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The sources of the wage losses of displaced workers: the Italian case

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Abstract

Exploiting a well-documented matched employer-employee dataset for Italy over the 1975-1997 period, this research assesses the sources of the wage losses of workers displaced due to firm closure based on the comparison of workers' wages before and after displacement jobs. With this aim, we estimate a three way high-dimensional fixed effects regression model that allows us to decompose, according to the Gelbach (2016) formula, the sources of the wage losses into the contribution of worker, firm, and match-quality fixed effects. According to our estimation, we find that post-displacement wages are 11.5 log points lower than pre-displacement wages, i.e., 12.18 percent less than average pre-displacement wages. Specifically, a big part of this change in wage losses comes from displaced workers moving into worse matches. Moreover, in contrast to the previous literature, we find that displaced workers are going into better paying firms. Finally, we estimate the change in firm and match-quality fixed effects, which capture the impact of permanent differences across workers in observed and unobserved characteristics. The results suggest that a change in region to the Northern Italy and a longer time unemployed, drive the workers into a better firms and worse matches.

Keywords: Wage losses, displacement, match-quality, region, high-dimensional fixed effects

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Abstrato

A partir do estudo de um conjunto de dados documentados entre trabalhador e empregador na Itália durante o período de 1975-1997, esta investigação avalia as fontes de perdas salariais de trabalhadores deslocados devido ao fecho de firmas baseando-se na comparação entre os salários antes e depois da troca de trabalho. Deste modo, estimou-se um modelo de regressão de efeitos fixos dimensionais de três vias que permitiu a decomposição, de acordo com a formula de Gelbach(2016), das fontes de perdas salariais na contribuição do trabalhador, da firma e dos efeitos fixos. De acordo com as estimativas constata-se que os salários pós-deslocação são 11.5 pontos inferiores aos salarios pré- deslocação, ou seja 12.18 por cento menos que os salários médios pré-deslocamento. Especificamente, uma grande parte dessa mudança nas perdas salariais vem de trabalhadores deslocados o estarem a fazer para lugares menos compatíveis. Além disso, ao contrário da literatura anterior, constata-se que os trabalhadores deslocados tendem a entrar em empresas com salário mais elevados. Por último, estimou-se a alteração do efeito fixo da empresa e correspondências , que captura o impacto de diferenças permanentes em trabalhadores com características observadas e não observadas. Os resultados indicam que uma mudança do trabalhador para o norte da Italia e um maior período de tempo desempregado, levam o trabalhador a deslocar-se para uma melhor empresa e piores correspondências.

Palavras-chave: perdas salariais, deslocamento, qualidade de correspondência, região, efeitos fixos de alta dimensão

Título: As fontes das perdas salariais dos trabalhadores deslocados: o caso Italiano

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1. Introduction

One of the main issues regarding job transitions is to understand why wages may drop when workers change jobs. In this respect, one of the challenges is that the researcher is often not able to disentangle voluntary job changes from involuntary ones. In the case of voluntary job changes, one would typically expect an increase in wages. However, in the case of involuntary job changes, there may be an increase or decrease in wages.

In this work, we overcome this difficulty by focusing on job changes due to firm closure which are presumed to be involuntary job changes (i.e. independent of the worker's willingness to switch employers). By focusing on job changes due to firm closures (and implicitly assuming that each worker has the same intrinsic "quality" before and after the job change), we hope to be able to investigate whether the change in wages is due to changes in the quality of the match between each worker and its employer or in employer's characteristics (or both), as this has been done in the previous literature, such as Jacobson, LaLonde and Sullivan (1993) and Raposo, Portugal and Carneiro (2021).

In other words, in this study, the closing down of a firm is considered as a natural experiment, which results in workers changing jobs involuntarily. These involuntary job changes are defined as "job displacement", which may affect many individuals over the course of their working lives. Displaced workers are considered our "treatment" group, since they are observed before and after the closing down of their employer. Conversely, the "control" group includes all the other workers that are not involved in the firm closure. By using this setup, our aim is to assess the sources behind the difference in wages. For example, we are able to control for the duration of unemployment periods of displaced workers after a firm closure (e.g., the more time a worker spends in unemployment after his employer closes down, the lower his wage may be once he finds a new job). We also control for workers' age (e.g., older workers may accept lower wages after a displacement), time varying characteristics, which are proxies for general economic conditions (e.g., an expansion or an economic downturn) that may affect wages and, on the employer side, we also control for the firm size (e.g., the larger a firm is after the displacement, the higher the wages may be). Furthermore, years of education and years of tenure (e.g., the more time a worker puts in one particular firm, the harder is to transfer

the specific skills required into another one) could represent two additional determinants of the difference in wages, before and after the displacement.[1]

For all these reasons, it is important to understand the various sources of wage losses due to a job displacement and its impact as a whole, in order to lead policies helping the workers involved. Therefore, exploiting a well-documented dataset for Italy over the period 1975-1997, the methodology of our study provides a detailed decomposition of wages difference between displaced and non-displaced workers, into three distinct dimensions: i) workers' characteristics; ii) firms' characteristics; and, iii) characteristics relating to the quality of the match between a specific worker and a specific employer (match-quality characteristics). In addition, our methodology allows us to consider the impact of workers moving from one region to another and the impact of the persistence of the unemployment status, following a job displacement.

Job displacement - and the possible subsequent wage reductions for displaced workers - have received an increased attention in the economic literature. Indeed, there is an unquestionable interest in understanding the sources of wage losses that are beyond the workers behavior, such as mass layoff or firm closure. For this reason, wage changes of displaced workers and future employment expectations have become one of the peculiar studies among many economists. Within the available studies, the evidence suggests that job displacements lead to significant wage reductions, although the magnitude of these reductions may vary according to the data used, group of workers examined and econometric specifications.[2] The largest estimated losses are obtained exploiting an unusual administrative dataset from Pennsylvania during the 1970s-1980s, that includes both employees' quarterly wages histories and information about their firms (see Jacobson, LaLonde and Sullivan, 1993). This work (JLS) shows that when high tenure workers separate from distressed firms, they experience a long term wage reduction of more than 40 percent, on average. It also suggests that displaced workers' wages losses result largely from the loss of some unidentified attribute of the employment relationship. Furthermore, workers' wage reductions happen even prior to separation, are not limited to workers in a few industrial sectors, and are substantial even for those workers who find new jobs in similar firms. On the other hand, Couch and Placzek (2010)

[1] When there is a lot of capital accumulated to a specific firm, it is going to be harder to move into another workplace.
[2] Kenneth A. Couch and Dana W. Placzek (2010) explore this result in detail.

using data from Connecticut, show that, regardless of the technique employed, wages reductions for workers displaced through mass layoff, lie in a range between 32 and 33 percent.[3]

Consistent with the previous articles, Stevens (1997) finds that the effects of job displacements are quite persistent, with earnings and wages remaining approximately 9 percent below their expected levels six or more years after displacement. There are two additional arguments explaining the persistence of those effects. The first is that much of this persistence can be explained by extra job losses in the years following an initial displacement. Second, less educated workers are somewhat more likely to experience more than one displacement over the period studied. In relation to the latter, the evidence suggests that workers with more schooling suffer smaller economic and wage losses as a result of the separation event, and that they spend significantly less time in finding a new job and returning to full employment (see Swaim and Podgursky, 1989). Therefore as in Raposo, Portugal and Carneiro (2021), one can argue that larger human capital endowments are associated with greater job opportunities and with higher opportunity costs of unemployment that necessarily erode with the progression of the unemployment period. Using data for Portugal, they also show that the worker-firm match plays a very sizeable role in explaining the sources of wage losses. Indeed, they find that the allocation of workers into poorer matches accounts for 38 percent of the total average wage loss; sorting among firms accounts for 36 percent, and job downgrading also plays a significant role in explaining the wage loss of displaced workers, accounting for the remaining 26 percent. Finally, similar results are derived by Addison and Portugal (1989), which in their paper illustrate that tenure on the first job is associated with higher wages in the post-displacement and a 10 percent increase in unemployment duration lowers accepted wages by about 1 percent.

Following Raposo, Portugal and Carneiro (2021), our study emphasizes the role of employee-employer match-quality. That is because it is important to distinguish between a good worker in a good firm and a good worker-firm match: when the event of displacement happens, a loss occurs if separated workers might be in a very good or bad match, that is, when a firm closes down and someone might be in a better or worse situation than before. The impact of the match-quality is determined assuming that

[3] Six years later, using the same estimators as JLS, earnings reductions for Connecticut ranged from 13 to 15 percent.

workers and firms are orthogonal with it, which has important repercussions in terms of econometric model specification. Indeed, the omission of match-quality effects biases the estimated returns to observed characteristics and the estimated worker and firm fixed effects.[4]

In particular, in order to understand the sources of wage losses, the methodology of our study relies on the estimation of a wage equation on a three high-dimensional fixed effects (for workers' characteristics, firms' characteristics and match-quality characteristics), using an administrative longitudinal employer-employee matched dataset from Italy. We adopt the Gelbach decomposition (2016) which exploits the omitted variable bias formula, disentangling unequivocally the sources of wage losses in the independent contribution of each unobserved fixed effect to the yearly wage losses of displaced workers.

Moreover, the second part of our study also assesses the role of observed permanent heterogeneity: in particular, it examines the mechanism behind the change in employer characteristics and the magnitude of its consequences. Specifically, the methodology of our second exercise is based on the estimation of the variation in firm and match-quality fixed effects on variation in firm size, variation in type of job, variation in region and joblessness duration. Importantly, our second specification allows us to understand mainly, if region inequality, workers' mobility and period of unemployment could be reasonable arguments for workers to be in a better or worse firm and match, after the event of separation.

Overall, our findings show that the displaced workers are earning 12.18 percent less than in the period before displacement, and this wage loss is explained primarily from the match-quality.

The remainder of this study proceeds as follows: section 2 describes the institutional framework, with the Italian historical regional gap and the Italian wage bargaining system. Section 3 describes the data and the sample composition and shows the descriptive statistics. Section 4 reports our econometric methodology, while section 5 presents the empirical results. Finally, section 6 derives the conclusions.

[4] See Woodcock (2007) for a detailed analysis of the effect of the omission of match quality.

2. The institutional framework

2.1 The Italian regional gap

The gap between Southern and Northern Italy is probably the most well-known and persistent characteristic of the Italian economic geography since the beginning of the 20th century. Specifically, the Italian regions have always differed in terms of size, economic development, civic culture and institutional performance (among other things), with a sharp difference between the North and the South of the country.[5] Moreover, internationalisation and innovation (or lack thereof) are two additional important aspects that affect the economy of Southern Italy and contribute to explain its lower economic development, compared to the rest of the country (and Europe as well). The insufficient endowment of infrastructure in the Southern regions - and low efficiency of the existing transport services in those regions - create a sizeable gap in terms of accessibility to the Central and Northern regions, and within the European context, for all modes of transport (rail, air and road). Moreover, as the Italian Prime Minister Mario Draghi has recently declared, the inequalities between the two macro-areas have increased with the COVID 19 pandemic, and, therefore, a large part of the European Funds made available to Italy will be used for the development of the Southern regions[6].

The aim of this study is to understand the sources of the wage losses of displaced workers. In particular, our purpose is to determine, using Italian data, to what extent the above-mentioned historical disparity between the North and the South of the country affects those wage losses and to understand the mechanism behind them.

2.2 The Italian wage bargaining system

Italy is one of the few European countries without a legal minimum wage.[7] Indeed, in Italy, wages are set by collective agreements, which cover the vast majority of employees, as amended and supplemented by the jurisprudence. Specifically, sectoral agreements (generally negotiated every two years) establish contractual minimum wages for different occupation classes (typically 7 or 8 sector specific classes) and these are

[5] In this work, the Italian regions are grouped as follows: North (Valle d'Aosta, Piemonte, Lombardia, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Liguria, Emilia-Romagna), Centre (Toscana, Umbria, Marche, Lazio, Abruzzo, Molise), and South (Campania, Puglia, Basilicata, Calabria, Sicilia and Sardegna).
[6] Link for the article: https://www.corriere.it/economia/lavoro/21_aprile_07/divario-nord-sud-investire-persone-colmare-gap-79a99fde-94aa-11eb-baed-430cc8195593.shtml
[7] The other countries are Austria, Cyprus, Denmark, Finland, Norway and Sweden.

automatically extended to all employees in the sector. Moreover, trade Unions can negotiate firm specific contracts that provide wage premiums over and above the sectoral minimums.[8] As a result of this institutional framework, minimum wages may sometimes be established in different ways in the North and in the South of Italy, to reflect the lower cost of living in the Southern part of the country. Differences in the minimum wage may also arise because judges have a wide discretion and can use many different criteria in setting the minimum wage, depending on the concrete case under consideration. This is again because there is no legal minimum wage and the reference in each specific case is the sectoral collective agreement, with each agreement including several sector-specific employee classes.[9]

At the moment, the dramatic social and economic situation generated by the COVID 19 emergency, the increased number of atypical workers, (often without minimum protection), and the exponential growth of contractual fragmentation have made it urgent to address the issue of the lack of a legal minimum wage in Italy. In October 2020, the European Commission published a Framework Directive for the introduction of the legal minimum wage, with the aim of contributing to the establishment of a fairer and more balanced system of remuneration for workers in the European Union. Specifically, the Commission indicated precise criteria for determining the minimum wage, such as 60 percent of the median gross wage or 50 percent of the average gross wage. Based on these indications, the first proposal of the Italian government was 9 euros per hour gross of social security and social security contributions, applicable only to categories without a collective agreement. The proposal was, however, subsequently not included in the final version of the PNRR.[10]

It is desirable that the Italian government would soon revisit the issue, since it can be presumed that a legal minimum wage, if applied broadly and accompanied by an effective program to combat undeclared work, would improve the quality of life of workers and increase their purchasing capacity, with a positive impact for the economy as a whole.

[8] See Marco Tufo, IUS Labor 1/2018, ISSN 1699-2938, p. 205-231

[9] In our sample, the minimum wage obtained after cleaning the data is 1,992 euros per year (at 2003 level).

[10] The National Recovery and Resilience Plan (PNRR) is the investment program that Italy must submit to the European Commission as part of the Next Generation EU program, in order to access the funds made available to address the crisis caused by COVID 19.

3. The Data

3.1 The Veneto Workers Histories dataset

In this study, we use a longitudinal matched employer-employee panel dataset called VWH (Veneto Workers Histories), constructed at the University of Venice from the administrative records of the Italian Social Security System (INPS), and provided by the Rodolfo DeBenedetti foundation.[11]

The VWH dataset includes the job and wages histories of the entire population of employees and workers, of two (out of seven) provinces of the Italian region of Veneto, namely Treviso and Vicenza. The Veneto region is the third Italian region in terms of GDP and has a population of around 5 million people, almost 8 percent of the country's total. Its economy is characterized by small manufacturing businesses that are organised on a regional basis by specialisation and with local integration, which have been effective in promoting and adapting to technological change during the last three decades.[12] This so called "Third Italy" region has received significant attention by researchers, both in the United States and in Europe (see Brusco 1983; Piore and Sabel 1984; Trigilia 1990; Piore 2009).

VWH includes register-based information on all firms and employees who have been hired by those employers for at least one day during the period of observation, independent of the worker's place of residence. The period of time covered by the database is 1975-1997 and allows us to consider also the turnover in relation to two expansionary cycles, namely 1984-90 and 1993-97, which has been characterized by nearly full employment, a positive rate of job creation in manufacturing, and positive migration flows. [13]

The VWH dataset excludes agriculture and public administration sectors, as well as other public services whose pensions are not managed by INPS. Firms not employing any worker are also excluded. Each individual is followed for the whole working life, even when hired by a firm operating outside the considered geographical area. The database contains three separate linkable datasets. The first one is a "Registry" file, which includes

[11] See Tattara and Valentini (2010) for details on the VWH dataset.
[12] Benetton, Sisley, Geox, Diesel, and Replay are Veneto firms.
[13] Notice that the years 1998, 1999, 2000 and 2001 are excluded because of a lack of data for those years.

an anonymous personal identifier and basic demographic information about each individual in the database. Then, there is a "Contribution" file, containing information about each year of contribution of the individual during the period 1975-1997. Lastly, the "Firms" file, which collects some information about the firms in the data, including the tax code, that can be used for matching each firm in other existing datasets. The Contribution file is the most used in this study, reporting each contract signed by each individual, which allows for a match between each worker and the corresponding firm through the firm's identification code and the worker's progressive code. Overall, this file includes about 45 million observations, with around 3 million workers, which represent about 60 percent of the total population of the Veneto region, and more than 100,000 firms considered, during the period 1975-1997. The file also includes firms operating outside the two provinces of Treviso and Vicenza in case they hired a worker who was previously employed by a firm located in those provinces. Data on wages refer to the yearly total real wages, in 2003 Euros for each job in each time period (year).[14]

3.2 Sample construction: – Displaced workers

The "treatment" group considered in this study contains a group of workers who lost their jobs between 1975 and 1997, due to a firm closure. For example, the 1975 "treatment" group comprises individuals who were working in 1975 and experienced a displacement event between years 1976 and 1977. Firm closures were identified based on the firm's identifying number. Thus, a firm is classified as an "exiting" firm if in the two years following its closure does not appear in the dataset anymore. That is, a firm is considered "exiting" in year t+1 if it is present in the VWH dataset in year t, but absent in t+1, t+2 and all of the subsequent years. Therefore, the first and the last year in which a firm closure can be identified in our dataset are 1977 and 1995, respectively. In this way, a firm closure is correctly recognized, since data about that specific firm in the following years are absent in the dataset. Moreover, to ensure that firms' true closures are considered (i.e., mergers or acquisitions are not included in the analysis), those workers that appeared in the database in the period following displacement with a year of

[14] Injury, maternity, and illness benefits as well as payment from the lay-off fund (Cassa Integrazione Guadagni) are included only when paid in advance by the employer.

admission in the new job of less than the year of displacement, minus one, are excluded from the sample[15]. These exclusions reduced the sample size by around 27.6 percent.[16]

To be included in the sample a worker must report positive wages in the year that immediately precedes the displacement event and must be continuously employed with the same employer during the first three years. The sample was restricted to full time wage earners in the private non-farm sector (workers, employees and trainees in the manufacturer sector), aged between 18 and 62 years during the final year of the screening period and that were employed in firm with at least 8 employees.[17] Furthermore, since Italy does not have minimum wage, the two extremes of the wage distribution are excluded from the sample, avoiding the fact that some people could earn more or less, relative to the other people in the sample.[18] Finally, we grouped the firms' cities into three aggregates, namely, North, Centre and South of Italy.[19] At the end of making those restrictions, our sample accounts for almost 28.18 percent of the original data, containing precisely 12,962,004 observations.

For estimation purposes, the reference year of the displacement event is labelled D_0, This means that D_0 is 1975 for the group of workers displaced in 1975, 1976 for the displaced in 1976, and so on. The dataset combines a group of displaced workers over the 1975-1997 period ranging from D_{-6} up to D_6. In sum, the sample includes all displaced individuals who are employed in the year that immediately precedes the displacement, D_0, and at least two periods before the reference year (D_{-1} and D_{-2}) and who are present in the VWH dataset in at least one year of the post-displacement period (D_1, D_2, etc.).

Table 1 reports the number of worker-year observations for the sample of workers displaced due to firm closure. As can be seen, 78,648 workers employed in firms with at least 8 employees were displaced due to firm closure in the 1975-1997 period (740,536 workers-year observations).

[15] If, for example, a worker's displacement year is 1975 and he or she appears in the database in the post-displacement period with a year of admission in the new job of 1975 or earlier, he or she is excluded from the sample.
[16] See Table 6 in the appendix for the detailed impact of sample restrictions on the original sample.
[17] The sample was restricted also to the largest connected set (the largest group of connected worker-firm pairs).
[18] See section 2.2 for the details on Italian wage bargaining system.
[19] See section 2.1 for the details on Italian historical regional gap.

Table 1: Sample composition: Displaced workers

Year	Number of displaced workers
D_{-6}	39,668
D_{-5}	47,748
D_{-4}	54,085
D_{-3}	61,929
D_{-2}	75,683
D_{-1}	77,382
D_0	78,648
D_1	67,051
D_2	69,582
D_3	62,977
D_4	39,000
D_5	35,243
D_6	31,540
Total	**740,536**

Notes: Table 1 reports the sample including all displaced individuals who are employed in the year of the displacement D_0 and at least two periods before displacement (D_{-1}, D_{-2}) and who are in reemployment in at least one year before the end of the sample period.

3.3 Sample construction: – Non-displaced workers

The "control" group is the group of non-displaced workers and includes all individuals who were employed in firms that did not close in the 1975-1997 period. As in the case of displaced workers, the group of non-displaced workers was restricted to full time wage earners in the private non-farm sector, aged between 18 and 62 years and that were employed in a firm with at least 8 employees. In addition, the two extremes (the 1st percentile and the 99th percentile) of the wage distribution, are excluded from the sample. After imposing those restrictions, the control group includes 12,221,468 workers-year observations. Table 2 reports the number of observations per year in the sample of displaced and non-displaced workers over the 1975-1997 period. As can be seen, the

number of displaced workers is increasing over time, until the last two years when there is a small drop of almost 10,000 units. Moreover, a huge increase in the amount of displaced workers can be observed from 1987 to 1988: in this period of time, the number of displaced workers rose by almost 79 percent[20].

Table 2: Sample composition: Non displaced workers

Year	Number of non-displaced workers	Number of displaced workers
1975	594,962	9,009
1976	563,887	10,450
1977	581,352	12,859
1978	626,209	20,654
1979	607,727	22,034
1980	617,112	23,437
1981	618,226	25,096
1982	608,994	26,690
1983	591,267	30,691
1984	561,148	32,534
1985	539,521	32,264
1986	526,668	33,184
1987	505,911	25,990
1988	482,626	46,638
1989	469,230	48,576
1990	465,938	49,358
1991	474,619	47,983
1992	467,748	47,537
1993	459,943	46,493
1994	454,347	43,590
1995	472,155	40,585
1996	468,107	35,064
1997	463,771	29,820
Total	**12,221,468**	**740,536**

Notes: Table 2 reports the composition of the sample by year and displacement status.

[20] According to the ISTAT (Italian Institute of statistics), in the years following 1987, Italy registered a decrease up to 8.6 percent in unemployment rate.

3.4 Sample description

Table 3 reports the descriptive statistics and the detailed composition in the reference period of both groups displaced and non-displaced workers.

In terms of age, there is no difference between the two groups, since the average age for the displaced workers is 37 and for the non-displaced is 36. Unfortunately, years of education and years of tenure are not reported in the data. This is a huge drawback and represents an omission of relevant variables usually included in a Mincer equation; however, education usually does not change within the workers and it is therefore included in the worker fixed effect. In the same spirit, tenure is going to be captured by the age and years dummies in the regression, as can be seen in the next section.

Furthermore, the proportion of women is higher in the group of displaced workers when compared with the non-displaced workers.

Table 3 – Descriptive statistics

Variable	Non-displaced workers	Displaced workers
Total yearly wage (2003 euros)*	31,929	40,360
Age (in years)*	36	37
Firm size (number of workers)*	521	407
Type of Job:		
Manufacturers	69%	62%
Employee	30%	37%
Trainee	1%	1%
Gender:		
Male	67%	63%
Region:		
North	94%	90%
Centre	3%	9%
South	3%	1%
Number of observations	**12,221,468**	**740,536**

Notes: Table 3 reports composition and summary statistics for the sample. The units are explained in parenthesis; the symbol * refers to the mean.

As expected, average firm size is smaller in the case of displaced workers than in the case of non-displaced workers. However, both groups of firms have the same proportion of manufacturing workers, employees and trainees.

It is worth mentioning that both displaced and non-displaced workers are mostly concentrated in Northern Italy. This is not surprising, since the data considers mainly people who live and work in the Veneto region (although, the workers living in Veneto but hired by a firm operating outside the region are also included). Finally, displaced workers earn significantly higher wages than their non-displaced counterparts. Unconditionally, the average real yearly wages amounts to 40,360 euros for the displaced, while for the non-displaced it equals 31,929 euros.

4. Econometric Method

4.1 Estimation based on the JLS model

To evaluate the effect of displacement on wages, this study starts following closely the methodological framework derived by Jacobson, LaLonde and Sullivan (1993) – or JLS – adopted also by Raposo, Portugal and Carneiro (2021).

The first statistical specification assumes that workers' wages at a given time period depend on displacement and on some controls for fixed and time-varying characteristics of the worker and firm and the economy:

$$w_{it} = \gamma_t + \beta X_{it} + \sum_{k \geq -m} D_{it}^{k} \, \delta_{k}^{base} + u_{it} \qquad (1)$$

Where w_{it} denotes the yearly wages (in log and euros) for each individual *i* in year *t,* D_{it}^{k} are dummy variables where *k* is equal to - *m*, - (*m* - 1), … 0, 1, 2, …, which represent jointly the event of displacement, δ_{k}^{base} measures the effect of displacement on worker's wages *k* years prior to, and following, the event of separation. The terms γ_t are calendar year fixed effects, included to capture the macroeconomic environment (business cycle). Finally, the vector X_{it} includes age, age squared and firm size as a set of controls, and its impact is measured by the coefficients β. The composite error term, u_{it} incorporates the worker, the firm and the match-quality fixed effects and, is assumed to be uncorrelated with the covariates. This identification strategy follows closely the one explored by JLS, since we compare the change in wages of displaced workers with the change in wages that would have occurred if the displaced had not lost their jobs.

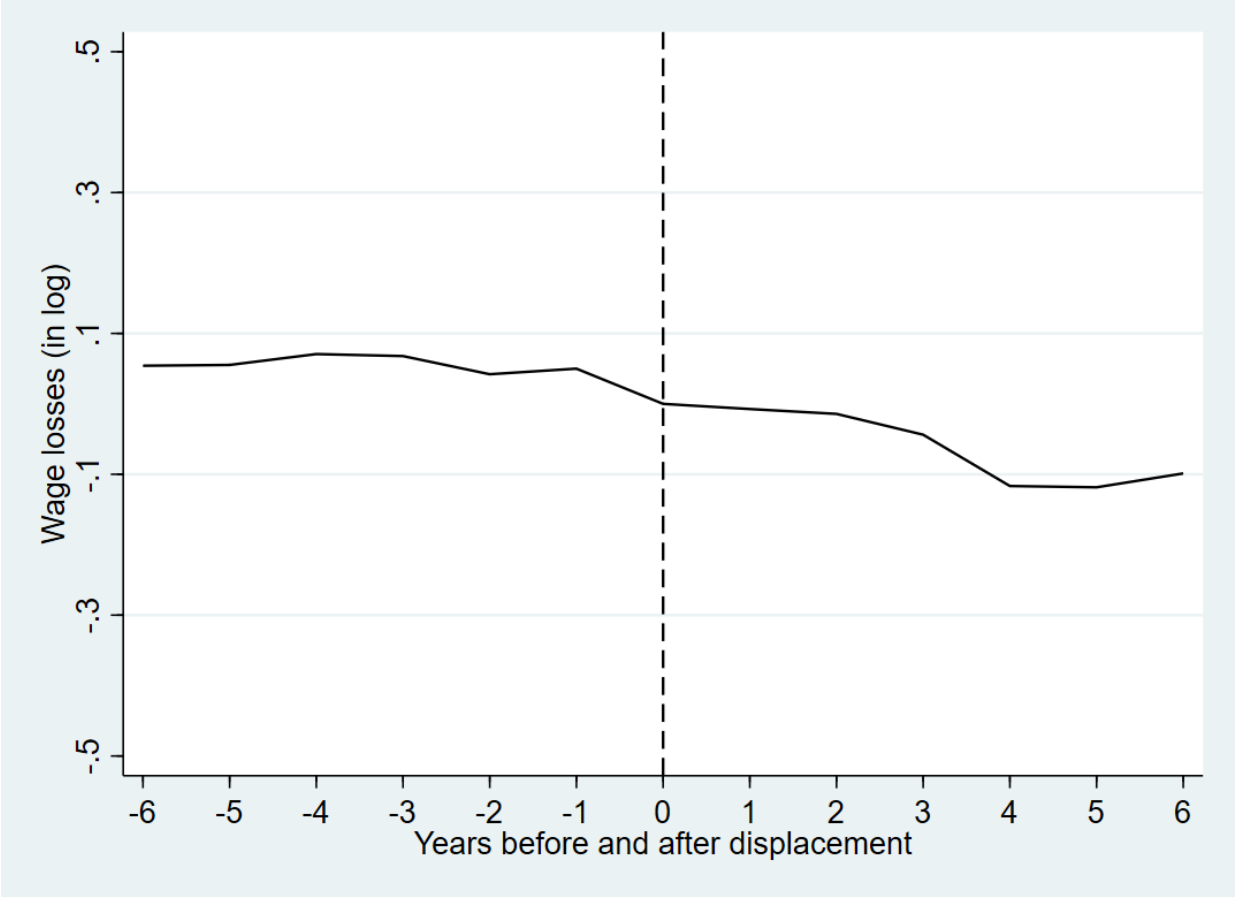
According to the fixed effects specification, the yearly wages losses of displaced workers remain around 9.9 log points (i.e., 10.40 percent) below their wage levels in the reference year, ($\delta_{6}^{base} - \delta_{0}^{base} = 0.113 - 0.212$).[21]

Moreover, since the joblessness events before and after displacement is excluded, we find that wages start declining more strongly one year before the shutdown of the firm and continue to decline for up to four years after firm closure. This can be explained by two main reasons. First, it may be that workers who found relatively higher wage offers returned earlier to employment and second, longer joblessness duration may have

[21] These results are presented in column one of Table 4.

damaged the human capital of displaced workers. However, in the last two years, wages seem to increase slightly and remain constant. These effects can be seen in Figure 1.

Figure 1: Yearly wage losses of displaced workers

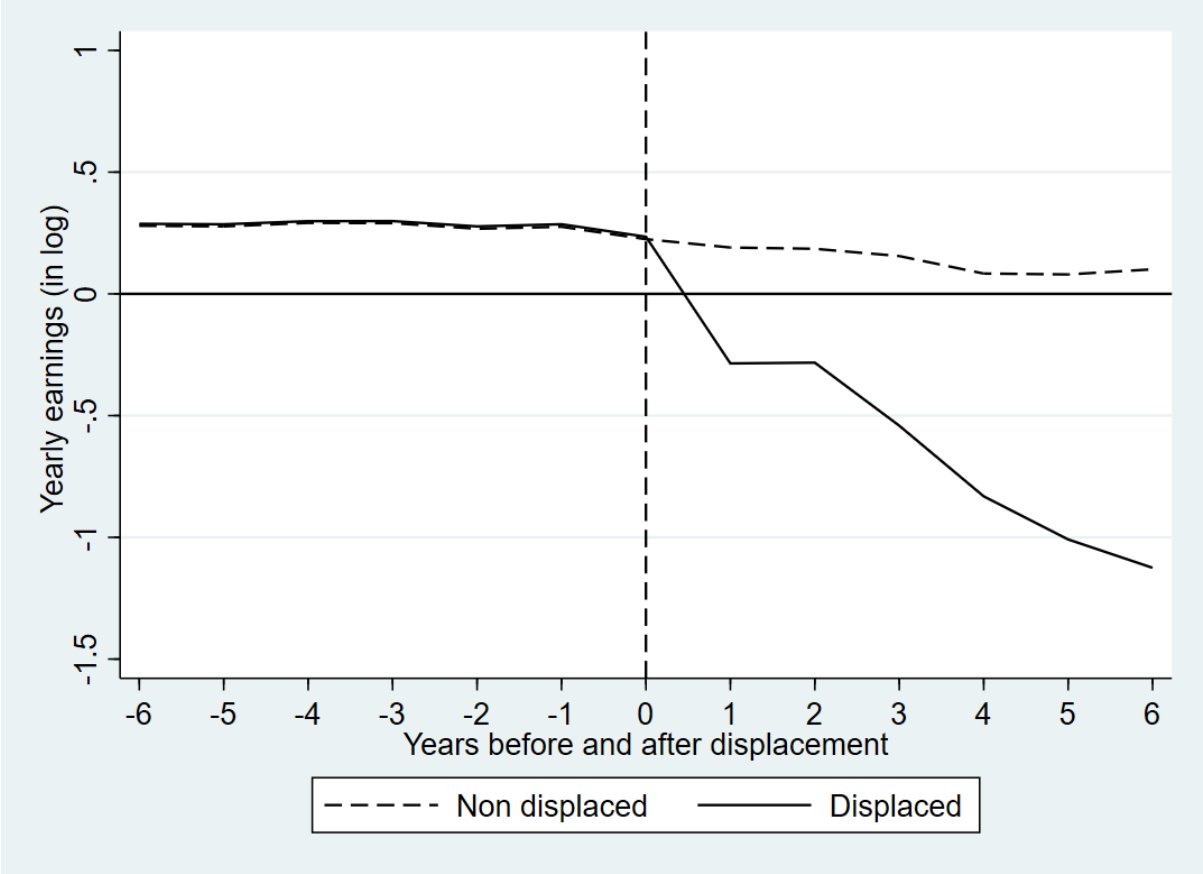


Notes: Figure 1 shows the log yearly wage losses excluding transitions to zeros. The year of firm closure is taken as the reference year (δ_k is normalized to zero). On the horizontal axis the relative time to firm closure is plotted in years. On the vertical axis is plotted the wage loss (in log) between displaced and non-displaced. In the regressions we control for age, age squared, firm size and calendar year fixed effects.

Finally, it is also important in our analysis to acknowledge the impact of unemployment duration, and therefore consider the earnings of displaced workers. Specifically, the earnings include both the wages and the unemployment benefits. As can be seen in Figure 2, in comparison with the group of non-displaced workers, the earnings of displaced workers start declining sharply after one year from the event of displacement and then continue downwarding until the 6th year after the firm closure. As in the spirit

of Jacobson, LaLonde and Sullivan (1993), the earnings are taken as zero whenever the individuals are unemployed.

<u>Figure 2</u>: Yearly earnings of displaced workers, compared with the group of non-displaced workers



Notes: Figure 2 depicts the log yearly earnings including transitions to zeros, in comparison with the group of non-displaced workers. On the horizontal axis the relative time to firm closure is plotted in years. In the regressions we control for age, age squared, firm size and calendar year fixed effects. See first column of Table 4 for the detailed results of the regression.

4.2 The high-dimensional fixed effects regression model

Following carefully the strategy of Raposo, Portugal and Carneiro (2021), the next identification is based on Woodcock (2008; 2015), who extended the worker and firm fixed effect model of Abowd, Kramarz and Margolis (1999) to account for match-quality heterogeneity. In our framework, it is important to distinguish a good worker in a good firm from a good worker-firm match. Therefore, to better understand the nature of the wage changes that affected displaced workers in relation to non-displaced workers, we turn to the estimation of the following three way high-dimensional fixed effects regression model, as given by the next equation:

$$w_{it} = \alpha_i + \varphi_{iF(i,t)} + \theta_{F(i,t)} + \gamma_t + \beta X_{it} + \sum_{k \geq -m} D_{it}^{k} \delta_k + u_{it} \qquad (2)$$

where now $\varphi_{iF(i,t)}$ accounts for the match-quality fixed effect that measures the returns to time-invariant characteristics of the worker-firm match. Then, the term $\theta_{F(i,t)}$ represents a firm fixed effect that controls for permanent characteristics of the worker fixed effect, and the term α_i captures the impact of permanent differences among worker's permanent observed and unobserved characteristics.

However, this model is over-parameterized, which makes it impossible to disentangle the three fixed effects. In this model, the quality of the worker-firm match is indistinguishable from a good employee working in a good firm. A practical procedure that allows us to estimate the combination of the three sets of effects (worker, firm and match-quality, which we call worker-firm fixed effect) is to replace these three fixed effects with a single set of fixed effects for each worker-firm pair, denoted by $\phi_{iF(i,t)}$. The full model is now written as:

$$w_{it} = \phi_{iF(i,t)} + \gamma_t + \beta X_{it} + \sum_{k \geq -m} D_{it}^{k} \delta_k + u_{it} \qquad (3)$$

This regression model incorporates three high-dimensional fixed effects, worker, firm and match-quality fixed effects, in line with the AKM model which includes only the worker and firm fixed effects,[22] and it will be estimated employing the algorithm developed by Guimarães and Portugal (2010). Then, using the Gelbach (2016)

[22] The AKM model developed by Abowd, Kramarz and Margolis (1999), makes inference on the sign and strength of assortative matching through the correlation between the worker and firm fixed effects estimated from standard Mincer-type wage equations.

decomposition, we are able to disentangle the δ_k that is due to each different fixed effects. This decomposition is a computationally simple and econometrically meaningful procedure that takes advantage, in an ingenious way, of the conventional OLS omitted variable bias formula. In this way, we can unambiguously disentangle the contribution of each fixed effect to the change in the coefficient estimate of the variables under observation. Nevertheless, to distinguish the worker, firm and match-quality fixed effects, we assume that they are orthogonal.

Since our sample is restricted to the largest connected set, the fixed effects are accurately identified. Specifically, a connected set is defined when at least one element of a worker-firm pair and match quality links the rest of the group (see Abowd, Creecy, and Kramarz, 2002). As a result of this strategy, the estimation takes into account all the wage earners observed between 1975 and 1997, corresponding to 12,962,004 observations.

5. Empirical results

5.1 The empirical distribution of wages and its components

To have a clearer picture of the results obtained estimating the previous models, in Figure 3 we start by graphing the empirical wage distributions and their components of workers displaced due to firm closures and their non-displaced counterparts only in the pre-displacement period, while in Figure 4 we compare the distribution of wages and their components of displaced workers based on values before and after displacement. Specifically, the wages components (i.e., worker's characteristics, firm's characteristics and match-quality characteristics) are extracted from equation (3), using the Gelbach (2016) decomposition formula.

The year of reference of the displacement event adopted in Figure 3 is assumed to be 1989, but the conclusions are similar using other reference years. It is clear from Figure 3 (a) that the wages of displaced workers are higher and more dispersed when compared with those of the non-displaced. Figure 3 (b) depicts the empirical distribution of worker

permanent heterogeneity, which shows that the observed and unobserved characteristics of displaced workers are associated with higher wages when compared to their counterparts. Moreover, Figure 3 (c) shows that displaced workers are characterized by better paying firms, while from Figure 3 (d) is clear that the match-quality distributions are almost the same for both groups of workers.

In Figure 4 we compare the distribution of wages (and its components) of displaced workers based on average values before and after displacement. From Figure 4 (a) it is notable that the distribution of wages was shifted to the left, evidence of some wage losses associated with firm closures. Figure 4 (b) shows the worker fixed effect distribution. Except for the self-selection generated by different duration of unemployment periods, the distributions for workers before and after the displacement should coincide exactly, which for the most part they do, suggesting that the time profile of reemployment is not a serious concern, at least in the worker heterogeneity dimension. Figure 4 (c) illustrates that the displaced workers are characterized by better firms after the event of displacement, contradicting the findings of the previous literature, such as Raposo, Portugal and Carneiro (2021) and Jacobson, Lalonde and Sullivan (1993). In other words, those firms are paying on average more than the past ones and, therefore, the role of firm heterogeneity is quite important in the formation of the wages. Finally, it is evident from Figure 4 (d) that the displaced workers are related to lower compensations, deriving from lower match-quality fixed effects.[23]

[23] A low match-quality fixed effect is a worker-firm match with total compensation lower than expected, conditional on observable time-varying regressors, workers and firms time-invariant observed and unobserved characteristics.

Figure 3: The empirical distribution of wages and wage components for displaced and non-displaced workers (reference year D_0)

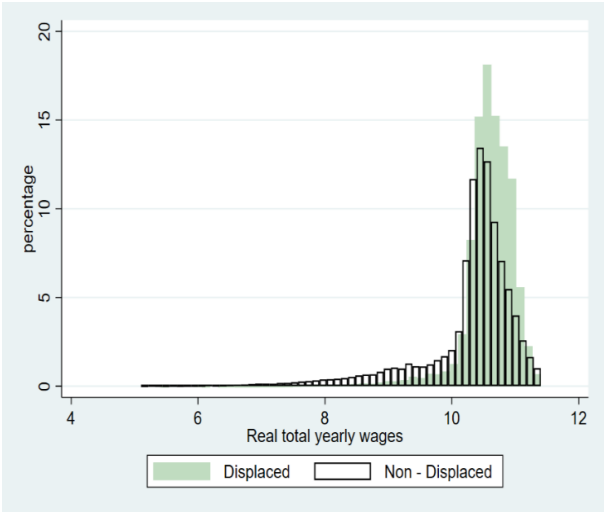


Figure 3 (a): Yearly wage distribution

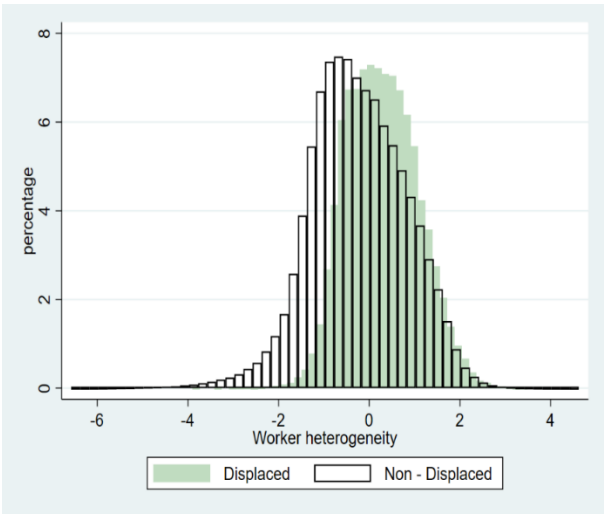


Figure 3 (b): Worker permanent heterogeneity

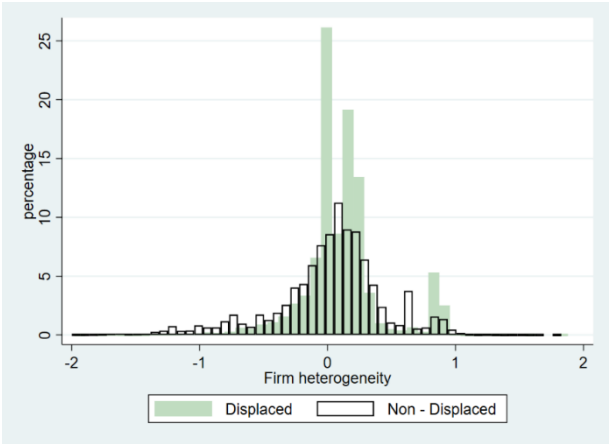


Figure 3 (c): Firm permanent heterogeneity

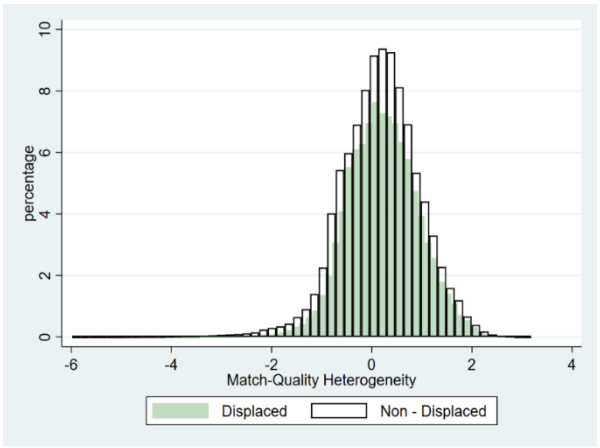


Figure 3 (d): Match-quality permanent heterogeneity

Notes: Figure 3 plots the empirical distributions of wages and wage components before displacement of workers displaced due to firm closures and their non-displaced counterparts. The plots for displaced workers correspond to the year of displacement (D_0) which in this case is assumed to be 1989. Figure 3 (a) plots the wage distributions before displacement for both groups of workers; Figure 3 (b) plots the worker distributions as estimated using the corresponding fixed effect; Figure 3 (c) plots the firm distributions as estimated using the corresponding fixed effect; and, Figure 3 (d) plots the match-quality distributions as estimated using the corresponding fixed effect.

Figure 4: The empirical distribution of wages and wage components of displaced workers: pre- and- post-displacement

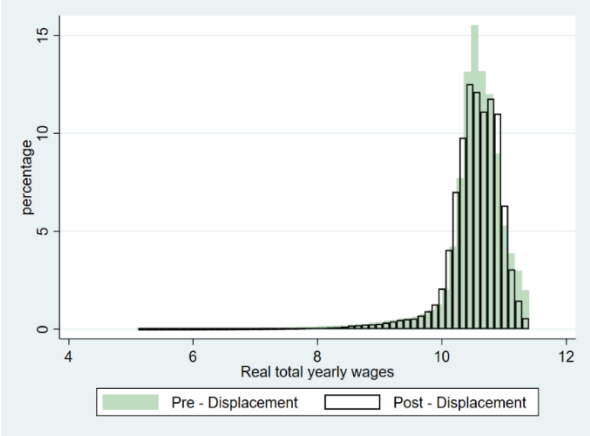


Figure 4 (a): Yearly wage distribution

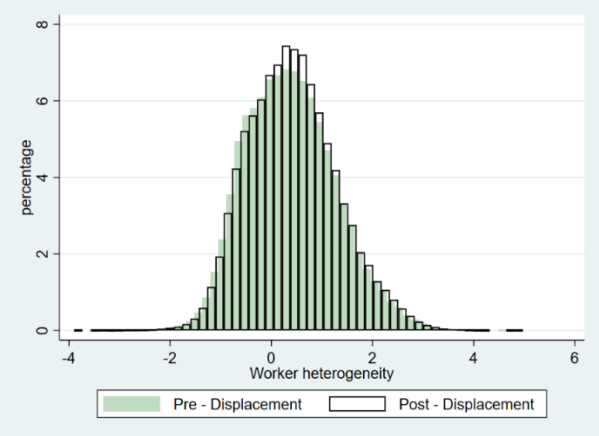


Figure 4 (b): Worker permanent heterogeneity

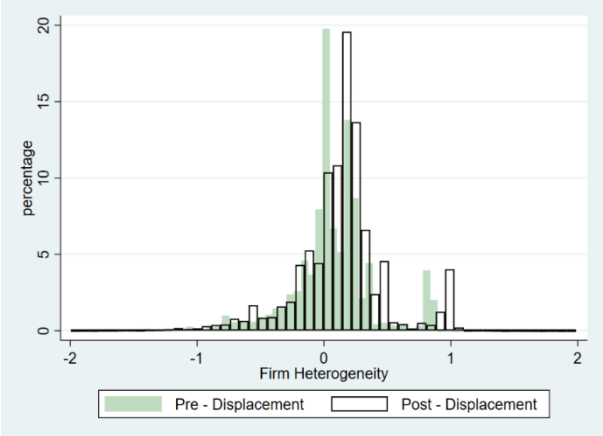


Figure 4 (c): Firm permanent heterogeneity

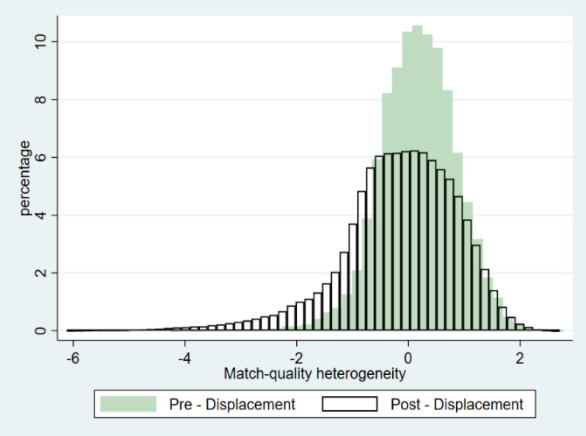


Figure 4 (d): Match-quality permanent heterogeneity

Notes: Figure 4 plots the displaced workers' empirical distributions in the last year before displacement and in the first year after displacement. Figure 4 (a) plots the wage distributions of displaced workers before and after displacement; Figure 4 (b) plots the worker heterogeneity as estimated using the corresponding fixed effect; Figure 4 (c) plots the firm heterogeneity as estimated using the corresponding fixed effect; and, Figure 4 (d) plots the match-quality heterogeneity as estimated using the corresponding fixed effect.

5.2 Regression results

The results of the decomposition of wage losses are reported in Table 4. The first column displays the Ordinary Least Squares (OLS) estimates of the base model, - i.e., it reports the estimates of equation (1), which is characterized by the absence of the worker, firm and match-quality fixed effects. Conversely, the second column presents the results of the full model, that is equation (3), which includes the set of the three fixed effects. The estimates of the wage losses' decomposition derived by using the Gelbach (2016) formula, that can be interpreted as the contribution of the corresponding fixed effect for the unobserved change in the estimates of δ from the base model specification to the full model specification, are reported from column 4 to column 6. If the base specification is an useful benchmark, and in our case it is simply a conditional gross measure of the displacement wage rate losses on age, age squared and firm size, the decomposition is also economically meaningful, providing an unambiguous measure of the contribution of each omitted variable to the change in the original coefficients of the displacement dummies (see Raposo, Portugal and Carneiro, 2021). For all the models, in the bottom part of Table 4, is described the wage loss estimates for two different specifications. Specification 2 aggregates the average of pre- and post-displacement years into two periods of time – before (years D_{-6} to D_0) and after (years D_1 to D_6) displacement – rows labelled "Pre-Displacement" and Post-Displacement", respectively.[24] Finally, specification 3 is a simple reformulation of specification 2, providing the net effect-row labelled "Net". The models were estimated for the sample of 12,962,004 workers-year observations for the treated and control groups, after guaranteeing that we are working with the largest connected set.

The OLS estimates provided in the base model show that displaced workers earn significantly lower wages than their non-displaced counterparts. Specifically, we find that post-displacement wages are 11.5 log points lower than pre-displacement wages, i.e., 12.18 percent less than average pre-displacement wages. On the other hand, the full model, which includes the combination of worker fixed effect, firm fixed effect and match-quality fixed effects, explains the whole wage losses, since the difference between

[24] This procedure is identical as the one having in the regression one dummy variable for each category (i.e. one dummy for the period before displacement and another one for the period after displacement).

the period before the displacement and after the displacement is almost 0.[25] Then, the analysis moves to the last three columns, in order to quantify the impact of each fixed effect on the wage losses of displaced workers.[26] First of all, the evidence shows that the worker fixed effect remains unchanged (i.e., the amount of the difference between the two periods is 0.1 log points). This means that the characteristics of the workers do not have a sizeable impact on the sources of wage losses. In general, many observed and unobserved characteristics are captured by the worker fixed effect, e.g., schooling, that usually does not change during professional life, is controlled by this fixed effect. On the contrary, a big part of the change in wages comes from the fact that people are losing the match-quality which means that displaced workers are going into worse matches. There are two main possible explanations for this result. First, it is possible that once displaced workers start working after the event of displacement, they could feel more unhappy or more unsatisfied than before. Second, the skills that were specific to one particular firm may have been lost after the firm closure. Therefore, for the majority of the displaced workers, skills or some other firm specific attributes were not easily transferred from the former job to the next. Finally, in contrast to the findings of previous articles, such as Jacobson, LaLonde and Sullivan (1993) which exploited US data, and Raposo, Portugal and Carneiro (2021) which exploited data for Portugal, the estimates of the last column, which accounts for the firm fixed effect, suggest that displaced workers are moving into firms that are paying, on average, more than the previous ones, which means that they are earning, on average, more than the period before displacement. Specifically, the difference in the firm fixed effect before and after the job displacement, implies that if the displaced workers were randomly allocated into a different firm, they would be earning, precisely, 6 log points, (i.e., 6.23 percent) more than the period before displacement.

[25] See last row of column 2.
[26] It should be noted that, in contrast to Raposo, Portugal and Carneiro (2021), job titles characteristics are not included in the specification because they are absent in the data.

Table 4: Decomposition of wage losses into the contribution of worker, firm and match-quality

				Decomposition of wage loss into		
Period relative to displacement	Base Model	Full Model	Base - Full	Match Quality	Worker	Firm
D_{-6}	0.266	-0.081	0.347	-0.002	0.245	0.103
D_{-5}	0.267	-0.065	0.333	-0.005	0.251	0.087
D_{-4}	0.283	-0.025	0.308	-0.010	0.251	0.067
D_{-3}	0.280	-0.001	0.281	-0.017	0.250	0.049
D_{-2}	0.254	0.032	0.222	-0.025	0.236	0.011
D_{-1}	0.262	0.054	0.208	-0.029	0.234	0.003
D_0	0.212	0.014	0.198	-0.032	0.231	-0.001
D_1	0.205	0.069	0.136	-0.229	0.241	0.124
D_2	0.198	0.031	0.167	-0.200	0.248	0.119
D_3	0.168	-0.015	0.184	-0.186	0.263	0.107
D_4	0.095	-0.043	0.139	-0.176	0.223	0.092
D_5	0.094	-0.068	0.162	-0.170	0.231	0.101
D_6	0.113	-0.056	0.169	-0.165	0.239	0.095
Specification 2						
Pre - Displacement	0.261	-0.010	0.271	-0.017	0.242	0.046
Post - Displacement	0.146	-0.014	0.159	-0.188	0.241	0.106
Specification 3						
Net	-0.115	-0.003	-0.112	-0.171	-0.001	0.060

Notes: Table 4 reports the Gelbach decomposition of the three fixed effects of the wage loss of displaced workers. In the regressions we control for age, age squared, firm size and calendar year fixed effects. It does not report the symbols *** to make it easier to read, but basically all results are significant using robust standard errors. All regressions are computed with worker fixed. In each column Pre-displacement is the computed average between the first seven lines (D_{-6} to D_0). Post-displacement is the computed average between the next six lines (D_1 to D_6). In the line net, we compute the difference between the previous two lines, which can be also computed by considering one dummy variable for the period after displacement.

5.3 Assessing the role of permanent observed heterogeneity

The results obtained in the previous section point out that displaced workers move into firms that pay, on average, more than the previous ones, and that they are associated with lower match-quality after the event of displacement. The second objective of our analysis is to understand the reasons-mechanism behind these results. In a fixed effects approach, worker, firm, and match-quality fixed effects may include two components - unobserved and observed time invariant characteristics. Therefore, it seems natural to ask how observed components are related to changes in the firm and match-quality fixed effect after displacement. This means that with our second exercises, we hope to be able to determine the main factors explaining the difference in firm and match-quality characteristics.

For that purpose, we run two separate Ordinary Least Squares (OLS) regressions using the sample of displaced workers that were reemployed during the period analyzed (1975-1997), i.e. 633,401 displaced workers, after excluding those observations with missing values in the explanatory variables. The results are reported in the following Table 5.

In the first regression (see left part of Table 5) the dependent variable is defined as the change in the firm fixed effect in the period after displacement relative to the period before displacement. Our set of control variables includes the variation in firm size (measured by the number of employees)[27], the variation in type of job (manufacturing workers, employees or trainees), the period of unemployment and a set of three interaction variables, with the purpose of determining in detail the impact of a change between Italian regions. Specifically, the first interaction term considers a change from the North to the South, the second reflects a change from the South to the North and the last one considers a change from the Centre to the North. In the second regression (see right part of Table 5) the dependent variable is the change in match-quality fixed effect and the covariates are the same as in the first specification. This methodology allows us to identify accurately the impact of a region variation on the difference in firm and match-quality characteristics.

[27] In this case we consider the change in firm size in logarithm terms.

Table 5: Assessing the role of permanent observed heterogeneity

Variables	Change in firm characteristics	Change in match-quality characteristics
Changed firm size (log)	-0.001	-0.001
	(0.007)	(0.001)
Changed type of job	0.005***	0.004
	(0.002)	(0.003)
Joblessness duration	0.012***	-0.009***
	(0.000)	(0.000)
Changed from North	0.050	-0.034
	(0.040)	(0.030)
Changed from Centre	0.124***	0.004
	(0.010)	(0.004)
Changed from South	0.116***	-0.062***
	(0.017)	(0.007)
Constant	-0.000	-0.000
	(0.000)	(0.000)
Observations	633,401	633,401
R - squared	0.069	0.017

Notes: Table 5 reports the regressions where all the explanatory variables are defined by comparing firm and match-quality characteristics of the displaced workers in the last record before (D_0) and after displacement. Robust standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results presented in the first regression reveal that the change in firm characteristics is explained primarily by the variation in region to the North, independently if it was from the Centre or from the South of the country, and by the joblessness duration, whose coefficients are statistically significant, while the variation in firm size and the variation in type of job do not have an impact on that. In other words, displaced workers are moving into better firms mainly for two reasons: first, because they move to Northern Italy after the event of displacement; and, second, because they spend longer periods of unemployment.

On the other hand, the results of the second specification show correctly that a change to the North from the South and longer period of unemployment have a sizeable impact on

the change in match-quality characteristics. This means that displaced workers who move to Northern Italy and stay more time without a job, are related to lower match-quality than in the period before the displacement. As a result of this, the North-South gap may be significant and powerful, with Northern Italy being characterized by better and healthier firms.

6. Concluding remarks

Wage losses of displaced workers can be associated with the worker, firm and match-quality that existed before and after the displacement. In this study, we first examined the sources of those losses, estimating a multi way high-dimensional fixed effects regression model - in line with the AKM approach - which enabled us to decompose the wage losses into the contribution of each fixed effect. The approach suggested by Gelbach (2016) provides a unified framework that allows us to separately identify the components of the sources of the wage losses related with the worker-firm pair into the contribution of worker, firm, and match-quality.

Following Raposo, Portugal and Carneiro (2021) and based on the JLS methodology, we found that post-displacement yearly wages are, on average, 10.40 percent lower than pre-displacement wages. Using the decomposition strategy, the results suggest that sorting into lower match-quality plays a very sizeable role in explaining the losses encountered by the workers displaced through a firm closure. On the other hand, our findings show that after the event of the separation, displaced workers are moving into better paying firms. Specifically, if they were randomly assigned to a different firm, they would be earning almost 6.23 percent more than the period before displacement.

Based on the results that we obtained from the firm and match-quality fixed effects, we analyzed the reasons-mechanism behind the change in their characteristics. Accordingly, our conclusions seem to show that the main reason why displaced workers are going to more well-paying firms and worse matches is because they might switch regions, moving mostly to firms that are located in Northern Italy. This is not surprising, and essentially due to the historical Italian regional gap, with the firms in the North being

better and more advantaged than the ones in the rest of the country. However, those conclusions reflect also the fact that the dataset used in this research is based on a sample of workers who live and work in two provinces of the Veneto region, namely Treviso and Vicenza, although, the workers living in Veneto but hired by a firm operating outside the region are also included in the analysis. Finally, the results suggest that displaced workers who spend longer periods of unemployment are associated with firms which pay, on average, more than the ones in the period before displacement, and with lower match-quality.

There are some potentially important policy prescriptions that may be derived from the results reported in this study. Losses related with the match-quality fixed effects may mean that a worker is moving from a high-quality match to a low-quality match. In this case, job search assistance programs may be justified as a help for the displaced workers to find a better match, implying a longer period to reach a better firm.

Appendix

Table 6: Sample restrictions on original data

Restrictions	Number of observations, percentage
Original data	45,985,568 (100%)
Aged workers between 18 and 62	44,038,082 (97.76%)
Full time employees and trainees	33,967,182 (73.86%)
Firm size larger or equal than 8	33,292,778 (72.39%)
Extremes of the wage distribution	24,548,530 (53.38%)
Restricting to the largest connected set	12,962,004 (28.18%)

Notes: the largest connected set is the largest group of connected worker-firm pairs. The percentages are computed with respect to the original data.

References

Abowd, J., Creecy, R., and Kramarz, F. (2002). Computing person and Firm effects using linked longitudinal employer-employee data. Technical Papers. 2002-06, Longitudinal Employer-Household Dynamics, Center for Economic Studies, U.S. Census Bureau.

Abowd, J., Kramarz, F., and Margolis, D. (1999). High wage workers and high wage firms. *Econometrica, 67(2):251-334.*

Addison John T., and Portugal P. (1989). Job Displacement, Relative Wage Changes, and Duration of Unemployment. *Journal of Labor Economics, 7(3): 281–302*

Brusco, S. (1983). The Emilian model: Productive decentralisation and social integration. *Cambridge Journal of Economics 6(2):167–84.*

Cardoso, A. R. (2000). Wage differentials across firms: an application of multilevel modelling. *Journal of Applied Econometrics, 15:343-354.*

Couch, Kenneth A. and Placzek, Dana W. (2010). Earnings Losses of Displaced Workers Revisited. *The American Economic Review, 100(1): 572-589.*

Devicienti F. , Fanfani B. and Maida A. (2019). Collective Bargaining and the Evolution of Wage Inequality in Italy. *British Journal of Industrial Relations June 2019 0007–1080: 377–407.*

Gelbach, J. (2016). When do covariates matter? And which ones, and how much? *Journal of Labor Economics, 34(2):509–543.*

Guimarães, P. and Portugal, P. (2010). A simple feasible procedure to fit models with high-dimensional fixed effects. *Stata Journal, 10(4):628-649.*

Jacobson, Louis, Robert LaLonde and Daniel Sullivan (1993). Earning Losses of Displaced Workers, *American Economic Review, 83: 685-709.*

© OECD. (2013). Back to work: Re-employment, earnings and skill use after job displacement.

Piore, Michael J. (2009). Conceptualizing the dynamics of industrial districts. In The handbook of industrial districts. Cheltenham: Edward Elgar.

Piore, Michael J., and Charles F. Sabel. (1984). Italian small business development: Lessons for U.S. industrial policy. In American industry in international competition. Ed. John Zysman and Laura Tyson. Ithaca, NY: Cornell University Press.

Raposo, P., Portugal, P. and Carneiro, A. (2021). The sources of the wage losses of displaced workers: the role of the reallocation of workers into firms, matches and job titles. *Journal of Human Resources, 56(3): 786-821*

Schmillen, Achim D. (2020). Causes and Impacts of Job Displacements and Public Policy Responses. World Bank Group.

Serafinelli, M. (2019). Good Firms, Worker Flows, and Local Productivity. University of Essex and Institute for the Study of Labor (IZA), *Journal of Labor Economics*.

Stevens, Ann H. (1997). Persistent Effects of Job Displacement: The Importance of Multiple Job Losses. *Journal of Labor Economics , 15(1): pp. 165 - 188.*

Swaim P. and Podgursky M. (1989). Do more-educated workers fare better following job displacement, Monthly Lab. Rev.

Tattara, G. and Valentini, M. (2010). Turnover and Excess Worker Reallocation. The Veneto Labour Market between 1982 and 1996. Wiley Online Library.

Tattara, G. and Valentini, M. (2004). Job flows, worker flows in Veneto manufacturing. 1982-1996. academia.edu.

Trigilia, C. (1990). Work and politics in the third Italy's industrial districts. In Industrial districts and inter-firm co-operation in Italy. Ed. F. Pyke, G. Becattini, and W. Sengenberger, 160–184. Geneva: International Institute for Labor Studies.

Tufo M. (2018). The minimum wage in Italy during the eurozone crisis age and beyond. *IUS Labor 1/2018, ISSN 1699 - 2938: 205 - 231*.

Webber, D. A. (2013). Firm Market Power and the Earnings Distribution. IZA Discussion Papers 7342, Institute for the Study of Labor (IZA).

Woodcock, S. D. (2007). Match effects. Technical Report 07-13, SFU Discussion Paper.