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## Losing work, moving away? Regional mobility after job loss

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 Losing Work, Moving Away? Regional Mobility After Job Loss

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## Losing Work, Moving Away? Regional Mobility After Job Loss\*

### Abstract

Using German survey data, we investigate the relationship between involuntary job loss and regional mobility. Our results show that job loss has a strong positive effect on the propensity to relocate. We also analyze whether the high and persistent earnings losses of displaced workers can in part be explained by limited regional mobility. Our findings do not support this conjecture as we find substantial long lasting earnings losses for both movers and stayers. In the short run, movers even face slightly higher losses, but the differences between the two groups of displaced workers are never statistically significant. This challenges whether migration is a beneficial strategy in case of involuntary job loss.

*Keywords: : job displacement, plant closure, regional mobility, earnings, SOEP*

*JEL Classification: J61, J63*

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## 1. Introduction

A large body of literature reveals that workers who lose their jobs involuntarily, e.g., due to plant closures or mass layoffs, suffer from severe and long-lasting negative consequences of this event, both in monetary and non-monetary terms. Besides substantial and persistent earnings losses (see, e.g., Jacobson et al. 1993 or Couch and Placzek 2010 for the US, Hijzen et al. 2010 for the UK, Huttunen et al. 2011 for Norway, Schmieder et al. 2010 for Germany) it has been shown, inter alia, that job displacement has negative impacts on affected workers' life-satisfaction (Kassenboehmer and Haisken-DeNew 2009) and health (Black et al. 2015), and even increases their mortality rates (Sullivan and von Wachter 2009).<sup>1</sup> Despite the considerable amount of knowledge regarding the consequences of job displacement, much less is known about the reasons for the large and persistent earnings losses (Carrington and Fallick 2014). One potential explanation is that displaced workers are not willing or unable to accept job offers in other regions although widening the geographic scope of the job search may increase both re-employment chances and wages. It can be expected that job offers arrive at a higher frequency and that the probability of finding a high paying job or a good match increases if displaced workers are willing to accept jobs in other regions as well.

Against this background, our paper contributes to the literature by shedding light on the relationship between involuntary job loss and regional mobility. In particular, we use German survey data to address the following research questions: First, does job loss increase the probability to relocate to a different region? And second, do displaced workers who relocate to another region after job loss have better labor market outcomes than those staying in the same area? To the best of our knowledge, the only study so far that links earnings losses of displaced workers and regional mobility conclusively has been conducted by Huttunen et al. (2015) for Norway. Certainly, several other studies (that will be outlined below) have investigated the relationship between regional mobility and employment outcomes after job loss. But these studies do not address the question whether limited regional mobility can serve as an explanation for the high and persistent earnings losses of displaced workers, since they lack a comparison with non-displaced workers

In their seminal analysis for Norway, Huttunen et al. (2015) find that regional mobility increases substantially after job displacement but at the same time, displaced workers who move to other regions after job loss have higher income losses than those staying in the same

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<sup>1</sup> Overviews of the job displacement literature are provided by Brand (2015) and von Wachter (2010), inter alia.

area. They further find that this unexpected result can be explained by non-economic reasons underlying displaced workers' mobility decisions. In particular, their findings indicate that displaced workers move to the proximity of family members or to rural areas. One potential explanation for the findings by Huttunen et al. (2015) is that the scope for improving individual labor market outcomes by relocating to another region is probably rather limited in Norway and that moves are therefore more likely to be motivated by non-economic factors, such as family ties. The reason for this conjecture is that Norway is characterized by comparably low disparities in regional labor market conditions. In Germany, by contrast, regional disparities are rather high and persistent. An OECD study for 26 countries shows that in 2003, Germany was among the three countries with the most pronounced disparities in regional unemployment rates whereas Norway was among the three countries with the least pronounced inequalities (OECD 2005). The comparably large disparities in Germany probably provide more scope for displaced workers to improve their labor market situation by relocating to another region. It is therefore highly interesting to see whether regional mobility comes along with better labor market outcomes of displaced workers or whether results for Germany, a large economy with pronounced differences in regional labor market conditions, resemble those for Norway.

Besides the study by Huttunen et al. (2015) several other studies on the determinants of regional mobility have dealt with the question whether involuntary job loss increases the probability to relocate. These studies typically find that unemployed individuals or those who recently lost their jobs are more likely to move to another region (see, e.g., DaVanzo 1978 for the US, Fischer et al. 2000 for Sweden, Hunt 2004 for West Germany, Gregg et al. 2004 for the UK). This suggests that job loss decreases the opportunity costs of relocation because it suddenly deteriorates economic opportunities in the current region. A second related stream of literature addresses the relationship between regional mobility and labor market outcomes of unemployed or displaced workers. Boman (2011), for example, analyzes the relationship between mobility and earnings after job loss for Sweden. He finds that post-displacement migration within the Swedish borders is associated with lower earnings in the short run, but these negative effects vanish after five or six years and become positive afterwards. Pekkala and Tervo (2002) investigate the effect of migration on re-employment probabilities of unemployed workers in Finland. Using an instrumental variables approach with local house prices and house owner status as instruments, they find that the relocation itself has negative effects on re-employment chances, at least in the short run, and that higher employment

probabilities of movers are caused by positive selection into migration. Opposite results are obtained by Goetz (2014) for the US. Applying an instrumental variables approach comparable to Pekkala and Tervo (2002) he finds that migration has a positive effect on re-employment probabilities. While these studies provide valuable insights into the effects of migration on employment outcomes of unemployed workers, they do not relate mobility decisions to the earnings losses of displaced workers compared to their non-displaced counterparts. Our study therefore investigates whether displaced movers have better labor market outcomes than displaced stayers compared to a control group of non-displaced workers. This will provide insights regarding the questions whether limited regional mobility can serve as an explanation for the high and persistent earnings losses of displaced workers in a major economy that is characterized by large disparities in regional labor market conditions.

For our empirical analysis, we make use of survey data from the German Socio-economic Panel (SOEP). Regarding the analysis of regional mobility, the SOEP offers two major advantages: First, it contains information on exact moving distances which allows us to derive more accurate measures of regional mobility, whereas other studies, such as Huttunen et al. (2015) or Hunt (2004) among others, had to rely on regional identifiers (i.e., labor market regions or administrative districts). Thus, crossing the border of a region is regarded as a move, even if someone just relocates to a neighboring village that is only few kilometers away and is therefore still working or searching for jobs in the same region as before. Hence, by making use of exact moving distances we are able to overcome this potential problem. Second, the SOEP includes rich information on family backgrounds and household characteristics. Both have appeared to be very important determinants of regional mobility decisions (e.g., Alesina et al. 2015, Dohmen 2005, Greenwood 1997, Rainer and Siedler 2009).<sup>2</sup>

Our results show that job loss has a strong positive effect on regional mobility. Regarding the question whether the high and persistent earnings losses of displaced workers can in part be explained by their limited regional mobility, our findings do not support this conjecture as we find substantial long lasting losses – both in terms of employment and wages – for movers and stayers. Employment outcomes seem to be even worse for movers than for stayers, at least in the short run, but the differences between the two groups of displaced workers are never statistically significant. Thus, our findings are quite similar to those by Huttunen et al.

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<sup>2</sup> Note that German administrative data, that are used inter alia by Schmieder et al. (2010) for the analysis of earnings losses of displaced workers, do not contain information on households and families.

(2015) and put into question whether relocation is a beneficial strategy regarding the labor market outcomes of displaced workers.

The remainder of the paper is organized as follows: In Section 2 we describe the data and the identification of job loss and regional mobility. Section 3 provides descriptive evidence on migration decisions and subsequent labor market outcomes. The econometric analysis of our research questions follows in Section 4, and Section 5 concludes.

## **2. Data**

The German Socio-economic Panel (SOEP) is a yearly household panel survey conducted since 1984. All members of a household aged at least 16 are included in the survey. Starting with a sample of around 6,000 households and 12,000 individuals in 1984, the latest available wave conducted in 2013 by now includes almost 30,000 individuals living in around 11,000 households. The data contain detailed information on socio-demographic characteristics of the respondents and their families as well as various job-related characteristics (see, e.g., Wagner et al. 2007 for more detailed information on the SOEP).

The SOEP provides information on whether a worker changed (or lost) his job in the one-year period between two interviews and respondents are asked how this job was terminated. We consider those workers as displaced who have lost their job due to firm closures and those who have been dismissed by their employers for other reasons.<sup>3</sup> Job displacement is often defined as an “involuntary separation based on operating decisions of the employer” (Farber 1999, p. 2445) implying that displaced workers are laid off due to reasons that are beyond their control and independent of their individual characteristics or performance. Accordingly, our definition of job displacement is broader as we also consider dismissed workers. However, this approach is in accordance with previous literature and corresponds to the definition of job displacement used in the Panel Study of Income Dynamics for the US, for example (see, e.g., Stevens 1997). Moreover, Grund (1999) finds no significant difference between post-displacement wages of workers losing their jobs due to either firm closure or dismissal in Germany.

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<sup>3</sup> Unfortunately, the SOEP does not allow to include “early leavers”, i.e., those who leave distressed firms because they anticipated the closure, as it is often done in studies that make use of linked employer-employee data (see, e.g., Schwerdt 2011, Huttunen et al. 2015).



We consider involuntary job losses occurring between 2001 and 2008 and follow each of these displacement cohorts up to 3 years prior to and 5 years after job loss. Earlier displacement cohorts are excluded because exact moving distances that are required for an accurate definition of regional mobility are not included in the SOEP waves prior to 2001. For each displacement cohort we construct a control group that consists of individuals who did not experience an involuntary job loss (due to plant closures or other dismissals) in the respective year. They are nonetheless allowed to terminate employment voluntarily (e.g. due to own resignation or mutual agreements).<sup>4</sup> The year in which the job loss was reported is denoted as base year  $t$  and all other survey waves are encoded relative to this base year. A job loss reported in the base year can hence be interpreted as a job loss occurring between the interview waves  $t-1$  and  $t$ .

Our sample is restricted to workers who fulfill several requirements in the year prior to displacement (i.e., in  $t-1$ ). To guarantee attachment to the labor force and to ensure that job loss affects not only secondary incomes, only workers who were full-time employed in  $t-1$  are included in the analysis. Every individual not employed, working only part-time, or being already retired in year  $t-1$  is eliminated both from the treatment and the control group, as well as everyone stating to be in education, military or community service, apprenticeship, civil service, or self-employment. Moreover, individuals younger than 25 before displacement are excluded as their moving behavior is supposed to depend on educational choices rather than on employment changes. Finally, everyone older than 55 is neglected, thereby minimizing the number of individuals who enter early retirement after losing their jobs. Subsequently, all displacement cohorts are pooled for further analysis. The treatment group consists of 1,576 workers facing involuntary job loss, while the number of individuals in the control group amounts to 37,110.

For the definition of regional mobility, we make use of exact moving distances that are provided in the SOEP since 2001.<sup>5</sup> For an accurate definition of mobility motivated by employment loss, the question arises how to determine a minimum moving distance. The aim of the distance measure is to include only those movers whose change of residence is accompanied by a change of the labor market region (Zax 1994). Therefore, information on

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<sup>4</sup> Individuals who separated from their employers due to other reasons that cannot be unambiguously regarded as involuntary or voluntary terminations (e.g. because their job ended automatically due to a limited working contract) are excluded from both the treatment and the control group.

<sup>5</sup> The SOEP provides this information in meters, though due to data protection not precisely up to the exact address but to the household's road section (see Goebel 2015).

commuting patterns provided in the SOEP is used to develop a mobility measure that makes it highly unlikely that workers commute to their old labor market region after relocation. Consequently, the use of more restrictive distance measures should also decrease the probability of commuting to a new region beyond this geographic scope among the group of stayers. Thus, defining a minimum moving distance greater than what the majority of workers would accept as daily commuting distance should allow for a clear separation of those whose relocation is accompanied by a change of the labor market region and those who change their place of residence without changing the labor market region (see, e.g., Renkow and Hoover 2000).<sup>6</sup>

An analysis of commuting patterns in year  $t-1$  shows that the mean distance between residence and workplace in the combined sample of treatment and control group amounts to approximately 23 km. Only 10 percent of workers commute 44 km or more, and only 5 percent claim to travel 62 km or more to work. It can therefore be argued that the further away an individual moves, the more likely it is that the change of residence is accompanied by the decision to search for work or take up a new employment in a different region as well. In the following, movers are defined as those who relocate to a new place of residence that is at least 40 km away from their old domicile. As robustness tests we also set benchmarks at 20 km, 60 km, and – very conservatively – 100 km. Conducting these robustness tests reveals that our results are not sensitive to variations in the minimum moving distance (results are available on request).

We further define a move to be related to job loss if it takes place in the year in which the event is reported or the first two subsequent years (i.e., between  $t$  and  $t+2$ ).<sup>7</sup> In Germany, unemployment benefits are usually paid for one year and are then cut down to means-tested social assistance. This is why one can expect that a non-negligible number of regional moves take place in the second year after job loss, i.e., after the expiration of unemployment benefits which comes along with serious financial cutbacks that might increase displaced workers' willingness to accept job offers in other regions. Excluding observations with missing information on relocation, these definitions leave us with 73 (815) movers and 1,462 (35,213) stayers in the treatment (control) group.

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<sup>6</sup> Our approach is further supported by the results of Ham et al. (2011), who find that the effect of mobility on wages is best measured when using distance-based definitions of migration, while the more commonly used definitions based on the crossing of state (or county) borders leads to serious misspecification of movers.

<sup>7</sup> We also conducted robustness tests varying the period in which we relate a move to a previous job loss, which did not alter our insights.

### 3. Descriptive evidence

To get some first insights into the mobility decisions of displaced and non-displaced workers, Figure 1 depicts the share of workers living at least 40 km away from the place they lived in  $t-1$ . It can be seen that mobility patterns do not differ between displaced and non-displaced workers in the years before job loss whereas one can observe substantial differences after this event, particularly in the year of and the first year after job loss. While the share of individuals living in a different region than in  $t-1$  increases rather steadily for non-displaced workers, there is a substantial increase for displaced workers. In the year of job loss (i.e., the base year  $t$ ), around 2.5 percent of displaced workers moved to a different region whereas the respective figure for non-displaced workers amounts to less than 1 percent. In the year after job loss the share of workers living in a different region than before job loss further increases to around 4 percent for displaced workers and only to around 1.5 percent for non-displaced workers. These figures indicate that the probability of relocating to another region is strongly related to job loss which is in line with previous findings (e.g., Gregg et al. 2004, Hunt 2004, Huttunen et al. 2015).

In order to obtain some information regarding the labor market performance of three groups of workers that are of interest for our analysis, i.e., displaced workers relocating to another region at least 40 km from their previous residence within the first two years after job loss (henceforth movers), displaced stayers, and non-displaced workers, Figure 2 shows mean annual labor earnings<sup>8</sup> over time for these three groups. One can see that displaced workers – both movers and stayers – have substantially lower earnings than their non-displaced counterparts already before job loss. At the same time, earnings trends seem to be rather similar up to the year before job loss. Comparing displaced movers and stayers reveals that stayers have slightly lower earnings before displacement suggesting that movers are a rather positively selected group among displaced workers. As expected, displaced workers experience a substantial earnings drop after displacement and this drop seems to be slightly larger for movers. In the following years, movers recover rather quickly and reach their pre-displacement earnings level in the fourth year after job loss. Stayers, by contrast, hardly recover from the earnings drop and are far from reaching their pre-displacement earnings level within the period of observation.

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<sup>8</sup> Annual labor earnings comprise “wages and salary from all employment including training, primary and secondary jobs, and self-employment, plus income from bonuses, overtime, and profit-sharing” (Grabka 2015, p. 50). Earnings are deflated to prices in 2010 using the consumer price index.

Since differences in earnings can occur due to differences in employment and wages, we further depicted the average number of month spent in unemployment<sup>9</sup> per year in Figure 3 and hourly wages<sup>10</sup> (logarithm, conditional on employment) in Figure 4. Looking at the months spent in unemployment reveals that unemployment incidence in the years before displacement is slightly higher for displaced than for non-displaced workers and that there is hardly any difference between displaced movers and stayers. For the control group months spent in unemployment remain rather stable over time. Displaced workers experience a sharp increase in unemployment by more than three months in the year after job loss ( $t+1$ ) compared to  $t-1$  and this effect is slightly stronger for movers. In the following years both groups of displaced workers recover but neither of them reaches their pre-displacement unemployment levels within the period of observation.

From Figure 4, it can be seen that non-displaced workers also obtain higher wages than displaced workers and this difference already exists in the years before job loss, suggesting that the earnings differential between displaced and non-displaced workers before job loss can be attributed to both wages and time spent in unemployment. Comparing displaced movers and stayers reveals that movers obtain slightly higher wages which suggests that the earnings differential between movers and stayers before job loss is mainly due to differences in wages as there is hardly any difference in unemployment between the two groups. Looking at the development of wages over time reveals a stable pattern in the control group. For displaced stayers one can observe a small drop in wages in the year of displacement (conditional on employment, i.e. zero wages are not considered). For movers, there is also a small drop in wages after job loss and the overall development is less stable. However, movers seem to perform better than stayers in the long run since there is a non-negligible increase in wages in  $t+4$  and  $t+5$  for this group.

Table 1 shows selected socio-demographic, job-related, and regional characteristics in year  $t-1$  (the year before job loss) for the three groups of interest. Comparing the socio-demographic, family, and household characteristics of displaced stayers – the bulk of displaced workers – and the control group of non-displaced workers reveals that there are only minor differences between these two groups. For instance, displaced stayers are somewhat less likely to be house owners or to be married than non-displaced workers but with respect to household

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<sup>9</sup> Months in unemployment refer to registered unemployment.

<sup>10</sup> Mean hourly wages are calculated by dividing income from the main job by annual work hours in that job. Wages are deflated to prices in 2010 using the consumer price index.

composition or age, e.g., the two groups are very similar. Displaced movers, by contrast, differ strongly from the other two groups. They are on average younger, and the share of females and workers with German nationality is higher. With respect to family and household characteristics, displaced movers are more likely to live alone and to have siblings and they are less likely to be married, to have children, and to be house owners. These descriptive results suggest that the household and family background plays an essential role for the decision to relocate, which is also suggested by previous studies (e.g., Alesina et al. 2015, Dohmen 2005, Greenwood 1997, Rainer and Siedler 2009).

Looking at the educational attainment of the three groups of interest shows that displaced stayers are somewhat less educated than non-displaced workers whereas displaced movers seem to be quite similar to the control group. This again suggests that movers are a rather positively selected group of displaced workers. All workers affected by job loss (both movers and stayers) have less tenure than non-displaced workers and displaced movers have less work experience than the other two groups. Moreover, displaced workers are more likely to live in East Germany and in rural areas. The county unemployment rate in the year before job loss is on average higher for displaced stayers than for displaced movers and non-displaced workers. The latter probably reflects that unemployment in some regions might be high because many of those workers who become unemployed in these regions are not willing or able to relocate.

The lower part of Table 1 shows regional characteristics in period  $t+3$ , i.e., three years after job loss. The depicted figures show that the share of workers living in East Germany has decreased substantially for displaced movers while it has remained rather constant for both displaced stayers and non-displaced workers. This suggests that displaced workers – if they decide to relocate – expect better labor market opportunities in West Germany. With respect to the share of workers living in urban regions, there is hardly any change for any of the three groups. Compared to  $t-1$  the county unemployment rate in  $t+3$  has decreased for all three groups. While the difference amounts to less than 0.5 percentage points for displaced stayers and non-displaced workers (reflecting a general time trend in unemployment), the respective figure for movers is about 1.5 percentage points suggesting that displaced movers relocate to

regions that offer better labor market prospects. This indicates that relocation after job loss is at least partly motivated by economic factors.<sup>11</sup>

#### 4. Econometric analysis

In this section we address our research questions econometrically. In the first step, we analyze whether job loss still increases mobility when we control for a wide range of socio-demographic, job-related, and regional characteristics. After that, we investigate whether individuals who decide to relocate to another region after job loss have better labor market outcomes than those staying in the same area, taking into account that movers are a selective group of displaced workers.

In the regression model for the determinants of regional mobility the dependent variable is a dummy indicating whether an individual relocates to a new place of residence between  $t$  and  $t+2$  that is at least 40 km away from his place of residence in  $t-1$ . Our main explanatory variable of interest is a dummy indicating whether an individual lost his job in the base year  $t$ . As control variables we include those characteristics listed in Table 1 as well as industry and base year dummies, each referring to  $t-1$ . We estimate our model by complementary log-log. The major advantage of this approach is that the underlying cumulative distribution function takes into account that one of the outcomes (relocation to another region in our case) is rare (see, e.g., Cameron and Trivedi 2005, p. 466).<sup>12</sup> Another convenient feature of the complementary log-log model is that exponentiated coefficients can be interpreted as hazard ratios, i.e., the proportional change in the hazard (the probability to relocate) given an increase in an explanatory variable by one unit (see, e.g., Jenkins 2005).

First of all, the regression results that are presented in Table 2 show that job loss has a large positive effect on regional mobility, which is in line with the results of previous studies (e.g., Huttunen et al. for Norway, Hunt 2004 for West Germany, Gregg et al. 2004 for the UK). The hazard ratio of 1.82 indicates that job loss in year  $t$  increases the probability to relocate to another region between  $t$  and  $t+2$  by 82 percent compared to a control group of workers who did not lose their jobs in year  $t$ . Having a look at the effects of further control variables, our results are also essentially in line with previous findings. The probability to relocate decreases

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<sup>11</sup> These insights still hold when we use a balanced sample of workers who are observed both in  $t-1$  and  $t+3$ .

<sup>12</sup> Our insights are still the same when we use a logit or linear probability model instead of the complementary log-log.

with age and is lower for women. Workers with German nationality are somewhat more likely to relocate, but the effect is statistically not significant.

As expected, family and household characteristics play an important role for the decision to relocate. People living in multi-person households have an around 30 percent lower probability to relocate than those who live alone. A similar pattern applies to those who are married, indicating that marriage is an additional barrier for mobility. Having children has also a negative effect on the moving propensity but the effect is statistically not significant. Furthermore, having siblings has a relatively strong and positive impact on the decision to relocate. While the data do not allow for any statements on the geographic proximity of these relatives (as in Huttunen et al. 2015), it confirms the result by Rainer and Siedler (2009). They argue that moving away from the family raises the probability that other siblings have to take responsibility for the elderly parents and might therefore be a beneficial strategy for individuals with brothers or sisters. Owning a house or apartment substantially decreases the likelihood to move and this effect amounts to around 66 percent. This strong effect is fairly intuitive and points to immense transaction and probably also psychological costs that arise if a house has to be rented out or sold (see, e.g., Dohmen 2005).

Mobility also increases with educational attainment. This might be explained by the wider radius of job advertisement for vacancies which require a high level of education, or by underlying characteristics such as ambition or determination that probably make those individuals more likely to relocate for occupational reasons. More years of firm tenure have a negative effect on relocation propensities whereas the effect of work experience is insignificant. The negative effect of tenure indicates that specific human capital, which loses at least part of its value after a change of employer, is a barrier to mobility. In addition, firm tenure is also an indicator for the years already spent in the same region and might therefore also reflect “location-specific insider advantages” (Fischer et al. 2000, p. 8).

Looking at the effects of regional characteristics, it can be seen that individuals living in East Germany in  $t-1$  are less likely to relocate, probably reflecting that those who decided to stay in East Germany despite still unfavorable labor market conditions (e.g. Schnabel 2015) are particularly immobile.<sup>13</sup> People living in urban areas in  $t-1$  have an around 28 percent lower probability to relocate than those living in rural areas. This may, for example, point to local

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<sup>13</sup> Lower mobility in East than in West Germany has also been found by Boenisch and Schneider (2010). They argue that this result can be explained by more pronounced social networks in East Germany.

amenities or better employment opportunities in urban regions. Interestingly, the county unemployment rate does not significantly affect moving propensities.

Having shown that job loss increases the probability of moving to another region substantially, we now turn to the question whether displaced workers who decide to relocate after job loss perform better in the labor market than those staying in the same region, taking into account that movers are a selective group of displaced workers. The labor market outcomes of both groups will be evaluated relative to the control group of non-displaced workers. For this purpose we estimate the following model:

$$Y_{it} = \alpha_i + \beta X_{it} + \sum_t \gamma_t T_t + \sum_t \delta_t D_i T_t + \sum_t \theta_t D_i M_i T_t + v_{it}$$

On the left hand side,  $Y_{it}$  is an outcome variable of interest (i.e., annual earnings, months spent in unemployment, or log hourly wages) for person  $i$  in period  $t$  where  $t$  indicates the year relative to the base year.  $\alpha_i$  is an individual fixed effect,  $X_{it}$  a vector of time varying control variables (i.e., a 4<sup>th</sup> order polynomial in age)<sup>14</sup>, and  $\beta$  the corresponding vector of coefficients.<sup>15</sup>  $T_t$  represents dummy variables indicating the year relative to the base year. The corresponding coefficients  $\gamma$  therefore measure the development of the respective outcome variable in the control group of non-displaced workers.  $D_i$  is a time-invariant dummy variable identifying displaced workers and  $M_i$  identifies movers, respectively. The coefficient vector  $\delta_t$  measures the difference in the development of the outcome variable between displaced and non-displaced workers and  $\theta_t$  measures the difference between displaced movers and stayers, respectively.  $v_{it}$  is an idiosyncratic error term. The results of these regressions are illustrated graphically in Figures 5-7.<sup>16</sup> These figures show the development of the respective outcome variable for movers and stayers relative to the control group.

Starting with the development of annual earnings (Figure 5) one can observe a small earnings dip for both movers and stayers already before displacement which has also been found in other job displacement studies (e.g., Jacobsen et al. 1993, Schmieder et al. 2010). After job loss there is a substantial drop in annual earnings which amounts to around 10,000 € for

<sup>14</sup> Age is centered at 40 years, i.e., we included (age-40).

<sup>15</sup> We do not include further time-varying control variables because one has to ensure that the included variables are exogenous and therefore not affected by job loss (von Wachter 2010). Exogeneity does not apply to job-related characteristics measured after displacement and family, household, and regional characteristics may change as a response to job loss as well.

<sup>16</sup> Complete regression results including confidence intervals are presented in Appendix Tables A1-A3.



stayers. For movers this drop is around 2,500 € larger but the difference between the two groups is statistically not significant. In the following years both groups of displaced workers recover slightly but at the end of the observation period the earnings gap between displaced stayers and the control group is still highly significant and amounts to around 6,600 €. Over almost the whole period of observation, movers seem to perform somewhat worse. Only in the last year the earnings gap is around 1,200 € smaller for movers but the difference between movers and stayers is not significant in any of the periods under observation. The large and persistent earnings losses of displaced workers are in line with the bulk of the job displacement literature (e.g., Jacobsen et al. for the US, Upward and Wright 2015 for the UK, Huttunen et al. 2015 for Norway, Schmieder et al. 2010 for Germany). As this pattern applies to both movers and stayers with even (insignificantly) higher earnings losses for movers (except for the last year), there is no indication that limited regional mobility of displaced workers serves as an explanation for the high and persistent losses.

Figure 6 depicts the development of the number of months spent in unemployment. Before job loss there is hardly any difference in unemployment patterns between displaced and non-displaced workers. After job loss, the number of months in unemployment increases substantially and the difference between treatment and control group amounts to more than three months in the year after job loss. In the following years one can again observe a recovery process but neither movers nor stayers catch up with the control group within the period of observation as the difference between displaced and non-displaced workers at the end of the observation period is still greater than at the beginning (before job loss). Comparing movers and stayers, we find slightly higher unemployment incidence for movers (except for the last period) but the difference between the two groups of displaced workers is never statistically significant.

Finally, looking at the development of log hourly wages (Figure 7) reveals that wages – conditional on employment – also decrease for displaced workers compared to their non-displaced counterparts after job loss. In the year after displacement, the wage gap between displaced stayers and the control group amounts to around 13 percent and there is hardly any recovery observable within the period of observation. Except for the last two years, wage losses are somewhat higher for movers than for stayers, but the difference between the two groups is never significant.

Taken together, we find large and persistent earnings losses for both movers and stayers while movers seem to perform somewhat (but not significantly) worse, at least in the short run. The same pattern applies when we evaluate the labor market performance of movers and stayers in terms of unemployment and wages. As displaced workers do not fully catch up to the control group both in terms of wages and unemployment, one can conclude that both short and long-run earnings losses are driven by wage and employment losses while the relative importance of unemployment seems to be higher in the short run.

Note that our insights still hold when we conduct several robustness tests (results are available upon request). First, regarding our definition of mobility we tested different minimum moving distances, namely 20, 60, and 100 km, which did not affect any of our insights. Second, we varied the period in which we relate a move to a previous job loss by including only the first year after job loss or by expanding this period to three years (instead of two years as in our preferred specification). Again, our results remain very similar. Third, one might conjecture that women are more likely to be tied movers and thus more likely to relocate for family rather than economic reasons.<sup>17</sup> To ensure that the labor market performance of movers is not driven by women relocating for non-economic reasons, we re-ran our analyses excluding females but this did not change our findings. Fourth, we also ran a robustness test excluding low qualified workers to make sure that this disadvantaged subgroup, which might also be more likely to relocate due to non-economic reasons, does not drive our results. Running this robustness test also did not alter any of our insights. Finally we tested different estimation procedures when investigating the determinants of regional mobility, namely logit and a linear probability model. The results reveal that our findings are not affected by the choice of the estimation procedure. Taken together, one can conclude that our results are robust over various specifications, definitions, and sample restrictions.

## **5. Conclusions**

In this study we have investigated the relationship between involuntary job loss and regional mobility using data from the German Socio-economic Panel (SOEP). Our results show that job loss has a strong positive effect on regional mobility. As our study evaluates the labor market performance of displaced movers and stayers relative to a control group of non-

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<sup>17</sup> By and large, this should also be ruled out by restricting the sample to individuals working full-time in the year before job loss, as we did throughout the entire analysis.

displaced workers, we are also able to shed light on the question whether the high and persistent earnings losses of displaced workers that have been found in the bulk of the job displacement literature can in part be explained by limited regional mobility of displaced workers. But as we find substantial long lasting losses – both in terms of employment and wages – for movers and stayers, our study does not provide any indication for this conjecture. Employment outcomes seem to be even worse for movers than for stayers, at least in the short run, but the differences between the two groups of displaced workers are never statistically significant.

Our results largely resemble those by Huttunen et al. (2015) for Norway who find that displaced workers who relocate to another region after job loss have even higher earnings losses than those staying in the same region. This similarity is highly interesting because Germany, in contrast to Norway, is characterized by very large inequalities in regional labor market conditions. One could imagine that these more pronounced regional disparities provide more scope for displaced workers to improve their labor market prospects by relocating to another region, but our results do not support this conjecture. In contrast to Huttunen et al. (2015), who find that regional mobility of displaced workers is mostly driven by non-economic factors such as family ties, we are unfortunately not able to shed more light on the reasons underlying the migration decisions of displaced workers. However, we find that displaced workers on average relocate to regions with lower unemployment rates suggesting that their migration decisions are at least not entirely motivated by non-economic reasons. Against this background, one potential explanation for our findings might be that increased competition for jobs in regions with more favorable labor market conditions (Fahr and Sunde 2006) negatively affects the employment opportunities of displaced movers.

Taken together, the results of our study put into question whether migration is a beneficial strategy to improve the employment outcomes of displaced workers. While some authors claim that relocation of unemployed workers is desirable and worth supporting (e.g., Fendel 2014, OECD 2005), our findings, in contrast, challenge whether measures of labor market policy such as promoting the regional mobility of displaced workers or imposing sanctions on those who are not able or willing to relocate would really help to improve their labor market prospects.

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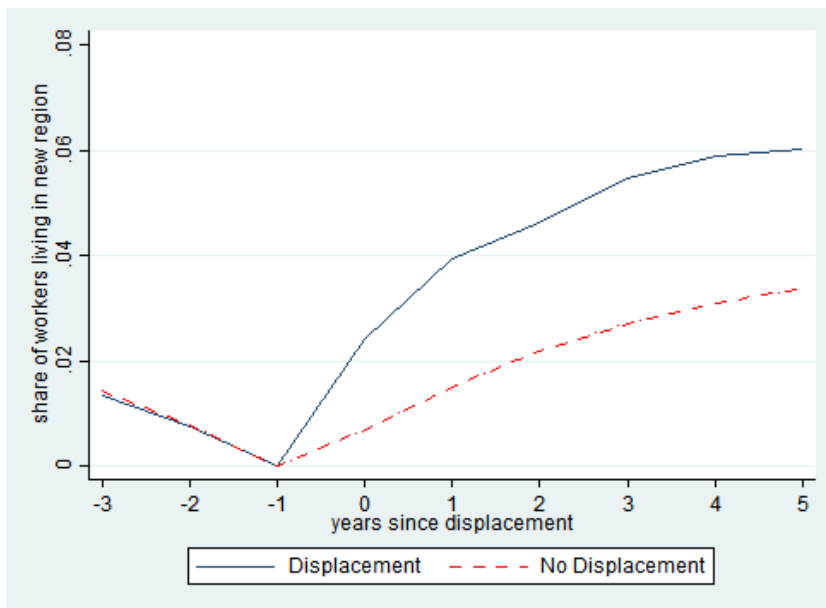
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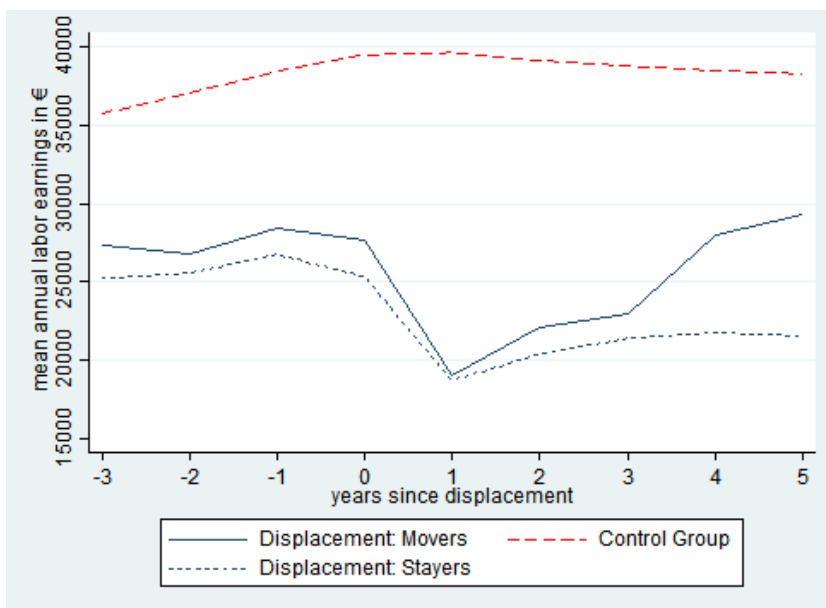
## Figures and Tables

Figure 1: Share of workers living in different region than in  $t-1$



Notes: Displacement cohorts 2001-2008. Displacement was reported in the base year, hence it occurred between  $t-1$  and  $t$ . Residence reported in year  $t-1$  is therefore the last address before job loss. Depicted is the share of individuals living at least 40 km away from the place they lived in year  $t-1$ .

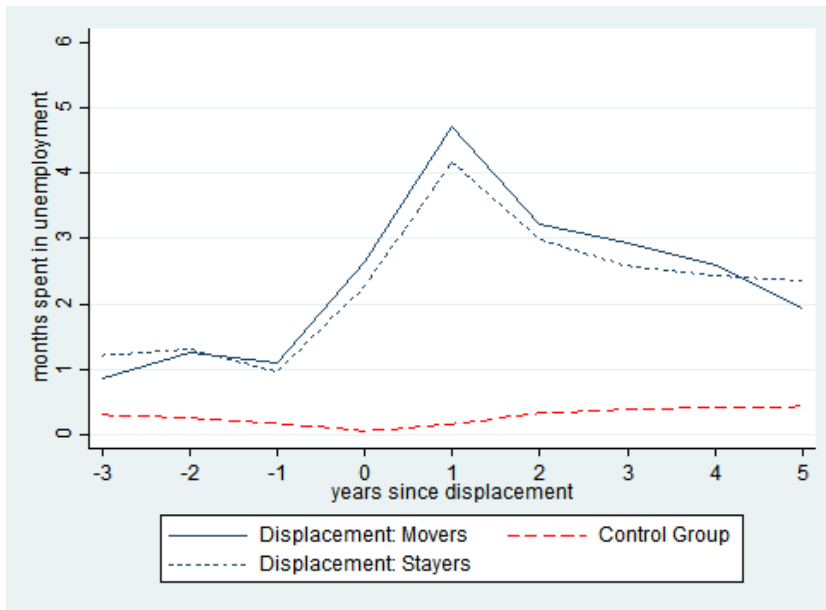
Figure 2: Mean annual labor earnings



Notes: Displacement cohorts 2001-2008. Earnings are deflated to prices in 2010 using the consumer price index.

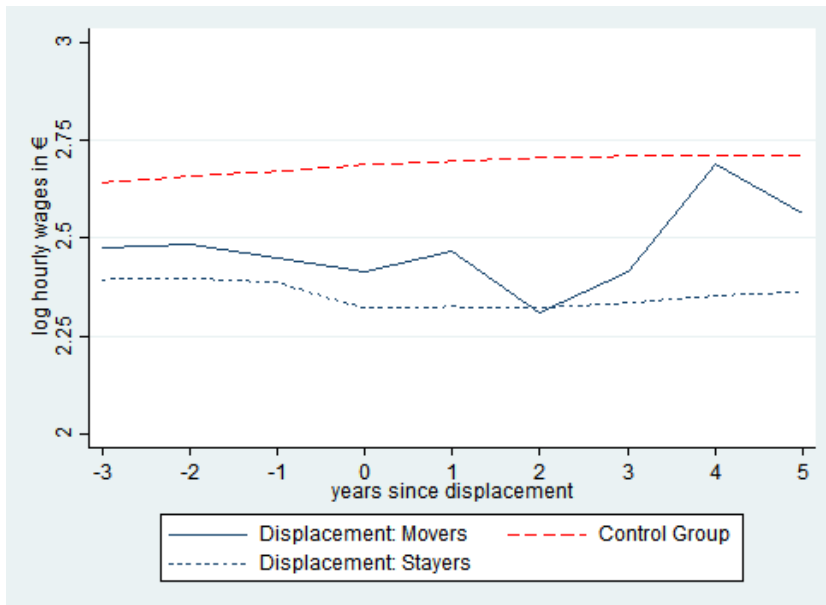


Figure 3: Months spent in unemployment per year



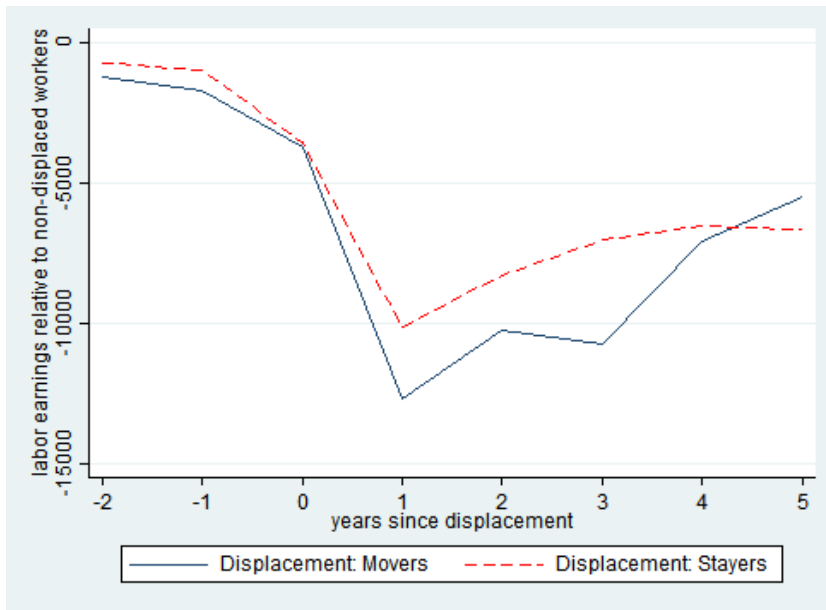
Notes: Displacement cohorts 2001-2008. Unemployment refers to registered unemployment.

Figure 4: Log hourly wages (conditional on employment)



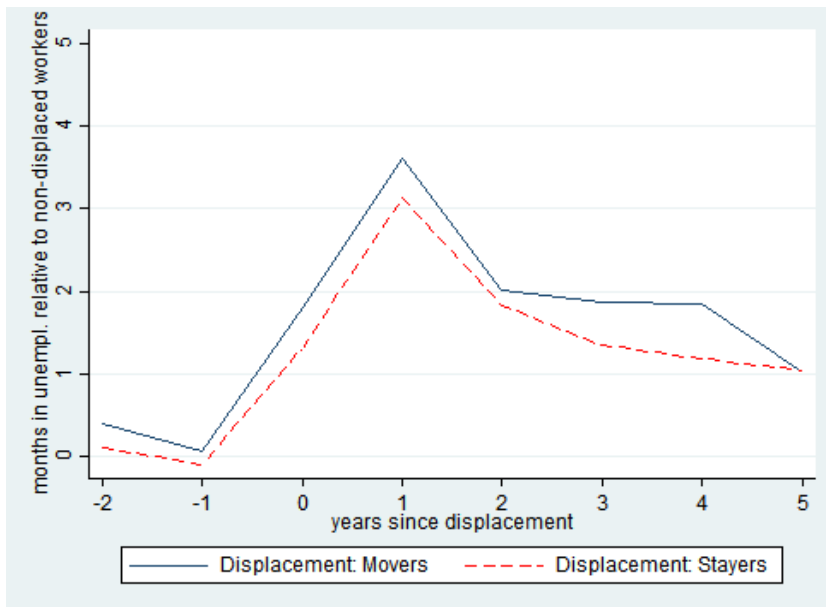
Notes: Displacement cohorts 2001-2008. Wages are deflated to prices in 2010 using the consumer price index.

Figure 5: Regression results – annual labor earnings



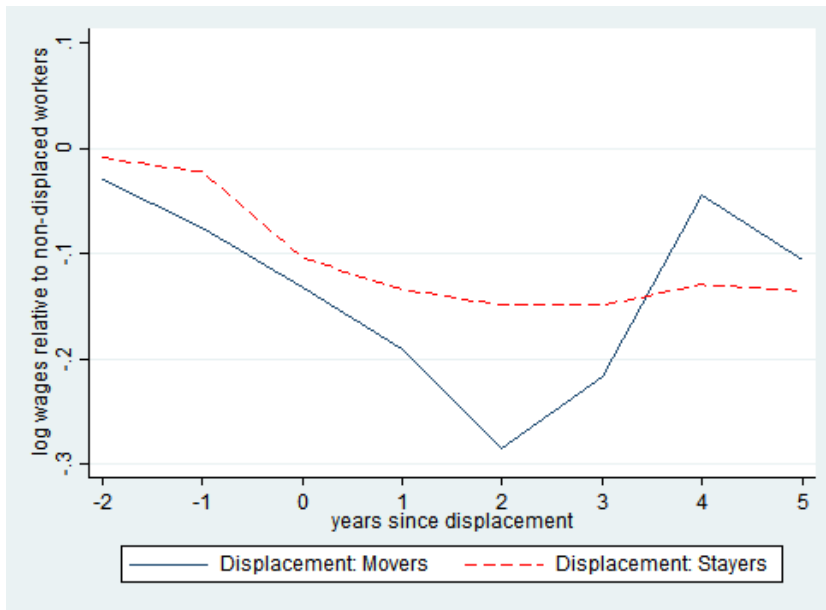
Notes: Fixed effects estimates, displacement cohorts 2001-2008. See Appendix Table A1 for the corresponding regression results. Earnings are deflated to prices in 2010 using the consumer price index.

Figure 6: Regression results – months spent in unemployment per year



Notes: Fixed effects estimates, displacement cohorts 2001-2008. See Appendix Table A2 for the corresponding regression results. Unemployment refers to registered unemployment.

Figure 7: Regression results – log hourly wages



Notes: Fixed effects estimates, displacement cohorts 2001-2008. See Appendix Table A3 for the corresponding regression results. Wages are deflated to prices in 2010 using the consumer price index.

Table 1: Means of selected variables

<b>Characteristics in year <math>t-1</math></b>	<b>Individuals affected by job loss</b>		<b>Control Group</b>
	<b>Movers</b>	<b>Stayers</b>	
age (in years)	35.13043 (0.84546)	39.46690 (0.22116)	40.34602 (0.04319)
female (dummy)	0.40580 (0.05955)	0.28239 (0.01195)	0.32349 (0.00250)
German nationality (dummy)	0.95652 (0.02473)	0.89366 (0.00818)	0.91375 (0.00150)
not living alone (dummy)	0.66667 (0.05717)	0.86268 (0.00914)	0.86747 (0.00181)
married (dummy)	0.43478 (0.06012)	0.59155 (0.01305)	0.64115 (0.00256)
any children (dummy)	0.37681 (0.05876)	0.43592 (0.01316)	0.44240 (0.00265)
any siblings (dummy)	0.21739 (0.05002)	0.14859 (0.00944)	0.16064 (0.00196)
house owner (dummy)	0.11594 (0.03882)	0.38028 (0.01289)	0.47676 (0.00266)
education (in years)	12.42754 (0.30488)	11.76796 (0.06005)	12.34134 (0.01356)
no high school (dummy)	0.11594 (0.03882)	0.15000 (0.00948)	0.11157 (0.00168)
high school (dummy)	0.66667 (0.05717)	0.71831 (0.01194)	0.68075 (0.00249)
more than high school (dummy)	0.21739 (0.05002)	0.13169 (0.00898)	0.20769 (0.00216)
tenure (in years)	4.57971 (0.58856)	5.51000 (0.18512)	10.55676 (0.04631)
full-time equiv. work exp. (in years)	11.84203 (0.93182)	16.14014 (0.24115)	17.30604 (0.04797)
living in East Germany (dummy)	0.34783 (0.05776)	0.39437 (0.01297)	0.25223 (0.00232)
living in urban region (dummy)	0.59420 (0.05955)	0.59366 (0.01304)	0.66425 (0.00252)
county unemployment rate (in percent)	5.32464 (1.06598)	6.34035 (0.22152)	5.32179 (0.03990)
<i>Number of observations</i>	<i>69</i>	<i>1,420</i>	<i>35,154</i>
<b>Characteristics in year <math>t+3</math></b>			
living in East Germany (dummy)	0.18182 (0.05249)	0.39833 (0.01414)	0.25977 (0.00253)
living in urban region (dummy)	0.63636 (0.06546)	0.58667 (0.01422)	0.65472 (0.00274)
county unemployment rate (in percent)	3.79091 (1.06911)	5.96917 (0.22672)	4.93031 (0.04001)
<i>Number of observations</i>	<i>55</i>	<i>1,200</i>	<i>30,019</i>

Notes: Displacement cohorts 2001-2008. Standard deviations in parentheses. Only observations with non-missing information for all depicted variables are included.

Table 2: Complementary log-log regression – determinants of regional mobility

Characteristics in year $t-1$	Hazard Ratio $exp(Coeff.)$	Std. Error	Conf. Interval (95%)	
displacement (dummy)	1.8170 ***	0.2463	1.3930	2.3700
age (in years)	0.9564 ***	0.0112	0.9346	0.9787
female (dummy)	0.8189 **	0.0775	0.6802	0.9858
German nationality (dummy)	1.1456	0.2273	0.7766	1.6901
not living alone (dummy)	0.7045 *	0.1398	0.4775	1.0396
married (dummy)	0.6957 **	0.1164	0.5012	0.9656
any children (dummy)	0.8515	0.1111	0.6594	1.0995
any siblings (dummy)	1.3305 **	0.1538	1.0607	1.6688
house owner (dummy)	0.3394 ***	0.0377	0.2730	0.4219
education (in years)	1.1998 ***	0.0253	1.1513	1.2504
tenure (in years)	0.9459 ***	0.0091	0.9282	0.9639
full-time equiv. work exp. (in years)	1.0080	0.0110	0.9866	1.0298
living in East Germany (in years)	0.8170 **	0.0838	0.6682	0.9988
living in urban region (in years)	0.7151 ***	0.0668	0.5954	0.8588
county unempl. rate (in percent)	0.9984	0.0056	0.9875	1.0095
industry sector (dummies)	incl.			
year of displacement (dummies)	incl.			
intercept	0.0413 ***	0.0149	0.0204	0.0838
Number of observations: 36,643				
Wald chi2(29) = 1048.21				
Prob > chi2 = 0.000				

Notes: Displacement cohorts 2001-2008. \*10% level of significance, \*\*5% level of significance, \*\*\*1% level of significance. The dependent variable is a dummy indicating whether an individual relocated to a new region in the periods  $t$  to  $t+2$  that is at least 40 km away from place of residence in year  $t-1$ . Standard errors are clustered by county of residence in year  $t-1$ .

Appendix Table A1: Fixed effects regressions – annual labor earnings

	<b>Coeff.</b>	<b>Std. Error</b>	<b>Confidence Interval (95%)</b>	
<i>Time trend in control group</i>				
t-2	1295.13 ***	55.12	1187.08	1403.18
t-1	2730.96 ***	93.10	2548.47	2913.45
t	3918.61 ***	128.46	3666.79	4170.43
t+1	4228.77 ***	167.25	3900.91	4556.63
t+2	3983.17 ***	200.66	3589.83	4376.51
t+3	3949.75 ***	232.11	3494.76	4404.75
t+4	4057.61 ***	265.18	3537.80	4577.43
t+5	4312.44 ***	310.84	3703.10	4921.77
<i>Effect of displacement</i>				
displacement*t-2	-704.08 **	281.71	-1256.30	-151.85
displacement*t-1	-965.15 ***	361.67	-1674.12	-256.18
displacement*t	-3542.99 ***	566.43	-4653.33	-2432.64
displacement*t+1	-10126.92 ***	556.45	-11217.69	-9036.15
displacement*t+2	-8278.34 ***	691.79	-9634.41	-6922.26
displacement*t+3	-7023.76 ***	631.95	-8262.54	-5784.98
displacement*t+4	-6520.23 ***	552.85	-7603.95	-5436.50
displacement*t+5	-6662.09 ***	563.26	-7766.22	-5557.97
<i>Effect of mobility after displacement</i>				
move*displacement*t-2	-496.51	1672.63	-3775.28	2782.25
move*displacement*t-1	-745.02	1418.39	-3525.41	2035.37
move*displacement*t	-160.72	2409.80	-4884.53	4563.10
move*displacement*t+1	-2530.70	2381.95	-7199.93	2138.53
move*displacement*t+2	-1936.58	2226.54	-6301.16	2428.00
move*displacement*t+3	-3685.32	2291.36	-8176.96	806.32
move*displacement*t+4	-575.39	2842.42	-6147.26	4996.47
move*displacement*t+5	1207.58	2635.88	-3959.40	6374.56
<i>Time varying controls</i>				
(age-40) <sup>2</sup>	-18.11 ***	3.36	-24.69	-11.53
(age-40) <sup>3</sup>	-0.24 *	0.13	-0.50	0.02
(age-40) <sup>4</sup>	-0.03 ***	0.01	-0.05	-0.01
intercept	36814.14 ***	188.38	36444.86	37183.42
Number of observations: 294,456				
R <sup>2</sup> within = 0.0264				
F(27,8263) = 93.04				
Prob > F = 0.0000				

Notes: Displacement cohorts 2001-2008. \*10% level of significance, \*\*5% level of significance, \*\*\*1% level of significance. Standard errors are clustered by individual. The relative time dummy *t-3* was excluded as a reference category. Earnings are deflated to prices in 2010 using the consumer price index.

Appendix Table A2: Fixed effects regressions – months spent in unemployment per year

	Coeff.	Std. Error	Confidence Interval (95%)	
<i>Time trend in control group</i>				
t-2	-0.0490 ***	0.0069	-0.0626	-0.0354
t-1	-0.1487 ***	0.0106	-0.1696	-0.1278
t	-0.2700 ***	0.0136	-0.2966	-0.2434
t+1	-0.1723 ***	0.0154	-0.2026	-0.1421
t+2	-0.0273	0.0181	-0.0628	0.0082
t+3	0.0140	0.0211	-0.0274	0.0554
t+4	0.0142	0.0240	-0.0329	0.0614
t+5	-0.0009	0.0271	-0.0540	0.0523
<i>Effect of displacement</i>				
displacement*t-2	0.1111	0.0780	-0.0418	0.2639
displacement*t-1	-0.1033	0.0959	-0.2913	0.0848
displacement*t	1.3168 ***	0.1128	1.0956	1.5379
displacement*t+1	3.1283 ***	0.1387	2.8564	3.4003
displacement*t+2	1.8295 ***	0.1322	1.5703	2.0887
displacement*t+3	1.3472 ***	0.1386	1.0756	1.6189
displacement*t+4	1.1827 ***	0.1389	0.9105	1.4549
displacement*t+5	1.0421 ***	0.1371	0.7734	1.3109
<i>Effect of mobility after displacement</i>				
move*displacement*t-2	0.2854	0.3891	-0.4774	1.0482
move*displacement*t-1	0.1688	0.3955	-0.6065	0.9442
move*displacement*t	0.4843	0.4901	-0.4764	1.4450
move*displacement*t+1	0.4830	0.7008	-0.8907	1.8566
move*displacement*t+2	0.1795	0.6545	-1.1036	1.4626
move*displacement*t+3	0.5311	0.6592	-0.7612	1.8234
move*displacement*t+4	0.6596	0.7115	-0.7352	2.0544
move*displacement*t+5	-0.0180	0.6075	-1.2087	1.1728
<i>Time varying controls</i>				
(age-40) <sup>2</sup>	-0.0001	0.0004	-0.0008	0.0006
(age-40) <sup>3</sup>	0.0000	0.0002	0.0000	0.0000
(age-40) <sup>4</sup>	0.0000 ***	0.0000	0.0000	0.0000
intercept	0.3084 ***	0.0185	0.2721	0.3447
Number of observations: 292,267				
R <sup>2</sup> within = 0.0354				
F(27,8263) = 58.21				
Prob > F = 0.0000				

Notes: Displacement cohorts 2001-2008. \*10% level of significance, \*\*5% level of significance, \*\*\*1% level of significance. Standard errors are clustered by individual. The relative time dummy  $t-3$  was excluded as a reference category. Unemployment refers to registered unemployment.

Appendix Table A3: Fixed effects regressions – log hourly wages

	<b>Coeff.</b>	<b>Std. Error</b>	<b>Confidence Interval (95%)</b>	
<i>Time trend in control group</i>				
t-2	0.0182 ***	0.0013	0.0156	0.0209
t-1	0.0357 ***	0.0020	0.0318	0.0397
t	0.0535 ***	0.0026	0.0483	0.0586
t+1	0.0597 ***	0.0032	0.0533	0.0660
t+2	0.0653 ***	0.0039	0.0577	0.0728
t+3	0.0697 ***	0.0045	0.0609	0.0785
t+4	0.0733 ***	0.0051	0.0633	0.0833
t+5	0.0789 ***	0.0058	0.0676	0.0902
<i>Effect of displacement</i>				
displacement*t-2	-0.0094	0.0128	-0.0345	0.0156
displacement*t-1	-0.0226 *	0.0131	-0.0482	0.0030
displacement*t	-0.1041 ***	0.0150	-0.1336	-0.0747
displacement*t+1	-0.1347 ***	0.0183	-0.1705	-0.0989
displacement*t+2	-0.1486 ***	0.0186	-0.1851	-0.1121
displacement*t+3	-0.1491 ***	0.0189	-0.1862	-0.1120
displacement*t+4	-0.1298 ***	0.0196	-0.1681	-0.0915
displacement*t+5	-0.1352 ***	0.0200	-0.1745	-0.0959
<i>Effect of mobility after displacement</i>				
move*displacement*t-2	-0.0202	0.0438	-0.1061	0.0656
move*displacement*t-1	-0.0536	0.0533	-0.1582	0.0509
move*displacement*t	-0.0278	0.0511	-0.1279	0.0723
move*displacement*t+1	-0.0565	0.0727	-0.1991	0.0860
move*displacement*t+2	-0.1369	0.1055	-0.3438	0.0700
move*displacement*t+3	-0.0674	0.0947	-0.2530	0.1182
move*displacement*t+4	0.0856	0.0627	-0.0374	0.2086
move*displacement*t+5	0.0281	0.0744	-0.1178	0.1740
<i>Time varying controls</i>				
(age-40) <sup>2</sup>	-0.0006 ***	0.0001	-0.0008	-0.0005
(age-40) <sup>3</sup>	0.0000 ***	0.0000	-0.0000	0.0000
(age-40) <sup>4</sup>	0.0000	0.0000	0.0000	0.0000
intercept	2.6721 ***	0.0031	2.6660	2.6782
Number of observations: 280,660				
R <sup>2</sup> within = 0.0176				
F(27,8262) = 35.88				
Prob > F = 0.0000				

Notes: Displacement cohorts 2001-2008. \*10% level of significance, \*\*5% level of significance, \*\*\*1% level of significance. Standard errors are clustered by individual. The relative time dummy  $t-3$  was excluded as a reference category. Wages are deflated to prices in 2010 using the consumer price index.



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