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Job Displacement, Inter-Regional Mobility and Long-Term Earnings

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Abstract

We examine the effect of job displacement on regional mobility using linked employer-employee panel data for the 1995-2014 period. We also study whether displaced movers obtain earnings and employment gains compared to displaced stayers. The results show that job displacement increases the migration probability by ~70%. However, social capital in a region and housing characteristics decrease the propensity to move, indicating that people do not make the migration decisions solely based on short-term economic incentives. Migration has an immediate negative relationship with earnings, but the link diminishes as time passes and eventually turns positive for men. The link between migration and employment is nevertheless positive and persistent for both genders.

Keywords: Unemployment, Job Displacement, Migration, Earnings, Employment

JEL codes: J61, J63

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1. INTRODUCTION

The quality of the region where adults and children live can significantly affect their opportunities in life (see Chetty and Hendren 2018a, 2018b). High structural unemployment is a pervasive problem in many European countries and is, within countries, an important factor that affects the opportunities for the inhabitants of the region. An important friction, especially in a thinly populated country such as Finland, is obstacles that prevent more efficient regional allocation of workers and jobs, as unemployed people suitable for a job are often located in a different region than the open job vacancy. If individuals follow economic incentives emerging from regional wage differences and job opportunities, they will migrate to better opportunity areas (Pissarides and McMaster 1990, Mueller 1982, Hicks 1932). However, if individuals have a home-region preference, or moving is too costly, they might not migrate to better opportunity areas. To what extent the unemployed respond to economic incentives is an empirical question and of first-order importance for policy makers who design policies aimed at reducing labor market frictions.

We have only partial answers on how involuntary job loss affects migration decisions. Recently, Huttunen, Møen and Salvanes (2018) and Bratsberg, Raaum and Røed (2016), utilizing a Norwegian setting, and Fackler and Rippe (2016), examining a German setting, found that job displacement increases regional mobility.[1] These studies have also found interesting differences across subgroups in the propensity to move. For example, more skilled women are more likely, and immigrants from developing countries are less likely to move to another region after experiencing a job loss. Previous literature

[1] Meekes and Hassink (2016) found that job displacement decreases the probability of moving, but on the other hand increases the probability of commuting, in the Netherlands.

is still lacking results on how migration decisions depend on economic incentives at a more detailed level, for example, how expected income differences across regions influence migration decisions after a job loss, as in the model of Kennan and Walker (2011).

This paper contributes to this topic by studying migration within Finland. We first describe mobility patterns and how these are associated with characteristics of regions and individuals. We then use involuntary job losses to examine the impact of an exogenous shock on regional mobility decisions. We furthermore compare subsequent labor market outcomes between displaced movers and stayers using comprehensive linked employer-employee panel data over the period of 1995-2014. We use plant closures and/or mass layoffs to identify involuntary separations from voluntary worker outflows.[2] We estimate to what extent these events increase migration to other regions in Finland and compare these effects with other incentives to migrate, such as social interactions with relatives and housing markets. We also estimate how earnings and employment develop after a job loss for those who decide to migrate.

We show descriptively that out-migration is not strongly associated with regional unemployment rates, while in-migration declines with unemployment rates. This observation raises some questions about whether all unemployed move to greater opportunity areas. However, utilizing plant closures and downsizings, we find that involuntary job loss positively affects the propensity to migrate. The estimates represent a sizeable increase in the migration probability of 70%. Consistent with the descriptive observation that migration decisions do not straightforwardly depend on economic

[2] The seminal contributions of the literature are Podgursky and Swaim (1987), Addison and Portugal (1989) and Jacobson, LaLonde and Sullivan (1993), among others, who examined the earnings losses of the displaced workers.

incentives, we find that besides economic incentives, there are also other drivers for migration decisions. Among the displaced workers, those who had a family member living in the same pre-displacement region were less likely to move compared to those who did not have such social capital. Migration is immediately negatively associated with earnings, but earnings changes become insignificant as time passes for both genders. In the long run, the estimates turn positive for men.

The question of to what extent regional unemployment, housing and wage differences (opportunities) affect migration is partly inspired by the study of Kennan and Walker (2011), who developed a model that allows for many alternative location choices and find that migration decisions are to a large extent affected by expected income. Housing markets and, in particular, home ownership play a role. Consistent with the existing literature, we find that homeowners are less likely to move even after facing a negative employment shock. This result could be explained by analysis in the literature that finds considerable evidence that homeowners are less likely to move compared to tenants (e.g., Böheim and Taylor 2002, Munch, Rosholm and Svarer 2008). Head and Lloyd-Ellis (2012) developed a multi-city model that allows for interactions between search frictions in both labor and housing markets. They found that homeowners accept job offers from other cities at lower rates compared to tenants and that the moving decision depends also on the housing liquidity, i.e., how quickly the homeowners can sell their houses. Increasing housing price differentials are also negatively associated with geographic labor mobility (Cannari, Nucci and Sestito 2000).

Other drivers for migration decisions, besides economic and housing-related motives, include social networks and other home preferences. Indeed, we find that individuals who have relatives in the region where they were displaced are less likely to migrate to another region. Consistent with this, Lundholm et al. (2004), focusing on five

Nordic countries, showed that the main motives for long-distance migration are not employment incentives but rather environmental and social factors.[3] The earlier literature shows that the existence of relatives or friends in the place of residence is negatively related to migration and that the propensity to migrate increases when relatives or friends are already living in destination locations (e.g., Haug 2008, Palloni et al. 2001, Huttunen et al. 2018). Return and repeat migration also account for a large part of the observed migration flows (Kennan and Walker 2011). Interestingly, we uncover quite significant return migration patterns among our displaced workers starting about nine years after the initial displacement. Many displaced workers initially move to another region, and after nine years many of them start to return to the original region. The timing of this return migration is consistent with the economic crisis starting in 2009.

We also contribute to the burgeoning literature by analyzing links between migration followed by an exogenous job loss and future labor market outcomes. Pekkala and Tervo (2002) utilized a sample of Finns who were unemployed in 1994. They examined whether inter-regional migration is related to increased employment probability after two years. Pekkala and Tervo (2002) found that movers are more likely to find a new job. This positive relationship diminishes or becomes negative after controlling for the endogenous migrant selectivity.[4-5] Boman (2011) used data from

[3] See, also the expository survey by Greenwood (1985) on the determinants of internal migration.

[4] Pekkala and Tervo (2002) used housing prices as an instrument for migration decisions, but we argue that housing prices are also significantly correlated with the local labor market conditions and thus changing employment prospects. Hämäläinen and Böckerman (2014) examine the role of housing markets as determinants of migration flows using Finnish aggregate data.

[5] Nivalainen (2005) examined inter-regional migration and post-move employment of Finnish husbands and their wives. The results showed that movers are less likely to be employed compared to stayers, and that this relationship is more pronounced for wives. In a related study, Nivalainen (2004) found that in the

Sweden and found that women especially suffer income losses after a geographic move that follows an involuntary job loss. In contrast, the earnings effect was slightly positive for men. Income losses are, on the other hand, quite similar for both displaced movers and displaced stayers in Germany (Fackler and Rippe 2016). The Norwegian results suggest that displaced movers suffer higher income losses than displaced workers who stay in the same region (Huttunen et al. 2018).[6]

The rest of this paper is organized as follows. Section 2 describes the data. Section 3 presents the empirical models and the results. Section 4 concludes the paper.

2. DATA DESCRIPTION

2.1. Data sources

The primary data are the Finnish Longitudinal Employer-Employee Data (FLEED) constructed by Statistics Finland. The data are created by combining registers that have been linked together using unique identification codes for individuals, firms and plants. The registers include wage and employment statistics, education and occupational registers, the region of residence, demographic characteristics, and the Business Register, which contains information on firms and plants. We identify each worker's employer in

family context, the migration mostly takes place due to demands related to the husband's career. However, individuals in the pre-move sample were not restricted to the unemployed.

[6] Korkeamäki and Kyyrä (2014) examined the wage response of exogenous job losses using Finnish data. They found that the effect is largest for low-skilled individuals and especially so if they lost their jobs during the recession. Hardoy and Schøne (2014) found that job losses during recessions have more severe negative effects on employment for immigrants than for natives.

the private sector by using firm and plant codes and examining whether plants are downsizing their workforce or closing down their entire business. The FLEED covers the entire Finnish labor force over the period of 1988-2014 (under the age of 70).

The data have yearly records of the individual's labor market status, whether they are a wage and salary earner, unemployed, self-employed or not participating in the labor force. The data also include employment months for each year. Information on the region of residence is based on the 77 NUTS 4-level (Nomenclature of Territorial Units for Statistics) classification.

The measure for income using FLEED is the annual taxable wage and salary earnings. To complement the analyses, we have also linked the Harmonized Wage Structure Statistics (HWSS) data of Statistics Finland to the FLEED. The HWSS data are available for private sector employees over the period of 1995-2013, except for those who work in the smallest firms (fewer than 5 employees). Accordingly, the HWSS data are not fully representative of the firms that are members of the Confederation of Finnish Industries (EK). The HWSS data represent ~60% of all Finnish employees in the private sector. The HWSS data include workers' hourly and monthly earnings, based on regular earnings paid for regular hours. The wage concept includes, e.g., basic pay, premium pay, performance-based pay components, the taxation value for fringe benefits, and hours worked. We use the wage measure from the HWSS data in robustness checks. The income measures are deflated to 2014 prices using the cost of living index.

The empirical specification for the migration decision includes the key individual-level controls (age, gender, education, marital status, having children), the individual's previous migration pattern, an indicator variable for the family member's location, housing liquidity, the unemployment rate in the home location and differentials in the

expected wages between broadly defined macro-areas. These control variables are discussed in more detail in Section 3.

2.2. Sample construction

We focus on the period of 1995-2014. Because being a student or early retiree may affect our empirical findings, we have restricted the sample to wage and salary earners who are between 25 and 55 years old. Those who are defined as retired persons, for example, in the form of disability pensions, are also excluded from the sample that is used to estimate the models.

We examine worker mobility following an exogenous job loss. Building on the earlier literature, we define the displaced as workers who lose their jobs (become unemployed) after a plant closure or mass layoff defined as the plants downsizing their workforce by 30% or more (cf. Huttunen et al. 2018). The treatment group also includes early leavers, defined as workers who leave a plant that downsizes or closes down within a one-year window before the closure (Schwerdt 2011).[7] The costs of involuntary job loss have been found to be lower for early leavers compared to ultimately displaced workers (Pfann and Hamermesh 2008, Schwerdt 2011). A plausible explanation for this difference is the compositional difference in productivity-related characteristics; high-skilled workers with better outside options are often early leavers. If the early leavers are excluded from the treatment group and included in the control group, this most likely

[7] It is possible that displaced workers quit to another plant *within* the same firm. Therefore, we define displaced workers and early leavers as persons who ultimately enter unemployment from employment. This restriction means, for example, that early leavers do not move from plant to plant and remain in the same firm.

leads to too conservative estimates on the effects of involuntary job loss on migration decisions and subsequent labor market outcomes.

The year of displacement for the treatment group and the potential displacement year for the control group is denoted by *b* (the base year). We restrict the sample to employees who are strongly attached to the labor market. This implies that workers must have worked in the same plant two years before the base year (*b-1* and *b-2*). The plants that have at least 10 employees are included in the analysis. In the case of downsizing plants, the number of employees also has to exceed 10 over the period of two pre-displacement years, but not necessarily in the base year *b*. Self-employed persons are also excluded from the estimation sample and workers have to have had positive annual earnings.

Labor market status originates from the Employment Statistics maintained by Statistics Finland. It is measured during the last week of each year. This implies that some of the displaced workers may have a short unemployment spell before they find a new job by the end of the year *b*. Thus, these individuals are observed as employed in year *b*, although they have experienced a short unemployment spell after experiencing the displacement. The data have yearly information on the number of (un)employment months. Therefore, we add workers who have also experienced a short-term unemployment spell after displacement to the treatment group. We further restrict the estimation sample to those persons who have valid information on pre-displacement individual and plant characteristics and we observe persons in both the control and treatment groups also at *b+2*. The share of displaced workers in the sample is 1.3%. If we exclude short-term unemployment spells from the group of displaced workers, the share is 0.7%. These figures show that most individuals who are displaced from their work find a new job within one year after experiencing a job loss. The share of displaced workers

matches well with the earlier numbers using the Finnish data (Korkeamäki and Kyyrä 2014).

Two relevant facts on the composition of displaced workers are worth noting. First, 93.3% of all displaced workers in the sample have experienced involuntary job loss once, 6.5% of them have experienced involuntary job losses twice, and only 0.2% of them have experienced involuntary job losses three times. These figures indicate that involuntary unemployment spells do not tend to accumulate to the same persons. Otherwise, the treatment group would be a highly selected group of persons. Second, only 1.5% of displaced workers who eventually enter employment after a job loss stay employed within the same firm.

2.3. Descriptive evidence

Table 1 documents the shares of inter-regional moves during the period of 1995-2014 for individuals who are 25-55 years old. Approximately 20% of individuals from the total sample have moved to another NUTS 4-level region at least once during the observation period. A substantial share of migration flows is explained by repeat migration, as Kennan and Walker (2012) also point out.

We further restrict the sample to persons who at the time *t* enter unemployment from employment and follow them up to the year 2014. These people may experience several unemployment spells during the sample period and have both public and private sector employment (column 2). We find that the migration rate is significantly higher for those who have experienced unemployment spell(s). In column (3), we restrict the sample

further to persons who at the time *t* enter involuntary unemployment from employment.[8] Those people are more likely to migrate compared to people in the total sample but less likely to migrate compared to people who have experienced at least one, potentially endogenous, unemployment spell.

The data reveal a significant positive relationship between unemployment and the out-migration rate at the regional level. Figure 1 depicts the relationship, where the horizontal axis presents the share of unemployed and the vertical axis presents the out-migration rate by using region-year observations over the period 1996-2013. The coefficient from the OLS (ordinary least squares) model is 0.09, and it is statistically significant at least at the 5% level. Figure 2 shows the corresponding relationship between unemployment and in-migration rate. The coefficient shows a much stronger linear relationship at -0.063, and it is statistically significant at least at the 1% level.[9] The aggregate analyses thus reveal that there is a lower net-migration rate in the regions that have higher unemployment.

Figure 3 describes the share of people who live in a different region than in the year *b-1*. The base year is *b* when a worker is potentially displaced from his/her job. Because displaced workers may move to another location by the end of the year *b*, we set the 'home-location' region at the year *b-1*. We follow these displaced and non-displaced workers up to 17 years following displacement and three years prior to displacement. As the baseline, we also examine the regional mobility of people who at the year *b* become unemployed but not necessarily due to exogenous job loss. As expected, displaced

[8] Here, we do not restrict the sample for those who have valid information on all important pre-displacement characteristics. However, the shares are similar for a smaller sample of displaced workers.

[9] The correlation coefficient between unemployment and out-migration rate is 0.06, and between unemployment and in-migration rate is -0.33.

workers are more likely to move to another region compared to non-displaced workers after job displacement. However, the migration rate is evidently higher for those who have become potentially unemployed at the year *b* due to non-exogenous reasons. Importantly, there is a notable return migration flow among the group of displaced workers, particularly over the years of 2008-2011. This trend is unlikely to be explained by repeat (exogenous) unemployment because the involuntary job losses did not accumulate to same persons, according to the data.

[Table 1 and Figures 1-3 in here]

Table 2 reports the sample means of labor market status and wages at the time *b+2* for the displaced and non-displaced workers by gender and inter-regional migration status at the NUTS 4-level. Information on pre-displacement wages, age, the years of education and a close family member living in the same pre-displacement region are also reported. Furthermore, we report the key plant-level characteristics in the table, namely, the firm size (measured by the number of employees), logarithm of the firm's turnover and average schooling years of employees. Annual earnings from the FLEED include both salary earnings and self-employment income at the year b+2.[10]

The share of non-displaced men and women who move to another region within two years is approximately 3.2%. The share of displaced men and women who move to another region within two years after a job loss is higher at ~7.1%. An unconditional relationship indicates an approximately 120% increase in the probability of moving after

[10] At time *b-1* annual earnings include only salary, as we have defined that displaced workers and the control group do not include self-employed persons or entrepreneurs. At time *b+2* displaced workers or workers in the control group may have nevertheless switched into self-employment.

experiencing displacement. Huttunen et al. (2018) found a smaller unconditional increase in the probability of moving after displacement using Norwegian data (~50%).

We find that workers who work in plants that are downsizing or closing down within one year earn approximately 10% less annually. However, this discrepancy in annual wages is explained by the fact that workers work less in the treatment group. Usually, the adjustment to new economic circumstances in the Finnish setting occurs at the labor supply margin rather than through wage adjustment (e.g., Pehkonen 2000). In fact, the monthly wages (annual wages / employment months) are higher in the treatment group compared to the control group at the year *b-1* of ~10%. The plants that are downsizing or closing down their business within one year are smaller and they have weaker turnover compared to the plants in the control group (see, also, Abowd, McKinney and Vilhuber 2009, Carneiro and Portugal 2010). This provides a central motivation to control for the pre-displacement plant characteristics in the model to make the individuals more comparable in both the control and treatment groups. The table shows that stayers and movers differ in terms of many of their characteristics. For example, movers are younger and more educated, but their pre-displacement earnings (both annual and monthly) are lower. Unsurprisingly, a higher share of stayers had a family member living in the same home location compared to movers.

The results show that the non-displaced workers are generally better off at time *b+2* compared to displaced workers. For example, a higher share of them are employed and they also earn more. However, non-displaced movers seem to have a weaker labor market position at time *b+2* compared to non-displaced stayers. They are less likely to be employed and they earn 6-12% less. Notably, non-displaced movers earned less already

at year *b-1*.[11] There are no similar significant differences in the post-displacement labor market outcomes between movers and stayers in the treatment group at the aggregate level, especially for men. For women, we find that a higher share of displaced movers than stayers are students or out of the labor force at *b+2*.

[Table 2 in here]

Table 3 provides a dynamic picture of migration flows using a matrix that cross-classifies the sub-regions where people live at two points in time, denoted by *b-1* and *b+2*. Panel A of Table 3 illustrates the situation for non-displaced workers and Panel B describes the corresponding situation for displaced workers. We first divide the sub-regions into three mutually exclusive large areas using information on capital centers of NUTS 3-level regions: the Helsinki center, other university centers and other centers of Finland. Two important empirical patterns stand out. First, non-displaced movers are more likely to migrate to some other small sub-region compared to displaced movers. Second, migration flows to other university centers are larger for the subset of displaced workers.

Table 4 reports the means of key regional characteristics (i.e., the unemployment rate, the average wage and housing price levels, and turnover rate) for displaced and non-displaced movers in the years *b-1* and *b+2*. We find that non-displaced movers tend to migrate to regions with lower unemployment rates, higher expected wages and housing price levels, and higher housing liquidity. Therefore, non-displaced movers tend to

[11] The main conclusion remains intact also when the education level and the structure of households are fully accounted for. The negative relationship between moving and the labor market outcomes among the group of non-displaced workers is likely to be explained by the migration flows to more rural areas (cf. Huttunen et al., 2018).

respond significantly to economic incentives. By contrast, displaced movers tend to migrate to regions with lower expected wage levels and higher housing price levels. The unemployment rate and housing liquidity do not differ statistically significantly between the regions before and after migration. Table A1 of the Appendix documents the means of regional characteristics by displaced and non-displaced movers and by the direction of regional mobility between university centers and other centers. These additional results confirm that non-displaced movers are more likely to migrate to regions that have higher expected wages (and housing price levels and housing liquidity) and lower unemployment rates, whether they move from a university center to another university center, or if they move from a smaller non-university center to another smaller non-university center. By contrast, we find that displaced movers are more likely to migrate to regions that do not have similar significant advantages in terms of unemployment conditions, housing liquidity, or expected wages.

[Tables 3-4 in here]

3. EMPIRICAL ANALYSIS

3.1. Specifications

We adopt and modify the model in Huttunen et al. (2018) and examine the effect of exogenous job loss on regional mobility using the following empirical specification:

$$M_{i(b-1)+3} = \alpha Displacement_{ib} + \beta' X_{i(b-1)} + \delta' Plant_{(b-1)} + \vartheta Family\ location_{i(b-1)} + \mu' Region_{(b-1)} + \epsilon_{ib}\ , \quad (1)$$

where $M_{i(b-1)+3}$ is a dummy variable indicating whether an individual *i* has moved to a new location by the end of three years after the pre-base year *b-1*.[12] $Displacement_{ib}$ is a dummy variable indicating whether an individual was displaced from a job at year *b*. $X_{i(b-1)}$ is a vector of individual control variables measured at year *b-1*.[13] The controls include the previous regional mobility pattern (five categories: 1 = has not migrated before, 2 = has migrated once before,…,5 = has migrated at least four times before), age, gender, education level (five categories: 1 = primary education, 2 = secondary education, 3 = lowest level tertiary education, 4 = lower degree level tertiary education, 5 = upper degree level tertiary education), marital status, having children (two categories: children under 7 years old and school-age children) and an indicator for home ownership. Accordingly, pre-displacement earnings are included in the model as an additional control for skills that are not captured by formal education (e.g., Boman, 2011).

$Plant_{(b-1)}$ stands for the pre-displacement plant characteristics, including the size of a plant, the logarithm of turnover and a full set of industry dummies. $Family\ location_{i(b-1)}$ stands for a measure of social capital and family connections. The data have information on the location of the father, mother and all siblings. We set the indicator variable to be one if at least one family member lives in the same pre-displacement region.[14] $Region_{(b-1)}$ stands for region-specific characteristics at the year

[12] We set the "home-location" region at the year *b-1* because displaced workers may have moved to another location by the end of year *b*.

[13] Huttunen et al. (2018) measure individual controls at the year *b* but also include earnings and employment history at the year *b-5* in the model.

[14] Approximately 18% of observations did not have information on any family member. This means that they have no siblings, and/or their parents are over 70 years old or already passed way. We simply treated these observations as not having a family member living in the same region. We also re-ran all the models

b-1, including the unemployment rate and housing liquidity, measured by the turnover rate (sales per housing stock) at the NUTS 4-level.[15]

Finally, we add control variables in the vector $Region_{(b-1)}$ that describe the expected differentials in the cost of housing and earnings between the home-location and other large macro-areas (cf. Cannari et al. 2000). To this end, we divide Finland into two areas according to 18 capital centers of NUTS 3-level regions: UC (University centers) and other centers. $HPD^{UC}_{(b-1)}$ is the relative price of houses in the home-location and a large macro-area UC. For expected wage differentials, we create $WD^{UC}_{(b-1)}$, which is the relative aggregate earnings in the home-location and the large macro-area UC. The housing prices and aggregate wage level are measured in *b-1*.

In the second part of our analysis, we examine the relationship between migration and future earnings. We follow Boman (2011) and examine both the short-term and long-term effects of migration using the following specification:

$$\log(wages)_{itd} = \alpha' M_{itd} + \beta' X_{itd} + \gamma wages_{i(b-1)d} + \delta' Plant_{(b-1)d} + \vartheta Family\ location_{i(b-1)d} + \epsilon_{itd} \quad (2)$$

$\log(wages)$ is the logarithm of the annual earnings of individual *i* at the year *t* for the group of displaced workers *d*. M_{itd} is the categorical variable representing the year since post-displacement migration. The variable obtains 17 categories: stayer (no migration), 1

for the sub-group of people for which we had information on some family member. The results were similar to the ones that are reported in this paper.

[15] This information is provided by Statistics Finland. See also Oikarinen (2012), who used sales volume as a proxy variable for housing liquidity in a setting using data from Finland.

year since migration,…,16 years since migration. The group of stayers is used as the reference category. X_{itd} is the vector of other explanatory variables at the year *t*. The explanatory variables include age, gender, education level, marital status, having small and school-age children, home ownership and year dummies. $Family\ location_{i(b-1)d}$ stands for a family member living in the same pre-displacement region. This constitutes a useful control variable because people may use close family ties to find a new job, for example, after experiencing involuntary job loss. $Plant_{(b-1)d}$ stands for plant characteristics, $wages_{i(b-1)d}$ stands for pre-displacement wages, and ϵ_{itd} is an error term. Equation (2) is estimated by OLS (Ordinary Least Squares) and the standard errors are clustered at the NUTS 4-level. We also examine the relationship between migration and employment. The model is similar to (2), except that we replace the dependent variable with an indicator for being employed.

3.2. The effect of involuntary job loss on migration decisions

Table 5 reports the marginal effects of displacement and other background characteristics on regional mobility for the total sample and for men and women separately. The displaced workers have a 2.3 percentage point higher probability of living in another region two years after the base year compared to the control group. The aggregate results in Table 2 showed that an average non-displaced worker had a 3.2% probability of moving to another region within two years after the base year *b*. Thus, the estimates represent a sizeable increase in the migration probability of ~70%. Huttunen et al. (2018) identified a smaller increase in the moving probability of ~30% for both genders.

The estimates for the individual background characteristics are in accordance with the expected effects. The results show that those persons who have moved to another

location earlier have a higher probability of moving again. Age is negatively associated and education is positively associated with regional mobility. The estimates for 'family ties' also confirm the well-known stylized facts according to which married individuals and those who have school-age children generally have a lower propensity to move to another location. For example, married individuals have an ~1.0%-point lower probability to move compared to non-married individuals. Having school-age children decreases this probability by 1.3% points. These results are in accordance with the patterns documented in Nivalainen (2005) and Huttunen et al. (2018).

As expected, being a homeowner is negatively related to the propensity to move, while higher housing liquidity increases the propensity to move (e.g., Head and Lloyd-Ellis 2012). However, the marginal effect of turnover rate is statistically significant only for women. The lower expected wage in some large, potential destination region of migration decreases the propensity to move. Finally, a close family member living in the same home location is negatively related to a person's propensity to migrate by ~2.2% points. The marginal effect of the expected housing price differential is negative; this result was not expected based on the earlier literature. The higher housing prices in the home location may be correlated with some positive regional amenities, such as efficient labor market matching. Although we control for the pre-displacement regional unemployment rate in the model, it is possible that there are unobserved regional characteristics that correlate with the housing prices and labor market prospects.

We next investigate how the effect of displacement on migration decisions varies with social capital, housing characteristics and expected wage differentials. To this end, we have estimated average marginal effects (AMEs), conditional on displacement, for every (discrete) combination of a family member living in the same region and home ownership. For the continuous variables, we have estimated the marginal effects at the

different percentiles of the distribution. Tables 6 and 7 report the results for the most important variables by gender.

The results show that conditional on displacement, men with a family member living in the same region at *b-1* have a 1.7%-point lower probability of moving compared to those men who have no such social capital in the pre-displacement region. The similar marginal effect for women stands at -1.2% points. Because an average displaced worker who did not have a family member living in the same pre-displacement region had an ~10% probability of moving to another region within two years after the base year *b* (Table 2), the marginal effects represent a decrease in the migration probability of 17% for men and 12% for women, respectively.

Among the displaced workers, homeowners are also significantly less likely to move compared to tenants (2.0% points). We do not find such variability in the marginal effects across the housing liquidity distribution. The marginal effects for displaced workers were also estimated at the 10th and 90th percentiles of the housing liquidity distribution. There is some evidence that if the expected housing prices are lower in the current location compared to some larger university center, the propensity to move is higher. This result is not consistent with the expected effects, but as discussed earlier, housing prices are likely to be a proxy for positive local amenities that are potentially negatively related to the migration decision. Finally, displaced workers are somewhat less likely to move from their pre-displacement home location if their expected wages are higher there.

3.3. Additional aspects

We extend the analysis on the effect of involuntary job loss on other labor market outcomes. Table A2 in the Appendix reports the marginal effects of displacement on log annual earnings and employment two years after the base year *b*. These results confirm the earlier findings, indicating that displaced workers earn less, and they also have weaker labor market attachment two years after the base year compared to the non-displaced workers. For example, displaced male (female) workers have an 8 (11) percentage point lower probability of being employed compared to non-displaced workers. The negative earnings effect of involuntary job loss is ~40% for both genders two years after the base year *b*.

We also analyzed the relationship between the duration of unemployment and regional mobility. We measured duration as the years of the involuntary unemployment spell at the time of potential regional mobility. These results show that the duration of unemployment decreases the propensity to move for women (Table A3 in the Appendix). For men, the marginal effect is not statistically significant at the conventional levels. Overall, evidence indicates that involuntary unemployment is positively related to regional mobility but that the increased duration of unemployment may decrease the migration decision for women. This indicates that women in particular may have stronger incentives to move right after a job loss in order to adjust to new economic circumstances.

3.4. Migration and subsequent labor market outcomes among displaced workers

The estimates from the earnings model with the 95% confidence intervals are presented in Figure 4 for men and in Figure 5 for women. The annual earnings from the FLEED are used as the main outcome variable. The measure includes wage and salary earnings and self-employed income. The standard errors are clustered at the NUTS4 regional level.[16] The results show that migration is negatively related to earnings one to two years after migration for both genders. Interestingly, the estimated negative relationship diminishes as time passes and eventually becomes positive, particularly among men. The estimates suggest an annual earnings premium for men of ~20% eight to ten years after migration. As seen from the figures, the estimates become less precise as time passes because the number of observations decreases in these cells.

As a test of robustness, alternative measures for labor market outcomes are considered. We first used the monthly earnings as an alternative outcome variable, because the association between migration and future earnings may be due to the differences in labor market attachment instead of greater earnings per unit of labor supplied. Thus, all individuals with zero employment months per year were excluded from the sample. The estimates reveal that migration has an immediate negative effect on monthly earnings of ~4-12% that persists for two years for men and four years for women. In accordance with the previous results, the estimates become statistically insignificant

[16] For brevity, the estimates for other control variables are not reported in tables, but all the coefficients obtain the expected signs. For example, education and a higher pre-displacement wage level are positively related to earnings for both genders and being married and having children are positively (negatively) associated with earnings for men (women). The number of observations was 343,460 for males and 200,169 for females.

for both genders as time passes and turn positive for men.[17] Our results are in line with Boman (2011), who found using Swedish data that migration is positively related to men's subsequent earnings and negatively related to women's earnings. Fackler and Rippe (2016) used a sample of displaced workers in Germany and found that there were no statistically significant earning losses for displaced movers compared to stayers.

We tested the sensitivity of our earnings results for the decision to move based on social capital. To this end, we divided the control group for sub-groups of people who either moved to a location where some of their family members already lived or moved to a location where none of their family members lived. The estimates from the earnings regression did not show a positive effect of migration on men's earnings in the long run. The results were robust for women.

As an alternative measure for labor market success, we used employment as the dependent variable. The results for men and women are documented in Figures 6-7, respectively. The results show a significant positive association between migration following an involuntary job loss and employment for both genders. This relationship is persistent in the long run.

[Figures 4-7 in here]

[17] The robustness tests using hourly wages from the HSWW data are in line with our main results (not reported in tables).

4. CONCLUSIONS

In this paper, we examined the fundamental factors that might facilitate the flexibility of labor markets in the European context. We used comprehensive linked plant-worker panel data to examine the effect of involuntary job losses measured using plant closures or mass layoffs on regional mobility patterns. Furthermore, we investigated whether displaced movers obtain earnings and employment gains compared to displaced stayers.

The standard economic theory asserts that economic incentives determine the migration decision. Thus, individuals should migrate from high unemployment regions to low unemployment regions if they lose their job in the home region. However, a complete behavioral model describing the unemployed and subsequent choices following a job displacement might not match the predictions of the simple economic theory. The key factors that potentially lead to deviations from the standard economic theory are labor market frictions.

We found mixed evidence concerning whether the unemployed make choices that are consistent with the standard economic model. We found that the unemployed are slightly more prone to migrate than the employed. Additionally, experiencing displacement increases the probability of migration significantly, i.e., the migration probability increases by ~70% as a response to job displacement. We also documented that the duration of unemployment is negatively related to the migration probability for women, which suggests that women may have stronger incentives to migrate immediately after an exogenous job loss to adjust to new economic circumstances.

In conclusion, individuals appear to respond to economic incentives to migrate across regions, although at the same time, some of them reside in regions with high average unemployment. Thus, frictions that prevent migration are relevant in the

European context. These frictions are likely to related to the housing market not functioning properly or to the unemployed having a strong preference to remain where they reside. For example, many of them reside in regions in which they have social connections within the family. Another possible explanation is based on the earnings trajectories right after the migration, which showed negative development for a few years after the migration. Thus, at least for some migrants, there could be substantial income risks associated with migration, and combining these risks with high housing prices, for example, in the capital region, would substantially reduce the economic incentives to migrate. In contrast, we found that the link between migration and long-term employment is positive and persistent for both genders. Thus, the results reveal that migration that follows a job loss is related to increased labor market attachment rather than greater earnings per unit of labor supplied, at least for women. The results covering the period after the global financial crisis reveal additional insights. We document a significant return migration trend.

Our results connect regional unemployment and the internal restructuring of regional labor markets due to the out-migration and in-migration rates. High unemployment increases the mobility of the working-age population of a region. Out-migration is alleviated if internal labor markets are dynamic, that is, job and worker flows at the plant level are frequent. However, the internal restructuring of regional labor markets cannot completely offset the pushing effect of high unemployment. The results suggest that labor market frictions could be attenuated by effective labor market policy that enhances internal migration. Migration that follows unemployment is positively related to long-term employment. The earnings development of movers is not beneficial right after the migration, but turns positive, especially for males, as time passes. Therefore, it would be important to promote more affordable housing options in areas

with better job opportunities, thereby also making migration an economically more feasible option for the displaced workers. The results also reveal that social connections with the family are a predictor of the propensity to move (or not to move) to another location. It is more challenging for public policy to influence non-economic incentives to migrate.

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Figures and tables

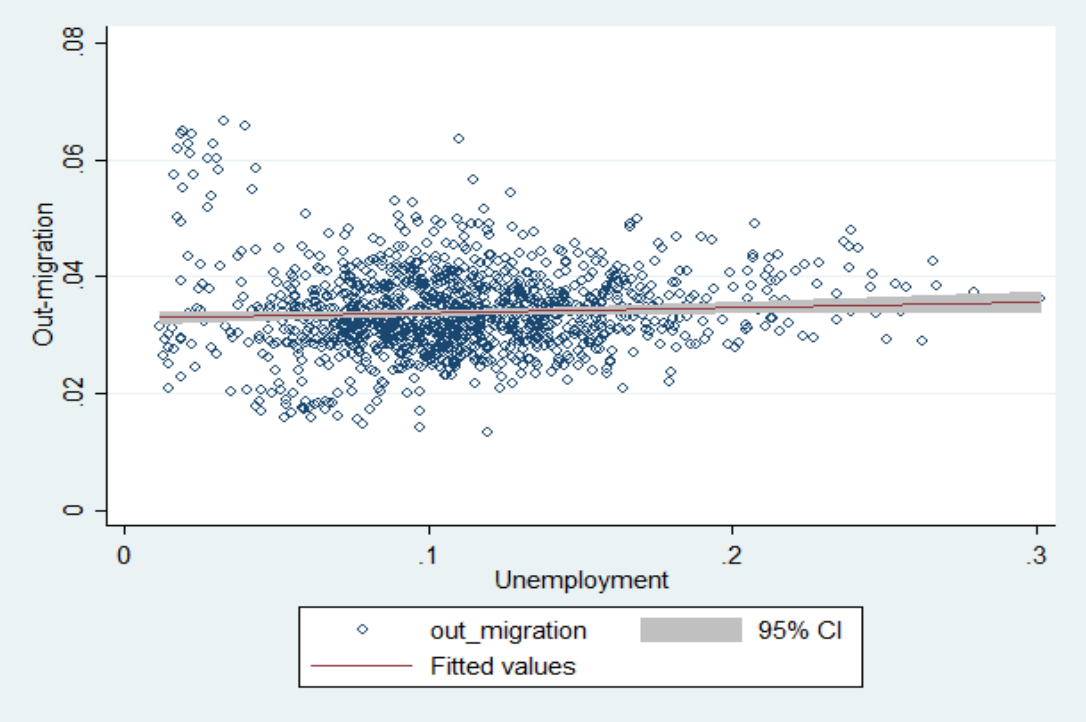

Figure 1. Out-migration rate and unemployment by using region-year observations over the period 1996-2013

Figure 2. In-migration rate and unemployment by using region-year observations over the period 1996-2013

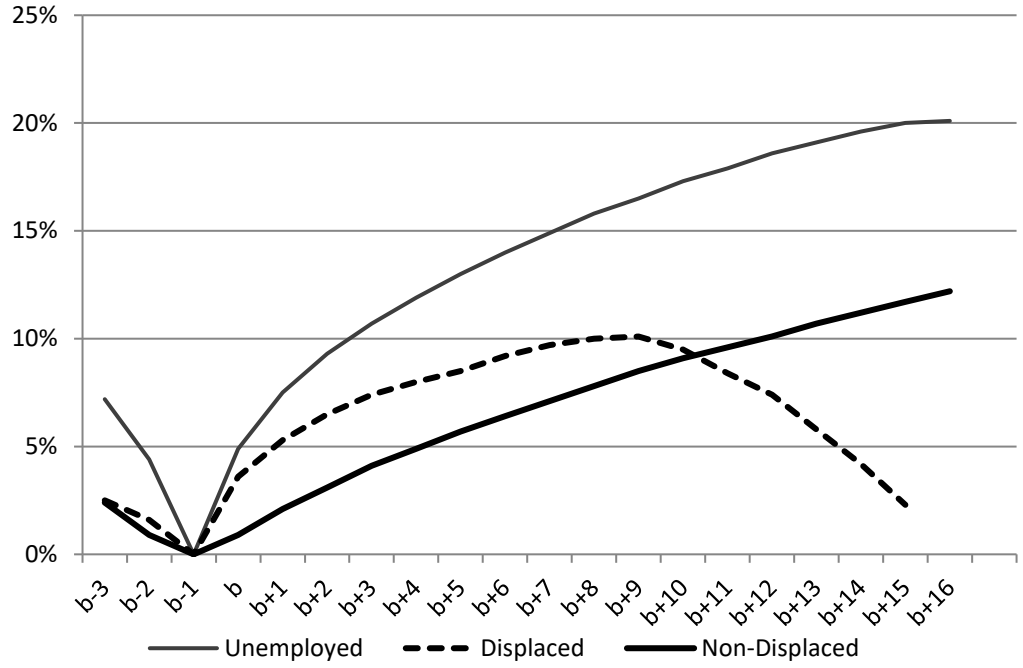

Figure 3. The fraction of people living in different NUTS 4-level region than in b-1

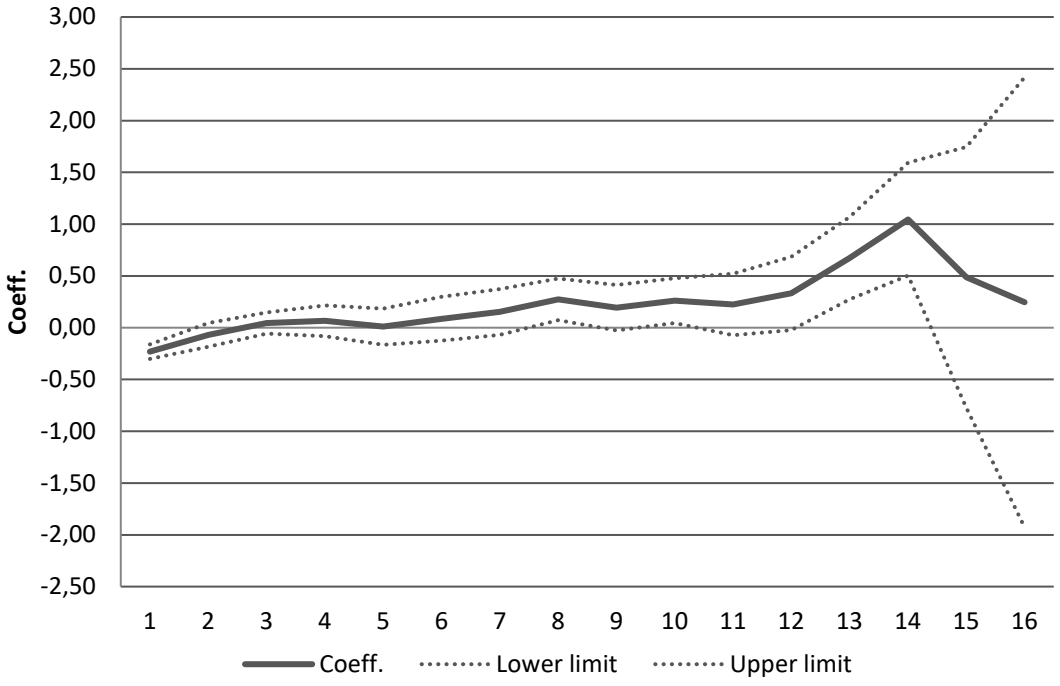

Figure 4. The coefficients for annual wages after migration following an exogenous job loss for men. The dashed lines indicate the 95% confidence intervals

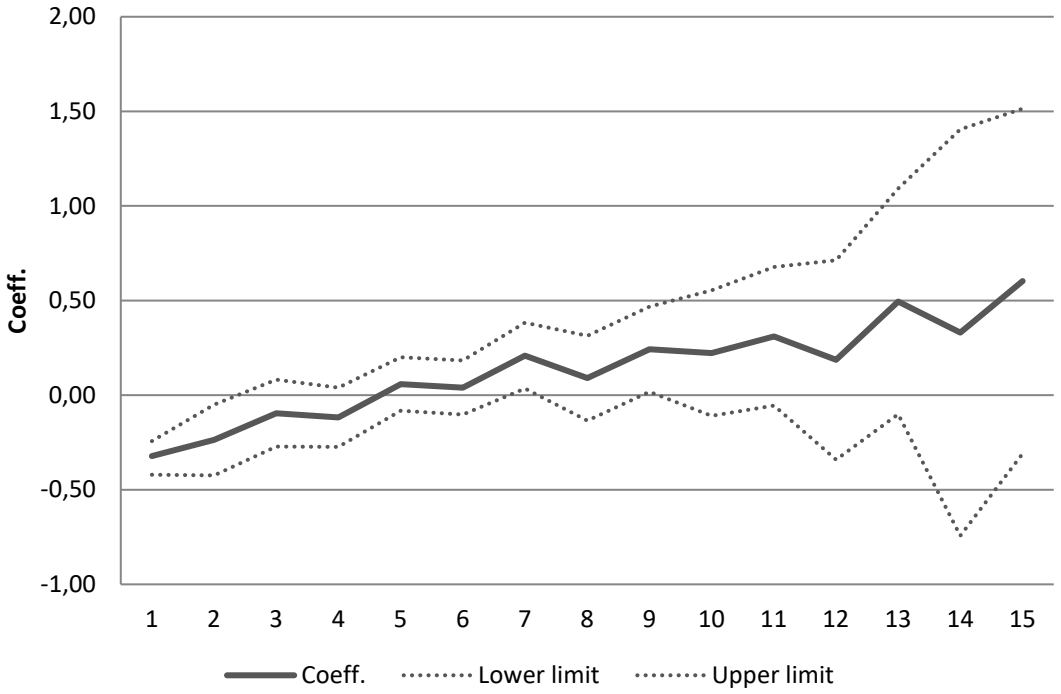

Figure 5. The coefficients for annual wages after migration following an exogenous job loss for women. The dashed lines indicate the 95% confidence intervals

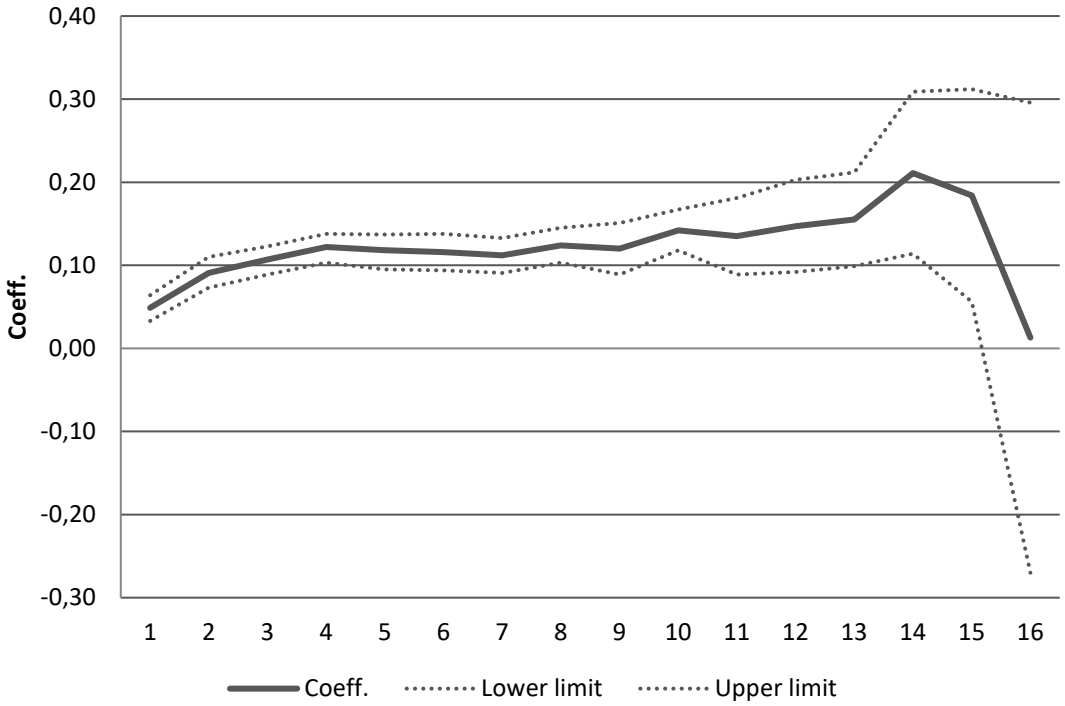

Figure 6. Employment probability after migration following an exogenous job loss for men. The dashed lines indicate the 95% confidence intervals

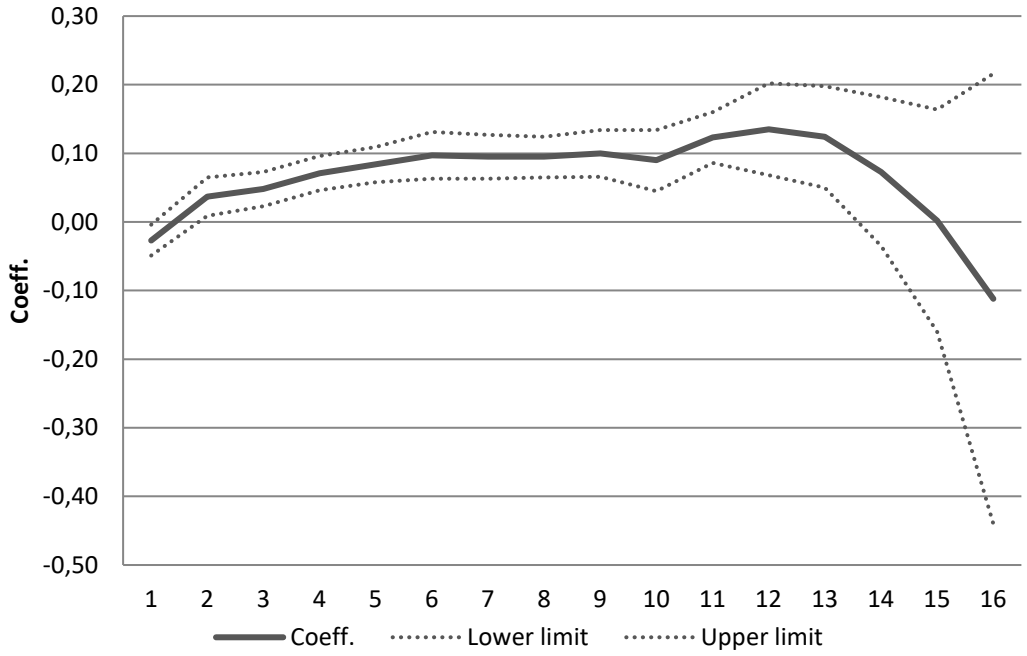

Figure 7. Employment probability after migration following an exogenous job loss for women. The dashed lines indicate the 95% confidence intervals

Table 1. The magnitude of inter-regional mobility at the NUTS 4-level over the period 1995-2014

	Total sample	At least one unemployment spell	At least one unemployment spell due to displacement
NUTS 4-level			
Share of regional moves			
None	80.3 %	72.4 %	76.3 %
One	11.8 %	14.8 %	13.8 %
Two	5.2 %	7.9 %	6.5 %
Three	1.7 %	2.9 %	2.1 %
Four or more	1.0 %	2.2 %	1.3 %
Number of individuals	3,503,186	794,236	156,670

Table 2. Sample means of selected pre- and post-displacement characteristics

	Displaced		Non-Displaced	
Men	Stayers	Movers	Stayers	Movers
Establishment characteristics				
Size (b-1)	234	269	352	343
Log turnover (b-1)	16.2	16.2	16.8	16.7
Worker characteristics				
Relative in region (b-1)	0.57	0.36	0.57	0.37
Age (b-1)	39.2	35.0	39.1	34.6
Education years (b-1)	12.2	12.5	12.6	13.0
Annual wages (b-1)	39 514 €	36 521 €	43 870 €	41 660 €
Monthly wages (b-1)	4 042 €	3 896 €	3 700 €	3 517 €
Annual wages (b+2)	30 705 €	30 011 €	46 239 €	43 230 €
Wage earner (b+2)	0.70	0.70	0.95	0.88
Self-employed (b+2)	0.05	0.05	0.01	0.02
Unemployed (b+2)	0.19	0.17	0.03	0.07
Student (b+2)	0.04	0.06	0.005	0.02
Out of labor force (b+2)	0.02	0.02	0.005	0.01
Relative in region (b+2)	0.56	0.25	0.55	0.26
N	43,224	3,349	3,614,835	118,056
	Displaced		Non-Displaced	
Women	Stayers	Movers	Stayers	Movers
Establishment characteristics				
Size (b-1)	248	272	318	341
Log turnover (b-1)	16.2	16.1	16.6	16.5
Worker characteristics				
Relative in same region (b-1)	0.53	0.34	0.52	0.36
Age (b-1)	39.2	35.5	39.5	34.5
Education years (b-1)	12.4	12.8	12.8	13.3
Annual wages (b-1)	27 814 €	26 301 €	32 202 €	30 674 €
Monthly wages (b-1)	3 075 €	3 038 €	2 727 €	2 614 €
Annual wages (b+2)	21 770 €	20 901 €	33 425 €	29 264 €
Wage earner (b+2)	0.65	0.63	0.93	0.81
Self-employed (b+2)	0.03	0.04	0.01	0.02
Unemployed (b+2)	0.19	0.16	0.03	0.09
Student (b+2)	0.08	0.10	0.01	0.04
Out of labor force (b+2)	0.05	0.07	0.02	0.04
Relative in region (b+2)	0.53	0.26	0.51	0.25
N	24,154	1,816	1,821,761	59,640

Notes: Stayers and movers are defined as persons who have either stayed within the same NUTS 4-level region or moved between the NUTS 4-level regions during the periods (b-1) and (b+2).

Table 3. Transition matrix of regional mobility

		Year b+2		
		Helsinki region	Other Un. region	Other region
Panel A: Non-displaced				
Year b-1	Helsinki region	0	24.9%	75.1%
	Other Un. region	23.7%	13.4%	62.9%
	Other region	20.2%	28.3%	51.5%
		Helsinki region	Other Un. region	Other region
Panel B: Displaced				
Year b-1	Helsinki region	0	29.2%	70.8%
	Other Un. region	25.1%	15.8%	59.1%
	Other region	19.3%	29.7%	51.0%

Table 4. Means of region specific characteristics

	Non-displaced			Displaced		
	b-1	*b+2*	*t-test*	*b-1*	*b+2*	*t-test*
Unemployment rate	10.5%	10.1%	37.03	10.3%	10.3%	0.44
Average wage level	30 754 €	31 021€	19.63	31 231 €	31 045€	2.40
Housing price level	1 217 €	1 353 €	92.50	1 278 €	1 404 €	14.77
Turnover rate	0.043	0.044	5.15	0.044	0.044	0.86

Table 5. Displacement and regional mobility

	Total sample	Men	Women
Displacement	0.023 ***	0.024***	0.022***
	(0.001)	(0.002)	(0.002)
Education level			
Secondary educ.	0.001	-0.002 **	0.006 ***
	(0.001)	(0.001)	(0.001)
Lowest level tertiary educ.	0.004 ***	0.002	0.007 ***
	(0.001)	(0.001)	(0.001)
Lower tertiary educ.	0.005 ***	0.004 ***	0.008 ***
	(0.001)	(0.001)	(0.002)
Upper tertiary educ.	0.007 ***	0.007 ***	0.007 ***
	(0.001)	(0.001)	(0.002)
Female	0.000		
	(0.001)		
Age	-0.002 ***	-0.002 ***	-0.002 ***
	(0.000)	(0.000)	(0.000)
Married	-0.010 ***	-0.009 ***	-0.013 ***
	(0.001)	(0.001)	(0.001)
Children < 7 years old	-0.003 ***	-0.004 ***	-0.001
	(0.001)	(0.001)	(0.001)
Children 7-18 years old	-0.013 ***	-0.013 ***	-0.014 ***
	(0.001)	(0.001)	(0.001)
Previous migration pattern			
Once before	0.025 ***	0.026 ***	0.023 ***
	(0.001)	(0.001)	(0.001)
Twice before	0.027 ***	0.029 ***	0.023 ***
	(0.001)	(0.001)	(0.002)
Three times before	0.038 ***	0.039 ***	0.034 ***
	(0.002)	(0.002)	(0.003)
At least three times before	0.041 ***	0.039 ***	0.046 ***
	(0.003)	(0.004)	(0.005)
Housing characteristics			
Homeowner	-0.016 ***	-0.015 ***	-0.017 ***
	(0.001)	(0.001)	(0.001)
Housing liquidity	0.032 **	0.012	0.066 ***
	(0.013)	(0.016)	(0.0123)
HPD^{UC}	-0.022 ***	-0.021 ***	-0.025 ***
	(0.002)	(0.003)	(0.004)
Expected relative wages			
WD^{UC}	-0.041 ***	-0.039 ***	-0.043 ***
	(0.005)	(0.006)	(0.010)
Family member in region	-0.022 ***	-0.022 ***	-0.020 ***
	(0.001)	(0.001)	(0.001)
Plant characteristics	Yes	Yes	Yes
Year dummies and unemp.rate	Yes	Yes	Yes
Number of obs.	5,694,580	3,787,500	1,907,080

Notes: *** and ** denote statistical significances at least at the 1% and 5% levels. All independent variables are measured during year *b-1*, except Displacement dummy and year dummies.

Table 6. Heterogeneity of displacement on regional mobility, men

	(1)	(2)	(3)	(4)	(5)
Displacement	0.024 ***	0.024***	0.024 ***	0.024 ***	0.024 ***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Disp. and relative in region	-0.017 ***				
	(0.001)				
Disp. and home owner		-0.020 ***			
		(0.002)			
Disp. and housing liquidity					
HL 25p (at HL = 0.016)			0.024 ***		
			(0.003)		
HL 50p (at HL = 0.041)			0.024 ***		
			(0.003)		
HL 75p (at HL = 0.058)			0.024 ***		
			(0.003)		
Disp. and HPD^{UC}					
HPD 25p (at HPD = 0.715)				0.026 ***	
				(0.002)	
HPD 50p (at HPD = 0.894)				0.023 ***	
				(0.002)	
HPD 75p (at HPD = 1.023)				0.021 ***	
				(0.002)	
Disp. and WD^{UC}					
WD 25p (at WD = 0.854)					0.025 ***
					(0.002)
WD 50P (at WD = 0.908)					0.024 ***
					(0.002)
WD 75p (at WD = 1.073)					0.021 ***
					(0.002)
Other individual characteristics	Yes	Yes	Yes	Yes	Yes
Plant characteristics	Yes	Yes	Yes	Yes	Yes
Year dummies and unemp.rate	Yes	Yes	Yes	Yes	Yes
Number of obs.	3,787,500	3,787,500	3,787,500	3,787,500	3,787,500

Notes: *** and ** denote statistical significances at least at the 1% and 5% levels. All independent variables are measured during year *b-1*, except Displacement dummy and year dummies.

Table 7. Heterogeneity of displacement on regional mobility, women

	(1)	(2)	(3)	(4)	(5)
Displacement	0.022 ***	0.022***	0.023 ***	0.022 ***	0.022 ***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Disp. and relative in region	-0.012 ***				
	(0.001)				
Disp. and home owner		-0.019 ***			
		(0.002)			
Disp. and housing liquidity					
HL 25p (at HL = 0.016)			0.021 ***		
			(0.002)		
HL 50p (at HL = 0.041)			0.022 ***		
			(0.002)		
HL 75p (at HL = 0.058)			0.023 ***		
			(0.003)		
Disp. and HPD^{UC}					
HPD 25p (at HPD = 0.729)				0.024 ***	
				(0.003)	
HPD 50p (at HPD = 0.901)				0.021 ***	
				(0.002)	
HPD 75p (at HPD = 1.033)				0.019 ***	
				(0.002)	
Disp. and WD^{UC}					
WD 25p (at WD = 0.856)					0.023 ***
					(0.003)
WD 50P (at WD = 0.910)					0.022 ***
					(0.003)
WD 75p (at WD = 1.074)					0.020 ***
					(0.002)
Other individual characteristics	Yes	Yes	Yes	Yes	Yes
Plant characteristics	Yes	Yes	Yes	Yes	Yes
Year dummies and unemp.rate	Yes	Yes	Yes	Yes	Yes
Number of obs.	1,907,080	1,907,080	1,907,080	1,907,080	1,907,080

Notes: *** and ** denote statistical significances at least at the 1% and 5% levels. All independent variables are measured during year *b-1*, except Displacement dummy and year dummies.

ONLINE SUPPLEMENTARY APPENDIX

Table A1. Means of region specific characteristics by the direction of regional mobility

	Non-displaced			Displaced		
	b-1	*b+2*	*t-test*	*b-1*	*b+2*	*t-test*
Un.centre → Un.centre						
Unemployment rate	9.6%	9.3%	14.28	9.2%	9.3%	0.70
Average wage level	32 453 €	33 007€	16.41	32 923 €	33 138€	1.22
Housing price level	1 457 €	1 684 €	70.19	1 520 €	1 743 €	13.63
Turnover rate	0.048	0.047	6.13	0.048	0.047	0.79
Un.centre → Other centre						
Unemployment rate	9.0%	10.5%	85.26	8.6%	10.9%	21.81
Average wage level	33 293 €	29 984€	156.20	33 709 €	29 697€	34.39
Housing price level	1 471 €	1 180 €	130.22	1 534 €	1 170 €	29.76
Turnover rate	0.041	0.043	11.40	0.042	0.042	0.65
Other centre → Un.centre						
Unemployment rate	11.8%	9.2%	113.90	11.6%	9.3%	17.46
Average wage level	28 829 €	33 073€	175.66	29 394 €	33 192€	27.24
Housing price level	1 003 €	1 652 €	279.90	1 058 €	1 748 €	53.82
Turnover rate	0.044	0.046	13.09	0.045	0.046	1.06
Other centre → Other centre						
Unemployment rate	11.8%	10.9%	34.27	11.7%	11.2%	3.25
Average wage level	28 517 €	29 250€	35.38	28 975 €	29 209€	1.97
Housing price level	976 €	1 098 €	55.70	1 033 €	1 130 €	7.59
Turnover rate	0.043	0.041	14.67	0.043	0.041	3.79

Table A2. Job displacement effect on labor market adjustment two years after displacement

	Employment (= 1)	Annual wages (log)
Men		
Displacement	-0.080 ***	-0.342 ***
	(0.002)	(0.007)
Other controls	Yes	Yes
N. of obs.	3,779,350	3,596,000
Women		
Displacement	-0.113 ***	-0.376 ***
	(0.003)	(0.014)
Other controls	Yes	Yes
N. of obs.	1,910,900	1,777,220

Notes: *** denotes statistical significance at least at the 1% level. Other controls include previous migration pattern, age, education level, marital status, having children, home ownership, relative living in a pre-displacement region, regional differences in housing prices and expected income and housing liquidity and year dummies

Table A3. Duration of unemployment and regional mobility

	Men	Women
Duration	-0.0001	-0.0004 **
	(0.0001)	(0.0001)
Other controls	Yes	Yes
N. of obs.	263,562	305,844

Notes: *** denotes statistical significance at least at the 1% level. Other controls include previous migration pattern, age, education level, marital status, having children, home ownership, relative living in a pre-displacement region, regional differences in housing prices and expected income and housing liquidity and year dummies