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Maurizio Franzini

Creation, destruction and reallocation of jobs in Italian firms: an analysis based on administrative data

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Creation, destruction and reallocation of jobs in Italian firms: an analysis based on administrative data

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March 6, 2023

Abstract

We study the creation, destruction and reallocation of jobs in Italy over a period of almost forty years, until 2021. The size of gross job flows was large and in line with other developed economies. Every year, around 13 per cent of jobs are created and 12 per cent are destroyed. Most of this creation and destruction occurs within narrowly defined sectors, highlighting the crucial role that firm heterogeneity – rather than sectoral shocks – plays in driving job flows. Although employment at incumbent firms is more influenced by the business cycle, the entry and exit of firms both contribute, respectively, to one third of job creation and destruction. During the pandemic, and contrary to what has been documented for the US and the UK, Italy experienced a decline in excess job reallocation, entirely due to within-sector flows, while between-sector reallocation increased only slightly. ICT services and the construction sector received larger inflows of workers. The former did so as a result of the opportunities brought about by the shift to a digital economy, while the latter was prompted by hefty fiscal incentives targeted at the industry.

JEL classification: E24, E32, J63, O4.
Keywords: Reallocation, Job Creation, Job destruction, COVID-19, Recession, Pandemic

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Sommario

Studiamo la creazione, distruzione e riallocazione di posizioni lavorative (o posti di lavoro) in Italia lungo un periodo di quasi quarant'anni, fino al 2021. Tali flussi di posizioni lavorative sono sostanziali e di dimensioni analoghe a quelli di altre economie sviluppate. Ogni anno, circa il 13 per cento dei posti di lavoro non esisteva l'anno precedente (sono stati "creati"), mentre il 12 per cento non esisterà quello successivo (saranno "distrutti"). La maggior parte di questa creazione e distruzione avviene all'interno dei settori, sottolineando il ruolo cruciale che l'eterogeneità d'impresa, e non gli *shock* settoriali, ha nel guidare i flussi di posti di lavoro. Anche se l'occupazione presso le imprese più mature è più influenzato dal ciclo economico, l'ingresso e l'uscita dal mercato delle imprese contribuiscono entrambi, rispettivamente, a un terzo della creazione e distruzione di posti di lavoro. Durante la crisi pandemica, al contrario di quanto documentato per Stati Uniti e Regno Unito, l'Italia ha subito un calo della riallocazione, interamente attribuibile ai flussi all'interno dei settori; al contrario, i flussi tra settori sono aumentati solo leggermente. Il settore dei servizi di informazione e comunicazione e quello delle costruzioni hanno ricevuto i maggiori flussi di lavoratori. Per il primo, sono state determinanti le opportunità portate dalla transizione digitale, mentre per il secondo hanno pesato gli incentivi fiscali.

Parole chiave: Riallocazione, Creazione di posti di lavoro, Distruzione di posti di lavoro, COVID-19, Recessione, Pandemia

1 Introduction*

This paper provides new evidence about job creation, destruction and reallocation in the Italian economy, over a stretch of almost four decades from the 1980s until end-2021, thus including the pandemic crisis and the ensuing recovery. We rely on confidential administrative micro data from the Italian Social Security Institute (INPS) on the universe of firms and employees in the non-farm private sector. Compared to more aggregate statistics, information on gross flows at the firm level allows us to observe the *distribution* of heterogeneous employment dynamics across firms, sectors and locations. This analysis reveals which segments of the economy are creating jobs and which are destroying them, allowing for a better understanding of the drivers of structural change and helping to better target government interventions.

Similarly to studies first conducted in the U.S. and later in other European countries (see Davis and Haltiwanger (1992); Boeri and Cramer (1992); Stiglbauer et al. (2003) and, more recently, Biondi et al. (2022)) we reveal a substantial degree of simultaneous job creation and destruction, underpinning substantial job flows from contracting to expanding firms and sectors during all phases of the business cycle. From 1984 to 2021, job creation amounted on average to 13 percent of the employment stock, while job destruction was 12 percent. These figures imply an excess reallocation[1] rate of about 25 percent, a value in line with what is observed on average for the OECD countries (Haltiwanger et al., 2014). Job creation and job destruction respond vigorously to the business cycle in the expected directions, mostly due to the expansion and contraction of incumbent firms, and less so due to firm entry and exit. Nonetheless we still find that entering and exiting firms contribute significantly to job creation and destruction, around one third each. We do not find any evidence that total excess reallocation is linked to the business cycle, but its components are: while excess job reallocation within sectors is mildly procyclical, between-sector reallocation is strongly countercyclical.

During the pandemic years, we find that the share of expanding firms dropped from 60 to 40

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[1]This is defined as the sum of absolute employment changes across firms (gross reallocation) less the absolute value of the aggregate net employment change, expressed as a percentage of total employment. This expresses the amount of job flows that occurred over and above what was needed to accommodate the net change in the employment stock.

percent, leading to a sharp decline in job creation. Job destruction also decreased in 2020, as a consequence of the public interventions implemented by the Italian government to face the pandemic crisis, such as a layoff freeze and a very generous short-time work scheme (hereinafter STW). Although workers under the STW were formally employed, the effective labor input used by firms decreased substantially. As for job reallocation, some commentators (see Barrero et al. (2021)) have argued that the peculiar nature of the Covid-19 shock could induce both a positive *reallocation shock* and a permanent process of structural transformation, away from interaction-intensive industries towards digital services. We contribute to this debate by showing that excess reallocation spiked upwards in the first quarter of 2020 but dropped strongly in the second quarter. It remained subdued until the third quarter of 2021, when it started a slow trend inversion. Quantitatively, however, these changes are not economically significant and represent small deviations from a downward trend in excess reallocation visible since 2017. Decomposing excess reallocation into within-sector and between-sector components, we detect very different dynamics. While within-sector reallocation decreased during 2020 and picked up again in 2021, between-sector reallocation increased slightly during 2020 but reverted to 2019 levels in 2021. By and large the relative magnitude of within- and between-sector reallocation remained unchanged during the pandemic.

The decline in intra-industry reallocation suggests that firm-level employment dynamics tend to co-move to a greater extent, as many more firms simultaneously have decreased their actual use of labor inputs, irrespective of their level of productivity. To shed light on this question, we classify firms according to within-sector quintiles of AKM firm fixed effects estimated on the pre-pandemic period and look at changes in their effective use of labor inputs before and after 2020.[2] The data indicate that firms in all productivity quintiles used less labor inputs during the pandemic, although to differing degrees, consistent with evidence found for other developed economies.

The temporary increase in between-sector reallocation prompts us to ask which sectors benefited and which did not during the pandemic. In particular, we investigate from which sectors to which sectors workers moved in response to the pandemic. Sector level employment changes indicate substantial expansions in both ICT services and the construction sector. While the former benefited from the notable shift in demand for digital products and work-from-home technologies, the employment increase in the latter is most likely owing to the very generous fiscal incentives for energy efficiency in the residential sector provided by

[2] As explained in detail in Section 2, the firm-level data lack information on the number of employees who are enrolled in zero-hour STW schemes. As such, our job creation and destruction measures have to be interpreted as effective labor input use and not a measure of payroll. This drawback of our microdata does not affect our *aggregate* estimates of job creation and job destruction, nor our excess reallocation measures.

the Italian government.

Prior works have studied the dynamics of job flows in Italy (Contini et al. (1995); Contini and Revelli (1997); Contini and Trivellato (2005); Tattara and Valentini (2010)), also using confidential INPS data but on shorter panels. To a large extent, the main finding from these works is that the Italian labor market displays a high level of dynamism, with job flows being largely in line with those of other developed economies. This is interesting in and of itself because the Italian labor market is highly regulated, characterized by wage rigidities due to centralized collective bargaining (Devicienti et al., 2007; Adamopoulou et al., 2016), strong employment protection legislation especially for bigger firms (Schivardi and Torrini, 2003) and on-the-job protection schemes such as short-time work (STW) (Giupponi and Landais, 2018). On the other hand, the Italian productive structure exhibits a firm size distribution that is highly skewed towards micro and small firms (where churning is substantially higher) as well as a high prevalence of temporary contracts which amplify the size of job flows.

Our work makes two key contributions to the previous literature. First, we observe creation, destruction and reallocation of jobs over a very long time period, spanning almost four decades, up to the end of 2021. This long-run view on job flows is unprecedented for the literature on job flows and job reallocation.[3] Secondly, we capture recent dynamics in job flows during the Covid-19 pandemic crisis, on which no evidence is available yet for Italy, and international evidence is scant. The closest contribution to ours is Basso et al. (2022), who look at the employment and transition probabilities of different worker categories at the onset of the pandemic. They find little evidence that the pandemic had an impact on the probability of changing sectors. While they are focused on worker flows (activations and separations) and take the perspective of the individual, our analyses concern job flows from and towards firms, for which we build aggregate statistics that we follow over a long period of time.

The paper is structured as follows. In Section 2 we describe our data sources and the indicators that we employ in the rest of the analysis. In Section 3 we look at job creation, destruction and reallocation in a historical perspective, without entering into the details of recent events. In Section 4 we zoom in on 2020 and 2021 to highlight job flows dynamics during the pandemic crisis. In Section 5 we conclude.

[3]To the best of our knowledge Stiglbauer et al. (2003) is the only study using a 20-year long panel in the context of Austria

2 Data and measurement

2.a Matched employer employee data from INPS

We base our analyses on confidential administrative matched employer-employee data from the Italian Social Security Institute (INPS). The data span four decades, from 1983 to 2021, and cover the universe of employer-employee relationships in the non-farm private sector in Italy.[4]

To identify job flows, we use a monthly panel of firms that contains information on employment levels for the universe of non-farm private employers over the period 1983–2021. The database includes approximately 1.5 million firms per year (increasing from 1.4 million in 1990 to 1.8 million in 2021). We aggregate our data over time at the quarter level taking average employment across the three months in a given quarter. Especially during the pandemic crisis, the high frequency of our data is a key advantage compared to other similar administrative datasets, where employment is often measured once a year.[5]

For some of the analyses we make use of a matched employer-employee dataset available for the years 2014 through 2021.[6] For every job spell we observe the start and end dates, the gross earnings, the number of weeks worked in full time equivalent units, whether the contract is part-time and the occupational classification (apprentice, blue collar, white collar, middle manager or senior manager). We can also link worker identifiers to a database containing basic socio-demographic characteristics such as year of birth or gender. The database has information on approximately 14 million workers (holding 18.5 million contracts overall), increasing from 13 million workers in 2014 to 20 million in 2021. This is the universe of non-farm private sector workers in Italy and represents more than 80% of total workers in Italy. As explained in Section 2.c, we use these data to estimate AKM models (Abowd et al., 1999) and to build sector-to-sector matrices of worker transition probabilities.

To better interpret our results, it is useful to bear in mind some limitations of the data. First and most importantly, our data exclude employees enrolled in zero-hour STW schemes. As we clarify in Section 4, this is particularly relevant during the Covid-19 pandemic, when these schemes were used extensively. It is important to note, however, that the excess reallocation measures are not affected by the exclusion of these workers. This is because

[4]The relevant statistical population has changed significantly for administrative purposes over the course of the 40 years under study. We limit our analysis to businesses in the private non-farm business sector with NACE codes ranging from 10 to 84 in order to have a relatively homogeneous population over the time span of our analysis. We provide more details on the population of interest in Appendix A.

[5]E.g. the US data from the Bureau of Labor Statistics, the German or the Austrian ones.

[6]See in Appendix A for a detailed description of the data used.

excess destruction from the activation of the STW schemes — and excess creation from the deactivation — feeds directly into net employment changes and thus is netted out in the calculation. Given this limitation, creation and destruction have to be interpreted as an effective labor input (providing at least one hour of work). We also do not observe dependent self-employed (*parasubordinati*) or the self-employed. Consequently, we do not observe firms unless they have at least one employee and we only observe the creation and destruction of employer-employee relationships.

Secondly, the anonymization of firm identifiers prevents us from tracking merger and acquisitions, which could distort some of the reallocation measures due to "spurious" births and deaths of firms. This is a common problem in these types of studies.

2.b Creation, destruction and reallocation indicators

We use the standard measures of job flows proposed by Davis and Haltiwanger (1992) and Davis and Haltiwanger (1999). We start with the definition of *jobs* as the number of workers a firm needs to produce a chosen amount of goods and services. We are interested in the movement of workers across firms only when they bring about a change in the number of jobs at the firm level.[7] In this context, job creation in period t is defined as the sum of all net employment gains occurring between t and $t-1$ at expanding firms; conversely job destruction is the sum of all net employment losses at contracting firms. The sum of creation and destruction gives gross job reallocation, while the difference gives the net employment change. If we subtract the absolute value of net employment change from gross job reallocation we obtain a measure of *excess* job reallocation, which captures how much more creation and destruction of jobs occurred in excess of what was needed to accommodate the observed net change in employment. In the paper, all of these changes are measured as a fraction of average employment between t and $t-1$ and can be interpreted as rates.

Formally, we compute the employment growth rate at firm i as follows:

$$g_{it} = \frac{E_{it} - E_{it-1}}{X_{it}} \tag{1}$$

where $X_{it} = \frac{1}{2}(E_{it} + E_{it-1})$ is the average employment level between t and $t-1$. Contrary to the more standard growth rate, this indicator varies between -200% (for exiting firms) and +200% (for firms entering the market). It well approximates log changes and more

[7] A large share of worker flows does not determine any change in the number of jobs at the firm level, for example replacement hires. This is referred to in the literature as *churning* (Davis and Haltiwanger, 2014).

standard growth rates, especially for small changes, and has the advantage of allowing for an integrated analysis of employment changes at incumbent, entering and exiting firms.

Job creation at the firm level is equal to this growth rate when positive, and zero otherwise, that is:

$$JC_{it} = \max\{g_{it}, 0\} \tag{2}$$

Similarly, job destruction at the firm level is equal to the growth rate when negative, and zero otherwise:

$$JD_{it} = \max\{-g_{it}, 0\} \tag{3}$$

At any other level of aggregation, be it sector-level or economy-wide, aggregate job creation and destruction can be written as employment-weighted averages of the respective firm-level indicators.[8]

$$JC_t = \sum_i \left(\frac{X_{it}}{X_t}\right) \cdot JC_{it} \tag{4}$$

$$JD_t = \sum_i \left(\frac{X_{it}}{X_t}\right) \cdot JD_{it} \tag{5}$$

where $X_t = \sum_i X_{it}$ is average total employment in period t. It follows from this definition that job creation is the sum of all employment gains at expanding firms, while job destruction is the sum of all employment losses at shrinking firms (appropriately rescaled by average employment between the two periods). Denoting by C the set of expanding firms and by D the set of shrinking firms, it is easy to prove that they both can be rewritten as:

$$JC_t = \frac{\sum_{i \in C}(E_{it} - E_{it-1})}{X_t} \tag{6}$$

$$JD_t = \frac{\sum_{i \in D}(E_{it} - E_{it-1})}{X_t} \tag{7}$$

[8]Note that because of the way we defined creation and destruction at the firm level, employers that do not expand in a period do not count towards aggregate job creation, and similarly for non-contracting firms for job destruction.

Net employment change is the difference between job creation and destruction, both at the firm level and at higher levels of aggregation. Job reallocation is the sum of job creation and job destruction. Excess job reallocation is the amount of job reallocation that exceeds what is required to accommodate the absolute change in employment level, i.e.:

$$ER_t = JC_t + JD_t - |JC_t - JD_t| \tag{8}$$

Job creation and job destruction can also be decomposed into the contributions coming from incumbent firms and from entry and exit. Since JC_{it} is 200 percent for entrants, it follows that:

$$JC_{it} = \sum_{i \in \text{incu}} \left(\frac{X_{it}}{X_t} \right) \cdot JC_{it} + 2 \cdot \left(\frac{X_t^{\text{entry}}}{X_t} \right) \tag{9}$$

Intuitively, the contribution of entrants to job creation is twice their share of employment at entry. A similar formula holds for job destruction, where X_t^{entry} is replaced with X_t^{exit}. A firm is entering in period t if it has employees in period t and zero employees in $t-1$ (i.e. it was not present in the INPS records). Conversely, a firm is exiting in period t if it has zero employees in period t but had at least one employee in $t-1$.[9]

2.c Job flows and productivity

To enrich the analysis of the pandemic crisis, we study the dynamics of gross job flows for firms with different productivity levels. To maximize coverage and to keep our reference population consistent with the rest of the paper, we construct productivity indicators based on wage data, in line with a broad literature in labor economics that uses AKM firm fixed effects as a proxy for firm quality (see Dauth et al. (2021); Macis and Schivardi (2016), among others).

We estimate an AKM model (Abowd et al., 1999) on an unbalanced yearly panel of workers aged 19 to 64 observed during the period 2014-2019. The main estimating equation is:

[9]Hence, the definition of entry and exit depends on whether a firm is recorded in the INPS database, and therefore depends on whether the firm has at least one employee. In principle a firm may not really exit the market, but become a self-employed individual, and similarly, an entrant could have been in the market as a self-employed. This is immaterial for our analysis, but may affect the comparison with aggregate statistics on firm demographics, that are based on the inclusion in the firm register as an active firm (including self-employed).

$$w_{(i,j)t} = \phi_i + \psi_j + \delta_t + x'_{(i,j)t}\beta + \sum_{h=\{2,3\}} \gamma_h \cdot (a_{it}^h - 40) + \sum_{h=\{2,3\}} \lambda_h \cdot (a_{it}^h - 40) \cdot \text{fem}_i + \epsilon_{(i,j)t} \quad (10)$$

where $w_{(i,j)t}$ is the natural log of the average weekly wage for worker i employed in firm j in year t; ϕ_i and ψ_j are worker and firm fixed effects, respectively; δ_t are year fixed effects meant to capture yearly changes in the overall level of wages (e.g. due to inflation); $x'_{(i,j)t}$ is a vector of covariates including a dummy for whether the job spell is part-time and for gender. The summation terms include two third-order polynomials in age that can vary according to the gender of the individual. In order to solve known multicollinearity issues (Card et al., 2018), we express age in deviation from 40 and exclude the linear term. This implies a restriction on the age profile such that it is flat at age 40. The inclusion of these polynomials ensures that the fixed effects do not capture differences attributable to gender-specific age profiles. Note that the normalization of the age variables does not affect the estimation of the firm fixed effects, which is what we are most interested in here (Card et al., 2018).

We then rank firms based on percentile of the firm fixed effect distribution *within* each 2-digit NACE sector. In this sense, our quality measure does not depend on the fact that certain sectors pay workers more than others, all other things being equal.

3 A long-run perspective on gross job flows in Italy

In this section we present the time series properties of job creation, job destruction, gross reallocation, and excess reallocation over a period of almost forty years (1984-2021) using the methodology described in Section 2.b. This long-run perspective allows us to ascertain the presence of long-run trends, something which was not possible in earlier analyses. In what follows, all of the series represent year-on-year changes between a given quarter and the same quarter of the previous year, which removes seasonal patterns.

3.a Job creation and job destruction measures

Figure 1 shows time series of annual job creation, job destruction and net employment changes, as a percentage of average employment. Grey bars indicate recessions, i.e. two consecutive quarters of negative GDP growth. We report corresponding averages and standard deviations for the whole period in Table 1. Overall, the two series appear stationary and do not display any visible trend. Job creation (destruction) remains high also during periods of

crises (booms). The job creation rate stands on average at 13.4 percent, indicating an absolute number of 1.3 million jobs created in any given quarter, relative to the same quarter of the year before. Conversely, the job destruction rate is 12.1 percent of employment on average, roughly amounting to 1.2 million jobs destroyed. The rate of net employment change as a consequence of these gross job flows is an order of magnitude smaller: 1.2 percent on average, around 120,000 jobs. The job creation rate peaked in 2000 when it hovered around 17 percent, while the job destruction rate was highest during the 2009 contraction, at about 15 percent. More generally, job creation and job destruction respond very strongly to the business cycle in the expected directions. The former is procyclical, while the latter is countercyclical.

The fact that gross flows are so much larger than the net change indicates that firm heterogeneity is much more important than aggregate shocks in explaining job flows (Davis and Haltiwanger, 1992). The simultaneous creation and destruction of jobs implies a massive movement of workers. All in all, our analyses indicate that the Italian labor market displays a high level of dynamism, in line with other advanced economies (Contini and Revelli, 1997; Contini and Trivellato, 2005), including the United States[10]. Using BED data on the 1998-2002 period, Pinkston and Spletzer (2004) show that in the United States the annual job creation rate (directly comparable with ours) was 14.6 percent, while the job destruction rate was 13.7 percent. For the UK, Hijzen et al. (2010) report job creation and job destruction rates of 10 and 13.7 percent, respectively, during the 1997-2008 period. Additional studies find similar magnitudes in other countries e.g. Boeri and Cramer (1992) for Germany, Stiglbauer et al. (2003) for Austria and Persson (2000) for Sweden.

In Figure 2 we provide a decomposition of job creation into the contributions from incumbent firms and from new entrants, as in Equation 9 (Section 2.b). Incumbent firms provide the largest contribution to cyclical movements in job creation. New entrants contribute about one third of total job creation, despite a very small employment share (around 2 percent). With regards to job destruction, in Figure 3 we provide a similar decomposition between incumbents and exiting firms. Exiting firms' contribution to total job destruction stands at around 40 percent. A higher sensitivity of gross flows to the business cycle among incumbent firms also has been highlighted in Austria (Stiglbauer et al., 2003). A potential explanation is that hiring and firing decisions are less costly and more rapid compared to starting or closing a business.

A further dimension that is worth exploring is the duration of employment contracts: in a labor market such as the Italian one, characterized by a strong duality, it is not surprising

[10]On the difference between the United States and Europe along these indicators, see also Bertola and Rogerson (1997)

that the main margin for adjustment consists of temporary jobs. Figure4 shows that the main contribution to job creation comes from fixed-term jobs (nearly three quarters, albeit with wide fluctuations). Interestingly, the creation of permanent jobs shows a fairly flat profile, with some exceptions due to regulatory changes that have supported its growth in some years.[11] Similarly, temporary jobs also contribute substantially to job destruction, with large fluctuations presenting opposite phases of job creation. In the years of the Covid-19 pandemic the destruction of jobs was essentially concentrated in temporary contracts, especially through non-renewals.

3.b Job reallocation measures

The high level of simultaneous creation and destruction of jobs indicates a high level of job reallocation across firms. In Figure 5 we plot both gross and excess job reallocation. Despite some cyclical movements, gross reallocation has been rather stable during the observation period, at around 25 percent. In Table 2 we report correlation coefficients between different job flows and the net employment change.

Gross job reallocation is positively correlated with net employment change in Italy, opposite to what happens in the US (e.g. in Davis and Haltiwanger (1990)). Notice that $COV(net_t, JR_t) = VAR(JC_t) - VAR(JD_T)$, thus its sign is also indicative of whether the time variability is larger for creation or for destruction. In the US, a country with a more flexible labor market, destruction is more responsive to recessions. The long run stability of this indicator is peculiar to Italy, and it reflects the rather high degree of labor hoarding in the Italian economy (Boeri et al., 2011).

Excess reallocation is decoupled from the business cycle (see Table 2). The Pearson's correlation coefficient with the net employment change is close to zero and not statistically significant. In fact, excess reallocation increased during the 1992-1993 recession while it dropped during the Great Recession. During the pandemic, excess reallocation declined both as a result of the contraction in economic activity and the decreased entry and exit of firms. These patterns are different from what happened in the UK and the US, countries with stronger use of unemployment insurance (in which workers are actually fired) rather than STW schemes (in which workers remain employed by the firm). As expected, in the UK and US excess reallocation has risen during the pandemic (Barrero et al., 2021).

A key question is the extent to which changes in excess job reallocation are due to hetero-

[11] From the graph it is evident that the peaks in the creation of permanent jobs correspond to the adoption of the so-called Jobs-Act (2015) and Dignity-Decree, two of the main labor market reforms of recent years. See Boeri and Garibaldi (2018).

geneous dynamics in labor demand between sectors or between firms with different characteristics within the same sector. To answer this question, we carry out a decomposition following Davis and Haltiwanger (1992), which shows that:

$$ER_t = \underbrace{\sum_s (JC_{st} + JD_{st} - |Net_{st}|)}_{\text{within-component}} + \underbrace{\sum_s (|Net_{st}|) - |\sum_s Net_{st}|}_{\text{between-component}} \tag{11}$$

The within-sector component is the sum across industries of the excess job reallocation in each sector: it reflects the contribution of the shifting of employment opportunities within the same industry. The between-sector contribution is measured by summing across sectors the deviation of the absolute employment change for the sector from the absolute change of the overall economy: it reflects the contribution of the shifting of opportunities across sectors.

In Figure 6 we present the time series of the within and between-sector component of excess job reallocation. Sectors are measured at the 4-digit NACE level. Similarly to Davis and Haltiwanger (1992), we notice that during the whole period, excess reallocation is largely a within-industry phenomenon, mostly reflecting heterogeneous dynamics in labor demand across firms with different characteristics, but belonging to the same industry. However, during the pandemic, the within-component of excess reallocation substantially decreased, while the between-component increased, reflecting the very sectoral nature of the pandemic shock, which hit entire sectors, rather than being specific to firm characteristics. Containment measures were accordingly set at sector level, which also likely contributes to this finding. Contrary to the overall excess reallocation, in Table 2 we can see that the two components react differently during the cycle. Within-sector reallocation is not very responsive to the cycle and therefore seems more linked to firm idiosyncratic shocks. Instead, between-sector reallocation responds to the cycle, in a countercyclical way: jobs move across sectors mainly during recessions.

4 Gross flows and reallocation during the pandemic

In 2020 Italy faced the largest GDP contraction since the Second World War (-8.9 percent). This decrease in economic activity, which reflects both demand and supply factors, was extremely uneven across sectors. Broadly speaking, while the manufacturing industry was hit as hard as the services sector during the peak of the pandemic, it also recovered more quickly during

2021. Value added in services, which were deeply affected by government restrictions, continues to remain subdued.[12] The prolonged fall in demand with restrictions imposed on interaction-intensive services in 2020 on the one hand, and the continuous rise of digital services on the other, opened up the debate as to whether the pandemic would induce any structural transformation. Despite its intuitive appeal, it remains to be determined whether the pandemic has truly been a persistent "reallocation shock". Understanding whether labor demand shifted permanently across sectors or across different types of firms is of first-order importance for policy-makers. The presence of occupation and sector-specific human capital may make it hard for incumbent workers to accommodate such changes. Recent evidence has shown that cross-sector transitions may be difficult for certain categories of workers employed in the entertainment sector (Basso et al., 2021).

In Figure 5 we show the time-series for both gross and excess job reallocation where a downward trend is evident since 2017. Contrary to what happened during the Great Recession and the Sovereign debt crisis, gross reallocation has strongly *decreased* since the onset of the pandemic. This is due to a strong decline in job *creation*, caused by heightened uncertainty and government measures to contain the spread of the virus. The entire decline observed during the Covid-19 period is due to the within-component, arguably because in this context firm characteristics mattered less, while some industries have suffered much more than others.

We are aware of only three recent contributions that provide evidence on reallocation measures during the pandemic. Using the Survey of Business Uncertainty (SBU) data on the US economy, Barrero et al. (2021) argue that Covid-19 is indeed a *persistent* reallocation shock. They do so by building monthly reallocation measures in line with Davis and Haltiwanger (1992), which combine realized (12 month look-back) and *expected* (12 month look-ahead) growth rates in sales and employment. They show that both the sales-based and the employment-based measures show an uptick starting from the beginning of 2020, and remain at a high level until the beginning of 2021. They interpret this as evidence of persistence in reallocation. While firm expectations are interesting in and of themselves, their measure of excess reallocation always conflates realized and expected growth rates, remaining silent on what really drives the variation. Firms' expectations may not be perfectly accurate, especially as employers were surveyed at the height of the pandemic crisis, at a time when vaccines were not yet available. Indeed, more recent time series based on the same survey show a

[12]Some manufacturing sectors have not recovered pre-pandemic levels in value added e.g. textile (-20.7 percent with respect to 2019), coke and refined petroleum products (-8.8 percent) and production of transportation vehicles (-6.8 percent). Conversely, value added in the construction sector in 2021 was 14 percent higher than in 2019.

reversal in expected excess reallocation.[13] Our measures, which only rely on realized growth rates, cover the universe of Italian employers (rather than just large firms) and extend up to the end of 2021, offering a very accurate view of the degree and the persistence of the reallocation process. Moreover, we also provide a decomposition of realized excess reallocation into within-sector and between-sector components.

In a recent contribution Consolo and Petroulakis (2022) question the idea that Covid-19 is a persistent reallocation shock. Using publicly available US data from the CPS and JOLTS, they look at transition probabilities for individual workers to move across sectors, and they do not find any noticeable change during the pandemic. This evidence at the individual level is consistent with recent work by Basso et al. (2022) who analyze comprehensive administrative Italian microdata coming from the Ministry of Labor on worker flows and who also find little variation in the probability of changing sectors by workers. While Consolo and Petroulakis (2022) and Basso et al. (2021) are more concerned with employment probabilities at the individual level, none of the two studies construct aggregate indicators of excess reallocation as we do. Individual transition probabilities and job reallocation indicators are distinct concepts: while Covid-19 may not have changed the probability for an individual to move out of their sector of origin, it might have changed the patterns of movements from particular sectors to others, something we investigate by looking at transition matrices in section 4.c.

4.a Job creation and job destruction: the different margins

In this subsection we investigate the dynamics of job creation and job destruction by Italian firms during the pandemic, with particular attention to the different margins, namely the intensive margin (i.e. incumbents) and the extensive margin (entry/exit). In that period, the effective labor input (hours × workers) decreased by a staggering 11 percent with respect to 2019, although the number of employed individuals declined by only 2.1 percent (525,000 jobs). In order to preserve existing jobs, the Italian government introduced two unprecedented interventions: an extension in the eligibility criteria for STW schemes and a ban on layoffs, both of which helped to limit the size of the drop in employment.[14] The government also enacted restrictions more broadly on non-essential economic activities, which could not operate.

[13] See `https://www.atlantafed.org/research/surveys/business-uncertainty?panel=1`

[14] Lo Bello (2021) provides a comprehensive historical account of the exact workings of the Italian STW scheme since 1970 and up to the pandemic crisis. Casarico and Lattanzio (2022) look at the evolution of *worker* flows during the first two quarters of 2020 and find a sharp drop in net hiring, mostly driven by decrease in hiring and the subsequent lack of endings of temporary contracts. Despite the layoff ban, they find that the contribution of layoffs to the overall decline is relatively small.

As explained in Section 2, our measures of firm employment in the micro data do not include workers who were enrolled in zero-hour STW programs. The pandemic crisis lead to a spike in the use of this type of program, especially during the first half of 2020.In order to get a sense of this measurement error, we analyze aggregate monthly data on the total number of zero-hour STW beneficiaries from INPS. As shown in Appendix B, the number of zero-hour beneficiaries was very low right before the pandemic (around 15,000), reaching a peak of 2.5 million in April 2020. Since late summer 2020, this figure has returned to a level of around 200,000 and by mid-2022 was closer to 100,000. Given this data limitation, creation and destruction have to be interpreted as an effective labor input (when workers provide at least one hour of work).

New businesses create, on average, one third of the new jobs every year, a much higher share than their relative importance in the aggregate economy (about 2 percent in terms of employees). However, incumbent firms provide the greatest contribution to the fluctuations in (gross) job creation, throughout all phases of the economic cycle. These trends have greatly abated during the recent pandemic crisis, when both incumbents and new businesses have contributed to the decrease in job creation, also due to the decline in business birth rates (see Figure 2).

On the other hand, firms leaving the market contribute 40 percent to the total destruction of jobs. Also in this case, the pandemic crisis represents an anomaly compared to previous episodes of recession (Figure 3): the drastic and sudden increase in the contribution of incumbents to job destruction was associated with a decrease in that of exiting companies, reflecting a reduction in the rate of mortality (mainly due to the blocking of bankruptcy proceedings and to the support measures adopted by the government, such as direct transfers to businesses, debt moratoriums, and loans backed by public guarantees).

During the pandemic, the possibility of resorting to flexible work schemes (such as working from home) has been the key to survival for many businesses and has greatly attenuated the trends described above. Since we do not have a granular measure of a firm's ability to operate with flexible work arrangements, we have adopted a sector-specific measure taken from Barbieri et al. (2022). At the sectoral level, a reduced ability to work from home is associated with a steeper decline in job creation and stronger growth in job destruction, while companies that were most successful in organizing work in a flexible way were affected by the Covid shock to a more limited extent (see Figure 7).

Finally, we link job creation and destruction to the types of contracts involved as we expect most of the dynamics of these magnitudes to be observed for temporary workers (Figure 8).

Since workers have been protected during the pandemic by the layoff freeze, we expect job destruction to be largely attributable to the non-renewal of expiring temporary contracts, as is evident from panel b) of Figure 8. Furthermore, we observe an increase in job creation starting from the second quarter of 2021, which has been much more intense for fixed-term jobs.

4.b Job reallocation measures within and between different groups of firms

The global financial crisis significantly impacted the Italian productive system, causing the exit of many small, highly indebted companies, with a consequent reallocation of resources towards larger and more productive companies (Bugamelli et al., 2018). Therefore, it is interesting to understand whether the pandemic shock has induced a similar pattern of job reallocation between different categories of firms.

As previously underlined, the nature of the recession triggered by the pandemic is profoundly different from previous recessions, as it affected all categories of companies, regardless of their size, indebtedness, or degree of exposure to international markets. In other words, the mandatory closures first, and the demand shock after, hit both healthy and less-healthy companies. We decompose excess reallocation according to several dimensions, using the same methodology as in section 3.b. First, we look at size classes[15]: even if a slight increase in the between-component in the second quarter of 2021 can be seen from Figure 9, virtually all of the excess reallocation takes place within narrowly defined size classes. Therefore, there is no evidence of a change in firm size composition in the post-pandemic period. Second, we repeat the same exercise with age classes[16]. Interestingly, Figure 10 shows that after the pandemic there was a surge in the between age classes excess reallocation with levels remaining constant until the end of the period of our analysis, mainly due to an increasing contribution from younger age groups.

The evidence presented so far unveils the existence of significant job reallocation between sectors and between firms with different characteristics. It then becomes essential to qualify those shifts in order to understand whether the productive system is going through a phase of structural change, perhaps accelerated by the Covid shock, or is temporarily reacting to the pandemic crisis. This is what will be explored in the next paragraphs.

[15] We define narrow size classes according to the number of employees as follows: $[0, 1)$, $[1, 2)$, $[2, 3)$, $[3, 5)$, $[5, 10)$, more than 10.

[16] Age classes are defined as follows: newborn firms (age 0), $[1, 2]$, $[3, 8]$, $[9, 17]$, more than 17 years old.

4.c Transition matrices

In order to shed light on the patterns of sector-to-sector shifts by workers during the pandemic, we estimate transition matrices for both 2020 and 2021.[17] For each sector of origin we normalize the volume of flows to 100 and look at what share of the latter ends up in each destination sector. In order to avoid capturing underlying trends in the transition patterns across sectors, we further normalize these flow shares by subtracting their average value between 2017 and 2019, before the onset of the pandemic. A transition is assigned to a given year if the destination sector is reached in that year, regardless of when the origin sector was left. These transitions consist both of direct job-to-job and job-to-nonemployment-to-job movements. We only exclude incomplete transitions (job-to-nonemployment). Results are summarized in Figure 11.

The results show a sharp drop in within-sector flows, evident from the prevalence of the blue chromatic scale along the secondary diagonal of the matrix, where the elements indicate the flows from one company in a sector to another company in the same sector. This pattern is even more pronounced in 2021. Regarding the flows between sectors, the most striking result is that in 2020 the hospitality sector received a very small inflow from other sectors, in line with the strong impact of the pandemic on that sector. In 2021, flows towards ICT (sector J) and construction (sector F) were particularly strong. The former benefited from the boost in digitization stemming presumably from work-from-home and the need to perform activities remotely; the latter benefited from large fiscal incentives instituted by the Italian government for energy-efficiency works in the residential sector. ICT received workers from most sectors, while flows towards construction have been mainly from real estate services and manufacturing.

4.d Gross flows and firm-level productivity

Based on the evidence presented so far, it is now possible to make some inferences about the likely effects of reallocation on aggregate productivity.

The drop in the within-sector component of reallocation, supported by the results shown in Figure 6 and in the transition matrices in Figure 11, suggests that during the pandemic reallocation from the least to the most productive firms in a given industry might have weakened, leading potentially to lower aggregate productivity. To test this hypothesis, within each industry we rank firms into quintiles of labor productivity, proxied by indicators

[17] We define sectors according to NACE letter codes, with the exception of manufacturing, for which we rely on a slightly finer classification

based on wage data as described in section 2.c. We then compute job creation, job destruction and net employment change for firms in the different productivity quintiles. Figure 12 shows that firms in the first quintile, i.e. less productive firms, experienced greater job creation and destruction. Firms in this quintile of the productivity distribution are typically "subsistence" firms and have a high churning rate (Schoar, 2010). Importantly, firms in the top quintile, i.e. the most productive firms, experienced a smaller drop in job creation relative to less productive firms, and virtually no increase in job destruction. As a result, the drop in net employment change during Covid-19 has been barely evident. This points to a relatively efficient allocation process of workers, despite the drop in the excess reallocation component. These findings are in line with Andrews et al. (2021a) and Andrews et al. (2021b), which show that during the pandemic in some advanced economies employment dynamics have been, in relative terms, more favorable for the most productive firms.[18]

In Italy, the job flows underlying the aggregate trends also point to another important distinction between more and less productive firms: the former adjusted their demand for labor by acting mainly on the margin of (less) job creation, keeping the existing positions practically intact; for the latter, job creation and destruction both contributed to the contraction of jobs.

5 Conclusions

In this paper, we analyze the ability of the Italian economy to allocate jobs efficiently between firms and between sectors over a forty-year horizon based on measures widely used in the literature, according to which, in any moment, both the creation of jobs (through the entry or expansion of firms) and the destruction of jobs (through the exit or contraction of firms) coexist in the market; these opposing forces induce a continuous process of job reallocation among firms and sectors. Our analysis allows us, among other things, to characterize the effects of the pandemic crisis on job reallocation and to highlight the differences with respect to other recessionary episodes. At least four important results derive from our analysis.

The first is that the Italian labor market is characterized by a degree of mobility and dynamism, measured by reallocation, in line with other advanced economies (including the US), even if dynamism has slowed down slightly in Italy since the global financial crisis. Contrary to what is commonly believed about the Italian labor market, we can say that "And yet it moves" and always has done so, driven by the high birth and death rates of businesses and

[18]Of course productivity reflects current firm performance; the pandemic might have permanently changed firm productivity, for example if consumer preferences for certain goods or services have permanently changed. Thus, our findings, are necessarily based on the hypothesis that productivity levels before the pandemic are a good proxy of future productivity levels that will prevail after the pandemic.

by the flows generated by very small companies, which are not subject to high redundancy costs and which still constitute a significant part of the Italian economy.

Second, a comparison of the trends in job flows in the recessionary phases of the last forty years indicates that during the pandemic crisis the destruction of jobs increased significantly, mostly due to the lack of renewal of fixed-term contracts. During the pandemic, exits from the market contributed much less to job destruction than in previous downturns; in fact, the mortality rate of businesses has fallen greatly as a result of the government incentives and regulatory measures introduced in response to the health crisis. Furthermore, job creation has slowed down sharply, both due to the contraction in the birth rate of companies and to the interruption of the growth paths of existing ones. In summary, the dynamism of the Italian productive system, measured through the reallocation of jobs, decreased much faster during the pandemic than in previous recessions, mainly due to government measures aimed at preserving the production potential.

Third, the pandemic shock has led to a reallocation of jobs between different sectors, consistent with the sectoral nature of the shock. In particular, there have been shifts towards information and communication services (ICT) and construction. In the first case, the shift resulted from structural changes induced by the digital transition and could lead to positive consequences in terms of productivity; in the second case, the shift to construction was largely influenced by tax incentives instituted by the Italian government.

Lastly, the destruction of jobs during the pandemic has been widespread and has affected even the most productive firms, though to a lesser extent. The trends are in line with what has been observed in other advanced economies, where the employment trend has been, in relative terms, more favorable for the most efficient companies and for sectors with a high digital content or those with a high capacity for work-from-home arrangements.

It is still too early to evaluate the effects on aggregate productivity of the sectoral recomposition induced by the pandemic shock, not only because the sectors involved are characterized by very different levels of efficiency (low in construction, high in ICT services), but also because in some industries the sectoral shift could be transitory, as expected for construction, while in others it may be permanent, as in ICT services.

However, the analysis clearly shows that a careful examination of labor market flows can be of great help in understanding the transformations of the productive system and the contribution of job reallocation to productivity growth. Governing these flows or at least countering their potential negative effects is the task of policy-making capable of grasping the complexity of the system. For this reason, analyzing job flows and raising knowledge

about the related dynamics are so important, especially in a country that must revitalize productivity.

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Tables

Table 1: Means and standard deviations for job flows and net employment changes

Job flow rate (X_t)	**mean**	**std. dev**
Job creation		
Overall	13.37	1.66
Entrants (contribution)	4.54	0.58
Incumbents (contribution)	8.83	1.31
Job destruction		
Overall	12.19	1.22
Exiting (contribution)	4.83	0.53
Incumbents (contribution)	7.36	0.90
Reallocation measures		
Gross reallocation	25.56	1.31
Excess reallocation	23.12	1.67
Within-sector component*	20.85	1.41
Between-sector component*	2.12	0.86

Notes: The table provides summary statistics for job flows. All variables are expressed as rates of the average number of jobs between t and $t-1$. Variables are measured each quarter taking the change between that quarter and the same quarter of the previous year. The within- and between-component of excess reallocation with net employment changes are computed from 1997 onward due to incomplete data in previous years.

Table 2: Correlations between job flows and net employment changes

Job flow rate (X_t)	$\rho(X_t, net_t)$	**p-value**
Job creation		
Overall	0.93	(0.00)
Entrants	0.54	(0.00)
Incumbents	0.94	(0.00)
Job destruction		
Overall	-0.87	(0.00)
Exiting	-0.50	(0.00)
Incumbents	-0.88	(0.00)
Reallocation measures		
Gross reallocation	0.37	(0.00)
Excess reallocation	-0.02	(0.82)
Within-sector component*	0.12	(0.25)
Between-sector component*	-0.37	(0.00)

Notes: The table provides Pearson's correlation coefficients between a given job flow and the net employment change. All variables are expressed as rates of the average number of jobs between t and $t-1$. Variables are measured each quarter taking the change between that quarter and the same quarter of the previous year. Correlations of the within- and between-component of excess reallocation with net employment changes are computed from 1997 onward due to incomplete data in previous years.

Figures

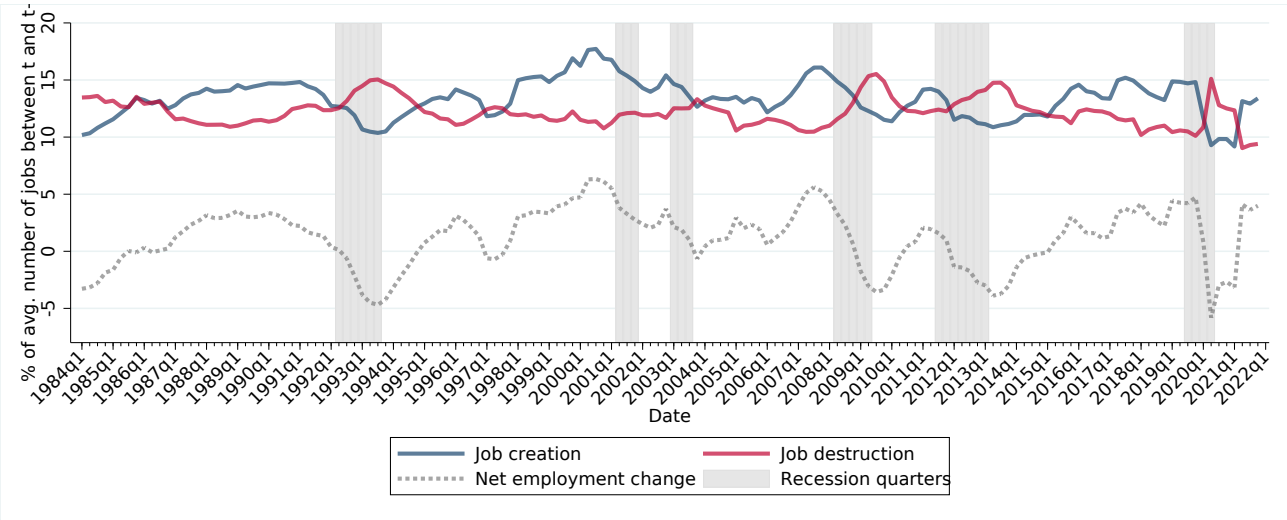


Figure 1: Annual rates of job creation, destruction and total employment changes. Grey bars are recession periods.

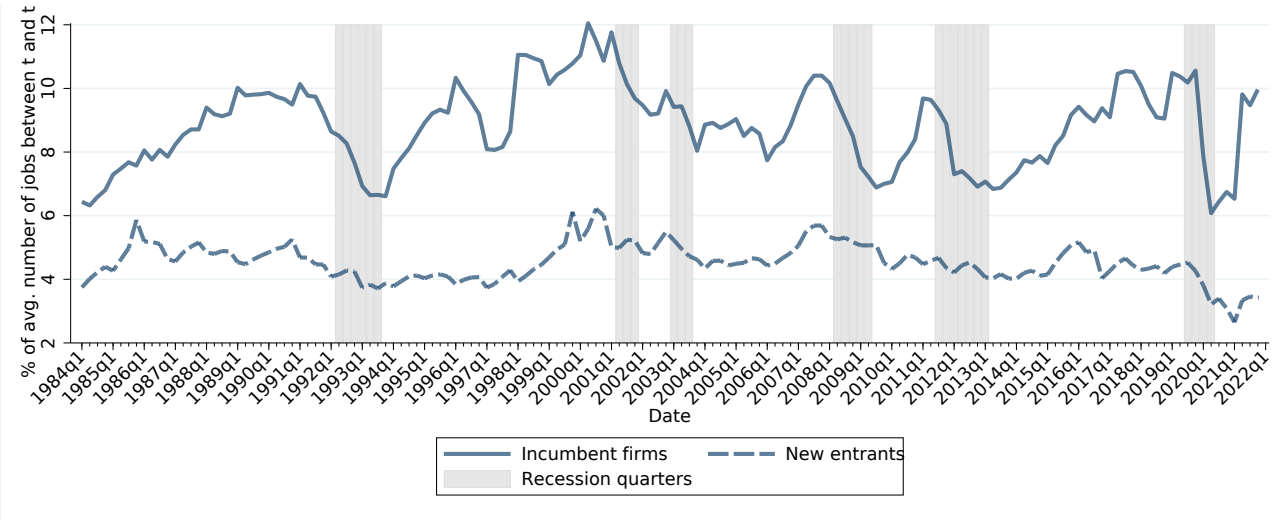


Figure 2: Contributions to job creation by incumbent firms and new entrants. Grey bars are recession periods.

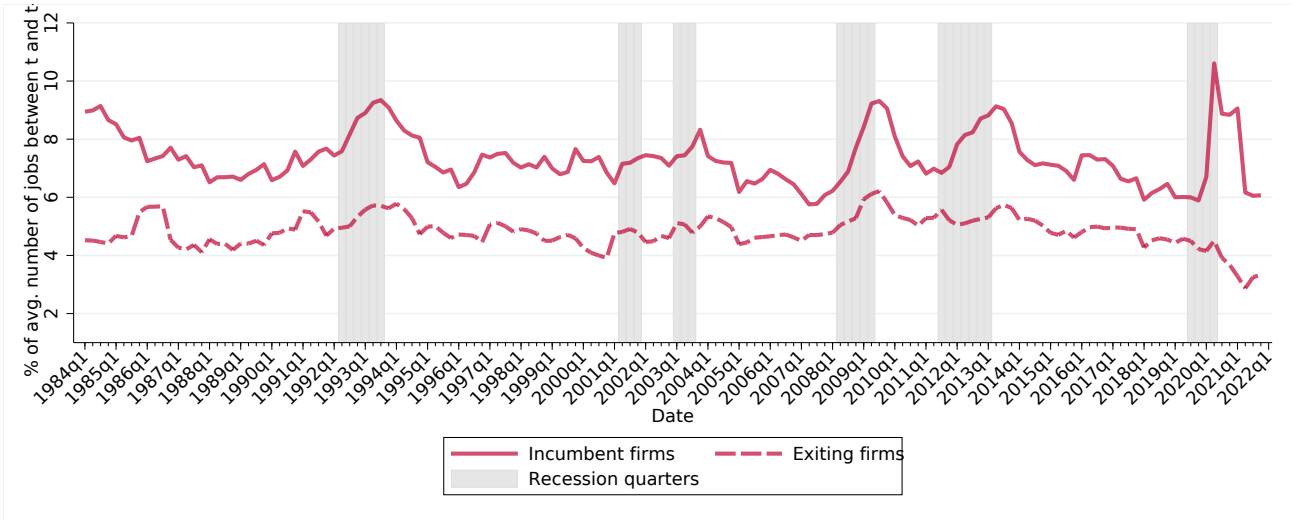
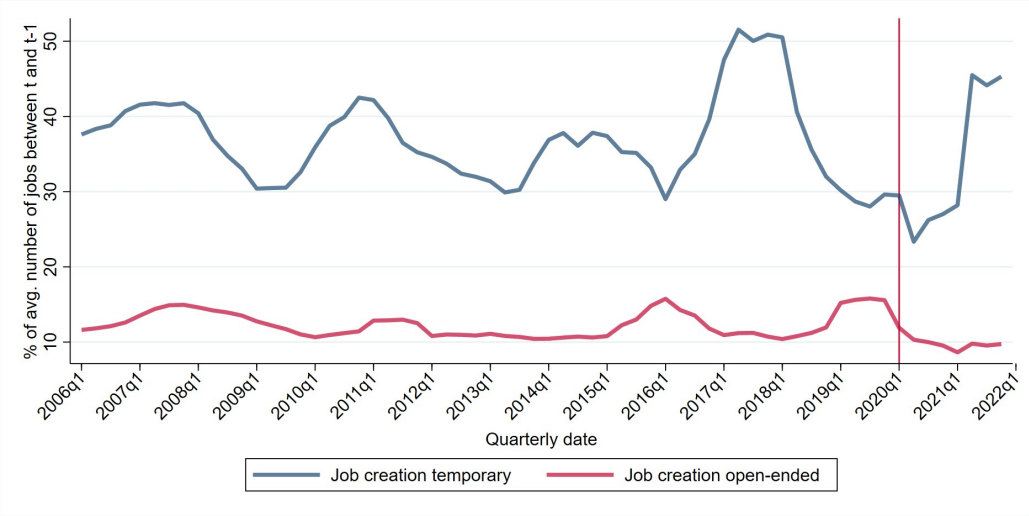
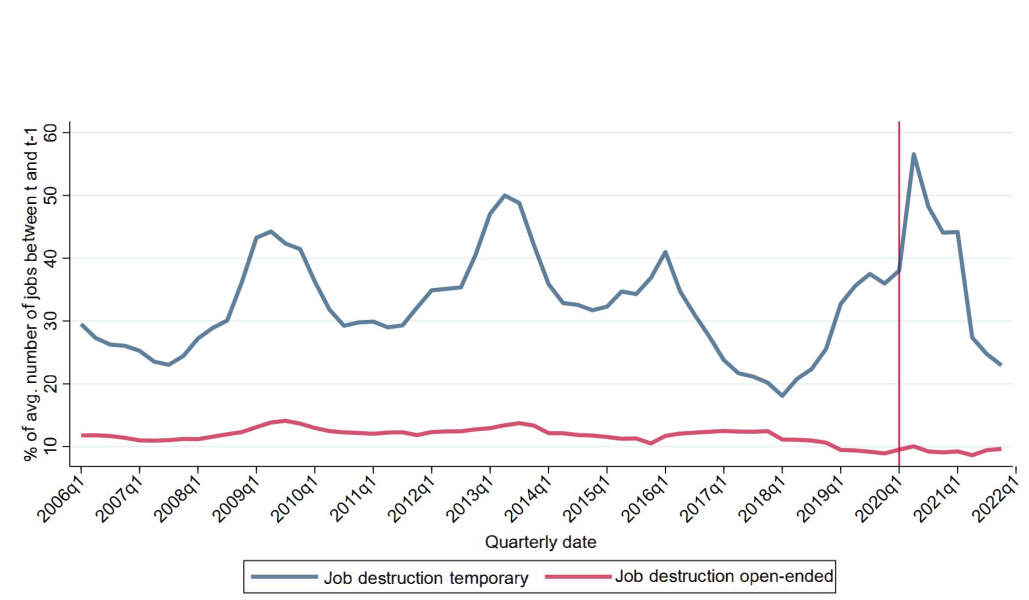


Figure 3: Contributions to job destruction by incumbent and exiting firms. Grey bars are recession periods.



(a) Job creation



(b) Job destruction

Figure 4: Job creation and job destruction: permanent vs temporary contracts

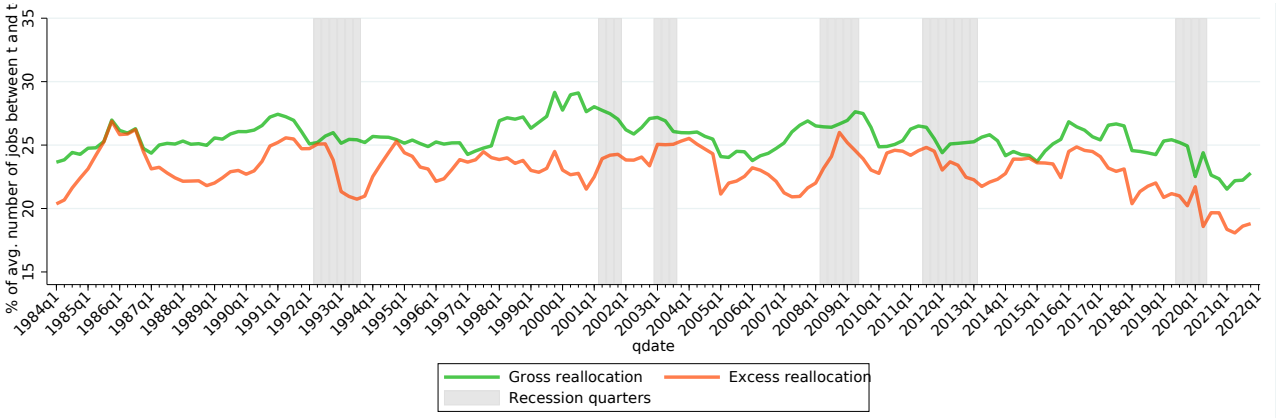


Figure 5: Annual gross and excess job reallocation. Grey bars are recession periods.

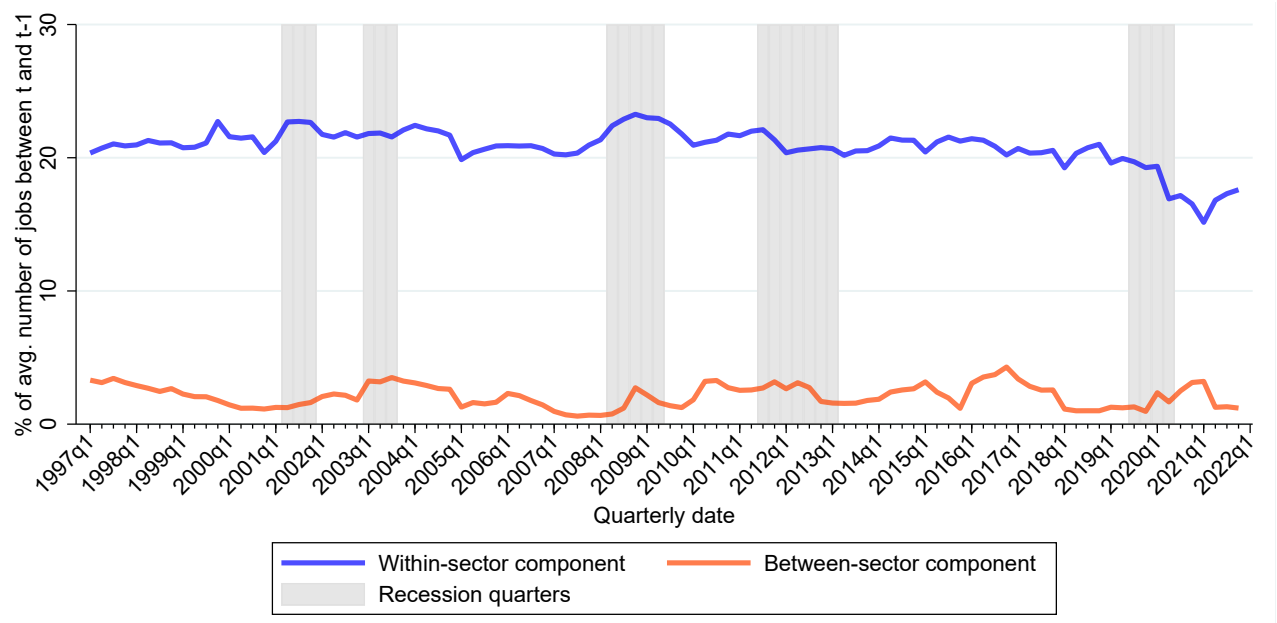
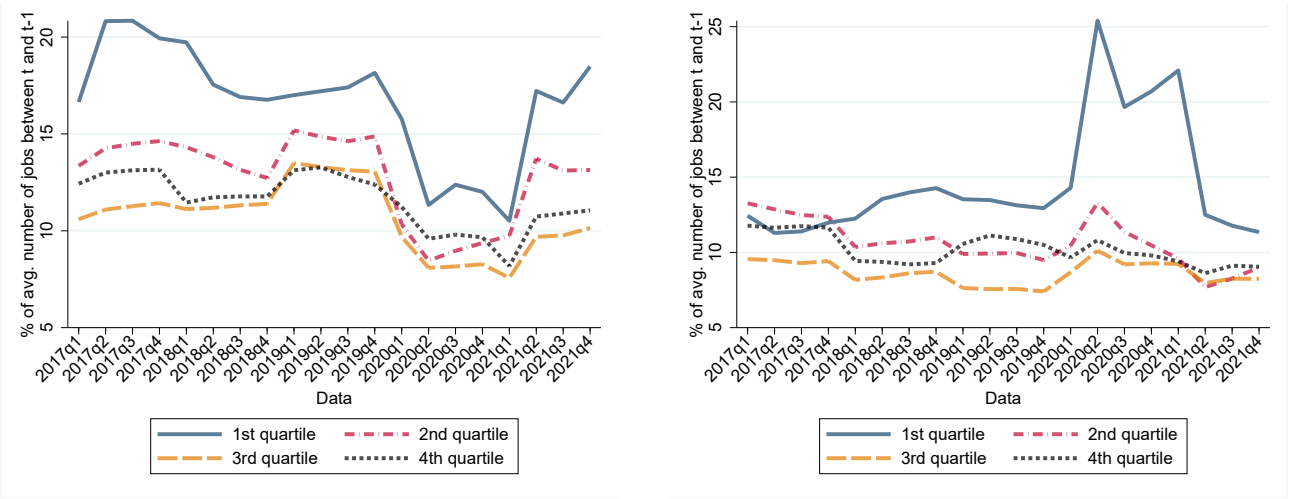


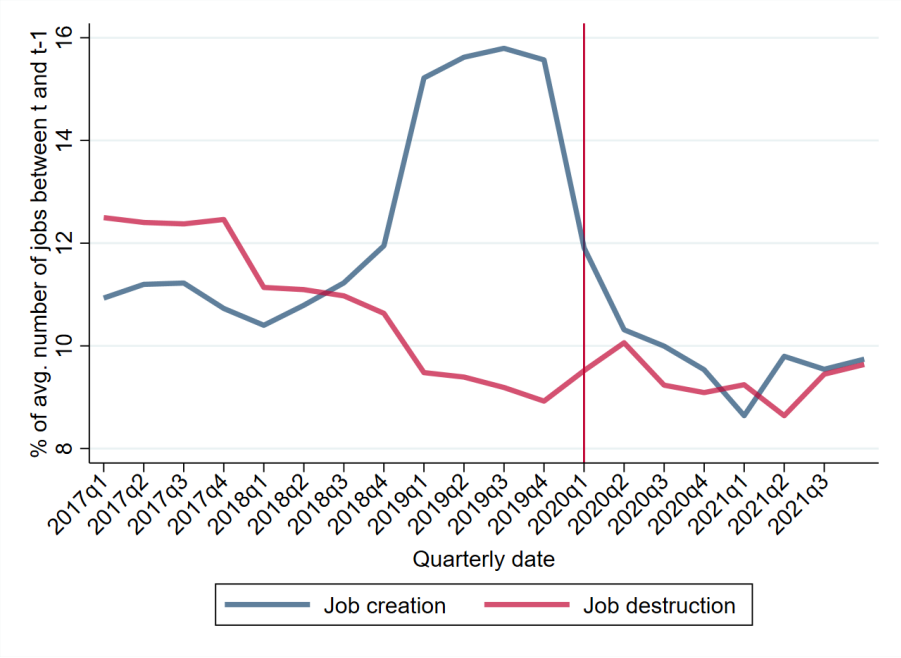
Figure 6: Contributions to excess reallocation by within and between sector job movements. Grey bars are recession periods.



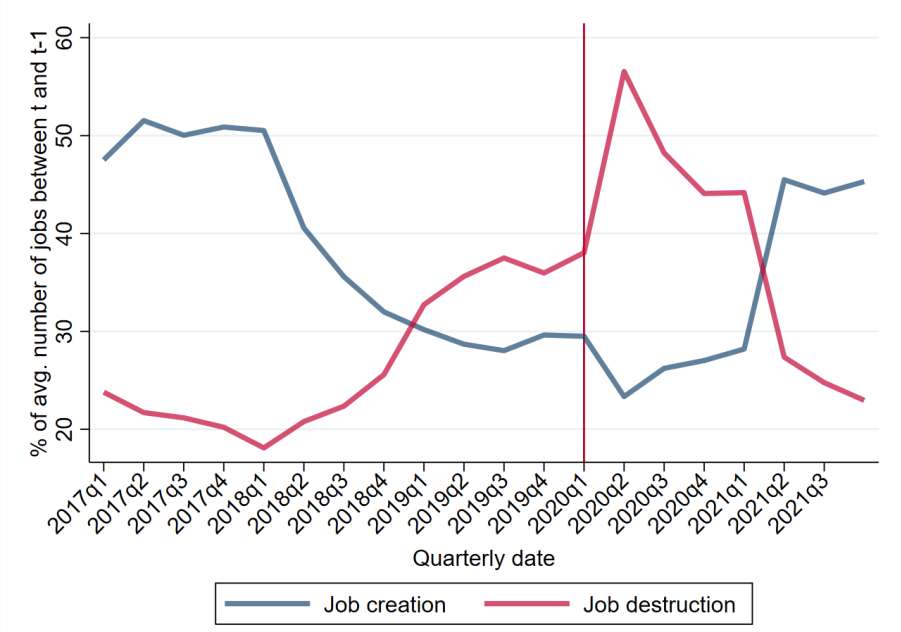
(a) Job creation

(b) Job destruction

Figure 7: Job creation and job destruction for different quartiles of teleworkability



(a) Permanent contracts



(b) Temporary contracts

Figure 8: Job creation and job destruction: permanent vs temporary contracts

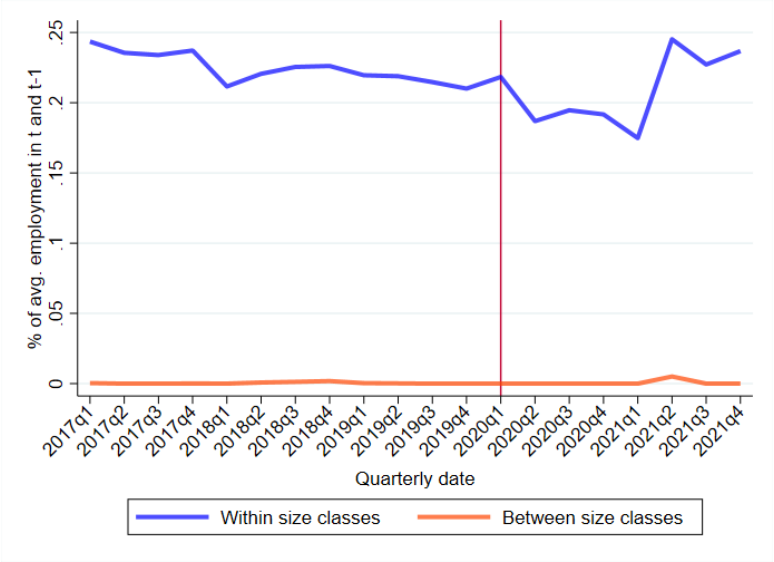


Figure 9: Contributions to excess reallocation by within and between size classes.

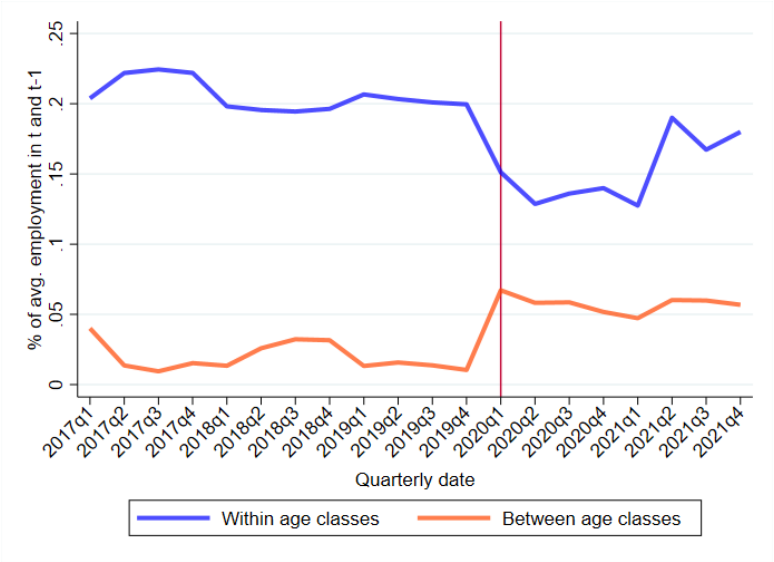


Figure 10: Contributions to excess reallocation by within and between age classes.

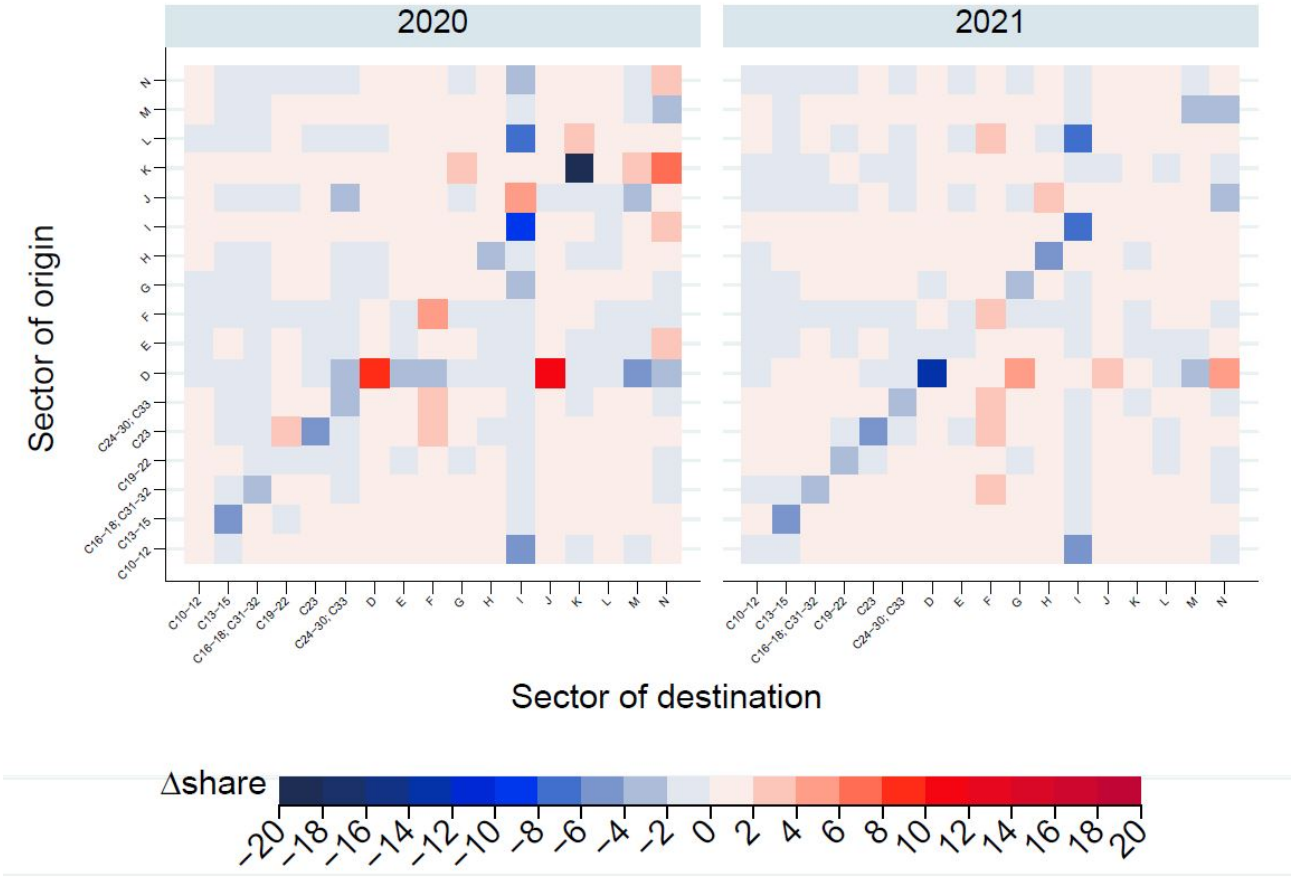
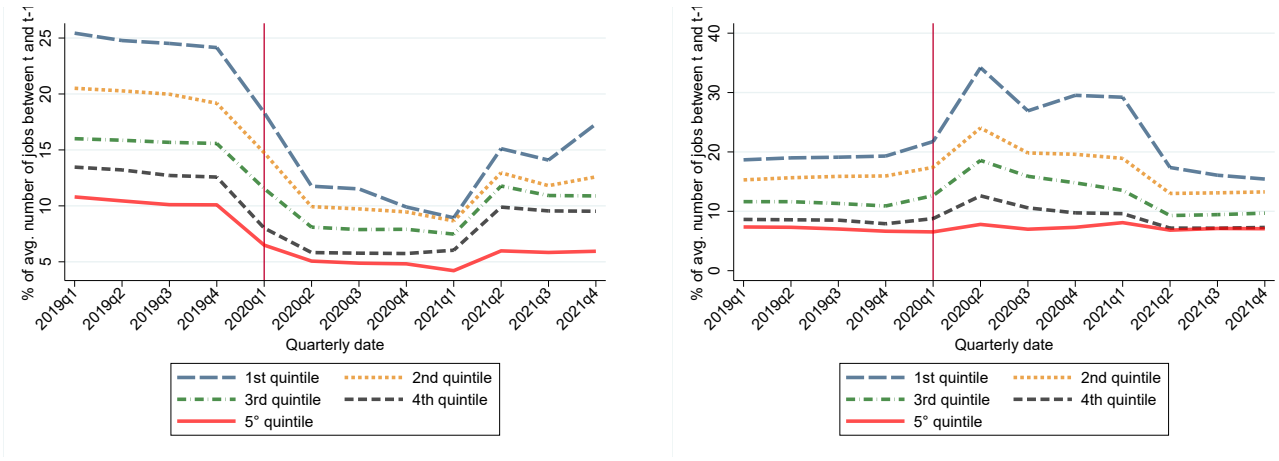
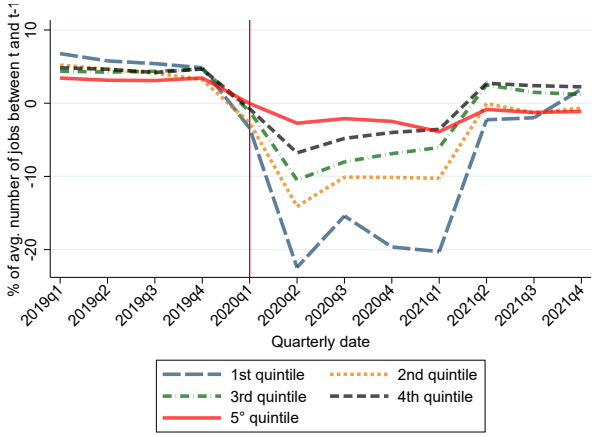


Figure 11: Sectoral transitions. Changes in the share of transitions compared to the 2017-2019 average (in percentage points). Y-axis: originating sector; X-axis: destination sector.



(a) Job creation

(b) Job destruction



(c) Net employment change

Figure 12: Job creation. job destruction and net employment change for different quintiles of firms' productivity levels.

Appendix

Appendix A Sample definition over time

In this paper, two data sources are used: those relating to companies and those relating to employment relationships. For the construction of the indicators of job creation, destruction and reallocation, data from INPS administrative sources present on the DCSRVisitInps platform (annual companies) were used. These constitute an anonymised version (and parsimonious in the number of characteristics) of the so-called "DM Virtuale", an administrative database which contains information on the consistency of the tax registration numbers for companies that declare employees in the private non-agricultural sector. In particular, for the whole period under analysis (1984-2021), the elementary data were aggregated at the company level. In the final database used there are about 1.5 million businesses per year (1.4 million in 1990, 1.5 in 2000, 1.9 in 2010 and 1.8 in 2021).

It should be clear that the use of very long historical series of administrative data for statistical analysis purposes is always a delicate exercise. Although these databases include the universe of firms that report non-agricultural private sector employees, over such a long interval the very definition of the reference population can vary considerably. For example, many social security institutions, not present in the archive in 1984, began to declare their workers following the transfer of the institution to INPS (for example INPDAI in 2002, IPOST in 2010, ENPALS in 2011, to name a few). The same thing happened to those public companies that were privatized (such as ANAS in 1994). New identifiers created due to these administrative events generate breaks in the series that can be misinterpreted as new job creation. Similarly, all the mergers and acquisitions of companies, not identifiable from the data used (which are not characterized by information on the ownership structure) could distort the measures of the reallocation intensity. These problems are typical of the kind of analysis developed in this note, but they also afflict other studies that have become milestones in this literature. The sample used in the analysis includes firms operating in the non-agricultural private sector, corresponding to the 2-digit NACE classification from 10 to 84, therefore excluding agriculture, forestry and fishing, mining and, in particular, personal services and sports and entertainment. In the years prior to 1997, the NACE variable in the INPS archives was missing in many cases.

To solve this problem of missing information, the companies with no NACE code were in any case kept in the sample if the sector inferable from the contributory statistical code was different from 2 ("Public bodies"), 3 ("State administrations") and 5 ("Agriculture), or if the

class was different from 2 ("Mining of metallic and non-metallic minerals"). The delimitation of the perimeter of analysis to the non-agricultural private sector strongly limits the distortion due to the sudden increase of workers in the sample generated by the entry of ENPALS into the database which took place in 2011. To assess how much the entry into the sample of other bodies may have distorted the analyses, the number of employees of the top 10 new entrants in a specific year from 1984 to 2021 is reported (Figure B.2). Given that the new entities enter the private sector with few contributory identifiers, the number of employees belonging to the top 10 new companies over time is a good indicator of the distortions due to these events. In consideration of the dates of entry of the social security institutions and the consistency of these entries, we can assume that since 2001 the historical series is sufficiently representative of the dynamics in the private labor market.

In the final part of the analysis, a different database present on the DCSR-VisitInps platform was used: the annual employment relationships, containing information on all employment relationships in the non-agricultural private sector (the data also exclude professionals and parasubordinate workers). In line with the firm-level analysis, these data are limited to the 2-digit NACE sectors 10 to 84, but instead refer to the period 2014 to 2021. The database contains approximately 18.5 million job positions per year (for about 14 million workers), and allows to follow the work histories of employees. In particular, in 2014 there were 17 million job positions (and about 13 million workers) while in 2021 there were about 20 million job positions (for 15 million workers).

Appendix B Additional figures

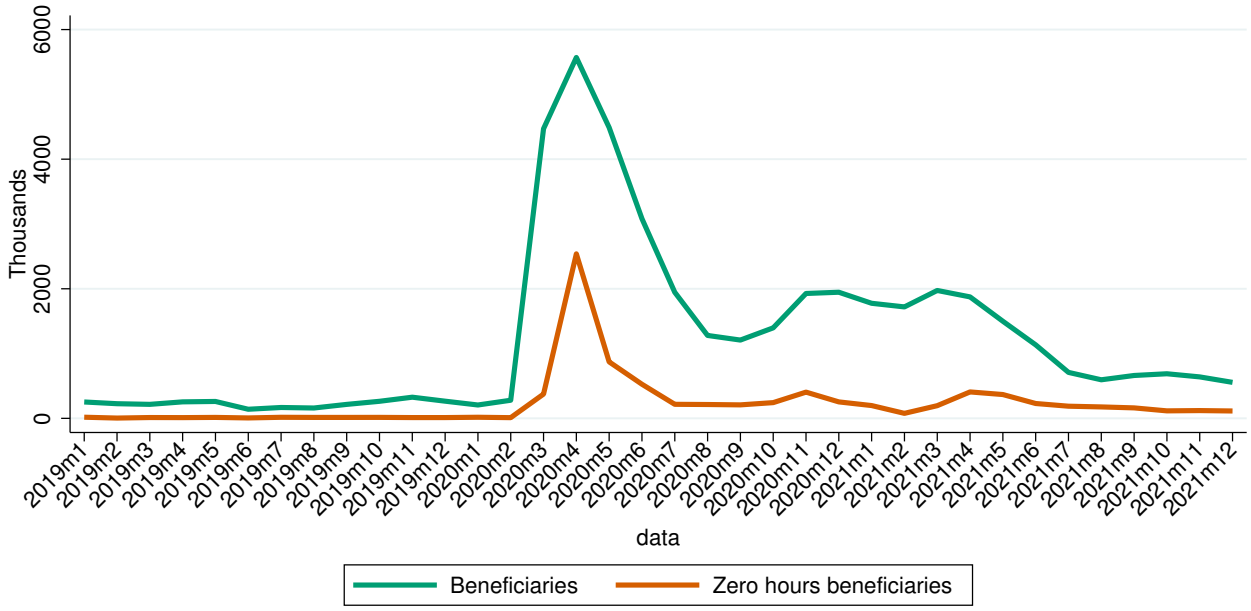


Figure B.1: Number of STW beneficiaries by month (thousands)

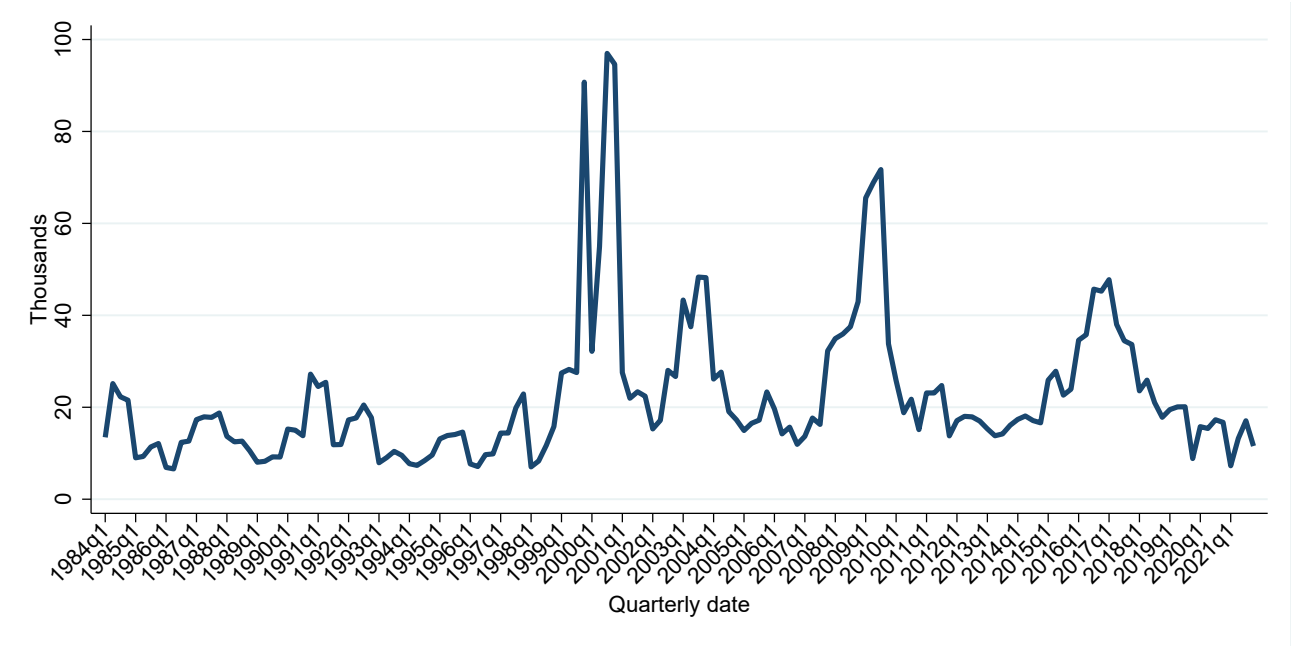


Figure B.2: Number of employees of the top ten new companies by size.