence of a large outflow of individuals who left permanent (and temporary) employment to become inactive and, more importantly, persisted outside the labor market until the fourth quarter of 2020. Females aged 30-39 with at least one young child, living in the North and Center of Italy, previously hired on a permanent contract show the largest and most persistent outflows. We find similar patterns in the South, but surprisingly the size of the impact is shown to be much smaller.

This paper fits in the growing literature which analyses the asymmetric effects of the pandemic on different categories of individuals (Caselli et al., 2021). A number of papers show that the impact of the shock has been disproportional high among vulnerable workers (Chetty et al., 2020). In particular, while there is quite a large consensus regarding the fact that younger low-income workers were more likely to lose their jobs, findings are more controversial regarding other demographic dimensions, such as gender. Some studies have provided evidence that the pandemic is largely affecting women's labor market outcomes. Specifically, Alon et al. (2021) finds higher employment losses for women compared to men in the US; these are confirmed by Albanesi and Kim (2021), who provide evidence of a substantial and persistent drop for women not only in employment, but also in labor force participation. Fabrizio et al. (2021) and Za-

marro et al. (2020) find that less educated women with young children were the most adversely affected, while Shibata (2020) shows that women and Hispanics are the two categories who lost the most. Finally, Adams-Prassl et al. (2020) show that women and workers without a college degree are significantly more likely to have lost their jobs. However, other contributions point to no gender difference in labor market outcomes as a consequence of the pandemic. (Casarico and Lattanzio, 2020) show that gender is a non-significant predictor of job loss in the aggregate, while Hupkau and Petrongolo (2020) find no difference in outcomes between men and women at the extensive margin, and if anything smaller losses for women at the intensive margin. Overall there is evidence of large heterogeneity across countries (Bluedorn et al., 2021; Adams-Prassl et al., 2020; Dang and Nguyen, 2021).

2 COVID-19 policies in Italy

The first cases of COVID-19 in Italy were registered on January 31, 2020, but the virus began to spread exponentially in the second half of February. At the beginning, the virus circulated predominantly in Northern regions but by the beginning of March, it had reached all regions. On March 10, the whole country went into a full lockdown. On March 11 the government prohibited nearly all commercial activity except for supermarkets and pharmacies and on March 21 it restricted the movement of people and closed all non-essential businesses and industries. Sectors identified as essential, which could continue operating, include mainly agriculture, some manufacturing, energy and water supply, transports and logistics, ICT, banking and insurance, professional and scientific activities, public administration, education, health care and some service activities. Non-essential sectors which were completely shut include most manufacturing, wholesale and retail trade, hotels, restaurants and bars, entertainment and sport activities Casarico and Lattanzio (2020).

Subsequently, on March 17 the Italian government implemented two new labor market policies to protect workers: (i) a COVID-19 furlough scheme and (ii) a ban on layoffs. The former was implemented for an initial duration of 9 weeks, and it applied retroactively starting from February 23. It represents an extension of the regular furlough scheme to all firms, independently on size. This measure aimed at preserving employment and allowed firms to cut labor costs during the lockdown period, by reducing hours of work thanks to a wage subsidy

granted by the government. Firms using the COVID-19 furlough scheme could renew temporary contracts, waiving to the norms of the standard regulation. Upon completion of the furlough period, firms were allowed to dismiss employees for redundancy. The ban on layoffs prevented firm to fire workers for 60 days, starting from March 17; this ban could be applied retroactively to pending, but already validated layoffs from February 23. Two later decrees extended the validity of these measures, which were still in place until the end of 2021.

3   The Italian labor market pre and during the COVID-19 pandemic

The Italian labor market pre-COVID-19 presented specific characteristics, which we deem as crucial to understand the asymmetric impact of the shock on different categories of individuals. The key features are the differentials in labor market participation by gender, males versus females, and by geographical area, North and Center versus South of Italy. The literature has highlighted significant gender differences, and relevant geographical differentials are also reported as a structural feature of the Italian labor market (Bertola and Garibaldi, 2003). Women, on average, show a lower attachment to the labor force together with a lower commitment to labor market activity compared to men (Schiattarella and Piacentini, 2018). While the North-South divide characterizes many elements of the economic and cultural life in Italy, it is particularly striking in women's work, with women from the Southern regions (and the Islands) being much less likely to work and much more likely to end up in unemployment or outside the labor force. A specific characteristic of women in Southern Italy is that they are comparatively more likely not to work and not to return to the labor after marriage (or childbearing). On average in Italy 30% of Italian mothers in employment stop working to care for children or other relatives, and of these only about 12% go back to work at some point, but this number is much lower in the Italian South, due to the predominant role of the male breadwinner model (Bettio and Pastore, 2017; Baussola and Mussida, 2014).

Finally, to gender and geographical characteristics, we add age as another dimension of analysis. We therefore split individuals according to 6 cohorts: the first 15-19 age cohort includes individuals who either decided to drop out high school or keeps on studying, the 20-

24 age cohorts identifies individuals who either decided to stop studying or attend university, individuals in the 25-29 age cohort are in transition between tertiary education and the labor market, the 30-39 age cohort is made of individuals who are likely to have a family with small children, while the 40-49 age cohort comprises individuals with older children. Finally, the 50-64 age cohort includes mature adults moving towards retirement. The next section (Section 3.1) describes in detail the data and the methodology used in the analysis.

3.1 Data and methodology

We use Italian quarterly longitudinal labor force data as provided by the Italian Institute of Statistics (ISTAT) for the period 2013 (quarter I) to 2020 (quarter IV).[1] The Italian Labour Force Survey (LFS) follows a simple rotating sample design where households participate for two consecutive quarters, exit for the following two quarters, and come back in the sample for other two consecutive quarters. As a result, 50% of the households, interviewed in a quarter, are re-interviewed after three months, 50% after twelve months, 25% after nine and fifteen months. This rotation scheme allows to obtain 3 months longitudinal data, which include almost 50% of the original sample.

The longitudinal feature of these data is essential for achieving a complete picture of significant economic phenomena of labor market mobility. Per each individual who has been interviewed we observe a large number of individual and labor market characteristics at the time of the interview and three months before. Taking into account the structure of this database, we compute the labor market flows by calculating the quarter-on-quarter transitions made by background individuals between different labor market states.

On average approximately 70.000 individuals are interviewed each quarter, of which 45.000 are part of the working age population. The average quarterly inflow of younger individuals in the working age population is 0.3%, while the average quarterly outflow of older individuals from the working age population is 0.4%, backing our hypothesis of a (almost) constant working age population within quarters.

The dynamics of the labor market can be efficiently described by Markov Chains with discrete states in discrete time. Our dataset allows to consider quarters as unit of time and

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[1]Data for the period 2013 (quarter I) to 2020 (quarter IV) are available upon request at: https://www.istat.it/it/archivio/185540.

to define seven labor market states: permanent (PE), temporary (TE), self-employment (SE), unem- ployment (U), the furlough scheme (FS), education (EDU) and inactivity (NLFET). The NLFET state collects the working age individuals who are not in the labor force, in education or in training, therefore representing an accurate measure of inactivity (Ose and Jensen, 2017). The dynamics are therefore represented through a Transition Probability Matrix (TPM), which shows both permanence in each labor market state and the probability of transition from one state to another in a given period of time, and fully characterizes the dynamics of the shares of the whole population in each state. In particular, the shares of individuals in different states provide a picture of the long-term trends, as they take longer to react to shocks, while the transition probabilities inform about the sudden impact of the (pandemic) shock. Taking into account the structure of the available database, we compute the labor market flows by calculating the quarter-on-quarter transitions made by individuals between different labor market states. In the analysis we take the first quarter of 2020, which marks the time of the initial spread of the virus, as the period when the dynamics of the Italian labor market are expected to change. The inferential analysis on the shares and transition probabilities is computed via bootstrap using 1000 draws from the original sample.

Important data limitations are to be mentioned. First, the point-in-time measurement of the worker's labor market state fails to capture transitions within the period (quarter). For instance, if an employed worker becomes unemployed and finds a new job within a quarter, we do not observe those transitions in our data. Second, the available data stop at quarter IV of 2020, while it would be desirable to have data also for 2021 to explore the further persistence of pandemic shock. Second, we do not have information about the household composition of individuals, as we only observe the household size. For this reason, in the last part of our analysis, we use data from the European Labour Force, which contains detailed information about the number and age of children. Finally, another important limit of our analysis is the short longitudinal span, as we have observations about the same individuals only in two consecutive quarters, thus forcing our analysis to be based on a Markovian process of order one, which is a further limit in the study of persistence.

3.2 Pre-COVID-19 pandemic

In this section we study the dynamics of the labor market before the pandemic (2013 quarter II - 2019 quarter IV), with a special attention to the long-run trends caused by the labor market reforms implemented during the period of observation. For this reason, we consider annual transition probabilities, calculated per each quarter as the product of the last four quarterly transition probabilities.

Figure 1. Shares of individuals aged 15-19 in NLFET and EDU in the North and Center and South of Italy.
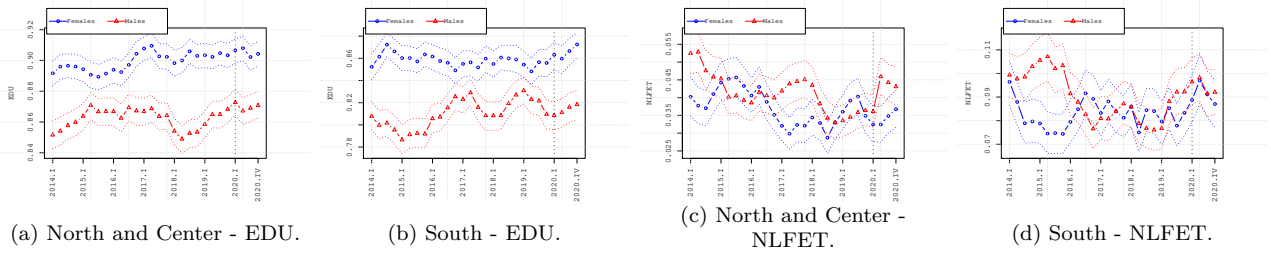
(a) North and Center - EDU.

(b) South - EDU.

(c) North and Center - NLFET.

(d) South - NLFET.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).
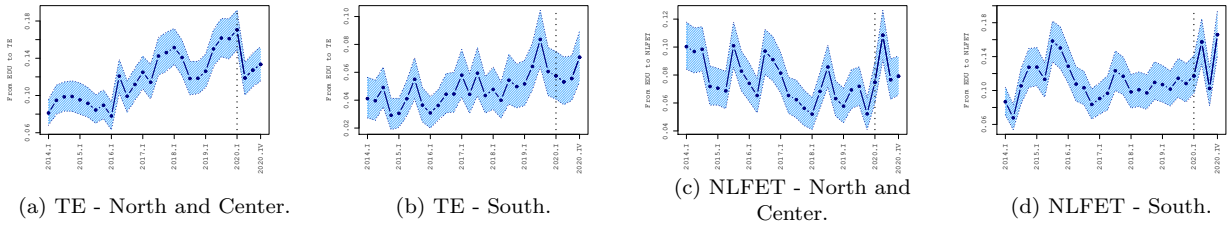
Specifically, a number of pension reforms increased retirement age and lead to a raise in the share of individuals aged 50-64 in permanent employment (De Philippis, 2017). Moreover, a number of reforms[2] changed the rules for the utilization of temporary contracts, creating from time to time incentives (or disincentives) for firms to hire workers on such contract, leading to increasing or decreasing shares of workers on temporary employment. Finally, in 2015, strong fiscal incentives for the hiring of permanent employees and the introduction of a new permanent contract, with firing costs increasing with tenure, lead to a significant increase in the transitions from unemployment and temporary employment to permanent employment (Boeri and Garibaldi, 2019). Net of these trends due to labor market reforms, through the analysis of the shares of individuals across states and the transition probabilities, we find large differences in the labor market choices of individuals in the North and the South of Italy. We also observe very different behaviors between males and females, across different age cohorts. We report all figures by gender, age and geographical location and detailed comments in Appendix A, while we summarize here the main findings. The different patterns between these four categories of individuals (males and females in the North and in the South) start as early as when they are

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[2]The *Decreto Poletti* in 2014 reduced the hiring costs and increased the number of extensions within the same duration, the *Decreto Dignita'* in 2018 reduced the maximum length, increased the hiring costs and reduced the number of possible extensions
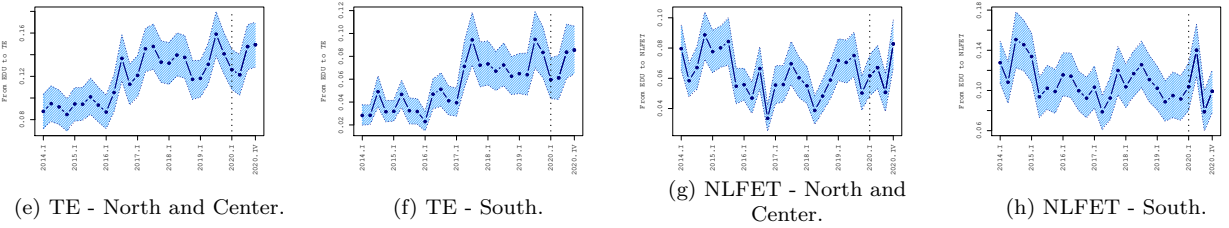
in secondary education (15-19 age group). On average females stay longer in education in both geographical areas compared to males, however already in this age cohort more individuals drop out school and enter the NLFET state in the South (Figure 1). This pattern is similar among males and females, with approximately 4% of individuals aged 15-19 being inactive in the North and already approximately 9% being inactive in the South.

Figure 2. Annual transition probabilities of individuals aged 20-24 from education to temporary employment and the NLFET state in the North and Center and South of Italy.

Females.

(a) TE - North and Center.	(b) TE - South.	(c) NLFET - North and Center.	(d) NLFET - South.

Males.

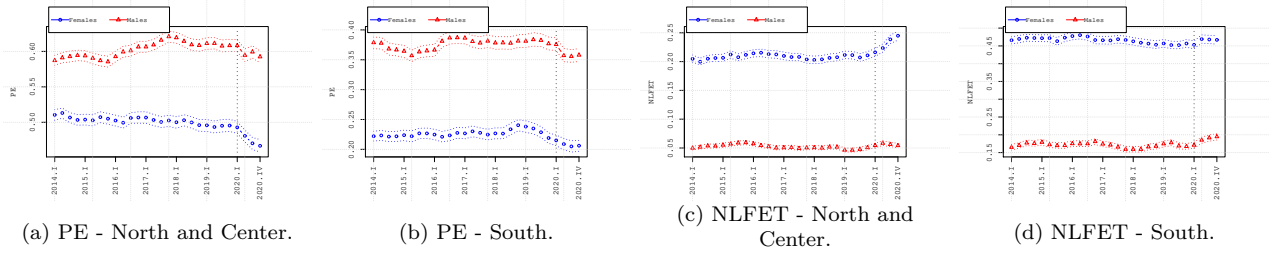|			
(e) TE - North and Center.	(f) TE - South.	(g) NLFET - North and Center.	(h) NLFET - South.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

The percentage of individuals (both males and females) who go to university is similar in the two geographical areas, but while in the North and Center, those who leave education are much more likely to enter the labor market, mainly with a temporary contract, in the South they are more likely to join the NLFET state (Figure 2). Among females approximately 14% transit from education to a temporary contract in the North and Center, compared to less than 6% in the South; at the same time approximately 8% transit to the NLFET state in the North and Center, compared to 12% in the South. Among males, 14% move from education to temporary employment and 6% to the NLFET state in the North and Center, compared to 8% and 12%, respectively in the South. This worrying bleeding of individuals in the South from education to NLFET state, across both females and males, seems like an irreversible process: persistence in the NLFET state remains very high across all cohorts. Over time more and more individuals in the South, mostly females, keep joining the NLFET state from all other states, particularly from unemployment and temporary employment. This leads to a dramatic situation in which

35% of females in the 25-29 age category in the South is in the NLFET state. This percentage keeps growing as they get older, reaching 45% among the 30-39 age category (Figure 3) and more than 50% among the 40-49 age category. Hence, the percentage of 30-39 years old in permanent employment is dramatically lower in the South, with less than 40% of males and 22% of females hired on a permanent contract compared to more than 60% of males and 50% of females in the North and Center, respectively.

Figure 3. Shares of individuals aged 30-39 in PE and NLFET in the North and Center and South of Italy.

(a) PE - North and Center.   (b) PE - South.   (c) NLFET - North and Center.   (d) NLFET - South.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

3.3   Dynamics during the COVID-19 pandemic

We analyse the impact of the pandemic on the labor market of the four categories of individuals (females and males in the North and Center and South of Italy), by age groups. As we are interested in the sudden impact of the pandemic and its short-run impact, we compute quarterly transition probabilities.

3.3.1   The dynamics of shares

To investigate the way the pandemic has affected the distribution of individuals across the seven labor market states, we compare the shares of individuals by age category in quarter IV of 2020 with the same quarter one year before (Table 1).[3]

In quarter IV of 2020, the shares of males living in the North and Center of Italy in the NLFET state increased across all age groups, except for the 30-39 cohort, compared to the same quarter one year before, with larger changes among the 20-24 and 25-29 age groups. When we compare those shares with the ones of males living in the South, we notice similar patterns: across (almost) all age categories the share of males in the NLFET state is higher. We also

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[3]In Appendix B we report the same statistics comparing the shares of individuals by age group in quarter III of 2020 with the same quarter one year before.

observe a higher share of 25-29 years old in education in the South, while no significant change in the education state in the North and Center. Among females in the North and Center of Italy we also have a larger presence in the NLFET state across all age categories (except for the 15-19 and 50-64 age groups). The increase is particularly important for the 20-24 and 30-39 age categories. However, quite surprisingly, the share of females living in the South in the NFLET state is larger only among the 25-29 age group. Finally, there is an increase in the share of 15-19 and 20-24 years old females in education in the South compared to the same quarter one year before, while no significant change in education in the North and Center.

Overall, we find a substantial increase in the share of males across all age categories in the NLFET state in the North and Center as well as in the South of Italy. With regards to females, while in the North and Center the NLFET share increased across all age categories, in the South it increased only for the 25-29 age category, while it did not change for all other age groups. We also observe a higher share of younger individuals in education in the South (both males and females), but no significant change in the North and Center.

3.3.2 The dynamics of transition probabilities

To assess the way the pandemic has affected the transition probabilities across labor market states, we compare the actual data with the counterfactual scenario of no pandemic shock, i.e., the quarterly transition probabilities for the four categories of individuals across demographic groups against the forecasted quarterly transition probabilities for the quarters during the pandemic, i.e., quarter I of 2020 to quarter IV of 2020.[4]

Table 4 reports the transition probabilities from unemployment to the NLFET state for all categories of individuals, thus capturing whether an increased number of discouraged workers who are pessimistic about the probability to find a job gave up on their search. Across all groups and across all age cohorts these probabilities have significantly increased in quarter II of 2020, compared to the forecasted probabilities. While for some categories the change was temporary and went back to the pre-pandemic rates in quarter III of 2020, for others, such as 20-24 and 40-49 females in the South the increased percentage persisted until quarter IV of 2020. Similar patterns are observed among 30-39 males in the South, while among both

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[4]The forecasted transition probabilities are computed using a combination of four forecasting models (ETS, TSLM, THETAF, and ARIMA) (Panagiotelis et al., 2021) in the period 2013 quarter I- 2019 quarter IV.

Table 1. Changes in the shares in different labor market states between quarter IV of 2019 and quarter IV of 2020 by category of individuals.

	SE	TE	PE	U	NLFET	EDU	FS
			Males - North and Center				
15-19	0.002	-0.012***	0.0004	0.00001	**0.007****	0.002	0.001*
	(0.113)	(0.002)	(0.424)	(0.482)	(0.045)	(0.383)	(0.053)
20-24	0.002	-0.011	-0.011*	0.005	**0.018*****	-0.020**	0.016***
	(0.331)	(0.131)	(0.088)	(0.212)	(0.000)	(0.041)	(0.000)
25-29	-0.007	-0.015**	-0.024***	0.003	**0.020*****	-0.003	0.026***
	(0.197)	(0.041)	(0.002)	(0.300)	(0.000)	(0.330)	(0.000)
30-39	-0.004	-0.010***	-0.016***	-0.002	0.003	0.002	0.027***
	(0.222)	(0.002)	(0.006)	(0.232)	(0.127)	(0.144)	(0.000)
40-49	-0.006	-0.008***	-0.020***	-0.004**	**0.013*****	-0.0004	0.026***
	(0.121)	(0.000)	(0.000)	(0.047)	(0.000)	(0.146)	(0.000)
50-64	-0.007*	-0.005***	-0.009**	-0.005***	**0.008****	0.0001	0.018***
	(0.062)	(0.001)	(0.030)	(0.000)	(0.022)	(0.182)	(0.000)
			Males - South				
15-19	0.003	0.010***	-0.003	-0.019***	-0.0002	0.009	0.0003
	(0.112)	(0.008)	(0.214)	(0.000)	(0.494)	(0.229)	(0.167)
20-24	-0.009**	-0.020**	0.008	-0.016**	**0.016****	0.010	0.011***
	(0.038)	(0.014)	(0.161)	(0.042)	(0.079)	(0.229)	(0.000)
25-29	0.002	-0.024***	-0.018	-0.022**	**0.017****	**0.034*****	0.012***
	(0.409)	(0.002)	(0.046)	(0.011)	(0.065)	(0.000)	(0.000)
30-39	-0.004	-0.014***	-0.019**	-0.021***	**0.027*****	0.004	0.027***
	(0.285)	(0.002)	(0.017)	(0.000)	(0.000)	(0.110)	(0.000)
40-49	0.005	-0.012***	-0.017**	-0.016***	**0.016*****	0.0005	0.025***
	(0.236)	(0.001)	(0.018)	(0.000)	(0.003)	(0.227)	(0.000)
50-64	0.003	0.0005	-0.007	-0.008***	-0.005	0.0001	0.017***
	(0.321)	(0.459)	(0.169)	(0.009)	(0.210)	(0.222)	(0.000)
			Females - North and Center				
15-19	0.001	-0.003	0.0004	-0.002	0.002	0.001	0.001*
	(0.245)	(0.204)	(0.409)	(0.341)	(0.331)	(0.450)	(0.054)
20-24	-0.002	-0.041***	-0.011*	0.013***	**0.034*****	-0.001	0.008***
	(0.305)	(0.000)	(0.050)	(0.009)	(0.000)	(0.467)	(0.000)
25-29	-0.0001	-0.021***	-0.027***	0.009*	**0.017****	-0.005	0.027***
	(0.485)	(0.005)	(0.002)	(0.077)	(0.022)	(0.244)	(0.000)
30-39	-0.009**	-0.007*	-0.029***	-0.015***	**0.034*****	-0.001	0.027***
	(0.012)	(0.052)	(0.000)	(0.000)	(0.000)	(0.225)	(0.000)
40-49	-0.009***	-0.010***	-0.020***	-0.007***	**0.020*****	0.0004	0.024***
	(0.008)	(0.000)	(0.000)	(0.001)	(0.000)	(0.247)	(0.000)
50-64	-0.006**	-0.006***	-0.007*	-0.001	0.002	0.0002	0.018***
	(0.010)	(0.000)	(0.083)	(0.293)	(0.358)	(0.194)	(0.000)
			Females - South				
15-19	0.002*	-0.002	-0.005***	-0.015***	0.004	**0.017****	0.0003
	(0.058)	(0.229)	(0.001)	(0.001)	(0.315)	(0.049)	(0.213)
20-24	-0.014***	-0.024***	-0.018***	-0.019**	0.013	**0.050*****	0.013***
	(0.000)	(0.000)	(0.001)	(0.017)	(0.143)	(0.000)	(0.000)
25-29	-0.006	-0.020***	-0.016**	-0.037***	**0.058*****	0.007	0.014***
	(0.166)	(0.003)	(0.041)	(0.000)	(0.000)	(0.254)	(0.000)
30-39	0.001	0.007	-0.013**	-0.022***	0.010	-0.001	0.017***
	(0.418)	(0.109)	(0.042)	(0.000)	(0.154)	(0.424)	(0.000)
40-49	0.003	-0.001	-0.023***	-0.005	0.011	0.002*	0.013***
	(0.304)	(0.461)	(0.000)	(0.148)	(0.116)	(0.086)	(0.000)
50-64	0.001	-0.005**	-0.013***	0.001	0.009	0.0004	0.007***
	(0.367)	(0.024)	(0.007)	(0.284)	(0.114)	(0.143)	(0.000)

Note: The attained significance levels (ASL) of the null hypothesis of equality between the shares in the two periods computed using 1000 bootstraps are reported in parenthesis (Efron and Tibshirani, 1994, p.220); *ASL<0.1; **ASL<0.05; ***ASL<0.01.

males and females in the North and Center, we do not observe persistence. Hence, while in the outburst of the pandemic all unemployed workers across different types got discouraged to some degree and left the labor market, the higher transition rates from unemployment to inactivity persisted mostly for females in the South.

We then focus on the transition rates from permanent and temporary employment to the NLFET state (Tables 5-6) to assess the effect of the pandemic on the outflows from permanent and temporary employment. We report statistics for the 30-39 and 40-49 categories for which the results are more striking.[5] The pandemic significantly increased the transition probabilities from temporary and permanent employment to the NLFET state mostly for females, and among those mainly for the ones living in the North and Center, across both age categories. Data show that females in the North and Center are the ones who are more affected by the pandemic as compared to women in the South, as a larger percentage was active on the labor market at the time of the shock. In quarter III of 2020 females aged 30-39 (40-49) had a probability to transit from temporary employment to the NLFET state of about 25% (19%) compared to the forecasted 10% (12%). Similar patterns are found for the probability to transit from permanent employment to the NLFET state: it jumped to 2.5% (1.3%) compared to a forecasted probability of 1.7% (0.5%) for women aged 30-39 (40-49). Although these numbers seem low, they correspond to approximately 40.000 women in the age 30-39 cohort and 25.000 women in the age 40-49 cohort moving from employment to inactivity.

3.3.3 Female labor market participation and household composition

During the pandemic due to the prolonged schools closure, women had to juggle between their jobs and the children care (Qian and Fuller, 2020). Particularly women with small children might have been pushed out of the labor market due to caring responsibilities. However, in the South, where the female inactivity rate in these age cohorts was already much higher, the impact of the pandemic has been less strong. Unfortunately, our data do not provide information about the number and age of children, but only about the household size. Therefore, we use European Labour Force Survey data for Italy for 2019 to compute the shares of females in the age cohorts 30-39 and 40-49 with at least one child below the age of 11 by employment status, distinguishing
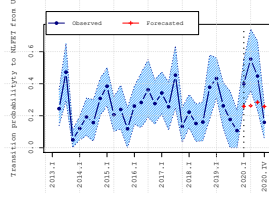
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[5]Statistics for all other age categories are reported in Appendix B.

Figure 4. Transition probabilities from unemployment to the NLFET state by age groups.
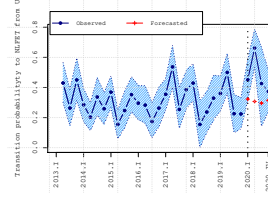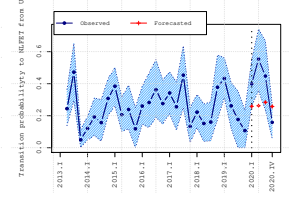
15-19.
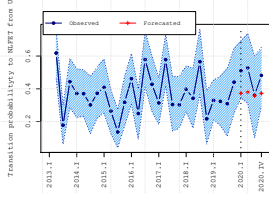
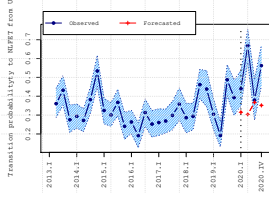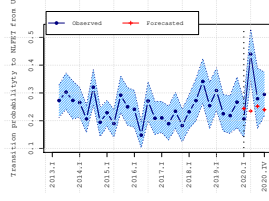(a) Female South. (b) Female North and Center. (c) Male South. (d) Male North and Center.
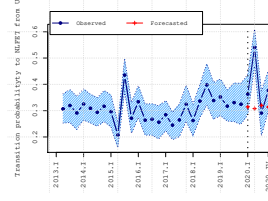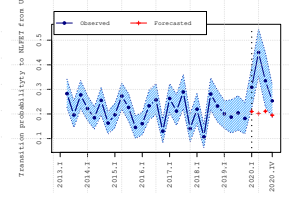
20-24.

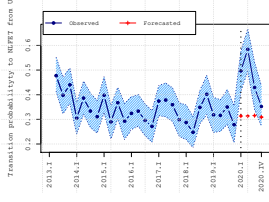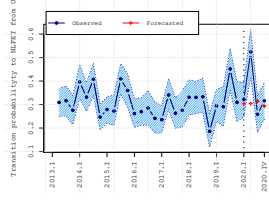(e) Female South. (f) Female North and Center. (g) Male South. (h) Male North and Center.
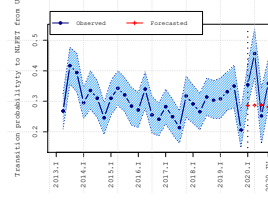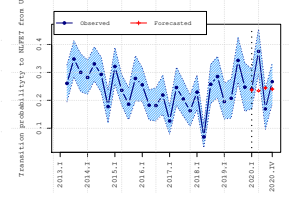
25-29.

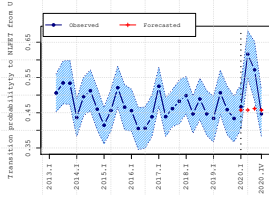
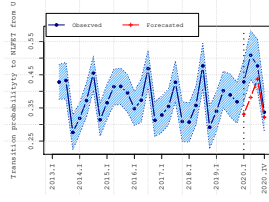(i) Female South. (j) Female North and Center. (k) Male South. (l) Male North and Center.
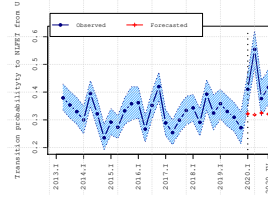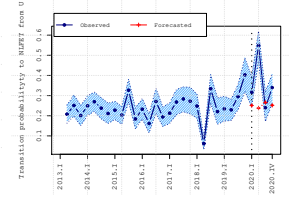
30-39.

(m) Female South. (n) Female North and Center. (o) Male South. (p) Male North and Center.

40-49.

(q) Female South. (r) Female North and Center. (s) Male South. (t) Male North and Center.

Note: The forecasted transition probabilities are computed using a combination of four forecasting models (ETS, TSLM, THETAF, and ARIMA) (Panagiotelis et al., 2021) in the period 2013 (quarter I)- 2019 (quarter IV). Confidence intervals at 90% are computed using 1000 bootstraps and reported in parenthesis. EDU refers to education, TE to temporary employment, PE to permanent employment, U to unemployment. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

between the North and Center and South of Italy (Table 2).[6] We select the age of children to be below 11, which we consider the cutoff age, below which children need the presence of their parents. We find that 47.5% of females in the 30-39 age group with at least one young child is employed on a permanent contract in the North and Center, compared to 19.1% in the South. While the share on temporary employment and self-employment is comparable, we find the share in unemployment to be higher in the South (10.2% against 6.2%) while the share of inactive females is much higher in the South, i.e., 55.7% compared to 28.2%. When we focus on the 40-49 age group, we observe very similar patterns.

Figure 5. Transition probabilities from temporary employment to the NLFET state by age groups.

30-39.

| (a) Female South. | (b) Female North and Center. | (c) Male South. | (d) Male North and Center. |

40-49.

| (e) Female South. | (f) Female North and Center. | (g) Male South. | (h) Male North and Center. |

Note: The forecasted transition probabilities are computed using a combination of four forecasting models (ETS, TSLM, THETAF, and ARIMA) (Panagiotelis et al., 2021) in the period 2013 (quarter I)- 2019 (quarter IV). Confidence intervals at 90% are computed using 1000 bootstraps and reported in parenthesis. EDU refers to education, TE to temporary employment, PE to permanent employment, U to unemployment. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

Table 2. Percentage of females with at least one child below the age of 11 by geographical area and employment status (2019).

		Age 30-39		Age 40-49	
		North and Center	South	North and Center	South
	Permanent	47.5	19.1	55.0	28.1
h	Temporary	8.7	7.1	6.4	5.9
	Self-employed	8.6	6.9	12.1	9.2
	Unemployed	6.2	10.2	5.4	8.4
	Inactive	28.2	55.7	20.2	48.0
	Total (in 000s)	1270	736	1249	559

Source: ELFS data.

We then split the sample of females with at least one child below the age of 11 by household

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[6]In the Appendix we report similar statistics for 2020.

Figure 6. Transition probabilities from permanent employment to the NLFET state by age groups.

30-39.

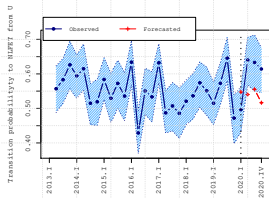

(a) Female South. (b) Female North and Center. (c) Male South. (d) Male North and Center.

40-49.

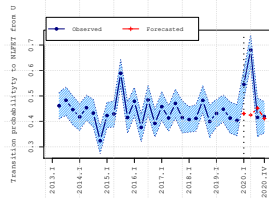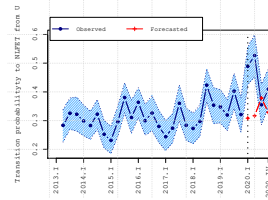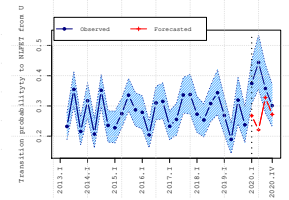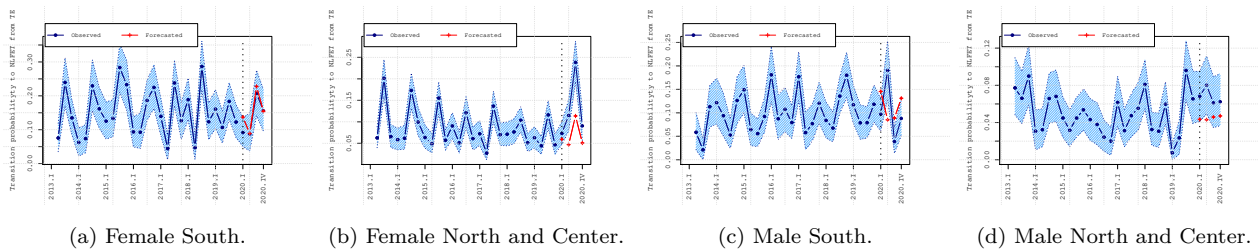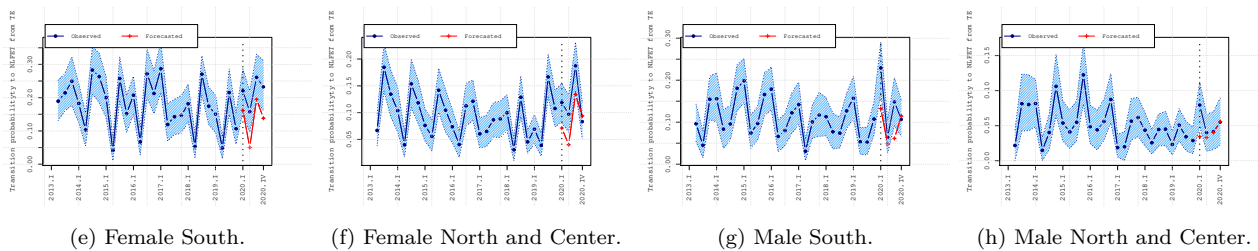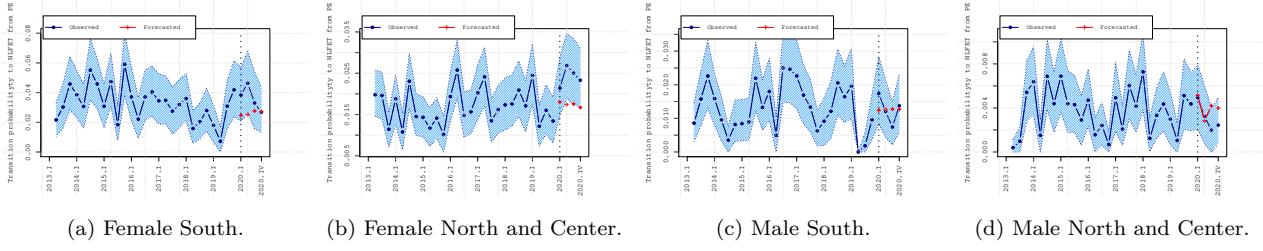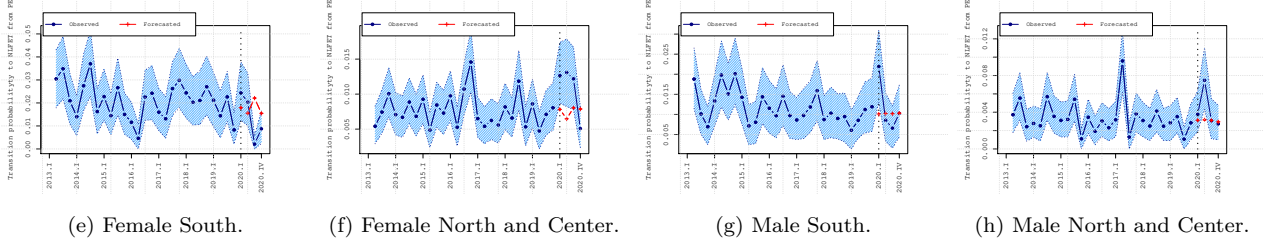(e) Female South. (f) Female North and Center. (g) Male South. (h) Male North and Center.

Note: The forecasted transition probabilities are computed using a combination of four forecasting models (ETS, TSLM, THETAF, and ARIMA) (Panagiotelis et al., 2021) in the period 2013 (quarter I)- 2019 (quarter IV). Confidence intervals at 90% are computed using 1000 bootstraps and reported in parenthesis. EDU refers to education, TE to temporary employment, PE to permanent employment, U to unemployment. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

size: we compute the share of females living in a household with less or more than two people, as a proxy for the presence of children, by geographical area and age cohort (Table 3).

Table 3. Percentage of females with at least one child below the age of 11 by geographical area and household size.

	Age 30-39		Age 40-49	
	North and Center	South	North and Center	South
> 2 components	81.2	71.5	55.2	44.0
≤ 2 components	6.6	9.3	6.0	4.8

Source: ELFS data.

Among females in the 30-39 age cohort, 81.2% live in a household with more than two components in the North and Center, and 71.5% in the South. This implies that among females in the 30-39 age category the household size is a good proxy to assess whether they have children below the age of 11. We use this information to compute the transition probabilities from permanent and temporary employment to the NLFET state for the two groups of females in the North and Center and in the South using the quarterly longitudinal labor force data (Figure 7).

We find that the transition probabilities to the NLFET state have significantly and persistently increased for females in the 30-39 age group living in the North and Center in a household with more than two people from both permanent and temporary employment. We

Figure 7. Transition probabilities of females aged 30-39 from permanent and temporary employment, to the NLFET in the North and Center and South of Italy by household size.

From permanent employment.
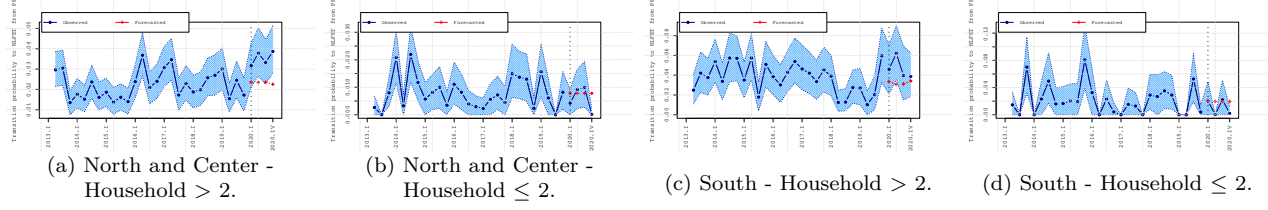
|(a) North and Center - Household > 2. | (b) North and Center - Household ≤ 2. | (c) South - Household > 2. | (d) South - Household ≤ 2.|

From temporary employment.

|(e) North and Center - Household > 2. | (f) North and Center - Household ≤ 2. | (g) South - Household > 2. | (h) South - Household ≤ 2.|

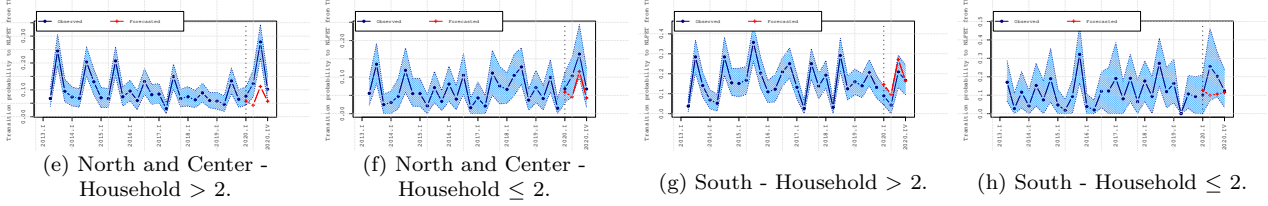*Note*: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

find no statistically significant effect for females living in households with less than two components neither in the North and Center or the South, neither from permanent nor from temporary employment. Interestingly, we also find no significant effect for females living in the South in a household with more than two people from both permanent and temporary employment. These results confirm our previous evidence of a stronger pandemic impact on females with young children living in the North and Center of Italy. Those women are likely to have been forced out of the labor market to take care of their children during the prolonged school closure. The worrying part of the story is the persistence of this effect until the end of 2020, as the literature has provided large evidence of weaker attachment of females to the labor market compared to males and of high female state dependency in the inactivity state (Duhautois et al., 2018). As explained by Honoré and Kyriazidou (2000), this state dependency might be of two types: either because lagged decisions play a role (true state dependency) or because of different propensities across individuals to experience the event (spurious state dependency). Distinguishing between these two types is extremely important for policy reasons, however long longitudinal data on individual histories are required, which unfortunately we do not have availability of. This is therefore part of our future agenda.

3.4 Estimation of the probability to remain active in the labor market

In this section we provide additional support to our findings by using a parametric estimation technique. We group observations according to whether the individuals are in or out of the labor force, as our analysis so far has shown that this is the most important feature to be attributed to the pandemic. The estimation is carried out using a *logit* model, in which the dependent variable is the probability to be active on the labor market in the next quarter conditional on being active the current quarter.[7] We split the sample into four sub-samples, according to gender and age. Specifically, we focus on the 30-39 and 40-49 age cohorts as these are the ones who have been more severely affected by the COVID-19 pandemic. Permanence in the initial state of activity is the baseline category for interpretation of results. The estimation of a logit model using design-based longitudinal weights may create severe numerical issues (Train, 2009). Hence, we run 1000 bootstraps using the longitudinal sample weights to estimate the model's coefficients and their 95% confidence intervals.

Table 4. Odds-ratios of remaining active on the labor market next period conditional on being active.

	Active in the labor market next quarter			
	Female 30-39	Male 30-39	Female 40-49	Male 40-49
2020	**0.509**	**0.627**	0.745	0.750
	(0.374-0.701)	(0.460-0.834)	(0.526-1.064)	(0.543-1.022)
2020 ×(North or Center)×	**0.614**	0.761	0.953	1.272
×(Household members >2)	(0.401-0.892)	(0.473-1.113)	(0.621-1.406)	(0.850-1.854)
(Intercept)	18.228	23.247	25.899	39.220
	(15.075-21.960)	(18.958-29.223)	(21.354-31.183)	(30.986-48.260)
Observations	62,950	78,307	95,990	120,232
Log Likelihood	−14,065.210	−12,152.510	−16,144.900	−14,945.660
Akaike Inf. Crit.	28,172.430	24,347.030	32,331.800	29,933.320

Note: Confidence interval at 95% are calculated by 1000 bootstrap using sample weights.

Table 4 displays the estimated odds-ratios of the probability to remain active on the labor market, conditional on being active the quarter before given a set of explanatory variables. In particular, the odds-ratio represents the ratio between the probability that the event will occur with respect to the probability the event will not occur, conditioned to a given explanatory

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[7]Alternatively, we could have estimated a multinomial logit, taking into account the transitions to all seven labor market states considered in our analysis so far. However, the validity of such estimation would have depended on the fulfillment of the Independence of Irrelevant Alternatives (IIA) condition (Train, 2009). In our case the IIA assumes that the odds-ratio is not altered with the addition or deletion of a particular alternative, which is very likely to be violated in our setting.

variable; hence, an odds-ratio grater than one implies an increased occurrence of the event, while an odds-ratio lower than one implies a decreased occurrence of the event with respect to a given explanatory variable. The reference category includes Italian individuals with a tertiary level of education living in the South in a household with less than two people.

The full regression with all the variables included is reported in Table 7 in Appendix D. Immigrants, both from EU and non-EU countries, are more likely to exit the labor market than Italian citizens across all four categories. Not surprisingly, primary and secondary educated individuals show a lower likelihood to persist in the active state, compared to tertiary educated individuals. The geographical location is important: living in the North and Center increases the likelihood to remain active, compared to living in the South, and the effect is much stronger for males than females. Finally, among females in both age groups, living in a household with more than two people significantly decreases the probability to remain active on the labor market. We also find evidence of seasonality, which means in quarter III among both the 30-39 and 40-49 age cohorts, for males, an increased persistence in the active state, while for females, a significant decrease in the probability to remain active.

Regarding the effect of the pandemic, the probability to remain active either did not change or increased before 2020; however, with the pandemic (year 2020) we estimate a significant decrease in the probability of remaining active among individuals in the 30-39 age cohort (both males and females). Specifically, the odds-ratio is 0.5, meaning that the probability of remaining active in 2020 is half the same probability in previous years. Importantly, for females in the 30-39 age cohort resident in the North and Center of Italy in a household with more than two people, the pandemic has significantly reduced the probability to be active on the labor market. The odds-ratio for this category of individuals is 0.6, implying that the probability of remaining active during the pandemic is almost half than it was before the shock. This result confirms our previous finding that women with small children living in the North and Center were more likely to go out from the labor market during the pandemic. We argue that part of explanation can be found in the heavier caring responsibilities caused by the long-lasting school closure in the lockdown and post-lockdown periods in Italy. Among women in the South we do not observe any significant change, probably due to the already high inactivity rate among this category of individuals before the pandemic.

4 Concluding remarks

In this paper, we assess the short-term impact of the COVID-19 pandemic on the Italian labor market by studying how the shares and transition probabilities of individuals between labor market states have changed after the country entered a full lockdown on March 10, 2020. We find remarkable asymmetric effects across gender, age and geographical location, which we attribute to the very different state of the labor market different categories of individuals faced at the outburst of the pandemic. Specifically, we show evidence of an increased number of discouraged workers who exited the unemployment state and joined the NLFET state across gender, age groups and geographical location, but mostly among individuals in the South. Most worrying, we find evidence of substantial outflows of females in the North and Center of Italy in their 30s with small children leaving employment, either permanent or temporary, and becoming inactive. To appreciate the magnitude of the shock, in quarter III of 2020 females aged 30-39 (40-49) had a quarterly transition probability from temporary employment to NLFET of about 25% (19%) compared to the forecasted 10% (12%) in absence of the pandemic shock. The quarterly transition probability from permanent employment to NLFET jumped to 2.5% (1.3%) compared to a forecasted probability of 1.7% (0.5%) for women aged 30-39 (40-49). Although these numbers seem low, they correspond to approximately 40.000 women in the age 30-39 cohort and 25.000 women in the age 40-49 cohort moving from employment to inactivity in a quarter. Surprisingly, we do not find the same strong outflows of women in the South from employment to inactivity. We argue that the already high share of females in their 30s and 40s in NLFET could have played a role, i.e., the women who are active on the labor market in Southern regions are strongly self-selected. The outflow of women in the North and Center in their 30s with young children from employment to inactivity which started in the beginning of the pandemic persisted until the end of 2020, making likely the presence of long-lasting scarring effects on the Italian female labor force participation, in line with the evidence found for other countries, such as Albanesi and Kim (2021) for the US, Andrew et al. (2020) for the UK, and Bowers (2020) for Israel.

References

Adams-Prassl, A., T. Boneva, M. Golin, and C. Rauh (2020). Inequality in the impact of the coronavirus shock: Evidence from real time surveys. *Journal of Public Economics 189*, 104245.

Agovino, M., A. Garofalo, and M. Cerciello (2019). Do local institutions affect labour market participation? The Italian case. *The BE Journal of Economic Analysis & Policy 19*(2).

Albanesi, S. and J. Kim (2021). The gendered impact of the covid-19 recession on the US labor market. Technical report, National Bureau of Economic Research.

Alon, T., S. Coskun, M. Doepke, D. Koll, and M. Tertilt (2021). From mancession to shecession: Women's employment in regular and pandemic recessions. Technical report, National Bureau of Economic Research.

Andrew, A., S. Cattan, M. C. Dias, C. Farquharson, L. Kraftman, S. Krutikova, A. Phimister, and A. Sevilla (2020). Parents, especially mothers, paying heavy price for lockdown. *Institute for Fiscal Studies. https://www. ifs. org. uk/publications/14861*.

Bachelet, M. (2020). Covid-19 and its impact on businesses and workers. Technical report, United Nations.

Barbieri, T., G. Basso, and S. Scicchitano (2021). Italian workers at risk during the covid-19 epidemic. *Italian Economic Journal*, 1–21.

Baussola, M. and C. Mussida (2014). Disadvantaged workers in the Italian labour market: gender and regional gaps. In *Disadvantaged Workers*, pp. 231–256. Springer.

Bertola, G. and P. Garibaldi (2003). *The structure and history of Italian unemployment: presented at CESifo Conference on Unemployment in Europe, December 2002*. CES.

Bettio, F. and F. Pastore (2017). Overview of female employment issues in Italy. Technical report.

Bluedorn, J., F. Caselli, N.-J. Hansen, I. Shibata, and M. M. Tavares (2021). Gender and employment in the covid-19 recession: Evidence on "she-cessions". Technical report, IMF Working Paper 2021/95.

Boeri, T. and P. Garibaldi (2019). A tale of comprehensive labor market reforms: Evidence from the Italian Jobs Act. *Labour Economics 59*, 33–48.

Bowers, L. (2020). The coronavirus crisis and women in the labor market: permanent damage or short-term setback with long-term potential. *Taub Center, Published on June.*

Casarico, A. and S. Lattanzio (2020). The heterogeneous effects of covid-19 on labor market flows: Evidence from administrative data. *Covid Economics 52*, 152–174.

Caselli, F., F. Grigoli, D. Sandri, and A. Spilimbergo (2021). Mobility under the covid-19 pandemic: Asymmetric effects across gender and age. *IMF Economic Review*, 1–34.

Chetty, R., J. Friedman, N. Hendren, and M. Stepner (2020). The economic impacts of covid-19: Evidence from a new public database built from private sector data. *Opportunity Insights.*

Dang, H.-A. H. and C. V. Nguyen (2021). Gender inequality during the covid-19 pandemic: Income, expenditure, savings, and job loss. *World Development 140*, 105296.

De Philippis, M. (2017). The dynamics of the Italian labour force participation rate: determinants and implications for the employment and unemployment rate. *Bank of Italy Occasional Paper* (396).

Duhautois, R., C. Erhel, and M. Guergoat-Larivière (2018). State dependence and labor market transitions in the European Union. *Annals of Economics and Statistics/Annales d'Économie et de Statistique* (131), 59–82.

Efron, B. and R. J. Tibshirani (1994). *An introduction to the bootstrap.* CRC press.

European Parliament (2021). Covid-19 and its economic impact on women and women's poverty. Technical report.

Fabrizio, M. S., D. B. Gomes, and M. M. M. Tavares (2021). *COVID-19 She-Cession: The Employment Penalty of Taking Care of Young Children.* International Monetary Fund.

Farré, L., Y. Fawaz, L. González, and J. Graves (2020). How the covid-19 lockdown affected gender inequality in paid and unpaid work in Spain.

Honoré, B. E. and E. Kyriazidou (2000). Panel data discrete choice models with lagged dependent variables. *Econometrica 68*(4), 839–874.

Hupkau, C. and B. Petrongolo (2020). Work, care and gender during the covid-19 crisis. *Fiscal studies 41*(3), 623–651.

Kleven, H., C. Landais, and J. E. Søgaard (2019). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics 11*(4), 181–209.

OECD (2018). How does Italy compare? Technical report.

OECD (2019). *Recent trends in the Italian Labour Market.*

OECD (2021). Women at the core of the fight against covid-19 crisis. Technical report.

Ose, S. O. and C. Jensen (2017). Youth outside the labour force—perceived barriers by service providers and service users: A mixed method approach. *Children and Youth Services Review 81*, 148–156.

Panagiotelis, A., G. Athanasopoulos, P. Gamakumara, and R. J. Hyndman (2021). Forecast reconciliation: A geometric view with new insights on bias correction. *International Journal of Forecasting 37*(1), 343–359.

Qian, Y. and S. Fuller (2020). Covid-19 and the gender employment gap among parents of young children. *Canadian public policy 46*(S2), S89–S101.

Saglietto, A., F. D'Ascenzo, G. B. Zoccai, and G. M. De Ferrari (2020). Covid-19 in europe: the Italian lesson. *The Lancet 395*(10230), 1110–1111.

Schiattarella, R. and P. Piacentini (2018). Old and new dualisms in the Italian labour market. In *The Italian Economy at the Dawn of the 21st Century*, pp. 81–100. Routledge.

Sevilla, A. and S. Smith (2020). Baby steps: the gender division of childcare during the covid-19 pandemic. *Oxford Review of Economic Policy 36*(Supplement_1), S169–S186.

Shibata, I. (2020). The distributional impact of recessions: the global financial crisis and the pandemic recession.

Train, K. E. (2009). *Discrete choice methods with simulation.* Cambridge university press.

Yildirim, T. M. and H. Eslen-Ziya (2021). The differential impact of covid-19 on the work conditions of women and men academics during the lockdown. *Gender, Work & Organization 28*, 243–249.

Zamarro, G., F. Perez-Arce, and M. J. Prados (2020). Gender differences in the impact of covid-19. Technical report, Working Paper. Switzerland: Frontiers in Public Health.

Appendix

A The dynamics of labor market pre-COVID-19

A.1 Shares of population in different states

We first look at the shares of individuals across the seven labor market states for the four categories of individuals: females and males in the North and Center and South of Italy, across the six demographic groups. This analysis is helpful in understanding the different choices of individuals by gender and geographical location. To have a clear understanding of the long-run trends before the pandemic and remove the seasonality, we compute annual labor market shares.

Figure 8. Shares of individuals aged 15-19 in the temporary employment, unemployment, NLFET, and education states in the North and Center and South of Italy.

North and Center.

| (a) EDU. | (b) NLFET. | (c) TE. | (d) U. |

South.

| (e) EDU. | (f) NLFET. | (g) TE. | (h) U. |
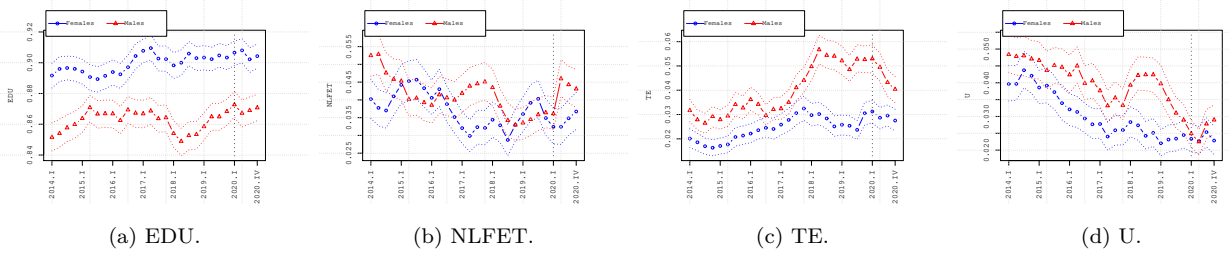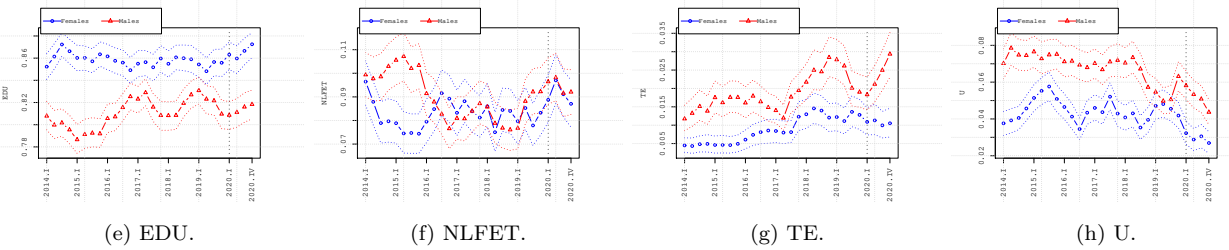
Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

Age 15-19 Among individuals aged 15-19 (Table 8) across both geographical areas, the share of females in education is higher compared to males (approximately 4% gap), but we also observe larger shares of individuals in education in the North and Center compared to the South (4% more across both males and females). While there is no large difference in the shares of males and females in the NFLET state in each geographical area, we notice that in the South the

Figure 9. Shares of individuals aged 20-24 in the temporary employment, unemployment, NLFET, and education states in the North and Center and South of Italy.

North and Center.

(a) EDU. (b) NLFET. (c) TE. (d) U.

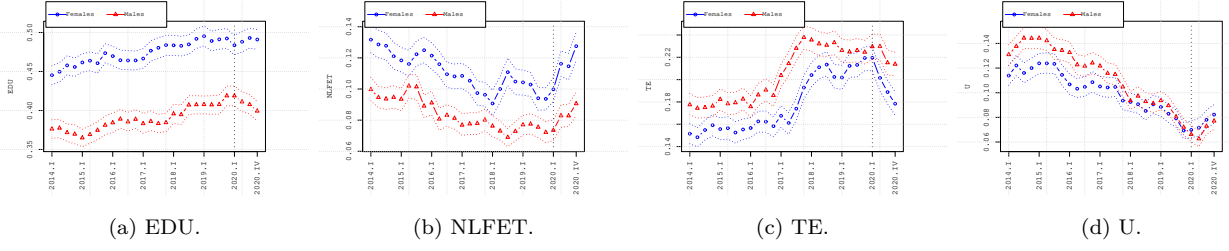**South**.

(e) EDU. (f) NLFET. (g) TE. (h) U.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).
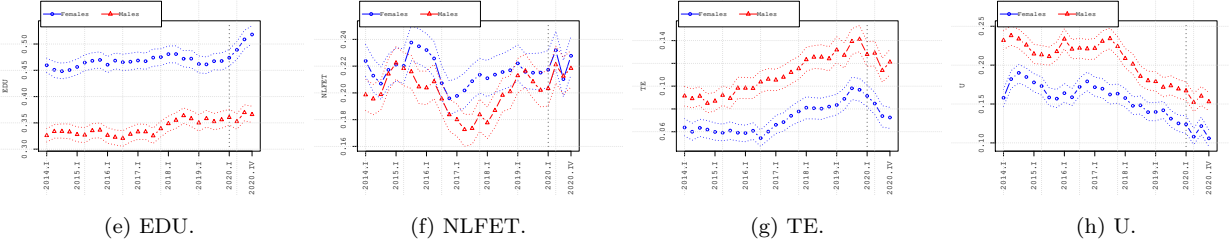
share is already 5 percentage points higher: 8.5% compared to 3.5%. The share of males and females in temporary employment is higher in the North and Center compared to the South and shows an increasing trend over time in both areas, with males being more employed in temporary employment compared to females (2 percentage points more). Finally, the share of individuals in the North and Center shows a declining trend in both geographical areas and among both males and females. However, unemployment is higher among males in both areas by approximately 2 percentage points.

Age 20-24 Among individuals aged 20-24 (Table 9) across both geographical areas, the share of females in education is 10 percentage points higher compared to males. We also observe an increasing trend of females and males in education in the North and Center (approximately 5 percentage points), while only a slight increase in the South (approximately 2 percentage points). While there is no large difference in the shares of males and females in the NFLET state in the South (approximately 21%), we find that in the North and Center the trend is decreasing, with the share of males approaching 8%, while the share of females approaching 10%. The share of males and females in temporary employment is higher in the North and Center compared to the South and shows an increasing trend over time in both areas, with males being more employed in temporary employment compared to females (2 percentage points

Figure 10. Shares of individuals aged 25-29 in the temporary employment, unemployment, NLFET, and education states in the North and Center and South of Italy.

North and Center.

(a) EDU. (b) NLFET. (c) TE. (d) U.

South.

(e) EDU. (f) NLFET. (g) TE. (h) U.
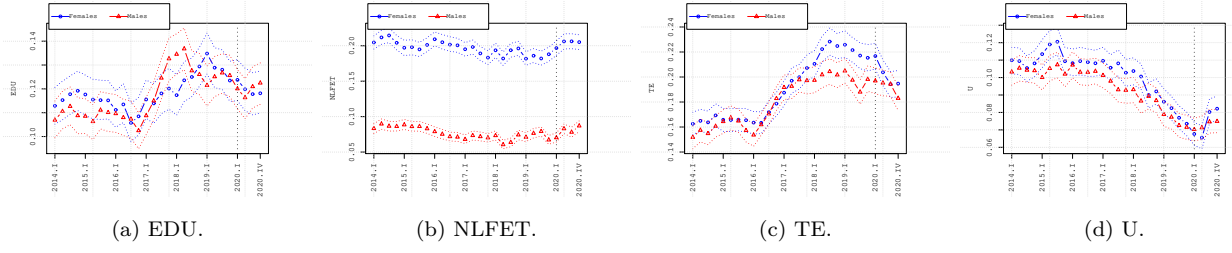
Figure 11. Shares of individuals aged 30-39 in the temporary employment, permanent employment, NLFET, and unemployment states in the North and Center and South of Italy.

North and Center.

(a) PE. (b) NLFET. (c) TE. (d) U.

South.

(e) PE. (f) NLFET. (g) TE. (h) U.
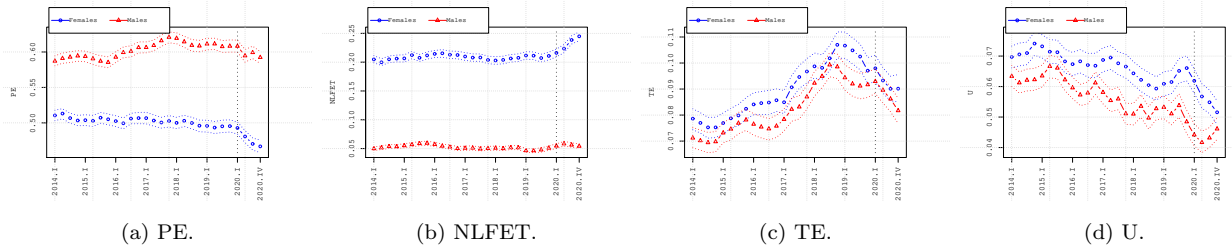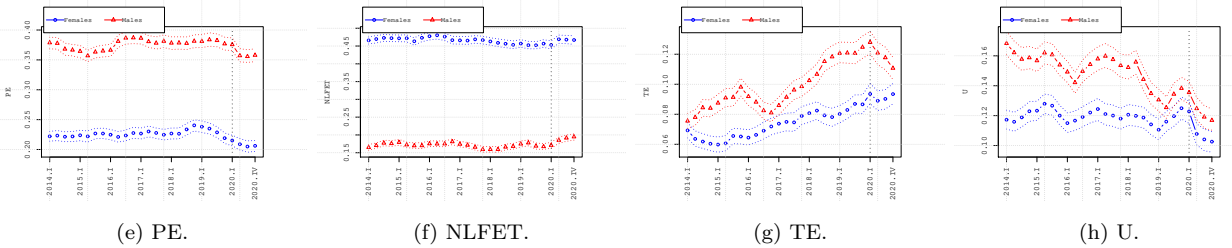
Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

more). Finally, the share of individuals in the North and Center shows a declining trend in both geographical areas and among both males and females. However, unemployment is higher among males in both areas by approximately 2 percentage points.

Age 25-29 While there is no difference between males and females in education in the North and Center, we observe large differences in the South: 20% of females is still in education

compared to approximately 16% of males (Table 10). Across both geographical areas, the share of females in the NLFET state is 15 percentage points higher compared to males. Moreover, while in the South the share of females in the NLFET state is as high as 36%, it is approximately 20% in the North and Center. We do not observe important differences in the shares of males and females in temporary employment in both geographical areas. In terms of unemployment, there is no difference between males and females in the North and Center, while the percentage is higher among males in the South (approximately 3 percentage points). In the South we also observe that the share of males is more than double the share in the North and Center.
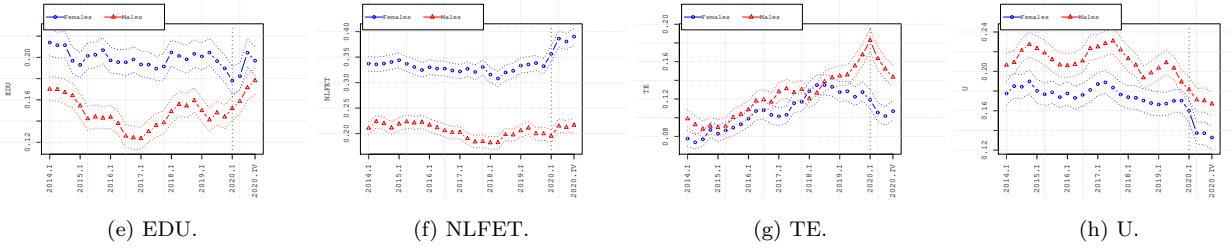
Figure 12. Shares of individuals aged 40-49 in the temporary employment, permanent employment, NLFET, and unemployment states in the North and Center and South of Italy.

North and Center.

| (a) PE. | (b) NLFET. | (c) TE. | (d) U. |

South.

| (e) PE. | (f) NLFET. | (g) TE. | (h) U. |

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).
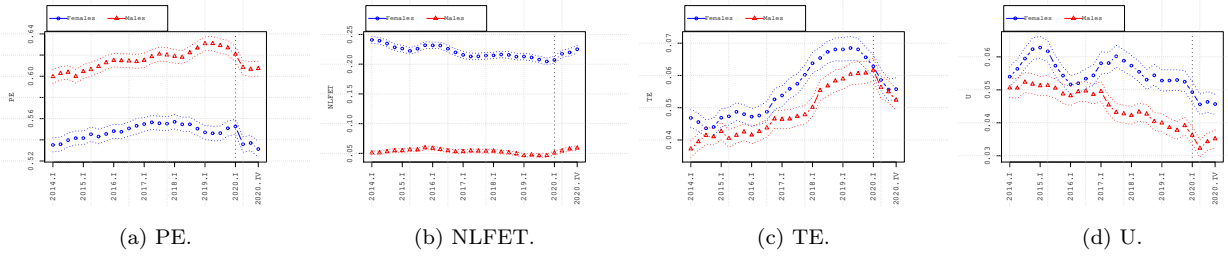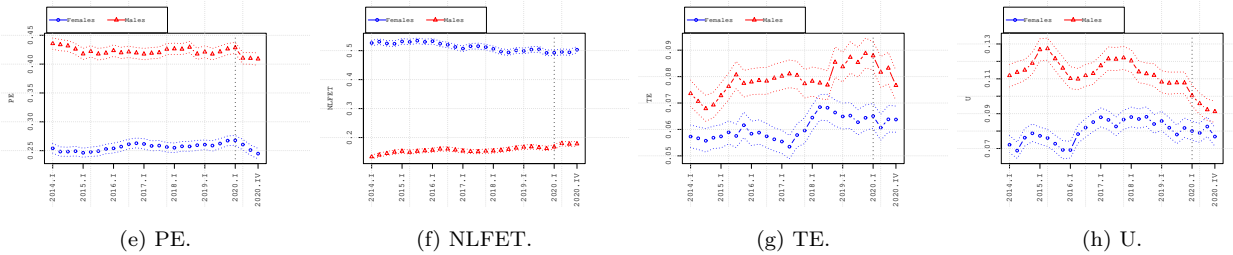
Age 30-39 The gap in the shares of males and females in permanent employment is larger in the South (Table 11): while less than 40% of males are in permanent employment, only 22% of females is. In the North and Center more than 60% of males is in permanent employment, against 50% of females. The shares of males and females in temporary employment is comparable across the two areas. Remarkable is instead the difference in the share of individuals in the NLFET state: 20% of females and 5% of males are in the NLFET state in the North and Center, while 45% of females and 15% of males are in the NLFET state in the South. In terms of unemployment, the share is higher among females in the North and Center (approximately 1 percentage point), while among males in the South (approximately 4 percentage points, al-

though the gap shrank during 2019). In the South we also observe that the shares of both females and males are much higher compared to the North and Center.

Figure 13. Shares of individuals aged 50-64 in the temporary employment, permanent employment, NLFET, and unemployment states in the North and Center and South of Italy.

title

North and Center.

(a) PE.	(b) NLFET.	(c) TE.	(d) U.

South.

(e) PE.	(f) NLFET.	(g) TE.	(h) U.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).
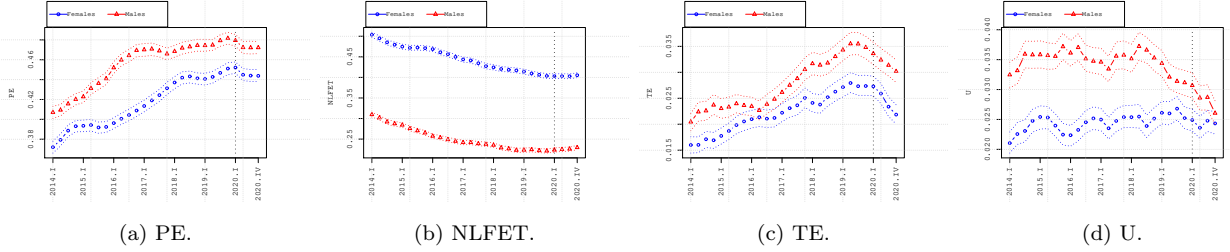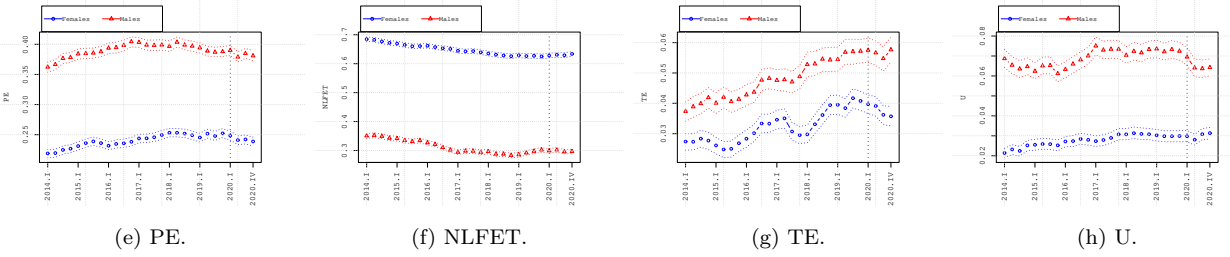
Age 40-49 The labor market situation of males and females in both geographical areas is similar to the labor market situation of 30-39 years old (Table 12). We observe much higher shares of individuals (both males and females) in the NLFET and unemployment states in the South compared to the North and Center. The gap is particularly large among females, whose share in the NLFET is approximately 50%. Permanent employment is much higher in the North and Center and shows an increasing trend over time for both males and females.

Age 50-64 We observe increasing shares of individuals (both males and females) in permanent employment in the North and Center (but not in the South) due to the increased retirement age (Table 13). Parallel to these changes we observe a decline in the shares of males and females in the NLFET state in the North and Center, but not in the South. Unemployment is higher among males in the South compared to males in the North and Center, while the share of females in the two geographical areas is comparable.

A.2 Transition probabilities

We then look at transition probabilities between different states and demographic groups by gender. The probabilities are computed at annual level to remove high fluctuations due to seasonality.

Figure 14. Annual transition probabilities of individuals aged 15-19 from education to the NLFET state in the North and Center and South of Italy.

(a) Females - North and Center.

(b) Females - South.

(c) Males - North and Center.

(d) Males - South.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).
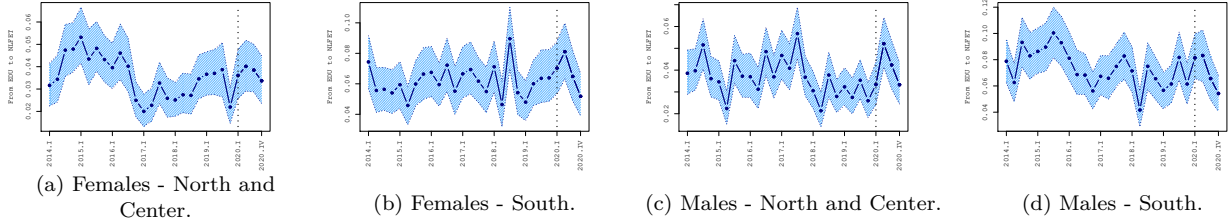
We observe that major differences between the North and Center and South of Italy are already evident for the 15-19 age group (Figure 14). The transition probability from education to the NLFET state is approximately 4% for females and males in the North and Center, while it is as high as 6% for females and 8% for males in the South.

Figure 15. Annual transition probabilities of individuals aged 20-24 from education to temporary employment and the NLFET state in the North and Center and South of Italy.

Females.

(a) TE - North and Center.

(b) TE - South.

(c) NLFET - North and Center.

(d) NLFET - South.

Males.

(e) TE - North and Center.

(f) TE - South.

(g) NLFET - North and Center.

(h) NLFET - South.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

When we move to the 20-24 cohort (Table 15), we notice similar patterns: the transition probability from education to the NLFET state fluctuates around 7% for females and 6% for

males in the North and Center, while it is as high as to 12% for both females and males in the South. If we consider the transition probability from education to temporary employment, this is much lower in the South: it ranges between 10% and 14% for females and males in the North and Center while it ranges between 4% and 5% for females and between 4% and 8% for males in the South.

Figure 16. Annual transition probabilities of individuals aged 25-29 from education to temporary employment, unemployment, NLFET states in the North and Center and South of Italy.

Females.

(a) PE - North and Center.   (b) PE - South.   (c) TE - North and Center.   (d) TE - South.

Males.

(e) PE - North and Center.   (f) PE - South.   (g) TE - North and Center.   (h) TE - South.

(i) NLFET - North and Center.   (j) NLFET - South.   (k) U - North and Center.   (l) U - South.
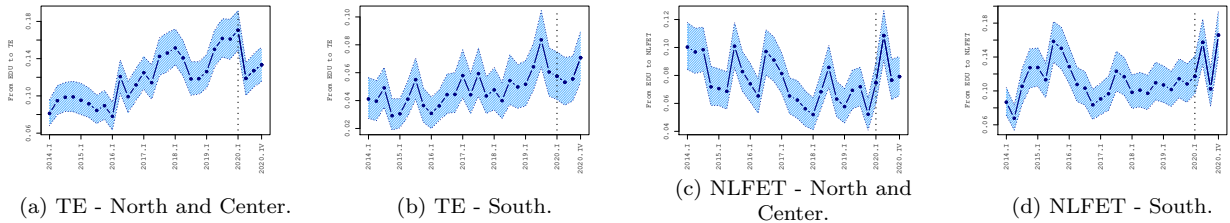
Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).
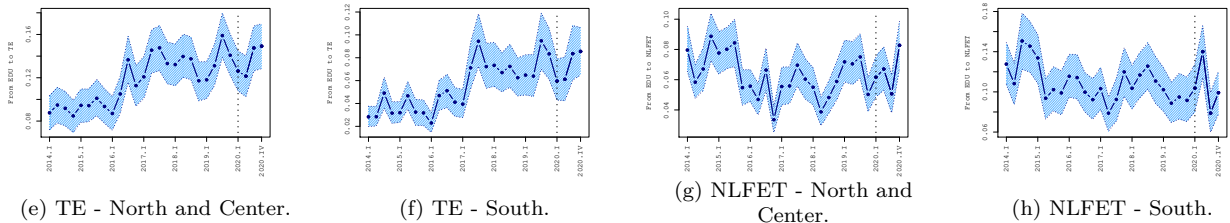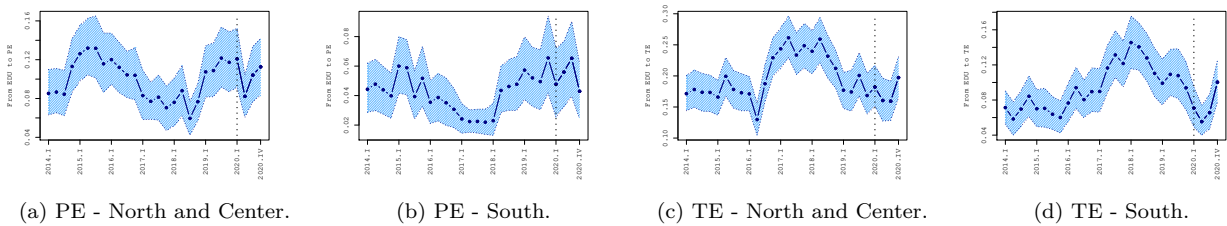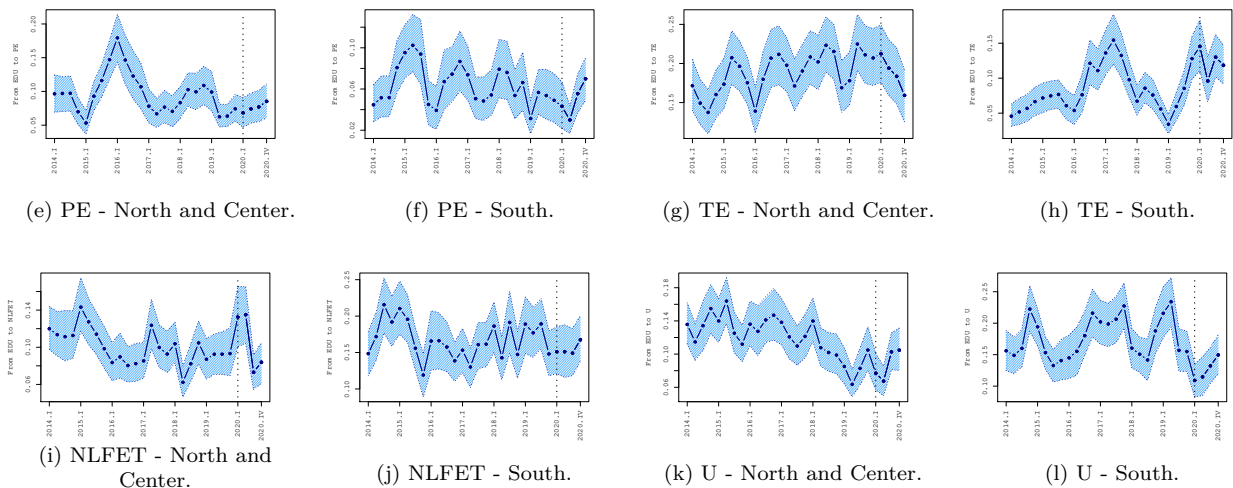
These large differences persist in the 25-29 cohort (Table 16): in the North and Center the transition probability from education to both temporary and permanent employment range from 8% to 10% and from 16% to 25%, respectively, for females, while in the South those percentages range between 4% and 6% and between 6% and 14%, respectively. Among males, the transition probabilities to permanent and temporary employment are much higher in the North and Center compared to the South, while those to the NLFET and unemployment are much higher in the South. As we progress towards older cohorts, the issue carries on: persistence in the NLFET state among 30-39 years old is 55% for females in the North and Center compared to 68% in the South (Table 17). Moreover the flows of females into the NLFET

state continues to be much larger in the South: the transition probabilities from permanent employment, temporary employment and unemployment are 14%, 42% and 60% respectively, compared to 7%, 24% and 45% in the North and Center. Larger flows into the NLFET state are also present for males (Table 18), but the gap between the North and Center and the South is smaller. Among 40-49 years old (Table 19) the persistence of females in the NLFET state increases: 65% in the North and Center compared to 76% in the South. On the other hand, the flows of females from unemployment into the NLFET state keeps increasing: it is more than 70% in the South and 60% in the North and Center. For the case of males the difference are less evident. Finally, among the 50-64 cohort, we observe a large persistence of females in the NLFET state in both geographical areas (approximately 90%), but while it shows a declining trend in the North and Center, it is constant in the South (Table 20). Among males, we observe a decreasing trend in both areas. All these negative trends go hand in hand with a surge in the transition probabilities from the NLFET state to temporary employment (Table 21).

Figure 17. Annual transition probabilities of females aged 30-39 from temporary employment, unemployment, NLFET, and permanent employment to the NLFET state in the North and Center and South of Italy.

North and Center.

(a) PE.   (b) TE.   (c) NLFET.   (d) U.

South.

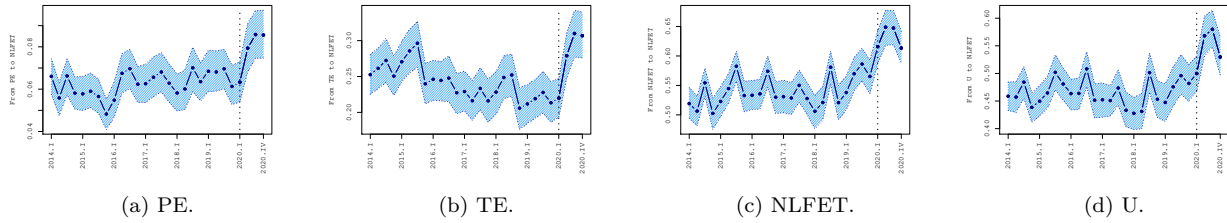(e) PE.   (f) TE.   (g) NLFET.   (h) U.
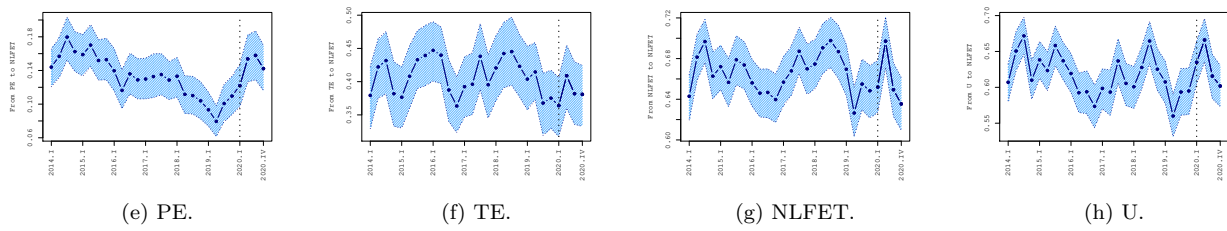
Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

Figure 18. Annual transition probabilities of males aged 30-39 from temporary employment, unemployment, NLFET, and permanent employment to the NLFET state in the North and Center and South of Italy.

North and Center.

| (a) PE. | (b) TE. | (c) NLFET. | (d) U. |

South.

| (e) PE. | (f) TE. | (g) NLFET. | (h) U. |

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

Figure 19. Annual transition probabilities of individuals aged 40-49 from temporary employment, unemployment, NLFET, and permanent employment to the NLFET state in the North and Center and South of Italy.

Females.

(a) PE - North and Center.

(b) PE - South.

(c) TE - North and Center.

(d) TE - South.

(e) NLFET - North and Center.

(f) NLFET - South.

(g) U - North and Center.

(h) U - South.

Males.

(i) PE - North and Center.

(j) PE - South.

(k) TE - North and Center.

(l) TE - South.

(m) NLFET - North and Center.

(n) NLFET - South.

(o) U - North and Center.

(p) U - South.
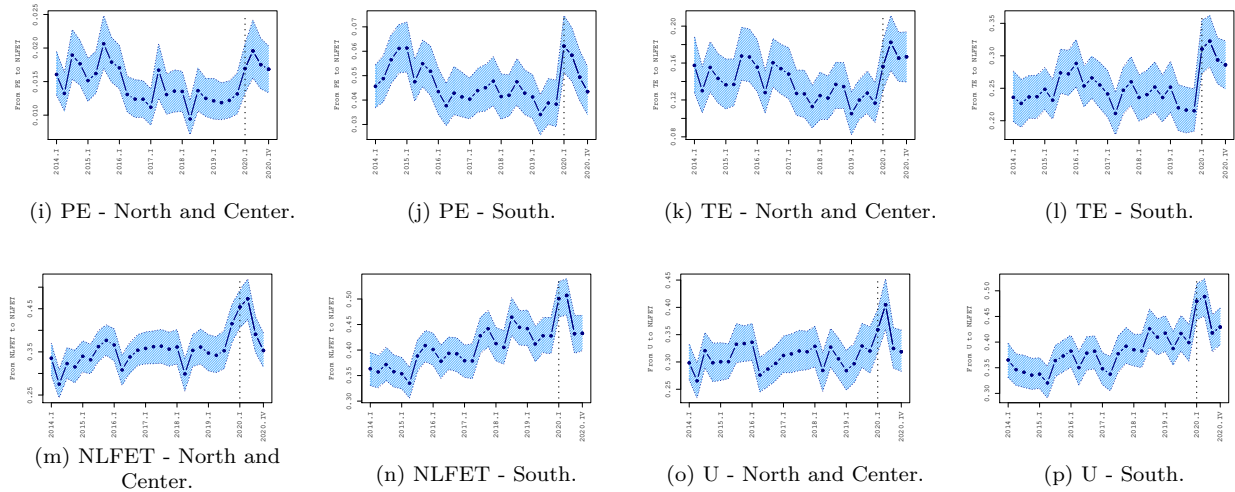
Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

Figure 20. Annual transition probabilities of females aged 50-64 from temporary employment, unemployment, NLFET, and permanent employment to the NLFET state in the North and Center and South of Italy.

Females.

(a) TE - North and Center.

(b) TE - South.

(c) NLFET - North and Center.

(d) NLFET - South.

Males.

(e) TE - North and Center.

(f) TE - South.

(g) NLFET - North and Center.

(h) NLFET - South.
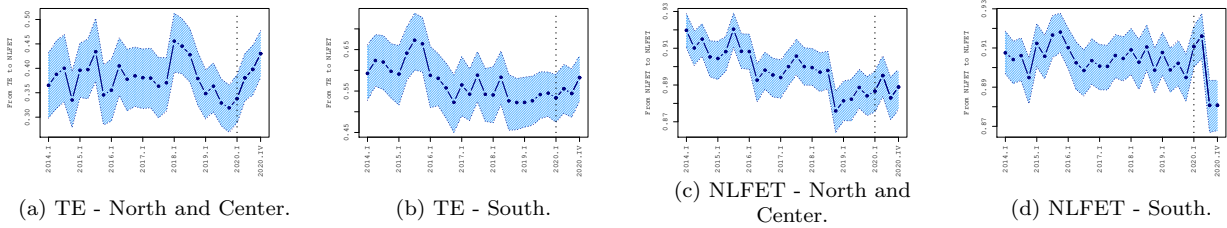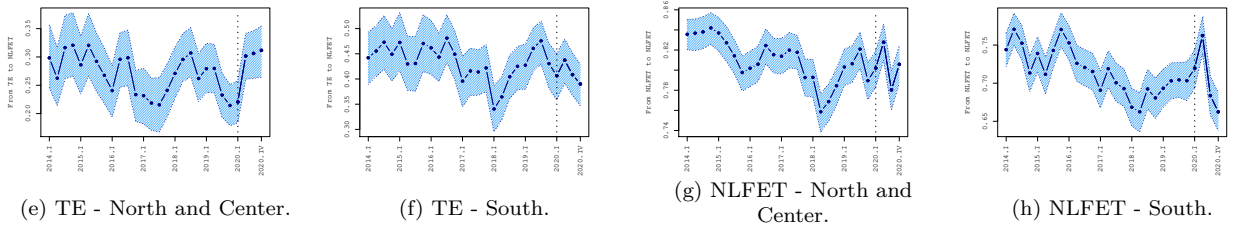
Figure 21. Transition probabilities of individuals aged 50-64 from NLFET to temporary employment in the North and Center and South of Italy.
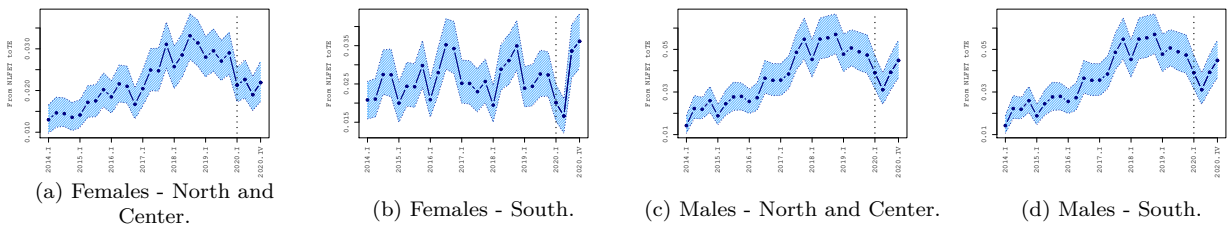
(a) Females - North and Center.

(b) Females - South.
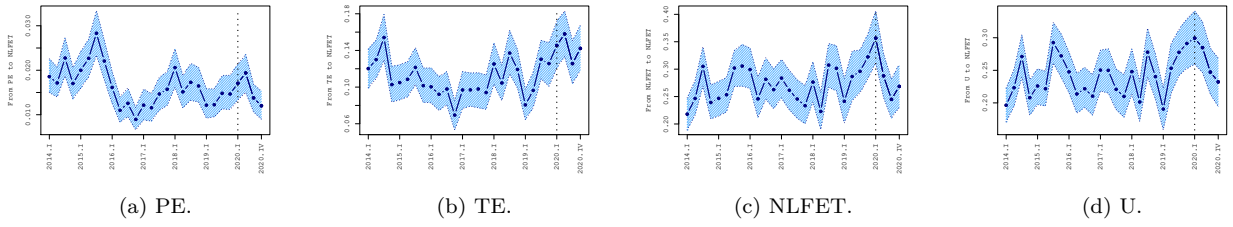
(c) Males - North and Center.
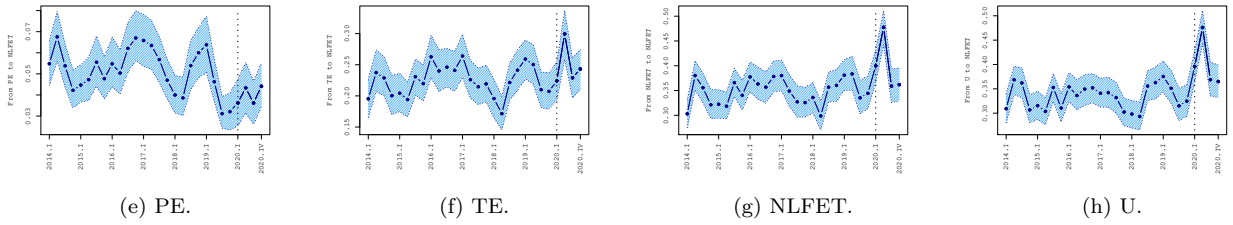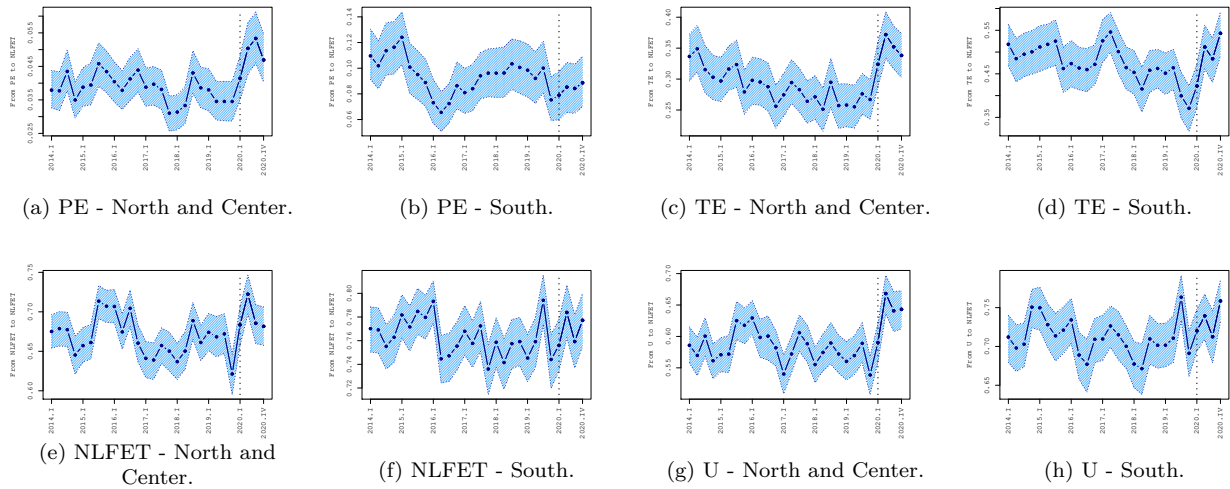
(d) Males - South.

Note: Confidence intervals at 90% are computed using 1000 bootstraps. *Source*: LFS 3-month longitudinal data as provided by the Italian Institute of Statistics (ISTAT).

B   The dynamics of the shares during COVID-19

To assess how the shares of individuals across different states have changed during the pandemic, we compare data from quarter III of 2020 with the same quarter one year before for the different categories of individuals (Table 5).

Table 5. Changes in the shares of different categories of individuals in different labor market states, by age groups.

	SE	TE	PE	U	NLFET	EDU	FS
			Males - North and Center				
15-19	0.0003	-0.010**	-0.001	-0.003	**0.008*****	0.004	0.001*
	(0.420)	(0.021)	(0.395)	(0.192)	(0.017)	(0.298)	(0.091)
20-24	0.002	-0.011	-0.004	-0.008	**0.007***	-0.0001	0.013***
	(0.284)	(0.117)	(0.307)	(0.108)	(0.098)	(0.464)	(0.000)
25-29	0.011	0.006	-0.033***	0.002	-0.001	-0.006	0.020***
	(0.060)	(0.219)	(0.000)	(0.390)	(0.437)	(0.215)	(0.000)
30-39	-0.009	-0.005	-0.008	-0.011***	**0.008*****	0.001	0.023***
	(0.047)	(0.102)	(0.122)	(0.000)	(0.000)	(0.176)	(0.000)
40-49	-0.001	-0.006**	-0.022***	-0.003*	**0.011*****	0.0002	0.021***
	(0.428)	(0.024)	(0.000)	(0.074)	(0.000)	(0.274)	(0.000)
50-64	-0.006	-0.004**	-0.007*	-0.003*	0.004	0.00002	0.016***
	(0.105)	(0.012)	(0.089)	(0.069)	(0.210)	(0.413)	(0.000)

	SE	TE	PE	U	NLFET	EDU	FS
			Males - South				
15-19	0.003**	0.005	-0.002	0.0003	-0.001	-0.006	0.0003
	(0.041)	(0.125)	(0.227)	(0.484)	(0.444)	(0.333)	(0.177)
20-24	-0.003	-0.025***	0.012*	-0.013	0.004	0.017	0.009***
	(0.289)	(0.000)	(0.080)	(0.102)	(0.351)	(0.114)	(0.000)
25-29	0.005	-0.003	-0.016*	-0.033***	0.013	**0.024*****	0.012***
	(0.266)	(0.385)	(0.067)	(0.000)	(0.116)	(0.002)	(0.000)
30-39	-0.007	-0.003	-0.027***	-0.015***	**0.023*****	**0.006****	0.023***
	(0.172)	(0.315)	(0.001)	(0.002)	(0.000)	(0.010)	(0.000)
40-49	-0.005	-0.002	-0.011*	-0.015***	**0.012****	0.0002	0.022***
	(0.214)	(0.312)	(0.095)	(0.000)	(0.031)	(0.340)	(0.000)
50-64	0.001	-0.002	-0.002	-0.010***	-0.002	0.0001	0.014***
	(0.402)	(0.249)	(0.377)	(0.000)	(0.386)	(0.237)	(0.000)

	SE	TE	PE	U	NLFET	EDU	FS
			Females - North and Center				
15-19	0.001	0.006	-0.002	0.002	-0.005	-0.002	0.001
	(0.192)	(0.048)	(0.146)	(0.299)	(0.103)	(0.338)	(0.046)
20-24	-0.004	-0.024***	-0.00000	-0.001	**0.021*****	0.002	0.007***
	(0.153)	(0.000)	(0.482)	(0.417)	(0.000)	(0.443)	(0.000)
25-29	-0.002	-0.023***	-0.017*	0.003	**0.024*****	-0.010*	0.025***
	(0.355)	(0.001)	(0.055)	(0.307)	(0.001)	(0.093)	(0.000)
30-39	-0.005	-0.012***	-0.025***	-0.010***	**0.031*****	-0.001	0.022***
	(0.131)	(0.000)	(0.000)	(0.000)	(0.000)	(0.311)	(0.000)
40-49	-0.005	-0.012***	-0.009*	-0.007***	**0.012*****	-0.0004	0.021***
	(0.135)	(0.000)	(0.064)	(0.001)	(0.000)	(0.215)	(0.000)
50-64	-0.004	-0.004***	-0.003	-0.002	-0.004	0.0004*	0.016***
	(0.109)	(0.001)	(0.288)	(0.114)	(0.239)	(0.064)	(0.000)

	SE	TE	PE	U	NLFET	EDU	FS
			Female - South				
15-19	0.0003	-0.004	-0.005***	-0.015***	**0.013***	0.010	0.0003
	(0.365)	(0.132)	(0.001)	(0.000)	(0.066)	(0.170)	(0.194)
20-24	-0.005	-0.024***	-0.009*	-0.010	-0.005	**0.041*****	0.011***
	(0.159)	(0.000)	(0.088)	(0.157)	(0.340)	(0.000)	(0.000)
25-29	-0.012*	-0.021***	0.004	-0.033***	**0.042****	0.008	0.011
	(0.016)	(0.000)	(0.327)	(0.000)	(0.000)	(0.230)	(0.000)
30-39	0.002	0.003	-0.024***	-0.016***	**0.016****	0.003	0.016***
	(0.363)	(0.260)	(0.000)	(0.001)	(0.045)	(0.147)	(0.000)
40-49	0.005	0.001	-0.011*	0.005	-0.010	0.0004	0.011***
	(0.176)	(0.400)	(0.060)	(0.162)	(0.125)	(0.355)	(0.000)
50-64	0.002	-0.005**	-0.006	0.001	0.002	0.0001	0.006***
	(0.242)	(0.020)	(0.172)	(0.352)	(0.389)	(0.355)	(0.000)

Note: The attained significance levels (ASL) of the null hypothesis of equality between the shares in the two periods computed using 1000 bootstraps are reported in parenthesis (Efron and Tibshirani, 1994, p.220); *ASL<0.1; **ASL<0.05; ***ASL<0.01.

C   Analysis by household size

Table 6. Percentage of females with at least one child below the age of 11 by geographical area and employment status (2020).

	Age 30-39		Age 40-49	
	North and Center	South	North and Center	South
Permanent	46.1	20.5	56.1	29.0
Temporary	7.9	6.4	5.6	5.8
Self-employed	8.1	6.5	11.1	9.4
Unemployed	5.4	8.5	4.1	6.9
Inactive	31.8	57.1	22.3	48.3
Total (in 000s)	1261	715	1188	557

Source: ELFS data.

D Logit estimation of the probability to be active next quarter for an individual currently active in the labor market

Table 7. Odds-ratios of being active next quarter for an individual currently active in the labor market.

	Active in the labor market next quarter			
	Female 30-39	Male 30-39	Female 40-49	Male 40-49
2014	1.032 (0.898-1.189)	1.072 (0.909-1.244)	1.127 (0.979-1.286)	0.903 (0.762-1.047)
2015	1.119 (0.962-1.290)	1.026 (0.871-1.194)	1.130 (0.986-1.292)	1.004 (0.856-1.157)
2016	1.070 (0.929-1.234)	**1.217** (1.029-1.416)	**1.149** (1.008-1.313)	**1.186** (1.012-1.391)
2017	**1.164** (1.011-1.349)	**1.223** (1.023-1.426)	**1.187** (1.016-1.367)	**1.209** (1.035-1.413)
2018	**1.224** (1.059-1.417)	1.126 (0.945-1.321)	1.149 (0.996-1.322)	**1.322** (1.116-1.543)
2019	1.123 (0.981-1.291)	**1.427** (1.193-1.685)	**1.203** (1.041-1.380)	**1.228** (1.041-1.437)
2020	**0.509** (0.374-0.701)	**0.627** (0.460-0.834)	0.745 (0.526-1.064)	0.750 (0.543-1.022)
Quarter II	0.981 (0.879-1.086)	1.091 (0.976-1.209)	1.085 (0.989-1.188)	1.030 (0.932-1.135)
Quarter III	**0.765** (0.688-0.844)	**1.378** (1.224-1.545)	**0.912** (0.835-0.998)	**1.411** (1.264-1.561)
Quarter IV	1.004 (0.898-1.103)	1.029 (0.914-1.147)	1.085 (0.979-1.189)	1.070 (0.971-1.177)
EU citizen	0.914 (0.791-1.054)	**0.555** (0.474-0.644)	**0.684** (0.602-0.778)	**0.418** (0.357-0.494)
No EU citizen	**0.781** (0.690-0.882)	**0.804** (0.721-0.893)	**0.753** (0.670-0.849)	**0.536** (0.479-0.599)
Primary education	**0.575** (0.519-0.630)	**0.501** (0.444-0.567)	**0.389** (0.352-0.426)	**0.311** (0.268-0.353)
Secondary education	**0.825** (0.762-0.889)	**0.756** (0.676-0.844)	**0.659** (0.602-0.722)	**0.556** (0.479-0.635)
North or Center	**1.893** (1.600-2.193)	**2.201** (1.873-2.540)	**1.813** (1.559-2.101)	**2.535** (2.170-2.963)
Household members >2	**0.680** (0.577-0.793)	0.872 (0.752-1.007)	**0.765** (0.663-0.881)	**1.211** (1.044-1.390)
2020×(North or Center)	1.088 (0.739-1.496)	0.831 (0.581-1.129)	**0.676** (0.453-0.940)	**0.628** (0.442-0.868)
2020×(Household members >2)	**1.483** (1.031-2.073)	1.208 (0.831-1.671)	1.031 (0.685-1.439)	0.761 (0.533-1.007)
(North or Center)×(Household members >2)	1.078 (0.892-1.301)	1.170 (0.964-1.392)	**1.430** (1.195-1.695)	1.029 (0.849-1.234)
2020×(North or Center)×(Household members >2) ×(Household members >2)	**0.614** (0.401-0.892)	0.761 (0.473-1.113)	0.953 (0.621-1.406)	1.272 (0.850-1.854)
(Intercept)	18.228 (15.075-21.960)	23.247 (18.958-29.223)	25.899 (21.354-31.183)	39.220 (30.986-48.260)
Observations	62,950	78,307	95,990	120,232
Log Likelihood	−14,065.210	−12,152.510	−16,144.900	−14,945.660
Akaike Inf. Crit.	28,172.430	24,347.030	32,331.800	29,933.320

Note: Confidence interval at 95% are calculated by 1000 bootstrap using sample weights.