

# Job Loss, Family Ties and Regional Mobility\*

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## ABSTRACT

It is well established that displaced workers suffer long-lasting and severe employment and earning losses. Why these losses appear to be so big and so persistent is on other hand not very well understood. For instance, it might be that workers who are affected by big and persistent income effects are immobile for different reasons limiting the search. Hence, the immobility of workers is one of the obstacles for well-functioning labor markets. This paper analyzes the geographic mobility of workers after permanent job loss. We study what affects the likelihood that worker moves away from the region after job loss. We put particular importance to family ties. We find that job displacement increases regional mobility. Family ties are very important for mobility decisions: workers are less likely to move if they have family in the region and some return back home after job loss. When analyzing the post-displacement differences in outcomes we find that movers tend to suffer more severe earning and employment losses after job loss than stayers. The difference is larger for females, and for workers moving away from urban areas and to regions where their parents live. This indicates that movers tend to move for non-economic reasons also: spouse's work and family ties are very important for mobility decision. Although the overall selection of movers appears to be from the lower tail of the skill distribution in the source regional labor market, we do find some indication of a great deal of heterogeneity in terms of selection depending on the returns to skill in the labor market they move to.

Keywords: plant closures, downsizing, regional mobility, earnings, family ties

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## 1 Introduction

Downsizing and closures of firms is a crucial part of the process of restructuring and growth of industries including a reallocating of displaced workers between firms and sectors and across regions (Blanchard and Katz, 1992). However, it is well established that displaced workers suffer long-lasting and severe employment and earning losses (e.g. Jacobsen, LaLonde, and Sullivan, 1994; Couch and Placzek, 2010; Eliason and Storrie, 2006; Bender and von Wachter, 2009, Rege, Telle and Votruba, 2010; Huttunen, Møen and Salvanes, 2010). Why these losses appear to be so big and so persistent is on other hand not very well understood. For instance, it might be that workers who are affected by big and persistent income effects are immobile for different reasons limiting the search. The costs of moving may vary for different reasons such as family responsibilities, networks etc. Knowledge of whether losses from displacement are strongly connected to immobile workers will inform policy makers on the importance of developing policy instruments that induce higher mobility and to smooth restructuring processes.<sup>1</sup>

This paper makes several contributions to the literature examining the question of why we see the strong persistence in losses following job displacement. First, to our knowledge, this is the first study that documents how mobile workers are across regional labor markets following a permanent job loss, and what factors explain why workers do not move after job loss. We show the importance of non-economic factors, such as family ties and family networks, on worker's mobility decision. We analyze also the selection of

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<sup>1</sup> Especially, the increased international trade to low cost countries such as China, had had a big impact on downsizing and restructuring of the manufacturing sector during the last couple of decades, see Author, Dorn, Hanson, and Song (2012) for and analysis of the impact on restructuring of regional labor markets for the US, and for an analysis of the China impact on Norway, see Balsvik, Jensen, and Salvanes (2012). Smoothing these processes has a large focus in economic policies (Heinrich, Mueser and Troske, 2010).

movers both with respect to individual characteristics and with respect to characteristics of the labor markets they move between. Secondly, we document how the workers are doing in terms of earnings, unemployment and the probability of leaving the labor. We also document how the economic outcomes for the movers compared to non-movers after displacement depend the characteristics of location where they move to, such as urban/rural, moving to where they have family ties etc.

The negative employment shock that displaced workers experience is expected to change incentives to migrate. In the first part of the analysis, we assess to what degree displacement causes regional mobility using the standard set up in the displacement literature, where plant exit or downsizing is considered a shock to the individual workers conditioned on a rich set of pre-displacement variables. Displaced workers are compared to a control group of non-displaced. A unique feature of our data is that we have rich information on the location of both parents and siblings of the workers, the age of their children, and the same for the spouse. Thus, for the displaced we can assess how various observable demographic variables and family network variables impact regional mobility.

In the second part of the analysis we assess the post-displacement labor market experience of movers and stayers. Here we use a standard set up in the regional economics (or across country) literature and specify a fixed effect model comparing outcomes in the labor market for movers and stayers (Glaeser and Mare, 2001). We focus both on employment and earnings, as well as income (including disability benefits from leaving the labor force early) both based on individual and family income. Importantly

we also take into account that the living expenses (especially housing) differs a lot across regional labor markets by using a regional consumer price index. A fixed effect specification will to a certain extent take out the heterogeneity in skills between movers and stayers, however, we should basically consider the results on earnings and income as a combined effect of returns to moving after being displaced and a selection effect.

Fundamentally, question we are dealing with when assess the labor market outcomes for movers as compared to non-movers among job losers, is whether the movers are positively or negatively selected. Theoretically the selection of who is moving and who stay is not obvious. The prediction from the Roy model using comparative advantages in the Borjas version of the model that selection is that the mover selection is based on not the absolute but the relative return to skill in the local labor market they move from and the local labor market they move to (Roy, 1951; Borjas, 1987, 1991; Borjas, Bronars, and Trejo, 1992). As discussed in Abramitzky, Boustan and Eriksson (2012), this implies that there might be a difference in the skill of those moving to the a local labor market where the returns to skill is high as compared to those moving to a local labor market where the returns to skill is low, both relative to the source local labor market. In the case of moving to a regional labor market where skills have a relatively higher return, positive selection of movers is expected as compared to stayers since movers are to a greater extent from the higher tail of the skill distribution. On the other hand, those who move to a regional labor market with relatively lower returns to skill as compared to the source labor market, predicted to be from the lower part of the skill distribution. In our setting, this means that where in the skill distribution the movers and the stayers are coming from

whether we see a bigger or smaller negative earnings and income effects for stayers and movers. It might well be that the most highly skilled (and highly enumerated workers) are best rewarded in the same labor market where they are displaced compared to their alternatives. Hence, stayers may be the most attractive workers and are more easily employable workers and they do not have to move in order to find a good job. Furthermore, the movers may be a very heterogeneous group consisting both of positively and negatively selected workers depending on the skill returns in the labor market they move to. One way to get at this is to assess the labor market performance for displaced movers as compared to displaced stayers, when we condition on *where* the displaced movers move. In particular, we do two cuts at the data: estimating the outcomes and persistence of the negative income shock for workers moving to urban versus rural areas as well as moving back to where the parents or the spouse's parents live.

As expected, we find that job displacement increases regional mobility. The mobility increase takes place two years after displacement, and then the difference in mobility between displaced and non-displaced is fairly constant over time. After two years about three percent of the displaced workers have migrated to a new region and two percent of the non-displaced. When conditioning on a large set of pre-displacement variables including children in school, marriage, and family networks we find that job displacement increases mobility by 6 percentage point. This effect corresponds to about 30 percent increase in mobility when comparing it to the two percentage migration average of non-displaced group. We also find that migrating workers are younger, more educated and more often single as compared to those who stay. Women are more likely to

migrate than men. We find that parental proximity and sibling proximity are factors that strongly reduce migration. When analyzing the post-displacement labor market experience of movers and stayers, we find that displaced workers who move have significantly lower re-employment rates than those who stay in the pre-displacement region. Our fixed effect estimation results indicate that displaced male movers have larger long-term earnings losses than displaced male stayers. For women, the difference between stayers and movers is even more pronounced. This might reflect that women are often so called “*tied movers*”, and that is the man’s career which determinates families moving decisions. When splitting the sample to workers who on the basis of their post-displacement regional status, we find that the negative effect of migration is entirely driven by people who move to rural region or to region where family members locate. This indicates that the movers are both positively and negatively selected from the skill distribution in the regional labor market where they come from. Those negatively selected and as it appears are moving for non-economic reasons, are willing to suffer earning losses if they can stay close to their family members.

The rest of the paper is organized as follows: Section 2 presents the institutional set up and a short literature review. Section 3 lays out the empirical strategy. Section 4 describes the data sets and the sample construction. Section 5 presents descriptive evidence and results of the part that analyzes mobility decisions after job loss. Section 6 presents the results of the analysis that examines how job displacement effects on labor marker outcomes vary between movers and stayers. Section 7 concludes.

## 2 Literature

It well established that family ties influence worker's mobility decisions (Mincer, 1978)<sup>2</sup>. Mincer (1978) established that it is the net family gain rather than net personal gain that motivate the migration of households. The possible net loss of a "tied" mover must be smaller than the net gain of the other spouse to result in a net family gain. Since the return to migration for families increase less than costs when household size increases, one would expect families to be less mobile than single individuals. The moving decisions of families are affected by a number of factors, such as the number of children, the age of the children and access to schools which the family prefers. Recent research has also shown that the location of parents and siblings is important. (*Kolmar et al.*, 2002, and Rainer and Siedler, 2005).

In particular we examine whether parents of the displaced worker or the spouse live in the local labor market where the displacement incident happens. Proximity to parents may reduce mobility for more specific reasons. Having parents and siblings close is an advantage because people in general enjoy the company of their family. Parents may be elderly and in need of care, or if not elderly, they may help bringing up children by acting as baby sitters and providing extra non-parental child care (Lin and Rogerson, 1993, Glaser and Tomassini, 2000). The effect of siblings on the decision to move is a bit more complicated. Siblings represent a positive incentive to stay for the same reason as

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<sup>2</sup> Alessina et al. (2010) show that individuals who inherit stronger family ties are less mobile, have lower wages, and are less often employed.

parents, but their presence may also make it easier to move because they are substitute caretakers for elderly parents. This is pointed out by Konrad et al. (2002) and Rainer and Seidler (2005).<sup>3</sup> Proximity to parents and siblings can also influence worker's employment and earnings directly. A family network in the local labor market may aid workers in finding new employment (Kramarz and Skans, 2011), and family member that act as baby sitters will make it easier to work long hours.

### **3 Empirical Specification**

The objective of this study is to analyze whether firm restructuring leading to worker job loss, leads to increased regional mobility, and secondly to provide evidence how geographic mobility is related to earning losses of displaced workers. We estimate separate regressions for men and women.

#### *Defining the treatment and control groups*

Following the literature we use job displacements as a shock to the individual worker and analyze how regional mobility is affected. Displaced workers are defined as workers losing their job following plant close downs and those separated from a plant that reduces employment by 30 % or more (Jacobsen, Lalonde and Sullivan, 1993, Bender and Von Wachter, 2009). Furthermore, we add early leavers to the treatment group defined as those who left the plant up to one year prior to plant closure since we expect them to be aware of the future closedown. As the control group we use a 30 percent sample of non-

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<sup>3</sup> These papers are not assessing migration per se, but analyze proximity between siblings and parents. In the models elder children act strategically by choosing to migrate away from parents in need of care.



displaced workers at the year of plant closure. We restrict the data set to full time workers between 25 and 50 years old the year of displacement (base year  $b$ ), for all sectors in Norway for the years 1991 to 1998, and we follow workers five years prior to the displacement year, and seven years after displacement. Note that after being displaced all workers and not only those attached to a plant are included when we assess mobility and income up to seven years. This means that unemployed, other temporarily outside the labor force (for instance maternity leave), and those permanently outside the labor force on disability pension are included. We have collected registry information on their annual pension. This is important since we know that this is a large group of displaced workers that leave the labor force and we may potentially exclude a large group of workers not considering these workers (Huttunen, Møen, and Salvanes, 2011, Rege et al., 2010). By restricting the age group up to the age of 50 in the year of displacement we avoid using workers on ordinary or early pension schemes which is from the age of (67) 63. The treatment group is thus displaced workers (split into movers and non-movers), and the control group is non-displaced workers.

We are defining regional mobility as workers' moving (gross out migration) across local labor markets as defined by Statistics Norway (Bhuller, 2009). Commuting patterns define these 46 regions. These local labor markets are something in between the 432 municipalities (the lowest administrative level) and 19 counties (the medium administrative level). Worker is a mover at time  $b$  (denotes a base year) if she no longer has the same region identification number as in time  $b-1$  (or time  $b-2$ ).

Since we are analyzing displacement that occurs in several years, we have a rolling base year, denoted  $b$  as the year of displacement, and  $b+1$  being the first year after and  $b-1$  being the year prior to displacement. We redefine base year accordingly and run pooled regressions for all base year samples 1991 to 1998.

We restrict our sample to workers with job tenure working at least 20 hours per week for the three years leading up to displacement,  $b-3$  to  $b-1$ . This means that they have attachment to a firm the 3 years leading up to displacement (and the displacement year), and had positive earnings from working.

#### *Displacement and regional mobility*

We begin by estimating the effect of displacement and background factors on regional mobility separately for males and females using following specification:

$$M_{ib+2} = \delta D_{ib} + \beta X_{ib} + \gamma_b + \varepsilon_{ib}$$

where  $D_{ib}$  is an indicator for whether worker  $i$  was displaced in a base year,  $b$ .  $M_{ib+2}$  is an indicator for whether worker  $i$ 's moving status, that is whether the worker lives in a different region two years after the base year,  $b+2$ .  $X_{ib}$  is a vector of observable worker, plant, labor market regions *pre-displacement* characteristics (from base year 0 if not mentioned otherwise). They are worker's age, age squared, education split into three categories, tenure, marital/cohabitation status, number of children and children under 7

(preschool age), earnings in years  $b-4$  and  $b-5$ , months of employment in years  $b-4$  and  $b-5$ , and dummy for being in education at  $b-4$  and  $b-5$ , years individuals have lived in pre-displacement region by base year  $b$ , plant size, indicator variable for having younger siblings, dummy variable indicating whether parents of the worker or his spouse are living in the same pre-displacement local labor market, dummy variable indicating whether sibling of the worker or his spouse are living in the same pre-displacement local labor market, and the interaction of these two (having spouse in the region\*having sibling in the region), regional unemployment rate, region size. Specification includes also base year fixed-effects  $\gamma_b$ , base year two-digit NACE industry dummies, and base year region dummies.

The main variable of interest is the displacement variable  $D_{ib}$ . This is a dummy variable indicating whether a displacement occurs at between the year  $b$  and  $b+1$ . The parameter  $\beta$  gives the difference in regional mobility between displaced and not-displaced workers conditional on all pre-displacement controls.

Next we study the importance of observable worker, network and labor market variables. Family ties are expected to affect workers' mobility decision as already discussed. Another dimensions related to families is whether the displaced worker (man or women) has a spouse or not. We expect that having a spouse reduces regional mobility since they are working, have networks on their own etc. The effect of job loss on migration may differ between workers with different education level and between workers in urban and rural locations. For example, the labor markets for highly educated workers are generally regionally much larger than those of low educated workers (see e.g. Machin, Salvanes and Pelkonen, 2011). This indicates that job loss would lead to a

much stronger regional mobility for highly educated workers since they will have much larger search radius when looking for a new job. Workers in rural areas should have much smaller opportunities in local labor markets, and thus the effect of job loss on regional mobility can differ from the effect for workers in urban areas. We assess the heterogeneity of the displacement effect on mobility by various dimensions by estimating several versions of the following equation:

$$M_{ib+2} = \delta D_{ib} + \delta_g D_{ib} * G_{ib} + \beta X_{ib} + \gamma_b + \varepsilon_{ib}$$

where  $G_{ib}$  is an indicator variable for the group that we allow the effect to vary:

education category, pre-displacement urban status, pre-displacement family status (married or cohabiting), pre-displacement family tie indicator (parent or spouse's parent living in the same pre-displacement region).

#### *Effect of job displacement on income*

Next we examine the effect of geographic mobility on earnings and income losses of displaced workers. We estimate the following model separately for males and females using data from pre- and post-displacement years -3 to 7 of all base year samples 1991-1998:

$$Y_{ibt} = \sum_{j=-3}^7 D_{ibt-j}^{mover} \delta_j^{mover} + \sum_{j=-3}^7 D_{ibt-j}^{stayer} \delta_j^{stayer} + \beta X_{ib} + \gamma_{bt} + \alpha_{ib} + \varepsilon_{ibt}$$

In equation (2)  $Y_{ibt}$  is the annual earnings, annual income (including disability benefits), or family income for worker  $i$ , in base year sample  $b$  at time (year since displacement)  $t$ .  $X$  is a vector of observable pre-displacement characteristics as defined when discussing equation (1). The parameter of main interest is the one is the effect of job displacement variable for movers  $\delta_j^{mover}$  and for stayers,  $\delta_j^{stayer}$ . This coefficient indicates the displaced and non-displaced earnings and employment differentials in different post displacement years separately for workers who moved within 2 years after job loss, and for those who did not. Note, that the comparison group workers are all non-displaced workers, i.e. an average over both non-displaced movers and non-displaced stayers.

The specification also includes a base-year\*time since displacement interaction-dummies,  $\gamma_{bt}$ , to make sure we compare earnings of the displaced and non-displaced in the same year since base year (-3 to 7) and in the same base year sample. Finally, we also include base-year specific individual fixed-effects  $\alpha_{ib}$ . This way we want to control the permanent differences in earnings between displaced movers and stayers and non-displaced (in a given base year), and make sure we do not mix compositional differences in outcome with the effect of job loss on the individuals.

Since moving is not expected to be random among displaced workers, we control for permanent differences in the *level* of earnings between movers and stayers by including the individual fixed effects. Moreover, we acknowledge that earnings *growth* may also differ by workers with different observational characteristics. For example it is well acknowledged in the literature that earnings growth of highly educated and workers in

urban areas differs from the earnings growth of less educated workers or workers in rural areas (Glaeser and Mare, 2001). In order to take this into account we let the age-earnings profiles differ between workers in urban and rural locations, and for workers in different education categories. The estimates obtained from this fixed effects approach cannot be interpreted as the causal effect of mobility, since the (unobservable) factors affecting selection into migration may also affect earnings growth after job loss. However, we claim that the set up allows us to provide transparent new evidence on how the income patterns of job losers depend on their mobility decisions.

In order to understand the mechanism how mobility is related to worker's post displacement outcomes, we investigate whether workers who move to a region where parents are located (back home) have different labor market outcomes than movers for work-related reasons. In addition, we analyze whether moving to rural and urban areas make a difference in terms of earnings. The reason for this descriptive exercise is that quite a few displaced workers leave the labor market and move back to where they originally came from and where their parents live. There may be many reasons for this; cheaper housing, stay with parents, wanting to go back where they grew up.

#### **4 Data, Variable Definitions and Sample Construction**

The primary data set we are using is the Norwegian Registry Data, a linked administrative data set that covers the population of Norway. It covers all Norwegian residents 16--74 years old in the years 1986-2006. It is a collection of different

administrative registers such as the education register, family register, the tax and earnings register, disability pension. A unique person identification code allows following workers over time. Unique spouse (married/cohabitation) and parent/children codes exist. Likewise, unique firm and plant codes allow identifying each worker's employer and examining whether the plant in which the worker is employed is downsizing or closing down. We also have an identification code for individuals' municipality of residences for every year. Plant and regional labour market characteristics such as industry, size and the rate of unemployment are also available.

Employment is measured as months of full-time equivalent employment over the year.<sup>4</sup> Earnings are measured as annual taxable income. The included components are regular labour income, income as self-employed, and benefits received while on sick leave, being unemployed and on parental leave. In addition, we include annual disability benefits in order to take into account the income for the group leaving the labor force. Family income is defined as the sum of the income of worker and her spouse. Regionally adjusted real income is the annual income deflated using regional price index, which is primarily based on house price differences across regional labor markets.

The age of the worker is given in the data set. Tenure is measured in years, using the start date of the employment relationship in a given plant. Education is measured as the normalized length of the highest attained education and is not survey based but comes from the education register where each education institution report every year to Statistics

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<sup>4</sup> We have three categories of working hours and control for part-time employment as follows:  $Y_{it}$  = months of employment if a worker is working more than 30 hours a week,  $Y_{it} =$  (months of employment) 0,5 if a worker is working 20-29 hours a week and  $Y_{it} =$  (months of employment) 0,1 if a worker is working less than 20 hours a week.

Norway. Educational attainment is split in three groups; primary secondary and tertiary education.

The unique spouse codes are used to merge information on spouse's labour market situation. In addition we use unique parent codes to attach information on the location of worker's parents and siblings each year. We also merge in information on children's birth year from population registers. We use this information to calculate the number of school age children and the number of under school age children parent has each year.

In order to examine the importance of family ties on mobility decision we define variables describing the location of parents and siblings. Indicator variable for *Parents and sibling living in the labor market region* means that worker's parent or his sibling lived in the same regional labor market area in the year when observed. Since it is well established that first-borns are more mobile than younger siblings (Konrad et al. 2002), we define variable *Younger siblings* means that worker has at least one younger sibling.

## **5 Mobility decision**

In this section we will first provide descriptive evidence on the migration behavior, background characteristics and post-displacement outcomes of displaced and non-displaced workers. Then we present the regression results.

### *A. Difference between treatment and control groups*



Tables 1a and 1b reports the mean values of the pre-displacement characteristics for different for displaced and non-displaced workers.<sup>5</sup> We present the mean values for displaced and non-displaced in column one and two, and p-values for testing whether the means are equal in column three. It is a common finding that displaced and non-displaced workers tend to have slightly different characteristics in the job displacement literature. We find the same thing in this case, displaced workers are very similar in terms of educational attainment, pre-displacement earnings, and the number of children under the age of seven as well as parental network. On the other hand displaced workers are slightly older, have higher tenure, a little less likely to be married, and slightly more unemployed four and five years prior to being displaced. Note that the sample is constructed to be identical in terms of employment up to three years prior to being displaced. These are not big differences, however, statistically significant, and thus we include these controls in the regression analysis, alternatively use them in a pre-stage using matching.

### *B. Descriptives: Displacement and mobility*

Figure 1 describes the share of movers among displaced and non-displaced workers for up to seven years following displacement, split by gender. As expected, displaced workers have a higher probability of moving compared to non-displaced workers in the years immediately following job loss for both genders. 3.38% of displaced females and 3.02% of displaced males have moved to a new region by the second year after job loss,

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<sup>5</sup> In the Appendix in Table 1A we split both displaced and non-displaced workers in movers and staying in order to show the difference between the movers and stayers for the treatment and control group. We notice that movers are very similar across the two groups as are stayers.

as compared to 2.10% of non-displaced females and 1.97% non-displaced males. Hence there is about a one percentage point difference for displaced as compared to non-displaced workers indicating up to about 50% unconditioned increase in the probability of moving after being displaced which is a big impact. The difference from the first year following displacement is kept also after 7 years so it appears that it is the first shock of displacement which is important for moving. This result is consistent with theoretical predictions. Job loss (personal unemployment) should augment migration likelihood, due to reduction of present income and, thus, the opportunity costs of moving. Notice also, that there is a slight mobility difference between those who will be displaced and non-displaced in the years leading up to displacement, but the difference increases after displacement.

The figures also indicate that the regional migration mobility in Norway is high. This is in line with the comparisons undertaken by geographers and economists, where Northern Europe with Norway is ranked among the countries with the highest regional mobility rates in Europe (Rees and Kupiszewski, 1999; Rees, Østby, Durham and Kupiszewski, 1999, Machin, Pelkonen, and Salvanes, 2011).

### *C. Regression results: Displacement, mobility and background factors*

Now we turn to results where we condition on all controls within a regression framework. First we present the results regarding moving decisions; which factors have an impact on the mobility of displaced and non-displaced workers, and which factors determine some displaced workers to migrate and some not.

In the first two columns in Table 2a and 2b we report the marginal effects for men and women from a probit model that estimates the effect of job displacement and background variables on the probability to move within 2 years after job loss. Displaced male workers have a 0.6 percentage point increase in the probability of moving to a new region within 2 years after job loss. An average *non-displaced male* worker has a 1.97 % probability of moving to a new region by the year 2, hence, a 0.6 percentage point increase represents around 30 % increase in the moving probability. Women have an even higher increase in probability of moving when being displaced; 0.7 percentage point, an increase of about 32 % as compared to average mobility rate of non-displaced females (2.10). Tables 2a and 2b also report the main characteristics driving regional mobility of both displaced and non-displaced. The full set of control variables are reported in table A2 in appendix. We see that there is a strong gradient in education; especially college educated have a much higher probability of moving which is supported by previous literature. Characteristics like having a spouse, having school aged children, and having parents in the region, all reduce the probability of moving both for displaced and non-displaced. Workers with younger siblings (reported in table 2A) are also more mobile, which is in line with findings by Konrad et al. 2002.

The next columns in table 2a and 2b report interactions terms between displacement and these pre-displacement variables. When interacting the displacement variable with education level, although there is a strong gradient in education for moving, there is no difference for high and low educated to move after job loss. Also, for workers with a

spouse and with school aged children, there is no difference in displacement effect on mobility. Interestingly, for men having a family in pre-displacement region significantly reduces the probability to move after job loss. This indicates that family ties indeed matter for worker's mobility decision. This can be explained by various reasons: parents may help individuals to find new employment in the region, they can provide child care help or individuals may just prefer being close to the family.

When interacting the displacement variable with urban dummy we find that job displacement increases mobility more for workers in the rural areas, although the difference is not statistically significant.<sup>6</sup> This may reflect that workers in rural areas have more limited employment opportunities and thus displaced workers need to search employment from wider areas. It also indicates that one of the mechanisms for the still ongoing strong urbanization process in Norway is that workers lose their job and then move (see Butikofer, Polovkova and Salvanes, 2012, for an analysis of the urbanization process in Norway).

## **6. Labor market outcomes for movers and non-movers**

Next we investigate how earnings and employment outcomes after job displacement are related to worker's mobility decisions.

### *A. Descriptives: Post-displacement outcomes by displacement and moving status*

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<sup>6</sup> The main effect of living in rural area is negative, indicating that workers in rural areas are less mobile. Since the model includes region fixed effects we could not estimate the main effect of living in rural area. In the model without region fixed effects the coefficient on rural dummy is -0.003.

Table 3 provides the employment status in  $b+2$  (short run) and  $b+7$  (long run) by gender, displacement and moving status. Displaced workers are workers that were displaced because of plant closure or downsizing between  $b$  and  $b+1$ . Stayers are workers who live the same regional labor market in year  $b+2$  as before displacement (year  $b$ ). Movers have a new local labor market code by second post displacement year  $b+2$ . This information will be useful when interpreting the regressions results in terms of post displacement earnings patterns for movers compared to non-movers; they may fare very differently in the labor market, leaving the labor market, and moving to an area where they have networks.

From the upper part of the table we see that about 86 percent of the displaced male workers are reemployed within two years. Displaced male workers who have moved to a new region have significantly lower re-employment rates (81 percent) than the ones who have stayed in the region they lived in before being displaced from their jobs (86 percent). Among the non-displaced male workers the stayers also seem to have much lower employment rates at year  $t+2$  than stayers.

The lower panel reports the results for females. The difference in the employment rate between movers and stayers seems to be higher than for males. Only around 69% of displaced female workers who have moved to a new region are working two years after the job loss, while 82% of displaced stayers are working. When investigating the end-states in more detail, the table shows that most of the male and female movers that end up

being outside labor force live in the regions where either their or their spouse's parents or siblings are located.

There may be several explanations why the descriptive evidence indicates that movers do have worse employment levels than non-movers. First, it may well be that workers move for non-work related reasons. Table A1 showed that family ties are very important for workers mobility decisions and that people are generally willing to live close to their family members. Thus, there may be some workers moving "back home" even though the employment opportunities in these regions are limited. The fact that the difference between movers and stayers is especially big for women, may indicate that women are more likely to be so called "tied movers" and that it is the male in the family whose employment decisions dominates in families moving decisions.

Another reason for the difference between movers and stayers is that the movers are negatively selected group. Workers who do not find employment directly after losing their jobs are more likely to migrate. It may well be that these workers have some (unobservable) characteristics that are correlated with their lower re-employment probability.

The short term results carry over to long-term results. Most of the difference in employment difference between displaced and non-displaced and movers and non-movers are kept after 7 years. There is a little bit of convergence across groups, but it is fair to say that the displacement shock appears to make the difference in outcomes in

terms of employment. We are looking at un-conditioned rates here so part of the difference in employment rates between movers and stayers may be due to observable characteristics.

In order to further investigate the reasons behind the difference in employment rates between movers and stayers we also split the sample to those who live in urban or rural location or in a region with family members (not reported here). Workers moving to urban locations had s higher employment rates than those moving to rural locations (84% and 78% for males, 74% and 65% for females). Also, workers moving to regions with family members had lower re-employment regions than workers moving to regions without family members.

*B. Descriptives: Post-displacement income by displacement and moving status*

In Figure 2 we present unconditioned mean of average annual income including of disability benefits (and using a regional CPI) for workers by moving and displacement status in years before and after job displacement. The results show that the raw pre-displacement earnings difference between displaced and non-displaced workers is relatively small. However, there seem to be a large pre-displacement (and pre-move) difference between movers and stayers. This indicates, as expected that movers tend to be a selected group, see Table A1 for the unconditioned mean differences.

The figure does indicate that job displacement was an exogenous shock to these workers. Job displacement reduces the earnings of displaced workers and opens up a significant earnings gap between displaced and non-displaced workers. In line with previous findings (e.g. Jacobson et al., 1993) the earnings difference between displaced and non-displaced begins a couple of years before the job loss occurs.

Even though the level of earnings for movers is higher for movers than for stayers, the drop in earnings after job loss seems to be higher for displaced movers than for displaced non-movers especially for females. For females, the difference between movers and stayers is much more pronounced, which indicates that women are more likely to work for reason that are not due to their own career (tied movers).

### *C. Fixed effect regression results: Income Loss for Displacement by Migration*

#### *Status*

Our final aim of the paper is to analyze to what degree the earnings losses found for workers who lose their jobs are connected to regional mobility. We have already established that job displacement increases regional mobility, now we want to analyze within a fixed effects set up whether there are big difference in income effects of job displacement between movers and stayers. We are using the non-displaced as control group for both displaced movers and non-movers. We do acknowledge that mobility decision is highly endogenous so we are cautious not to interpret our estimates as causal effects of mobility. However, by carefully analyzing the income patterns before and after



job loss, we can provide transparent and new information on how earnings losses of displaced workers are related to their mobility decisions. Since we already have seen that tied-movers may be an issue, we also provide results for family income.

In Figure 3 we present the results of the regression that estimates the effect of job displacement on annual taxable earnings. Workers with 0 annual earnings are included in the sample, and thus effect captures both the effect on employment and earnings. The figure plots the point estimates and confidence intervals of job displacement dummies separately for movers and stayers. Since model includes fixed effects for each individual in a given base year sample, we cannot estimate the effect for the first time period -3, and it is thus used as the base-level. The model also includes base-year specific time dummies and age and squared age that is specific for base year-education level and base year urban status.

We observe that before the job loss there was no significant difference in earnings growth between these groups. After job displacement, earnings drop dramatically for both movers and stayers. The effect of job displacement on earnings is strongest in the second post displacement year. The earnings losses for movers are larger than for stayers. Displaced male movers annual earnings decrease on average 26,500 NOK (the dollar is about 6 to 1 to the Norwegian kroner (NOK), so that this a little more than 4,000 dollars). This corresponds to 7.9 % decrease in annual earnings<sup>7</sup>. For stayers the drop is less dramatic, displaced workers that have moved to a new region experience a -14,000 NOK

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<sup>7</sup> As compared to average annual earnings of non-displaced male workers in year 2: 334,196 NOK. The estimated effect of job displacement for male movers in the year 2 is -26,520 . For male stayers the effect is -14,043.

drop in earnings (4.2 %). The negative effect of job displacement remains until the 7<sup>th</sup> post-displacement year.

For women, the difference in the earnings loss between stayers and movers is even more pronounced. On the second post displacement year, the earnings drop for displaced movers is on average -28,800 NOK. This corresponds to a 12.6 % reduction in the mean earnings<sup>8</sup>. For displaced female workers who stay in the pre-displacement region the estimated effect is -8,800 NOK (around 3.8 %). The results are similar when we use as a dependent variable total income, i.e. annual earnings and disability benefits. These results are reported in table A1 in Appendix.<sup>9</sup>

The difference between movers and stayers may also reflect the fact that workers may move to region with lower living expenses after having lost their jobs. In order to take this into account we use as a dependent variable regionally adjusted income measure (including disability benefits). Figure 4 reports the estimated effect of job displacement on regionally adjusted annual income in different time periods since job loss. Again, we find that movers have larger income losses after job displacement than stayers, although the difference between movers and stayers diminishes a bit. The drop in annual income in the second post displacement year for male movers is -26,900 NOK (7.25%) and for male

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<sup>8</sup> The average annual earnings of non-displaced female workers in year 2, 229,663 NOK. The estimated effect of job displacement for female movers in the year 2 is -26,908. For female stayers the effect is -8,833.

<sup>9</sup> Note, since the number of disability pension recipients is relatively small, the difference in the mean income with and without disability pensions is relatively small. The average annual income (with disability pension) for non-displaced males in year 2 is 334,618 NOK. The estimated effect for movers is -25,685 (-7.67 %).

stayers -15,300 NOK (4.12%). For females, the effect for movers is -26,300 NOK (-10.8) and for stayers -9,519 NOK (-3.76%)<sup>10</sup>:

It is well established (Mincer, 1978) that it is the net family gain rather than net personal gain that motivates the migration of households. The possible net loss of a “tied” mover must be smaller than the net gain of the other spouse to result in a net family gain. In order to take into account that many of the displaced movers may be so called “tied movers”, we use as our income measure total family income rather than personal income. The total family income is created by summing worker’s own and his spouse’s annual real income. For workers without spouse this equals his own income.

The regression results are presented in Figure 5. We see that job loss has a long-lasting negative effect on family income.<sup>11</sup> Movers suffer bigger earnings losses in the years immediately following job loss. The drop in year 2 mean family earnings for displaced male movers is 38,600 NOK that corresponds to 9 % reduction in total family earnings. For stayers the reduction is smaller, about -14,300 NOK (-3.4%). In time, the earning loss for movers diminishes. For women, the loss in total family earnings is bigger for movers in the years immediately following job loss, but the effect fades away in time.

This can reflect both the fact that women are tied movers, and that moving decisions are also driven by spouse’s employment situation. However, the difference in total family income between stayers and movers can also reflect the difference in marriage propensity

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<sup>10</sup> The mean regionally adjusted income for non-displaced males in year 2 is 371,618 and for non-displaced females 252,670 NOK.

<sup>11</sup> Results using annual family earnings as dependent variable are reported in figure A2 in appendix.

between these two groups. Since movers are younger and less likely to be married as shown in table 1, the faster growth of family income in later years can also reflect that they find partner's in later years. In order to take this into account we restricted the sample to workers who had a spouse in the base year 0, and investigate how job displacement affects earnings for stayers and movers. These results are reported in figure 6. Again we find that movers tend to suffer slightly larger losses in total family income than stayers. The earnings loss in year 2 for displaced male movers is 36,900 NOK (7.8%) and 13,500 NOK (2.9%) displaced male stayers<sup>12</sup>. For female movers the drop in income after job loss is 26,500 NOK (5.6%) and for female stayers 11,800 NOK (2.5 %). However, the loss fades away in time for women.

#### *D. Heterogeneity in the selection of movers*

In order to further examine heterogeneity in selection of movers, we analyzed how the effect of job displacement varied by the characteristics of the destination where worker moved to. That is, whether workers moved to urban or rural location, and whether they moved to regions where their parents or their spouse's parents locate. We acknowledge that this analysis is descriptive in nature, since the decision to move to certain kind of destination is endogenous. We however, believe that by splitting the data to these subsamples we can provide interesting descriptive information on mobility behavior of job losers.

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<sup>12</sup> The average family income for non-displaced males in year 2 is 472 971 NOK.

Figure 7 reports the results of fixed-effects regression, where we estimate how income losses of job losers vary between 4 different categories: 1) workers who stayed in urban region, 2) workers who moved to urban region, 3) workers who stayed in rural region, and 4) workers who moved to rural region. The comparison group is all non-displaced workers, and again we control for worker fixed effects and let the age and age squared vary by workers pre-displacement urban status and education. The results show that the negative effect of job displacement for movers is entirely driven by individuals that move to rural locations. Workers who move to urban regions do not suffer any post-displacement earnings losses at all, while movers to urban regions suffer severe and long-lasting earning losses. Stayers in urban and rural locations both suffer some earning losses after job displacement, but the drop is much smaller than the drop for workers who move to rural regions.

In order to examine whether family ties are likely to be reason for mobility decision, we split the sample by parent's location in year 2. We estimate a similar fixed effect specification but let the effect of job displacement vary between four categories: 1) workers who moved (by year 2) to region where her or her spouse's parent locate, 2) workers who stayed (until year 2) in pre-displacement region where her or her spouses parent locate, 3) workers who moved to a region where neither her nor her spouse's parent locate and 4) workers who stayed in the region where neither her nor her spouse's parent locate. The results are reported in figure 8. The results indicate that workers who move to a region where family members located suffer bigger earning losses than the workers who move to regions with no family. Male workers who move to region where

their parents do not locate suffer almost no long-term losses. It seems that family ties may be one reason why workers move to a new region, and these workers tend to have lower income growth than other displaced workers<sup>13</sup>.

#### *D. Robustness Checks*

Since movers differ from stayers by observational characteristics, as a robustness check, we trimmed the comparison group by pre-displacement characteristics using an estimated propensity score. In order to estimate the effect of job displacement for movers we first estimated a probit model that explained the probability to be “displaced mover” by rich set of pre-displacement characteristics (reported under figure A4) using data on displaced movers and all non-displaced workers. We then weighted the non-displaced comparison group by predicted probability to be “displaced mover”<sup>14</sup>. This way we made sure that we compared displaced movers to similar non-displaced workers. In order to estimate the effect of “job displacement” for stayers, we first estimated the probability to be “a displaced stayer”, and then we used this predicted probability (propensity score) to weight the comparison group sample. The results using this approach are reported in figure A4. The results are relatively similar to unmatched results, for male movers the effect of job displacement is now smaller.

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<sup>13</sup> We also examined the heterogeneity of the effect of job displacement by mobility and various pre-displacement characteristics, including education, urban status and family ties in pre-displacement region. The results by educational categories are reported in appendix. The model is estimated separately for each educational category. The results indicate that movers tend to suffer larger losses than stayers in all educational categories. In absolute terms the earning losses for highly educated are larger, but in percentages the primary educated suffer bigger losses.

<sup>14</sup> Following Hirano and Imbens (2001) we estimate the effect of treatment on treated by weighting the data so that the weights equal unity for the treated units and  $\hat{p}(x)/(1-\hat{p}(x))$  for the control units, where  $\hat{p}(x)$  is the estimated propensity score.

## **6 Concluding remarks**

The aim of this paper is to analyze geographic mobility of workers after permanent job loss, and what influence's workers decision to move away from region. We provide evidence that job displacement increases regional mobility, especially for workers whose parents or siblings do not locate in the region. Family ties are very important for worker's mobility decision. Workers are less likely to move away from regions where they parents or siblings locate, and some move back home after job loss. We also provide descriptive evidence how earnings losses after job displacement are related to worker's decision to migrate from the region. Our findings suggest that workers who move to a new region after job loss suffer bigger income losses related to stayers. These losses are driven by workers who move to rural regions and to regions where they have family members.

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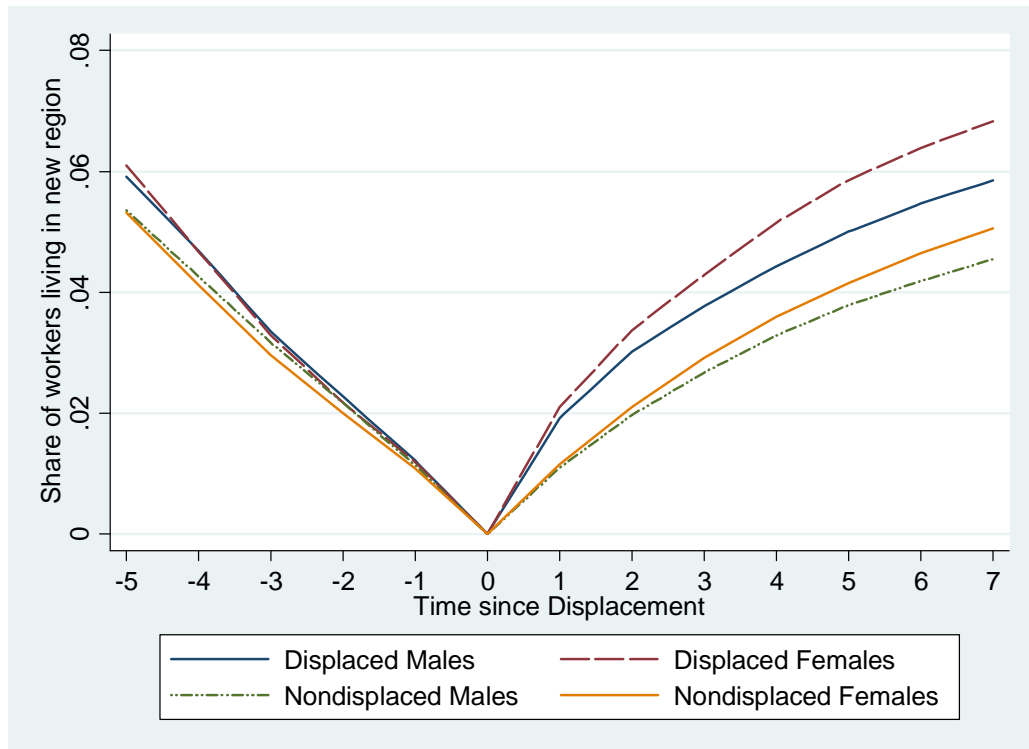
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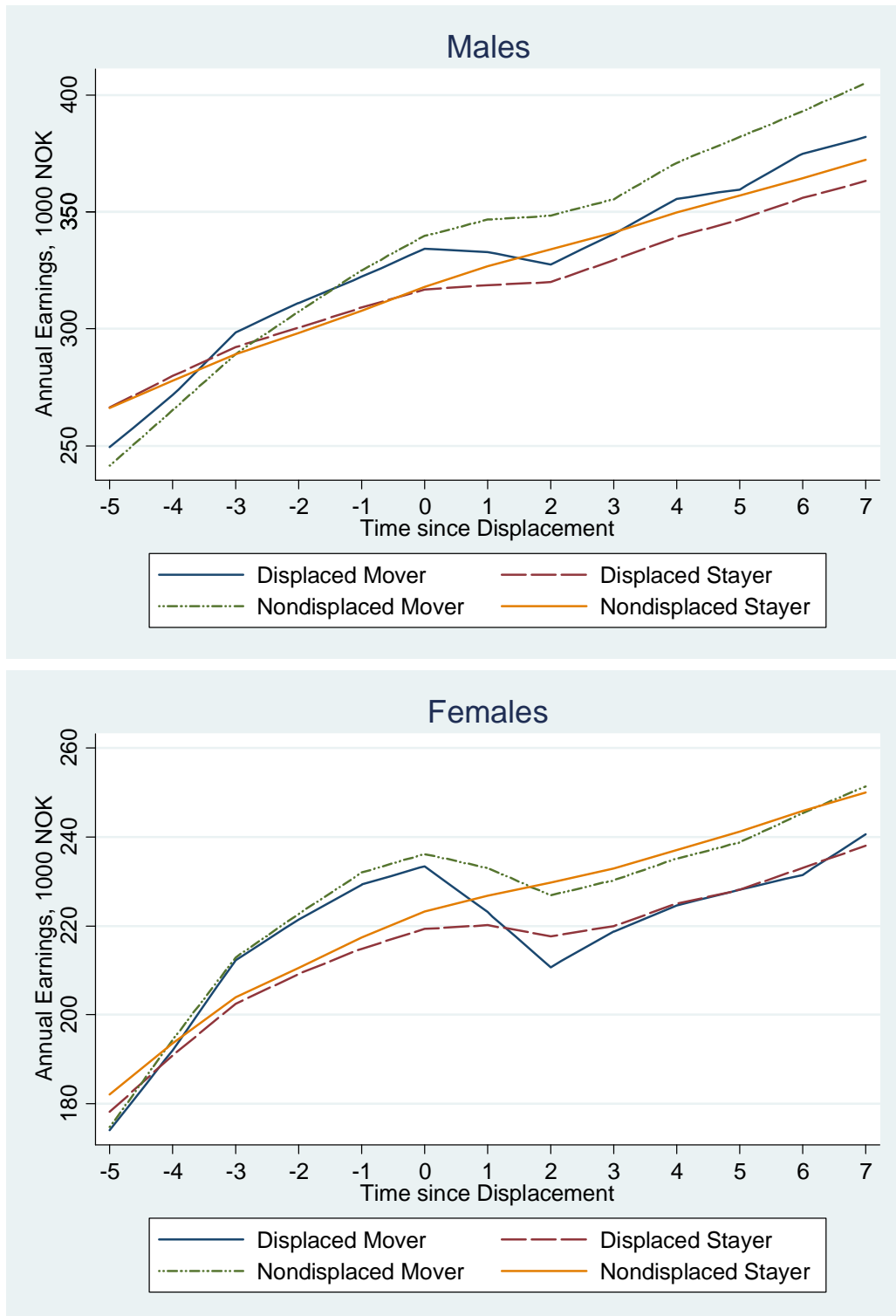
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Tables and figures

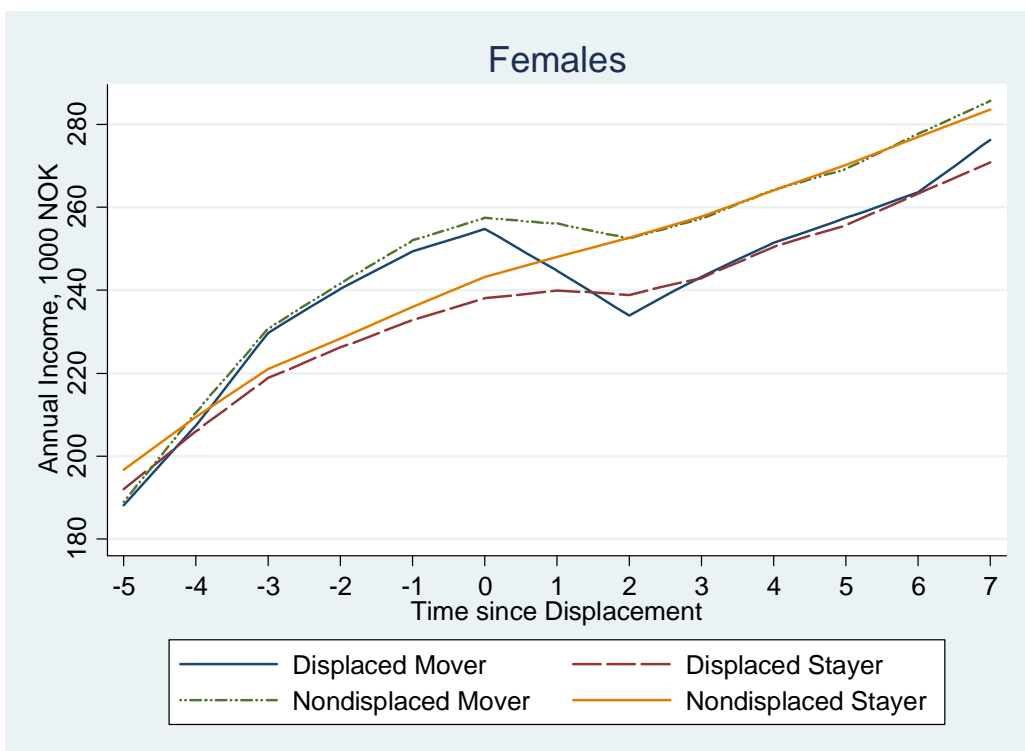
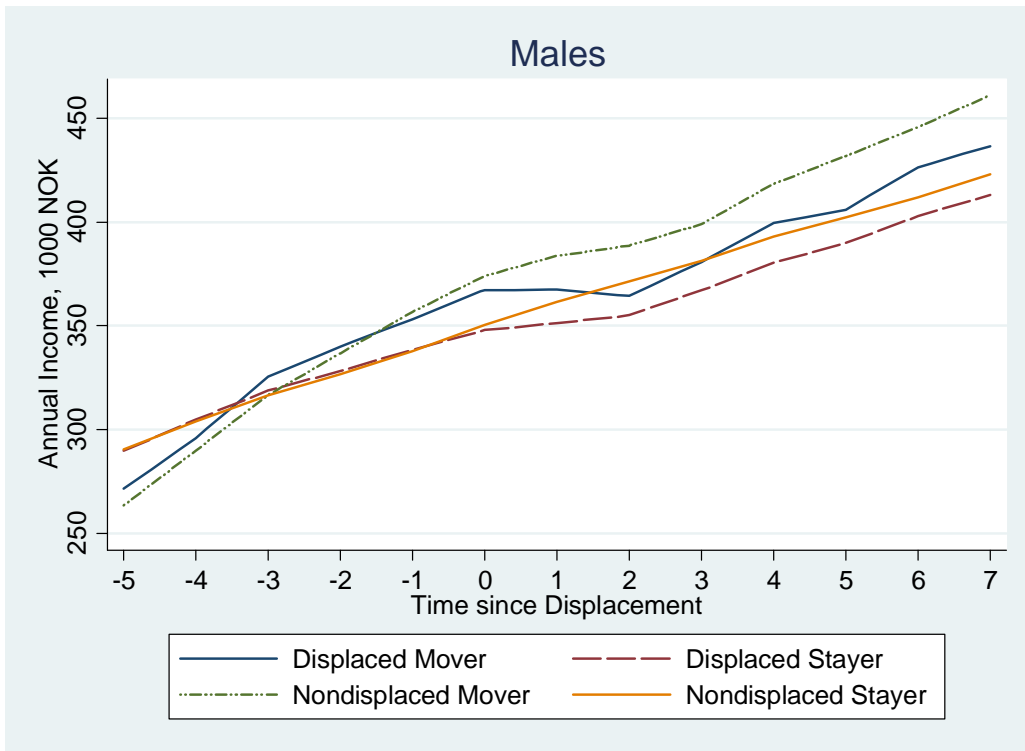
1. Figure 1. Share of workers living in the different region than in base year 0.



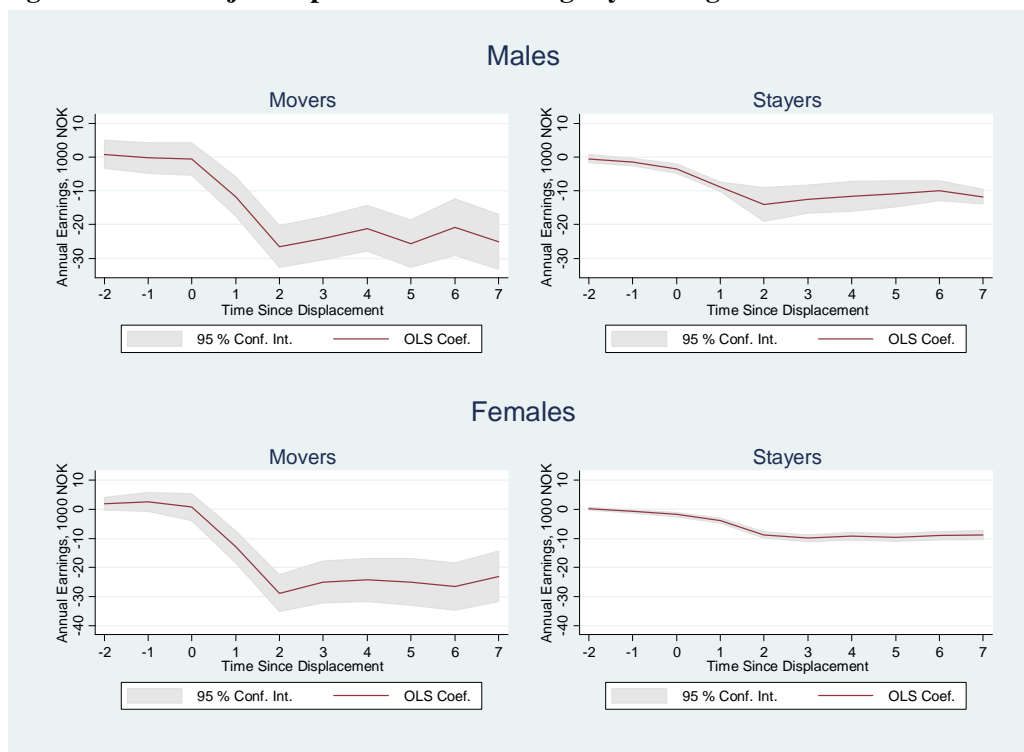
**Figure 2. Annual earnings for movers and stayers**



**Figure 2\*. Annual regional adjusted income for movers and stayers**



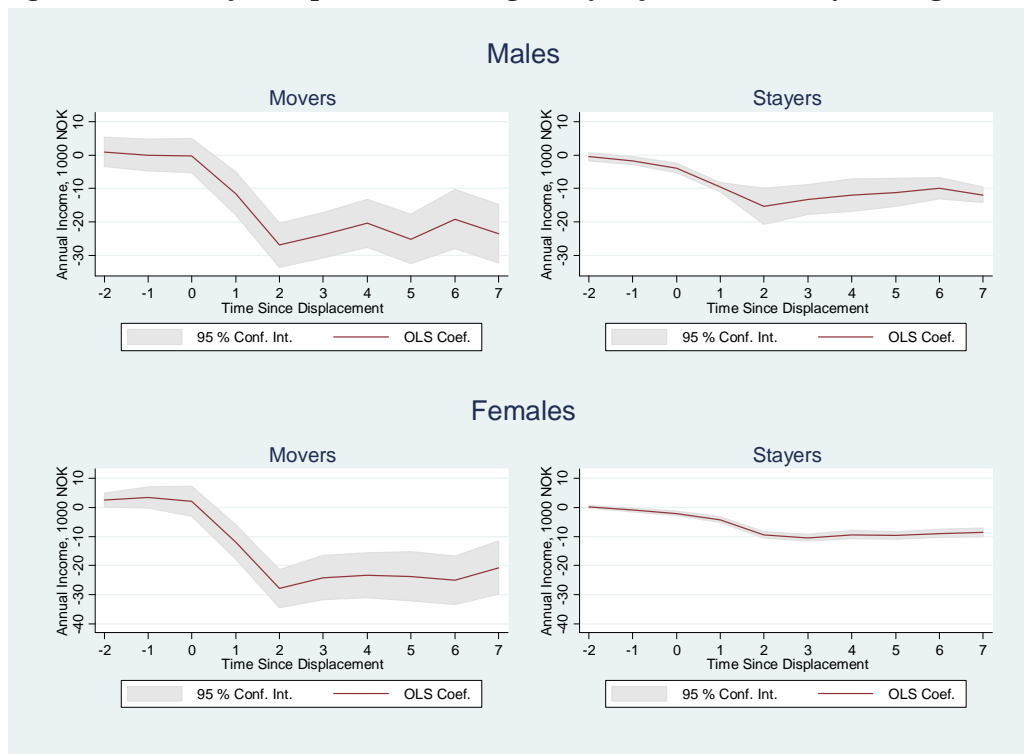
**Figure 3. Effect of job displacement on earnings by moving status**



Notes: The dependent variable is real annual earnings. The sample consist of workers that were 25-50 years old and full time employed in base year 0 (years 1991-1998). The time period is from -3 to 7. Job displacement happened between time 0 and 1. The model includes base-year-individual fixed effects and age and squared age that is specific for base year-education level and base year urban status.

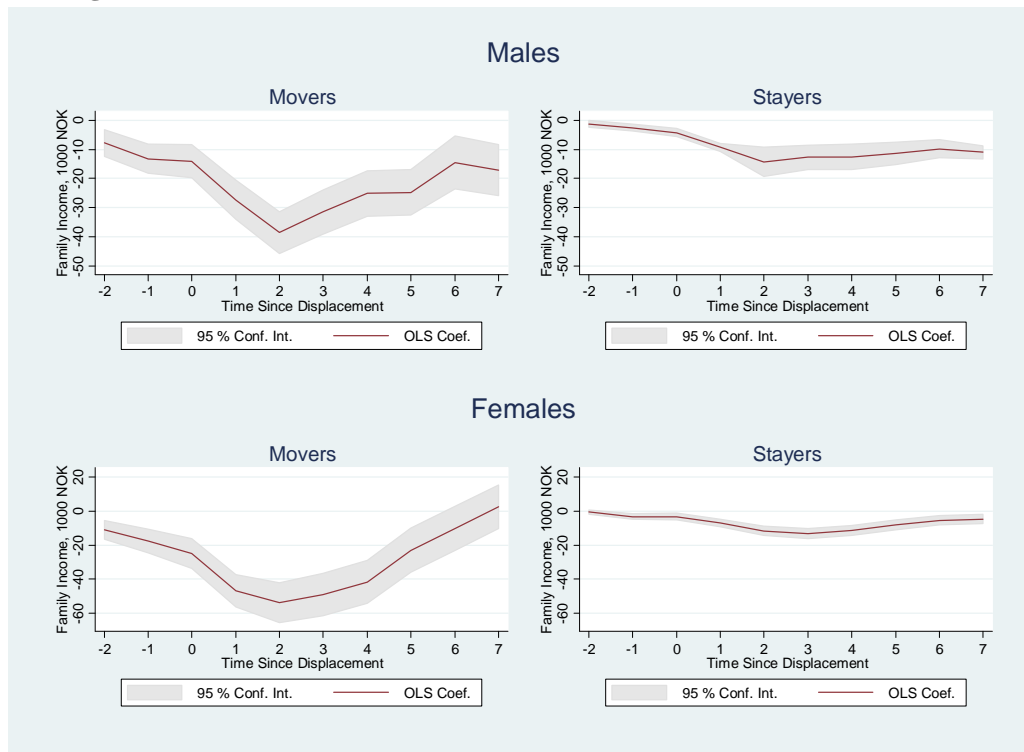


**Figure 4. Effect of job displacement on regionally adjusted income by moving status**



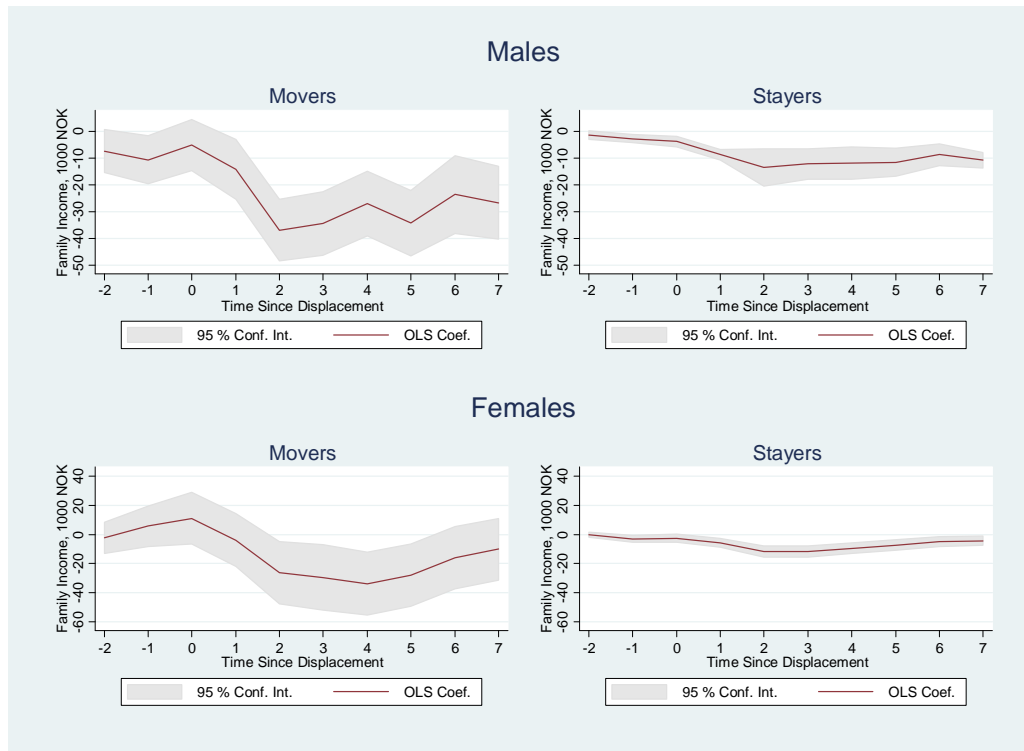
Notes: The dependent variable is real annual income that is deflated using regional price index. The sample consist of workers that were 25-50 years old and full time employed in base year 0 (years 1991-1998). The time period is from -3 to 7. The model includes base-year-individual fixed effects and age and squared age that is specific for base year-education level and base year urban status.

**Figure 5. Effect of job displacement on family income by moving status (both earnings and income, remove other)**



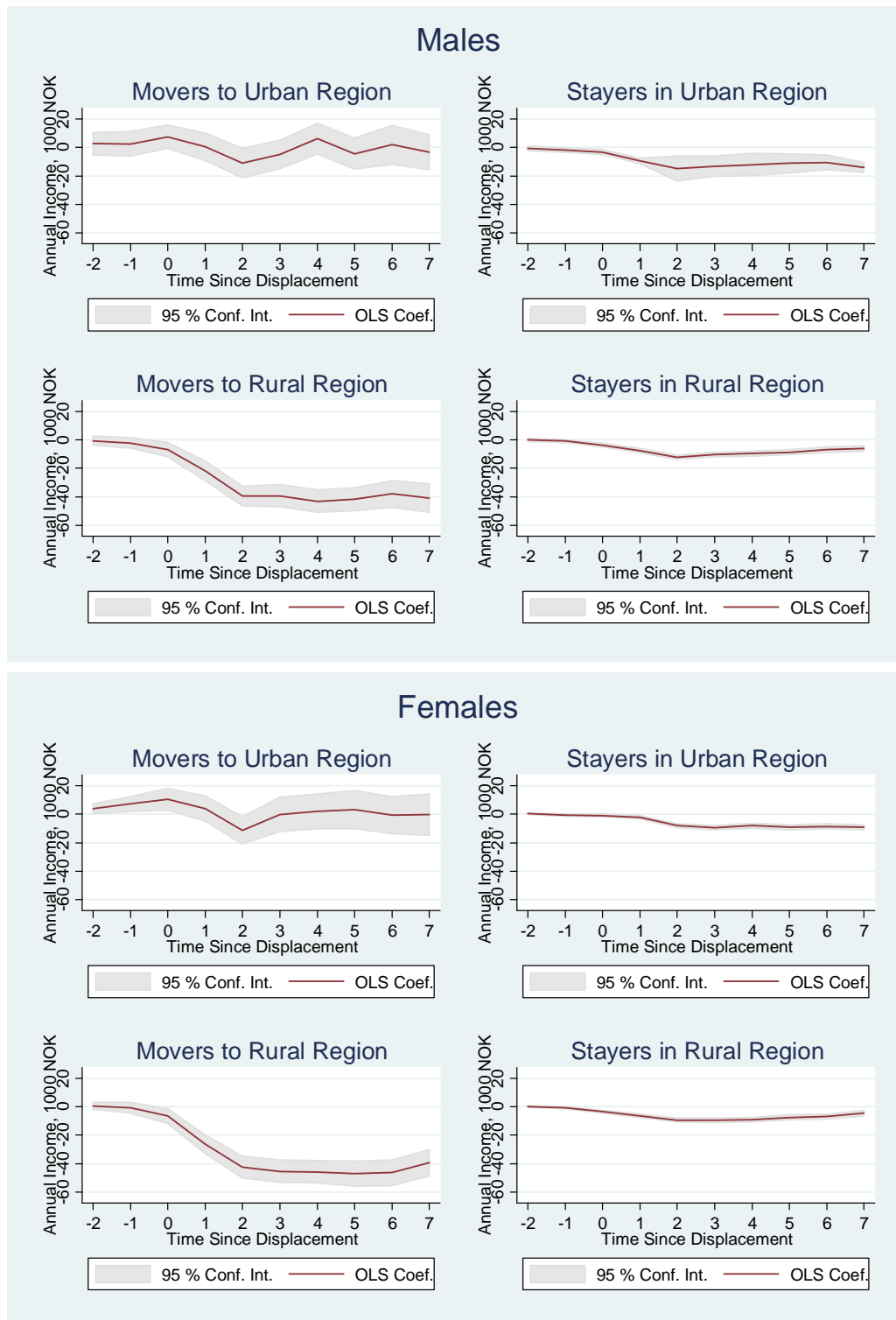
Notes: The dependent variable is real annual family income (including disability pension).

**Figure 6. Effect of job displacement on family income by moving status**



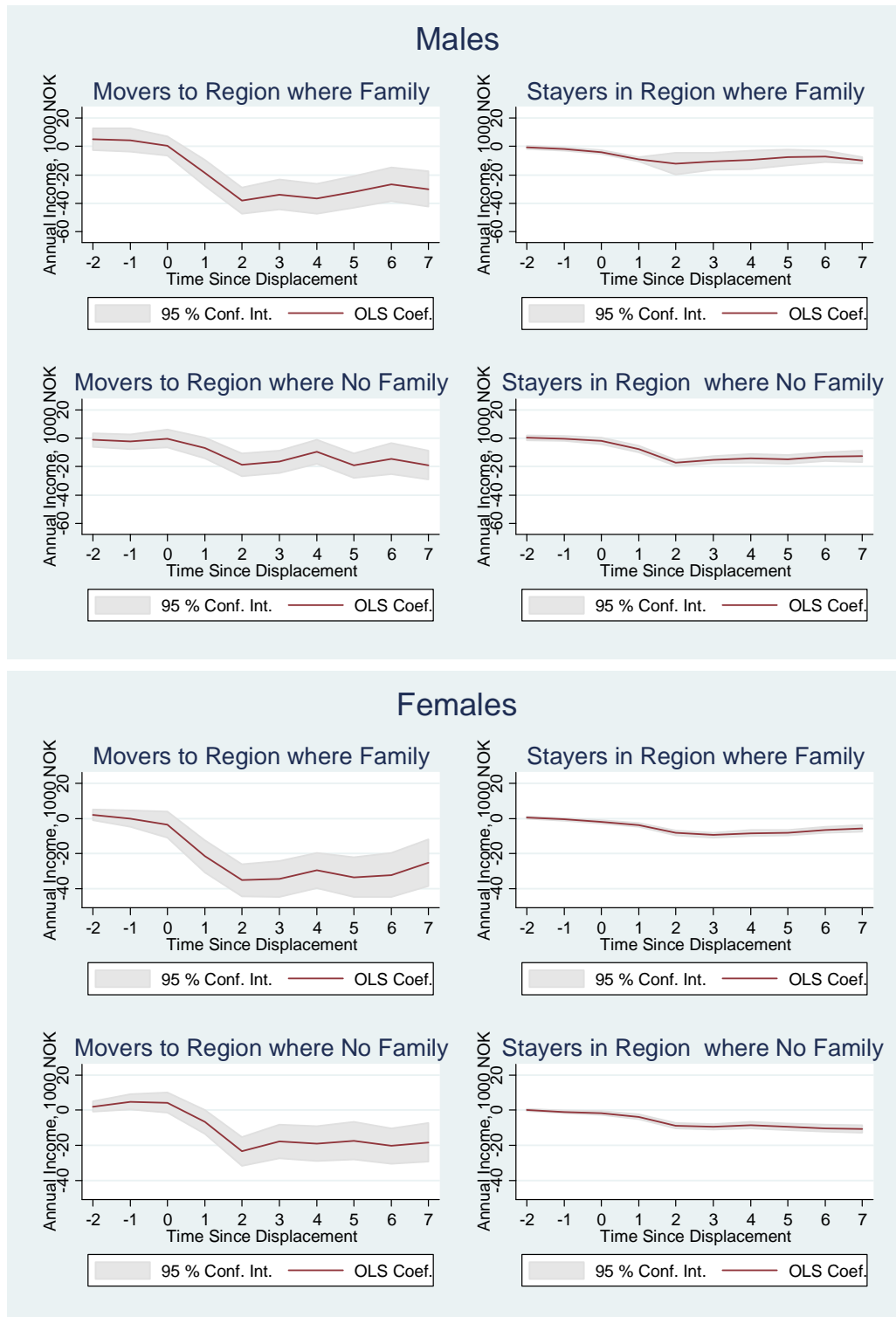
Notes: The dependent variable is real annual family income (including disability pension). The sample consist of workers that were 25-50 years old and full time employed and who had a spouse in base year 0 (years 1991-1998). The time period is from -3 to 7. Since model includes fixed effects for each individual in a given base year sample, we cannot estimate the effect for the first time period -3, and it is thus used as the base-level. The model also includes base year specific time dummies and age and squared age that is specific for base year-education level and base year urban status (in order to take into account that age-earnings profiles differ between workers from different educational groups and locations).

**Figure 7. Effect of job displacement by mobility and urban status of location in year t+2**



Notes: The dependent variable is real annual income. FE-model. Family in region means parent of the worker or his spouse is a resident in the same region at year 2., See text under table 4 for details.

**Figure 8. Effect of job displacement by mobility and family ties in location in year 2**



Notes: The dependent variable is real annual income. FE-model. Family in region means parent of the worker or his spouse is a resident in the same region at year 2. See text under table 4 for specification and controls.

**Table 1 a - Sample means of selected pre-displacement characteristics. Males.**

Variable	Displaced	Not displaced	P-value for difference
Age	38.02 (0.03)	38.26 (0.01)	<0.01
Secondary	0.63 (0.00)	0.63 (0.00)	0.90
Tertiary	0.21 (0.00)	0.21 (0.00)	0.81
Tenure	6.77 (0.02)	7.30 (0.01)	<0.01
Cohabiting or married	0.72 (0.00)	0.74 (0.00)	<0.01
Years in region	4.82 (0.00)	4.83 (0.00)	<0.01
Children at school	0.43 (0.00)	0.44 (0.00)	<0.01
Children under 7	0.20 (0.00)	0.20 (0.00)	0.35
Parent same region	0.69 (0.00)	0.69 (0.00)	0.12
Sibling same region	0.74 (0.00)	0.75 (0.00)	<0.01
Parent and sibl. in region	0.62 (0.00)	0.62 (0.00)	<0.01
Younger siblings	0.47 (0.00)	0.47 (0.00)	<0.01
Plant size (no. coworkers)	247.57 (1.37)	260.83 (0.60)	<0.01
Earnings t-3	292429 (469)	289132 (172)	<0.01
Earnings t-4	279610 (517)	277683 (164)	<0.01
Earnings t-5	265945 (510)	265856 (163)	0.85
Employment months t-4	10.98 (0.01)	11.11 (0.00)	<0.01
Employment months t-5	10.50 (0.01)	10.67 (0.00)	<0.01
At school t-4	0.05 (0.00)	0.06 (0.00)	<0.01
At school t-5	0.05 (0.00)	0.05 (0.00)	<0.01
Observations	79681	561892	

**Table 1 b -Sample means of selected pre-displacement characteristics. Females**

Variable	Displaced	Not displaced	P-value for difference
Age	37.55 (0.04)	38.02 (0.02)	<0.01
Secondary	0.65 (0.00)	0.64 (0.00)	<0.01
Tertiary	0.18 (0.00)	0.20 (0.00)	<0.01
Tenure	6.27 (0.03)	6.72 (0.01)	<0.01
Cohabiting or married	0.66 (0.00)	0.69 (0.00)	<0.01
Years in region	4.82 (0.00)	4.84 (0.00)	<0.01
Children at school	0.31 (0.00)	0.32 (0.00)	<0.01
Children under 7	0.06 (0.00)	0.06 (0.00)	<0.01
Parent same region	0.59 (0.00)	0.60 (0.00)	0.15
Sibling same region	0.66 (0.00)	0.67 (0.00)	<0.01
Parent and sibl. in region	0.53 (0.00)	0.54 (0.00)	0.13
Younger siblings	0.45 (0.00)	0.44 (0.00)	0.04
Plant size (no. coworkers)	201 (1.95)	249 (1.01)	<0.01
Earnings t-3	202811 (432)	204098 (168)	<0.01
Earnings t-4	190962 (437)	193558 (167)	<0.01
Earnings t-5	178036 (456)	181970 (166)	<0.01
Employment months t-4	9.79 (0.02)	9.88 (0.01)	<0.01
Employment months t-5	9.16 (0.03)	9.28 (0.01)	<0.01
At school t-4	0.05 (0.00)	0.05 (0.00)	0.99
At school t-5	0.05 (0.00)	0.05 (0.00)	0.90
Observations	30311	226667	

Notes. The probit marginal effects. The sample consists of workers who in year 0 (base years 1991–1998) are aged 25–50, employed in plants private sector plants with at least 10 workers. Displacement happened btw years t and t+1. Controls include also base year, region, and industry dummies.

**Table 2a. The effect of displacement on regional mobility by pre-displacement characteristics. Males.**

Males	(1)	(2)	(3)	(4)	(5)	(6)
Displaced	0.006 (0.000)**	0.005 (0.001)**	0.005 (0.001)**	0.007 (0.001)**	0.007 (0.001)**	0.006 (0.001)**
Displaced*Secondary		0.001 (0.001)				
Displaced*Tertiary		0.002 (0.001)				
Displaced*Rural			0.001 (0.001)			
Displaced*Spouse				-0.001 (0.001)		
Displaced*family in region*					-0.002 (0.001)*	
Displaced*school age children						0.001 (0.001)
Secondary Edu	0.001 (0.000)*	0.001 (0.000)*	0.001 (0.000)*	0.001 (0.000)*	0.001 (0.000)*	0.001 (0.000)*
Tertiary Edu	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**
Spouse	-0.004 (0.000)**	-0.004 (0.000)**	-0.004 (0.000)**	-0.003 (0.000)**	-0.004 (0.000)**	-0.004 (0.000)**
Family in Region*	-0.017 (0.001)**	-0.017 (0.001)**	-0.017 (0.001)**	-0.017 (0.001)**	-0.016 (0.001)**	-0.017 (0.001)**
School Age Children	-0.002 (0.000)**	-0.002 (0.000)**	-0.002 (0.000)**	-0.002 (0.000)**	-0.002 (0.000)**	-0.002 (0.000)**
Observations	638789	638789	638789	638789	638789	638789

Notes. The probit marginal effects. Dependent variable is an indicator whether worker moved between year t and t+2. The sample consists of workers who in year 0 (base years 1991–1998) are aged 25–50, employed in plants private sector plants with at least 10 workers. Displacement happened btw years t and t+1. \*Parent or spouse’s parents in located in the same pre-displacement region. **The regressions include all variables listed in table 3???** as additional controls. Since the specification includes baseyear-region fixed effects variable “urban” could not be estimated. In a model without regional fe-effects its coefficient is 0.003 (0.001).



**Table 2b. The effect of displacement on regional mobility by pre-displacement characteristics. Females.**

Females	(1)	(2)	(3)	(4)	(5)	(6)
Displaced	0.007 (0.001)**	0.009 (0.002)**	0.006 (0.001)**	0.008 (0.001)**	0.008 (0.001)**	0.006 (0.001)**
Displaced*Secondary		-0.002 (0.001)				
Displaced*Tertiary		-0.001 (0.002)				
Displaced*Rural			0.001 (0.001)			
Displaced*Spouse				-0.002 (0.001)		
Displaced*family in region*					-0.001 (0.001)	
Displaced*school age children						0.001 (0.001)
Secondary	0.002 (0.001)**	0.002 (0.001)**	0.002 (0.001)**	0.002 (0.001)**	0.002 (0.001)**	0.002 (0.001)**
Tertiary	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**	0.006 (0.001)**
Spouse	-0.006 (0.001)**	-0.006 (0.001)**	-0.006 (0.001)**	-0.005 (0.001)**	-0.006 (0.001)**	-0.006 (0.001)**
Family in Region*	-0.013 (0.001)**	-0.013 (0.001)**	-0.013 (0.001)**	-0.013 (0.001)**	-0.013 (0.001)**	-0.013 (0.001)**
School Age Children	-0.005 (0.000)**	-0.005 (0.000)**	-0.005 (0.000)**	-0.005 (0.000)**	-0.005 (0.000)**	-0.005 (0.001)**
Observations	256040	256040	256040	256040	256040	256040

Notes. The probit marginal effects. Dependent variable is an indicator whether worker moved between year t and t+2. The sample consists of workers who in year 0 (base years 1991–1998) are aged 25–50, employed in plants private sector plants with at least 10 workers. Displacement happened btw years t and t+1. \*Parent or spouse’s parents in located in the same pre-displacement region. **The regressions include all variables listed in table 3???** as additional controls. Since the specification includes baseyear-region fixed effects variable “urban” could not be estimated. In a model without regional fe-effects its coefficient is 0.003 (0.001).

**Table 3. Employment status at time t+2 and t+7 by displacement and moving status**

<b>Males</b>	Displaced		Non-Displaced	
	Stayers	Movers	Stayers	Movers
Two years after				
Employed	86.41	81.46	95.31	86.45
Same plant	4.67	1.85	75.84	33.07
same firm (diff plant)	17.29	13.17	3.54	7.54
same industry (diff firm)	33.42	26.47	5.40	14.67
Diff industry, private sector	28.60	34.61	9.78	27.55
Public sector	2.43	5.37	0.76	3.61
Not-employed	13.59	18.54	4.69	13.55
Unemployed	5.10	8.18	1.30	4.44
<i>Unempl &amp; no family in region*</i>	1.16	3.86	0.26	2.24
<i>Unempl &amp; family in region*</i>	3.94	4.32	1.04	2.20
At school	0.81	0.92	0.29	0.84
Outside	7.69	9.44	3.10	8.27
<i>Outside &amp; no family in region*</i>	1.46	4.24	0.56	3.77
<i>Outside &amp; family in region*</i>	6.22	5.20	2.55	4.50
No. of observations	76,568	2,384	547,447	10,989
<b>Males</b>	Displaced		Non-Displaced	
Seven years after	Stayers	Movers	Stayers	Movers
Employed	86.49	82.02	89.87	85.10
Not-employed	13.51	17.98	10.13	14.90
No. of observations	75,776	2,331	541,534	10,756
<b>Females</b>	Displaced		Non-Displaced	
Two years after	Stayers	Movers	Stayers	Movers
Employed	82.27	68.90	91.92	73.61
Same plant	3.82	0.79	73.98	24.54
same firm (diff plant)	13.14	8.86	2.83	5.91
same industry (diff firm)	32.44	19.98	4.83	13.24
Diff industry, private sector	27.41	29.43	8.70	23.31
Public sector	5.46	9.84	1.58	6.61
Not-employed	17.73	31.10	8.08	26.39
Unemployed	6.08	14.76	1.76	9.78
<i>Unempl &amp; no family in region*</i>	1.62	7.68	0.43	4.31
<i>Unempl &amp; family in region*</i>	4.46	7.09	1.33	5.47
At school	1.09	2.07	0.47	1.94
Outside	10.57	14.27	5.85	14.67
<i>Outside &amp; no family in region*</i>	2.36	5.81	1.14	6.55
<i>Outside &amp; family in region*</i>	8.21	8.46	4.71	8.13
No. of observations	29,087	1,016	220,826	4,736
<b>Females</b>	Displaced		Non-Displaced	
Seven years after	Stayers	Movers	Stayers	Movers
Employed	81.60	75.62	85.31	77.86
Not-employed	18.40	24.38	14.69	22.14
No. of observations	28,795	1,005	218,910	4,665

\*Parent or sibling of worker or parent or sibling of worker's spouse

**Appendix**

**Table A1 a - Sample means of selected pre-displacement characteristics: Males**

Variable	Displaced Movers	Displaced Stayers	P-value
Age	35.14 (0.14)	38.11 (0.03)	<0.01
Secondary	0.56 (0.01)	0.63 (0.00)	<0.01
Tertiary	0.34 (0.01)	0.21 (0.00)	<0.01
Tenure	4.65 (0.08)	6.83 (0.02)	<0.01
Cohabiting or married	0.54 (0.01)	0.73 (0.00)	<0.01
Years in region	3.94 (0.03)	4.85 (0.00)	<0.01
Children at school	0.29 (0.01)	0.44 (0.00)	<0.01
Children under 7	0.27 (0.01)	0.20 (0.00)	<0.01
Parent same region	0.42 (0.01)	0.69 (0.00)	<0.01
Sibling same region	0.52 (0.01)	0.74 (0.00)	<0.01
Parent and sibl. in region	0.36 (0.01)	0.63 (0.00)	<0.01
Younger siblings	0.51 (0.01)	0.47 (0.00)	<0.01
Plant size (no. coworkers)	234 (7.60)	248 (1.40)	0.089
Earnings t-3	298467 (3164)	292242 (474)	0.024
Earnings t-4	271697 (2767)	279853 (526)	<0.01
Earnings t-5	249488 (2853)	266451 (518)	<0.01
Employment months t-4	10.08 (0.09)	11.01 (0.01)	<0.01
Employment months t-5	9.21 (0.10)	10.53 (0.01)	<0.01
At school t-4	0.05 (0.00)	0.05 (0.00)	0.312
At school t-5	0.05 (0.00)	0.05 (0.00)	0.429
Observations	2384	77297	

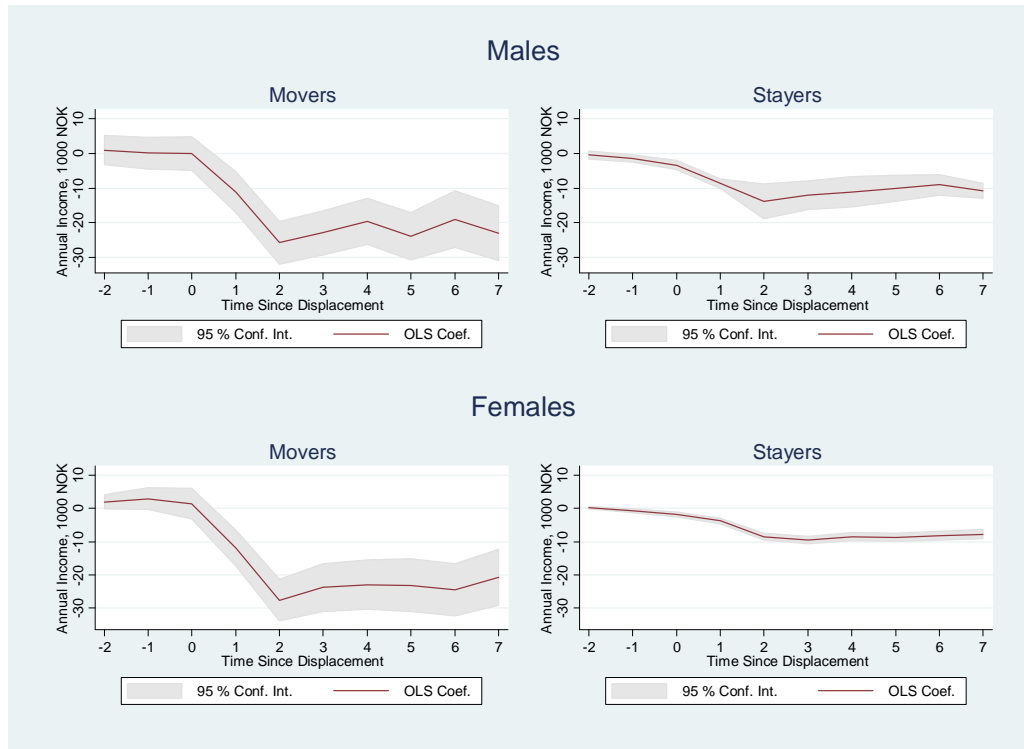
**Table A1 b - Sample means of selected pre-displacement characteristics: Females**

Variable	Displaced Movers	<i>Displaced Stayers</i>	<i>P-value</i>
Age	33.45 (0.21)	37.69 (0.04)	<0.01
Secondary	0.60 (0.02)	0.65 (0.00)	<0.01
Tertiary	0.30 (0.01)	0.189 (0.00)	<0.01
Tenure	4.62 (0.12)	6.33 (0.03)	<0.01
Cohabiting or married	0.40 (0.01)	0.67 (0.00)	<0.01
Years in region	3.97 (0.05)	4.85 (0.00)	<0.01
Children at school	0.16 (0.01)	0.31 (0.00)	<0.01
Children under 7	0.06 (0.01)	0.06 (0.00)	0.707
Parent same region	0.39 (0.02)	0.60 (0.00)	<0.01
Sibling same region	0.46 (0.02)	0.67 (0.00)	<0.01
Parent and sibl. in region	0.33 (0.01)	0.54 (0.00)	<0.01
Younger siblings	0.54 (0.02)	0.44 (0.00)	<0.01
Plant size (no. coworkers)	206 (10.58)	201 (1.99)	0.658
Earnings t-3	212292 (2445)	202482 (439)	<0.01
Earnings t-4	192053 (2607)	190924.1 (443)	0.643
Earnings t-5	174012 (2751)	178176 (462)	0.101
Employment months t-4	9.38 (0.14)	9.80 (0.02)	<0.01
Employment months t-5	8.65 (0.16)	9.18 (0.03)	<0.01
At school t-4	0.06 (0.01)	0.05 (0.00)	0.782
At school t-5	0.05 (0.01)	0.05 (0.00)	0.917
Observations	1016	29295	

**Table A2 - The effect of pre-displacement characteristics on the probability of move**

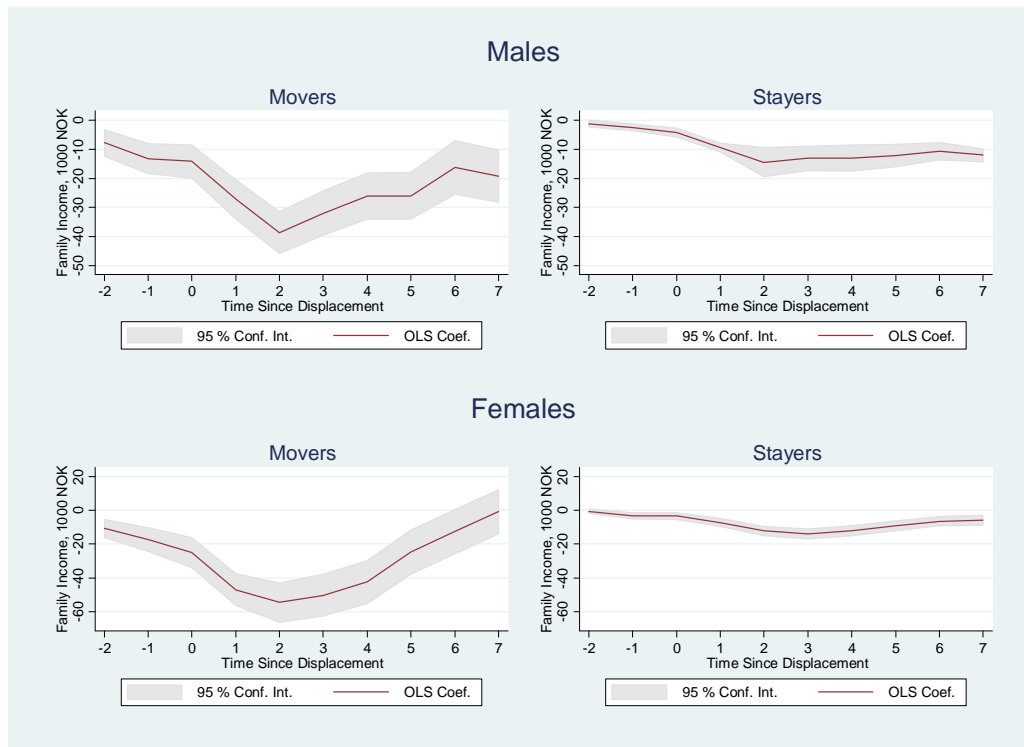
	All workers		Displaced workers	
	Males	Females	Males	Females
Displaced	0.006 (0.000)**	0.007 (0.001)**		
Age	0.001 (0.000)**	0.001 (0.000)*	0.002 (0.001)**	0.003 (0.001)*
Age^2	-0.000 (0.000)**	-0.000 (0.000)**	-0.000 (0.000)**	-0.000 (0.000)**
Secondary	0.001 (0.000)*	0.002 (0.001)**	0.002 (0.001)	-0.000 (0.002)
Tertiary	0.006 (0.001)**	0.006 (0.001)**	0.011 (0.002)**	0.005 (0.003)
Tenure	-0.001 (0.000)**	-0.001 (0.000)**	-0.001 (0.000)**	-0.001 (0.000)**
Married or cohabiting	-0.004 (0.000)**	-0.006 (0.001)**	-0.008 (0.001)**	-0.010 (0.002)**
Regional Unemployment Rate	0.002 (0.001)**	0.000 (0.001)	0.002 (0.002)	-0.004 (0.003)
Size of the Region/10000	0.001 (0.000)**	0.001 (0.000)**	0.001 (0.001)*	0.002 (0.001)
Years in region	-0.005 (0.000)**	-0.005 (0.000)**	-0.008 (0.000)**	-0.007 (0.001)**
School Age Children	-0.002 (0.000)**	-0.005 (0.000)**	-0.002 (0.001)	-0.006 (0.002)**
Under Sch. Age Child.	0.002 (0.000)**	-0.002 (0.001)**	0.003 (0.001)*	-0.004 (0.003)
Parent in the Pre-Displacement Region	-0.017 (0.001)**	-0.013 (0.001)**	-0.029 (0.003)**	-0.023 (0.004)**
Sibling in the Pre-Displacement Region	-0.007 (0.000)**	-0.006 (0.001)**	-0.009 (0.002)**	-0.013 (0.003)**
Parent and Sibl. in Reg.	0.000 (0.001)	-0.000 (0.001)	0.002 (0.002)	0.004 (0.004)
Younger Siblings	0.000 (0.000)	0.002 (0.000)**	-0.000 (0.001)	0.002 (0.002)
Plant size (# of co-workers)	0.000 (0.000)**	0.000 (0.000)**	-0.000 (0.000)	0.000 (0.000)
Earning t-3	0.000 (0.000)**	0.000 (0.000)	0.000 (0.000)**	0.000 (0.000)
Earning t-4	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Earning t-5	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)	0.000 (0.000)
Empl. Months t-4	-0.000 (0.000)**	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Empl. Months t-5	-0.000 (0.000)**	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
At school in 4	-0.001 (0.001)	0.000 (0.001)	-0.003 (0.002)	-0.001 (0.004)
At school in 5	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.002)	-0.000 (0.004)
Observations	638789	256040	79332	30135

**Figure A1\* Effect of job displacement on annual income (including disability benefits)**



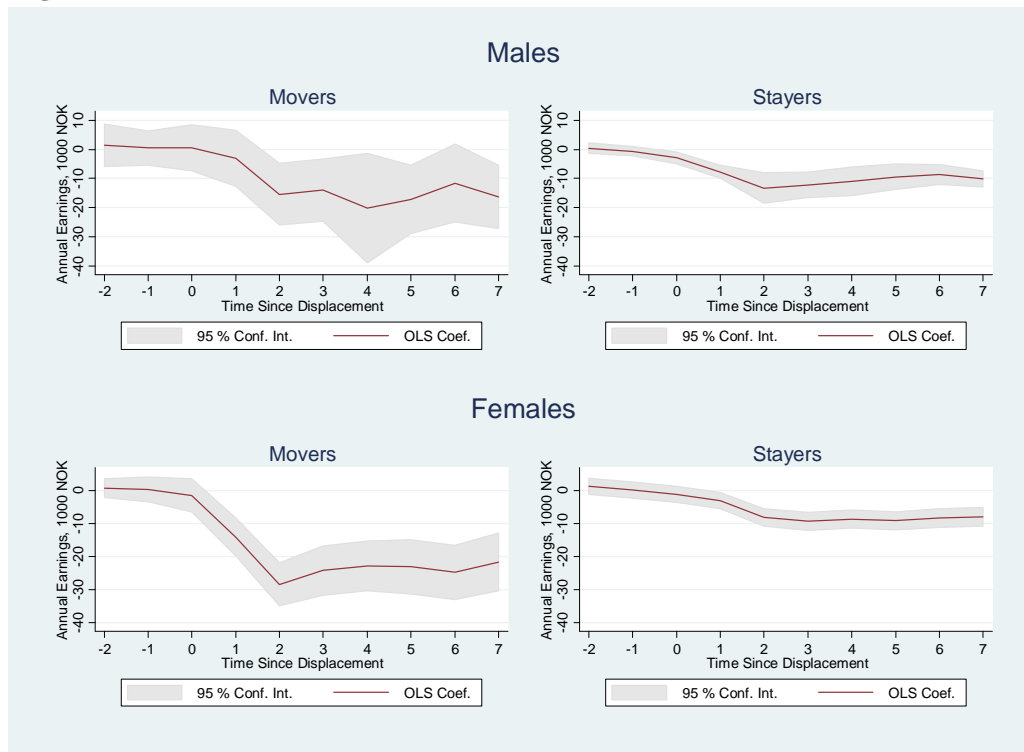
Notes: The dependent variable is real annual income.

**Figure A2. Effect of job displacement on real annual family earnings.**



Notes: The dependent variable is real annual family earnings.

**Figure A3. Effect of Job Displacement on Earnings: Propensity Score Weighted Regressions**



Dependent variable real annual earnings. Propensity score weighted estimation results. Weights equal 1 for treated, and  $p/(1-p)$  for non-treated, where  $p$  is the estimated propensity score. The pre-displacement (from year 0 if not mentioned otherwise) variable that are used to estimate propensity of treatment (job displacement and move, or job displacement and stay) are age, age squared, secondary, tertiary, base year tenure, married, cohabiting, school age children, children under 7, parent same region, spouse's parent in region, siblings (of the worker or his spouse) in the region, parent and siblings in region, younger siblings, years in region, same region in year t-5, plant size, annual real earnings t-3, annual real earnings t-4, annual real earnings t-5, employment months t-4, employment months t-5, at school t-4, at school t-5, base year dummies, base year region dummies, base year two digit industry dummies.

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