How destructive is creative destruction?
The costs of worker displacement ¤

by

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Abstract: We analyze the long-term e¤ects of worker displacement using a large administrative matched employer–employee database spanning throughout the entire Norwegian economy. Our focus is on prime-age male manufacturing sector workers displaced due to plant closure or signi…cant downsizing of the plant. The data follows these workers within the Norwegian economy up to seven years after displacement. We demonstrate that displacement signi…cantly increases the probability of exiting the labor force. Workers who remain in the labor force su¤er long-lasting negative earning losses. The magnitude of this loss, which peaks at 5 percent two years after displacement, is clearly smaller than what is found for the US. Older workers, workers with low education levels and workers displaced from small plants are more vulnerable than other groups. Twenty percent of the displaced workers …nd a new job in a sister plant within the same …rm. In the long run, 35 percent of the displaced workers change industry, as compared to 17 percent of nondisplaced workers.

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1 Introduction

In competitive markets there is continuous entry and exit of …rms. Productive and innovative …rms expand and less productive …rms downsize. This is the process of creative destruction, widely thought to be the most important source of long-term economic growth.[1] However, such reallocation is not frictionless, and the burden of restructuring is not equally distributed across workers.

Research suggests that the e¤ects of being displaced are quite detrimental. The majority of US studies analyzing the costs of involuntary job loss indicate that earnings and employment losses of displaced workers are large and persistent.[2] For high-tenured workers, earnings losses are estimated to be up to 25 percent, four years after losing the job. Studies of displaced workers in European countries are fewer and the results less clear. The general picture for Europe is that while earnings losses are smaller, time out from employment is longer than in the USA.[3] The results depend to a great extent on the groups of workers who are included in the data, how displaced workers are de…ned and what type workers are used as a comparison group. One particular shortcoming of the previous studies is that the studies use a sample of workers within the labor force to measure earnings loss and employment.[4] Obviously this may underestimate the true costs of displacement, as displacement might in‡uence the probability of leaving the labor force permanently.

An important contribution of this paper is to analyze the probability that workers leave the labor force permanently after being displaced. In addition, we analyze the e¤ect of displacement on earnings and employment of workers staying in the labor force. This makes it possible to compare our results with studies from other countries. We use matched employer–employee data

[1] See e.g., Haltiwanger et al. (2000).

[2] See surveys by Hamermesh (1987), Fallick (1996) and Kletzer (1998).

[3] See the studies in Kuhn (2002).

[4] There are exceptions. One is Chan and Stevens (2001), who analyze a sample of older workers in the USA. Another is Eliason and Storrie (2004) using data from Sweden.

from the census of the Norwegian population of workers and plants for the years 1988–1998. Census data has an advantage over more commonly used individual or household level survey data by making it possible to identify workers outside of the labor force. Having employer–employee data with a full set of labor market states also provides rich opportunities to partition the data in di¤erent ways to assess di¤erent outcomes and to de…ne di¤erent treatment and control groups. For instance, we can analyze the …rms and thus the sectors in which workers relocate after being displaced. This is informative about the speed with which industry restructuring occurs and the role of displacement in this process. We also pay particular attention to who bears the burden of restructuring by characterizing the workers most severely a¤ected by job displacement.

Several important methodological issues remain unsolved in the literature, and the data of this study o¤ers several opportunities for the provision of some answers. In order to measure the causal e¤ect of displacement, we would ideally compare the displaced workers' earnings and employment histories with what would have happened without displacement. Obviously, there is no such information available about workers both as displaced and in employment at the same time. The general solution to this problem is to use comparison groups to construct the counterfactual situation, i.e., use information about the nondisplaced workers to approximate the outcome for displaced workers in the nondisplacement situation. We follow this standard approach in the literature utilizing administrative data sets and use plant closure and signi…cant downsizing to identify exogenous separations. However, such troubled plants are not a random sample. We exploit the richness of the data to construct what can be thought of as "twin …rms" contrasting within a regression framework the labor market experience of workers from plants that are similar along many observable dimensions, such as plant size, industry and regional labor market conditions. The di¤erence in outcomes for similar workers in the treatment and control group identi…es the e¤ect of displacement.

Several alternative de…nitions of treatment and control groups have been used in the literature, and every identi…cation strategy results in a potential selection problem. We de…ne three alternative treatment groups, distinguishing between workers who lost their jobs when their plant closed (exit-layo¤s), those who left the plant in the period before it closed (early-leavers), and workers leaving plants that downsize signi…cantly from one year to the next without exiting (downsizing-plant-separators). We pool these three groups in our main analysis. Our control group is workers representing the "ongoing economy", i.e., all other workers – not only nondisplaced workers staying in the labor force. A signi…cant number of workers leave a plant for reasons other than having been displaced, and these workers must be included in the control group to avoid overstating the e¤ect of displacement.

We …nd that displacement increases the probability of leaving the labor force, especially in the long run (after seven years in our case). About 13 percent of the displaced workers leave the labor force within seven years, while 8 percent of the nondisplaced workers leave the labor force within the same time span, a di¤erence of about …ve percentage points.

Displaced workers remaining in the labor force work on average 2.4 months less in the following year compared to similar workers who were not displaced. Seven years after displacement, the average employment reduction is only a few days per year. Earnings are on average reduced by 4 percent in the …rst year after displacement. The earnings loss increases to 5 percent two to four years after displacement and then decreases to zero seven years after displacement. The increased earnings loss from year one to year two after displacement is most likely due to the fact that some workers receive compensation from their previous employer for some time after being displaced. We demonstrate statistically signi…cant but modest predisplacement e¤ects on employment and earnings. Controlling for individual …xed e¤ects generally reduces the estimated earnings loss, but not much.

In the short run, workers displaced by plant closure are less likely to be unemployed than workers displaced from troubled plants that do not close.

This could be due to selection and the "lemons argument" of Gibbons and Katz (1991), or because workers whose plants do not close hope that they will be recalled. The long-term effects suggest that the latter effect dominates, as workers displaced from downsizing plants do better than those displaced from plant exits after seven years.

Low-education workers and workers displaced from small plants are more vulnerable than other groups. The first finding is consistent with educated workers having more general human capital and therefore being more flexible in the labor market. The second finding suggests that large plants are in a better position to assist their workforce to transfer into new jobs. Large plants are likely to be under more pressure from special-interest groups. In general, already displaced workers have a higher probability of being displaced again than other workers do.

Transfers to other plants within multiplant firms upon displacement is quite common. In the short run, 20 percent of the displaced workers find a new job within the firm. Recall to downsizing plants is not unusual either. Three percent of the displaced workers were temporarily laid off with a formal recall possibility, but after seven years, as much as 9 percent of workers displaced from downsizing plants returned to the plant from which they were displaced. Examining where displaced workers reallocate in terms of industries, we find that 48 percent are still working in the same two-digit industry in the short run. Four percent move to a different two-digit manufacturing industry. As much as 20 percent reallocate to the private service sector, while 2 percent move to the public sector. The relative share of employed workers changing industry is far higher among displaced workers than among the nondisplaced workers. This suggests that displacement is a powerful vehicle for industry restructuring.

The rest of this paper is organized as follows: Section 2 discusses the previous literature. Section 3 describes the data, gives details on the sample construction and explains the definition of key variables. Section 4 describes relevant labor market institutions in Norway. Section 5 discusses the econo-

metric speci…cations. Section 6 presents descriptive evidence. Section 7 provides the results from the regression analysis, and Section 8 concludes the paper.

2 Previous Literature

The costs of displacement have been studied intensively for the last 25 years. Until recently, most of these studies analyzed displacement only in the US labor market. The results indicate substantial negative earnings e¤ects both in the short and in the long run. The earnings loss starts at least three years before displacement and persists for many years. Four to …ve years after displacement the loss is still 10–25 percent. The early literature compared earnings for the same workers before and after being displaced. The approach of using comparison groups for measuring the e¤ect of displacement, i.e. measuring the earnings change for displaced workers relative to a control group that was not displaced, was initiated in the early 1990s with papers by Ruhm (1991a and b) and Jacobson et al. (1993). Ruhm (1991b) uses a nationally based sample of displaced workers from the Panel Study of Income Dynamics (PSID) to examine the e¤ect of job displacement on unemployment. The treatment group consists of the workers who were displaced during a "base year". The comparison group consists of workers loosing their jobs at a later date. This allows Ruhm (1991b) to control for unobservable heterogeneity between displaced and nondisplaced workers, to the extent that persons displaced in di¤erent periods are similar. The results indicate that displaced workers su¤er signi…cant reduction in employment opportunities after displacement, but this e¤ect is not permanent; it appears to fade away within four years.

In their seminal work, Jacobson et al. (1993) de…ne workers as displaced if they leave a …rm that experienced signi…cant downsizing. They use as a comparison group the workers who do not leave their …rms. They …nd that displaced workers su¤er large and long-lasting earnings reductions after

displacement. Five years after displacement, average quarterly earning losses were 25 percent. There are, however, several reasons why their results cannot be generalized. They only examine high-tenured workers and they use data from only one state, Pennsylvania. Displacement in a state dominated by traditional manufacturing industries may not be representative of the whole nation. Furthermore, they focus only on workers who remain in Pennsylvania after displacement, have earnings and stay in the labor force.

Stevens (1997) examines long-term e¤ects of job displacement on earnings. A worker is labeled displaced if he or she leaves the previous job due to plant or business closure, or to being laid o¤ or …red. The comparison group consists of the never-displaced workers. She …nds that the e¤ects of displacement are quite persistent, with earnings and wages remaining approximately 9 percent below their expected levels six years or more after displacement. She also demonstrates that much of this persistence can be explained by additional job losses in the years following displacement. Workers who avoid additional displacements have earnings and wage losses around 1–2 percent six or more years after the initial displacement.

Kletzer at al. (2003) use data from the National Longitudinal Survey of Youth (NSLY) to study long-term e¤ects of job displacement on young workers. They de…ne a worker as displaced if the worker was no longer working at a reported job and the reason for the job ending was either "layo¤" or "plant closure". They include only the …rst observed job displacement for each individual during the survey period. Thus, potential future displacements are viewed as a cost of the initial displacement. They …nd that the earnings and wage losses associated with job displacement for young workers are somewhat smaller and less persistent than the losses reported in other studies for older workers.

In contrast to the large supply of US studies, studies using European data on the costs of job displacement have been scarce. As in the US studies, the main focus has been on earnings losses following displacement. The results of these studies are di¢cult to summarize, as they appear to provide

rather mixed results. On average smaller short-term and long-term earnings losses have been reported in Europe than in the USA. The European studies support the observation that those who experience further job losses following displacement experience larger earnings losses.

Borland et al. (2002) examine the consequences of job loss for displaced workers in Britain, using the British Household Panel Survey. Workers are de…ned as displaced if they leave their previous job due to redundancy or dismissal. They …nd that weekly wage of the average displaced worker is around 10 percent lower in the new job than in the job lost. Part of the loss is due to the fact that displaced workers are more likely to end up in part-time jobs. If the displaced worker …nds a new full-time job, the wage loss is 4 percent. Those who move directly into a new job have a wage loss of only 2 percent.

Bender et al. (2002) examine the e¤ects of worker displacement in France and Germany using matched employer–employee administrative data sets. They focus on prime-age males with more than four years of seniority. Displacement is de…ned as a separation that results from the closure or signi…cant downsizing of the employing …rm. Using the French data they found no negative postdisplacement earnings e¤ects, while in Germany the displacement appears to lead to a 1–2 percent wage decrease. In Germany, Burda and Mertens (1998) also report on average small wage e¤ects following displacement, although highly paid workers experience an earnings reduction prior to displacement that is more similar to the US results. In a recent study von Wachter and Bender (2006) examine the wage loss for young workers in Germany up to …ve years after displacement. They …nd that the wage loss is about 15 percent initially but that it vanishes after …ve years.

Albæk et al. (2002) examine the e¤ects of job displacement in Denmark and Belgium. The …rst-year estimated earnings loss in Denmark is 2.9 percent compared to nondisplaced workers in downsizing …rms and 4.7 percent compared to other workers. The estimated earnings loss after three years is 2.1 percent compared to nondisplaced workers in downsizing …rms and 6.8

percent compared to other workers. The corresponding Belgian numbers are rather unstable, varying from a 35 percent wage loss to a 6.5 percent wage gain, depending on the chosen control group and the time span.

In a recent paper, Carneiro and Portugal (2004) use administrative matched employer–employee data to analyze earnings losses of displaced workers in Portugal. In contrast to most European studies they …nd substantial earnings losses following displacement. The earnings loss is 8–11 percent after four years. This is within the lower bound of the US results. They also …nd that the losses depend on spells of unemployment as well as on worker and …rm characteristics.

As mentioned in the introduction, most data sets used in displacement studies cover only workers who remain in the labor force[5]. This will tend to underestimate the displacement costs, since an obvious consequence of job displacement is that workers might permanently withdraw from the labor force. Chan and Stevens (2001) focus on this question. They examine the employment patterns of older workers (50+) after job loss, using US data from the Health and Retirement Study. They focus on workers who have lost their jobs due to plant closure or other types of layo¤, and …nd that a job loss results in large and lasting e¤ects on future employment probabilities. Four years after a job loss, at age 55+, the employment rate of displaced workers remains 20 percentage points below the employment rate of similar nondisplaced workers.

Studies examining employment consequences of job displacement in Europe are very scarce. Most of these studies provide only descriptive information on the duration of nonemployment, or study the determinants which a¤ect the duration of nonemployment. Abbring et al. (2002) report that most of the displaced workers in the sample of workers in Netherlands move directly to new jobs, and very few su¤er a period of joblessness that lasts for more than one year. Abbring et al. (2002) also have a subsample in which

[5]One of the commonly used data sets in the USA, for example, the PSID, has only information on household heads (thus mostly men) with positive earnings in every year.

they observe workers if they leave the labor force, but there are too few observations to make any inference. Bender et al. (2002) found that in France and Germany displaced workers are less likely to have nonemployment spells after separation than other separators. They also abandon nonemployment faster. Albæk et al. (2002) …nd that in Belgium, reemployment is signi…cantly more likely for high-wage workers, young workers and for high tenure workers. This positive e¤ect of tenure may re‡ect greater advance notice and other reemployment assistance provided to senior workers.

Eliason and Storrie (2004) examine the employment consequences of job displacement using data for the entire private sector in Sweden. They …nd that displaced workers are more likely to be unemployed and have higher probability of leaving the labor force than other workers. Rege et al. (2005) investigate the impact of plant downsizing on disability pension utilization in Norway. They …nd that workers a¤ected by plant downsizing are more likely than comparable workers in nondownsizing plants to use disability pensions in the following years.[6]

3 Data, Variable De…nitions and Sample Construction

The data on workers used in our study is derived from administrative registers and prepared for research by Statistics Norway. It covers all Norwegian residents 16–74 years old in the years 1988–1998.[7] There is information about employment relationships, labor income, educational attainment, labor market status, and a set of demographic variables such as gender, age, experience and marital status. A unique person identi…cation code allows following workers over time. Likewise, unique …rm and plant codes allow identifying

[6] There are also a few case studies from the Scandinavian countries that analyze in detail the outcomes over time for workers displaced from one particular plant after bankruptcy. See Westin (1990) and Edin (1988).

[7] Data for the years 1986, 1987, 1999 and 2000 is available, but not used in this study as information about months of unemployment is unavailable.

each worker's employer and examining whether the plant in which the worker is employed is downsizing or closing down. Plant and regional labor market characteristics such as industry, size and the rate of unemployment are also available. The match between workers and plants is in May until 1995 and in November from 1996.

The sample used in our main analysis is constructed by …rst identifying all male workers between age 25 and 55 who were full-time employed in manufacturing plants with at least …ve workers in 1991, our "base year". The year 1991 is chosen because we want to study the e¤ect of displacement for a number of years after displacement and also to assess the employment history of workers some years before displacement. In this way a window of analysis is provided both before and after displacement. As a robustness exercise we attempt di¤erent base years, and the pre- and postdisplacement patterns in employment and earnings were quite stable; see Figures A1 and A2 in the appendix.[8] The age of 55 is chosen as a cut-o¤ age primarily because the workers are still not old enough to have bene…ted from ordinary early pension schemes seven years on, when we assess the long-term consequences of displacement.We restrict our analysis to workers that were in the labor force and did not experience a displacement incident between 1988 and 1991. The sample obtained in this way consists of 114 740 workers. We trace these workers' employment history three years before and seven years after 1991. This provides an 11-year-long panel.

Based on what happened between May 1991 and May 1992, workers are divided into …ve categories: exit-layo¤s, early-leavers, downsizing-plant-separators, other separators and nonseparators (stayers). The …rst three categories de…ne our treatment group. These are workers who were full-time employed in manufacturing in May of 1991 and became displaced from their jobs between May 1991 and May 1992. These workers will be referred to as displaced in 1991. The comparison groups are those working full-time in manufacturing in May 1991 who were not displaced from their jobs between

[8] These …gures are directly comparable with Figures 2 and 3.

May 1991 and May 1992.

Following the previous literature, displaced workers are understood to be individuals, who involuntary separate from their jobs by exogenous shocks. Hence, voluntary job-movers and workers …red for cause should not be included, see for instance Fallick (1996). We conceptualize this by de…ning displaced workers as workers separating from plants that close down or reduced employment by 30 percent or more in the year when the separation occurrs. Displaced workers are classi…ed as exit-layo¤s if they worked in an exiting plant at the time the plant is last observed.[9] Workers are classi…ed as early-leavers if they leave a plant that exits within the next two years. They are classi…ed as downsizing-plant-separators if they separate from a plant that reduces employment by 30 percent or more in that year.[10] Note that temporary layo¤ with recall is a possibility in Norway and displacement includes these workers. The data allows us to identify this group and in Table 3 we present the proportion of laid-o¤ workers with recall. The comparison or control group consists of all nondisplaced workers, i.e. both stayers in downsizing plants and workers in all other continuing plants in the manufacturing sector.

We identify being out of the labor force as not having a plant identi…er. Those outside of the labor force include all workers on disability pension,

[9] A plant is de…ned as an exiting plant in year t if it is present in year t but absent in $t + 1$ and in $t + 2$. If possible, we also check that the plants do not reappear after $t + 2$. We remove from the sample all workers in plants that reappear. Furthermore, we check whether the workers whose plant exited between t and $t + 1$, work in a new plant at time $t + 1$ with a new identi…cation code, but with mostly the same workers as in the exiting plant. Such "false" plant exits may happen when more than one of the following events occur: The plant moves to a di¤erent municipality, changes industry and/or changes owner.

[10] A similar downsizing plant de…nition has been used in many previous studies, e.g., Albæk et al. (2002). The downsizing category does not include early-leavers who leave downsizing plants that are exiting in the future. Note also that for small plants, a 30 percent reduction is not a "mass layo¤". Our assessment is, however, that an approach without a special size cut for de…ning downsizing plants is better than having an arbitrary size cut and including all workers leaving smaller plants in the nondisplaced comparison group. We are using a …ve-employee size cut for all plants in the base year sample.

and on di¤erent types of work rehabilitation programs. Since the upper age in our sample is 55 in 1991 and we measure the outcome up to seven years later, those on standard early retirement schemes from the age of 63 or standard retirement schemes from the age of 67 are not included in our analysis. Hence, workers who leave the labor force one to seven years after displacement do so for health-related reasons.

Employment is measured as months of full-time equivalent employment over the year.[11] This allows us to account for unemployment spells and part-time jobs as an outcome variable. Earnings are measured as annual income that provides pension points in the national security system. The included components are regular labor income, income as self-employed, and bene…ts received while on sick leave, being unemployed and on parental leave. 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.

Table 1 reports the mean values of the main predisplacement variables for di¤erent worker categories. Overall, the observable di¤erences between the various groups are small which supports our sample selection criteria. Displaced workers are slightly younger, more educated and have shorter tenure than nondisplaced workers. Furthermore, displaced workers earn slightly more than nondisplaced workers both one and three years prior to displacement. Exit-layo¤s seem slightly older than downsizing separators and early-leavers. Among the nondisplaced workers, stayers are older and have more tenure than other separators.

At the plant level we calculate the female work force, the average education level, average tenure, average worker age, plant size and plant age. Regional labor markets are de…ned by Statistics Norway and follow the EU standard NUTS 4, see Statistics Norway (2000). The size of the regional

[11] 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.

labor market is measured as the working age population, i.e., the population between 16 and 74. The regional unemployment rate is calculated as the ratio of unemployed man-years to the working-age population. Table 2 provides plant- level descriptive statistics. It is revealed that the average plant size in the sample, 41 workers, is small. This re‡ects the general industry structure in Norway, which consists mostly of small and medium-sized …rms. Exiting and downsizing plants are somewhat smaller than other plants, having on average 23 and 30 workers respectively. Average tenure is 1.3 years shorter in exiting plants and 0.8 years shorter in downsizing plants compared to the overall average. Both of these patterns are consistent with many of the exiting plants being young. On average, exiting plants are two years younger than the remaining plants.

4 Institutional Details

Countries di¤er in terms of institutional settings in the labor market and in labor relations. These di¤erences may impact both on the incidence of displacement and on the size and type of associated costs. In this section we provide information on wage setting institutions, layo¤ protection regulation and unemployment insurance in Norway, as compared to other countries. We also provide a brief account of possible exit routes from the Norwegian labor market.

4.1 Wage setting

According to Stokke et al. (2003), about half of the Norwegian labor force in the private sector is covered by collective agreements. Union density, i.e., the share of employees who are members of a union, is somewhat lower in the private sector, 43 percent. Wallerstein et al. (1997) demonstrate that these …gures were stable throughout in the period we analyze. Bargaining coverage is higher than union density because …rms covered by a collective agreement apply the agreement to all employees. However, in contrast to many other

European countries, there are no extension mechanisms imposing regulations from collective agreements onto the nonunionized sectors.

For employees covered by collective agreements, wage setting takes place at two levels, national (or industry) and at the …rm level (called wage drift). Central negotiations concern collective agreements, wage regulations, working hours, working conditions, pensions, medical bene…ts, etc. Firm-level negotiations determine possible local adjustments and additions to the collective agreements. Holden (1998) explains that these negotiations are generally conducted under a peace clause in order to prevent strikes and lockouts within the contract period of the collective, i.e., central, agreements.

4.2 Employment protection

The two main laws governing the labor relations in Norway are the law on employment ("Sysselsettingsloven") and the law on labor relations ("Arbeidsmiljøloven"). The former mainly regulates changes in labor use during a period of restructuring and mass layo¤s by a …rm. The latter includes standards for general working conditions, overtime regulations and legal regulation for employment protection. According to the law on labor relations, dismissals for individual reasons are limited to cases of disloyalty, persistent absenteeism, etc. In general, it is possible, but very di¢cult, to replace an individual worker in a given job with another worker. The law on employment states that the general rule for laying o¤ a worker for economic reasons is that it can occur when the job is "redundant" and the worker cannot be retained in another capacity. This regulation covers all workers regardless of how long they have been employed. Requirements for collective dismissals in Norway basically follow the common minimum standards for EU countries. It is important to note that a …rm can dismiss workers not only when it is making a loss but also when it is performing poorly. There is no legal rule on the selection of workers to be dismissed, although seniority is a strong

norm[12].

The employment law states that employment is terminable with one month's notice for workers with tenure of less than or equal to …ve years. In international comparisons, this one-month notice period is at the lower end of the spectrum. However, most workers have a three-month notice requirement for both parties to the contract. Although there is no generalized legal requirement for severance pay in Norway, agreements in the private sector requires lump-sum payments to workers aged between 50 and 55. When …rms downsize, workers may also be o¤ered pay after termination of employment, if they resign voluntarily. The period with pay from the previous employer may vary from two weeks to two years. Typically, long tenure implies more generous conditions. Other components in voluntary agreements o¤ered to smooth the downsizing process may include job search assistance, social plans for retraining or transfer to another plant within the …rm.

An interesting aspect of the Norwegian labor protection rules is access to temporary layo¤s with recall possibilities. This regulation is part of the Main Agreement between the main employers' and employees' organization, and it is also observed by most …rms outside the employers' organization. This agreement states that it is possible for a …rm to temporarily lay o¤ workers due to temporary changes in demand for the product etc. The …rm has to pay wages for 10 days. After that, the workers are on unemployment bene…t. Workers can be temporarily laid o¤ for up to six months within an 18-month time span.

Compared to other OECD countries, Norway is ranked slightly above average for strictness regarding the use of temporary employment (OECD, 1999). Obviously, intercountry comparisons are di¢cult, and very few comparative studies of the overall degree of employment protection exist. A much-cited study by Emerson (1987) ranks Italy as having the strongest employment protection rules, while the UK, and, on some criteria, Denmark are

[12]Seniority is institutionalized in the main collective agreement ("Hovedavtalen"), but only in situations when "all else is equal".

at the other end of the spectrum. Norway is ranked in the intermediate range as a country with a fairly high degree of protection, together with Sweden, France and to a lesser extent Germany.

4.3 Unemployment insurance

The unemployment bene…t system in Norway is mandatory. Given labor earnings, a very low threshold in the previous year, a worker is entitled to a bene…t of 62.4 percent of the previous year's pay, or 62.4 percent of the average of the last three years. One may receive bene…ts for up to 156 weeks. Until 1997 there was a formal limit of 80 weeks, followed by a period of 13 weeks without bene…ts, and then 80 new weeks of bene…t. In practice there were exemptions from these rules, so e¤ectively there was no interruption to receiving bene…ts. The rules are more liberal for older workers; from the age of 60.5 years one is basically entitled to unemployment bene…t until the retirement age of 67. After the unemployment bene…t period, one is entitled to means-tested social support.

4.4 Early retirement

The mandatory retirement age in Norway is 67. It is possible to work until one is 70 and still receive the pension, but it is reduced according to labor income. When retired, one receives about 62 percent of last year's labor earnings. After tax this amounts to about 83 percent of the previous earnings[13].

There is no common early retirement scheme in Norway. However, from 1989 there has been an early retirement arrangement for those covered by the main employers' and employees' organization. These organizations negotiated an early retirement scheme which is quite generous in that pension income is not adjusted according to the time of retirement as long as certain

[13] These numbers apply for low-income workers receiving public pension only. High-income workers will receive less relative to previous income in public pensions, but usually they have additional private pensions providing as good coverage.

criteria are ful…lled. What is most important is to have earned pension points in the National social security scheme for at least 10 years after the age of 50. The age of early retirement started at 66, but it has gradually been reduced; since 1998 it has been 62. As mentioned in section 3, we restricted our sample so that all workers are less than 62 years old seven years after displacement. In that way we avoid the e¤ects of early retirement. A very common way of exiting the labor market, however, is through disability pension. In our data period the access to disability pension was very liberal, and according to Dahl et al. (2002) it is quite clear that labor market conditions were a factor when assessing people. In order to receive disability pension, a person has to document that their ability to earn income is reduced by at least 50 percent. The usual chain of events is …rst to receive sickness pension for one year and then to register for a period in a work rehabilitation program. One receives about 62 percent of last year's labor earnings in a disability pension.[14] There also exist private early retirement schemes for workers in some …rms. This may increase the earnings to cover up to 90 percent of last year's pay.

5 Econometric Speci…cations

Our aim is to estimate the short run and long run costs of displacement. Our identi…cation strategy consists of three main elements. First, we compare postdisplacement outcomes for displaced workers from exiting and downsizing plants to workers in continuing plants. Next we include control variables and compare workers as similar as possible on observable characteristics, working in …rms that are as similar as possible in terms of …rm characteristics, local labor market characteristics and industry characteristics. Finally we account for unobservable characteristics by including worker …xed e¤ects.

We start our analysis by investigating the e¤ect of displacement on the probability of being out of the labor force in di¤erent postdisplacement years. We use the following probit speci…cation:

[14] Disability pensions are supposed to give workers the same income as they would have received from the ordinary old age pension had they not become disabled.

$$P(E_i) = \Phi(X_i\beta + Z_i\gamma + D_i\delta) \quad (1)$$

E (exit) is a dummy variable for being out of the labor force, X is a vector of observable pre-and postdisplacement worker characteristics comprising years of education, age, age squared, pre displacement tenure, and pre displacement marital status. Z is a vector of plant and regional labor market characteristics including predisplacement plant size, size of the predisplacement labor market, predisplacement regional rate of unemployment. D is a dummy variable for having been displaced between May 1991 and May 1992. We estimate the model separately for each postdisplacement year, i.e., from 1991 to 1997. We also expand specification (1) by distinguishing between the three subcategories of displaced workers: exit-layoffs, early-leavers and downsizing separators. Finally, we estimate the model separately for different groups of workers in order to investigate potential heterogeneity in the effect of displacement.

Having explored how displacement affects labor force participation, we examine how job displacement affects employment and earnings for those who remain in the labor force. When analyzing this second question, our main specification is

$$Y_{it} = X_{it}\beta + Z_{it}\gamma + \sum_{j=-3}^{\bar{X}} D_{it-j}\delta_j + \tau_t + \alpha_i + \epsilon_{it}. \quad (2)$$

Y is labor market outcome, either months of employment or the natural log of annual taxable labor income. X and Z are, as above, vectors of observable worker and firm characteristics. Time dummies, τ, are included, and in some specifications also individual fixed effects, α_i. The variables of main interest are the displacement variables, D_{it-j}. These are dummy variables indicating whether a displacement occurs at time $t - j$, t being the observation year. Job loss is allowed to affect labor market outcomes four years before its occurrence and seven years after its occurrence, hence $j = -3..., 0, ...7$.

It is important to keep in mind that displacements may not be completely

exogenous to the workers. Separations from plants closing down or downsizing are likely to be close to exogenous job losses, being the result of an operational response of the employer to some exogenous shock. Individual worker characteristics are unlikely to be major determinant of plant shutdowns or large-scale employment reductions. However, we cannot test this assumption, and we acknowledge that none of our displacement categories can be thought of as generated by purely randomized experiments. There are two main reasons for this. First, there is selection of plants into exiting plants and downsizing plants. Such plants will be concentrated in industries and regional labor markets experiencing reduced labor demand. This again is likely to a¤ect the future employment conditions of the workers of these plants, since their human capital is speci…c to troubled sectors or occupations. Second, displaced workers may be a selected sample of workers even within the same industry, location or …rm, see below. In order to control for the possible endogeneity of displacements we condition on a rich set of predisplacement worker, plant and local labor market characteristics, as well as region and time e¤ects. We also estimate the regressions with individual …xed e¤ects in order to control for potential unobserved di¤erences between displaced and nondisplaced workers.

In order to explore possible selection issues, we examine whether the displacement e¤ect varies by the di¤erent displacement categories, exit-layo¤s, early-leavers and downsizing-plant-separators. The latter two groups may be a nonrandom sample of the plants' employees, as the troubled plants have an obvious incentive to lay o¤ less-productive workers, or more precisely, workers with low productivity relative to their wage. Furthermore, workers with relatively better external market opportunities and lower proportion of …rm-speci…c human capital may be more likely to quit when their employment relationship becomes uncertain. Since a plant closing is often preceded by a period of signi…cant downsizing, this has rami…cations also for the exit-layo¤s. If workers who leave during a downsizing period are a selected group,

workers who stay until the end will also be selected.[15] In order to explore possible differences between the three displacement categories, we estimate a model in which the displacement effect is allowed to differ between the groups:

$$Y_{it} = X_{it}\beta + Z_{it}\gamma + \sum_{j=-2}^{2} EXIT_{it-j}\lambda_j + \sum_{j=-2}^{2} EARLY_{it-j}\mu_j + \sum_{j=-2}^{2} DOWN_{it-j}\nu_j + \tau_t + \alpha_i + \epsilon_{it} \quad (3)$$

The dependent variable and the covariates are identical to those in equation (2). EXIT, EARLY and DOWN are dummy variables. We estimate the equation both with and without fixed effects (α_i).

It is not obvious that the effect of displacement is equally distributed across workers with different characteristics. For example, if the earnings loss for displaced workers is explained by the loss in firm-specific human capital, workers with long predisplacement job tenure should suffer more severe reductions in their earnings than workers with short predisplacement job tenure. If, on the other hand, the earnings and employment reduction reflects that workers in exiting and downsizing firms are situated in poorly performing labor markets, the losses should differ according to the characteristics of the regional labor markets. In order to explore heterogeneity in the displacement effects, we include interactions between the displacement dummies and the variables in the X and Z vectors:

$$Y_{it} = X_{it}\beta + Z_{it}\gamma + \sum_{j=-3}^{3} D_{it-j}\delta + \sum_{j=-3}^{3} X_{it} \pounds D_{it-j}\theta_j + + \sum_{j=-3}^{3} Z_{it} \pounds D_{it-j}\theta_j + \tau_t + \alpha_i + \epsilon_{it} \quad (4)$$

[15] Lengermann and Vilhuber (2002) study the employment flows from plants prior to plant closure. They find important differences between the quality composition of workers who leave the plant before the closure and those who stay until the closure. Cf. also Bowlus and Vilhuber (2002) and Hamermesh and Pfann (2001).

6 Descriptive Evidence

In this section we …rst present the incidence of plant exits and worker displacement patterns over the business cycle. Next, we provide a detailed descriptive analysis of di¤erent end-states for workers in the short and long run. Finally, we provide some descriptive analysis supporting our choice of control group, i.e., using all other workers not displaced instead of only nonseparators or nondisplaced workers staying in the labor force.

Figure 1 presents the pattern over the business cycle of exiting plants and worker displacement. All three categories of displaced workers are displayed as share of total employment for the period 1986–1996. GDP growth and the unemployment rate are used as business cycle indicators. Plant exits and displacements are both negatively correlated with GDP growth and positively correlated with the change in the unemployment rate. Hence, displacements are countercyclical. The total displacement rate varies between 5 and 11 percent. In the USA the displacement rate is about 5 percent; for most European countries it is between 5 and 10 percent and thus similar to our results (Kuhn, 2002).

Table 3 provides …gures for the employment status of workers one and seven years after separation. More precisely, it demonstrates the employment status in May 1992 and November 1998 for workers separating between May 1991 and May 1992. From the upper part of the table we see that 73 percent of the displaced workers are reemployed by May 1992. If separations are equally distributed throughout the year, the average worker was displaced six months previously. Some workers, obviously, will have been displaced quite recently. For workers who are displaced from plants that will close down in the near future (early-leavers), the reemployment rate is 79 percent. Workers who stay with the dying plant until the end (exit-layo¤s) are a little less likely to be reemployed within one year after separation. Their reemployment rate is 76 percent. Downsizing-plant-separators are worst o¤; only 68 percent are reemployed within one year after displacement. This lower reemployment rate could be because they hope to be recalled and

therefore are more reluctant to accept new jobs. It could also be due to selection, i.e., workers with low productivity are laid o¤ …rst. For the control group the employment rate is about 96 percent, clearly indicating that the displaced workers in the short run are performing worse than the rest of the workers in the economy. However, most of the nonemployed displaced workers are registered as unemployed and only 2 percent are never again observed in the labor force.

The lower part of Table 3 focuses on long-term e¤ects. The employment rate for all displaced workers increases over time and is 82 percent seven years after displacement. The employment rate for the control group has fallen to 88 percent. There is a very small di¤erence between the employment rates of the three displacement categories seven years after displacement. The improved position of downsizing-plant-separators is consistent with their higher nonemployment rate one year after displacement, being due to a hope for recall rather than selection. We also show that laid-o¤ workers do have a realistic hope of being recalled. Nine percent of workers laid o¤ from plants that do not exit in the meantime are back at the same plant seven years after the displacement incident.

The composition of the nonemployed workers changes dramatically from the short to the long run. About 2 percent of the displaced workers are unemployed seven years later and about 13 percent left the labor force. The numbers are 2 percent unemployed and 8 percent out of the labor force for the control group. This suggests that the long-term e¤ect of displacement is a signi…cantly higher probability of permanent job loss, about 5 percent.

Most displacement studies use …rm-level data, other use plant-level data. According to Kuhn (2002, p.18) "a common practice, especially in European plant closures, involves the reallocation of large numbers of employees to other branches of the same …rm". If Kuhn is correct, this makes the distinction between plant and …rm important when analyzing displacement. When de…ning displacement at the plant level, one should …nd more workers displaced, but on average they are likely to be less severely a¤ected, as some of

the workers are not displaced from their …rms. Our data contain identi…ers for both plant and …rm, hence, we are able to analyze this question. As far as we know, this has not been attempted before. We demonstrate that transfers to other plants within multiplant …rms upon displacement are quite common. In the short run, 20 percent of the displaced workers …nd a new job within the …rm. Workers who are displaced from exiting plants are less likely to be reemployed in the same …rm than are early-leavers and downsizing-plant-separators. The …gures are 9, 28 and 19 percent respectively. If the plant does not exit, recall to the same plant is not unusual, either. Three percent of the displaced workers are temporarily laid o¤ with a formal recall possibility. Such layo¤s are mostly used in industries with very cyclical demand. After seven years, as many as 9 percent of workers displaced from downsizing …rms are back at the plant from which they were displaced.

Examining where displaced workers end up in terms of industries, we …nd that 48 percent are still working in the same two-digit industry in the short run.[16] Four percent move to a di¤erent two-digit manufacturing industry. As much as 20 percent move to the private service sector, while just 2 percent move to the public sector. The share of workers who change industry grows over time. Seven years after displacement, 26 percent are working in the service sector and 3 percent in the public sector. The relative share of employed workers changing industry is far higher among displaced workers than among other workers. This suggests that displacement is a forceful vehicle for industry restructuring. Finally, we notice that the originally displaced workers have a higher probability of being displaced yet again in the following seven years than other workers, 29 percent versus 12 percent.

In Figures 2 and 3 we depict the employment and earnings patterns for all displaced workers compared with two alternative control groups, stayers and all nondisplaced workers. Stayers are obviously a selected group of particularly stable workers. All nondisplaced workers, on the other hand, represent

[16] The number for workers staying in the same two-digit industry includes workers who remain with the same …rm. To the extent that these workers have been transferred to plants in other two-digit industries, this is not accounted for.

the "on-going" economy where workers separate for reasons other than being displaced: they quit or become ill etc. It is quite clear from Figure 2 that such events are common, and hence using only stayers as the control group will bias the cost of displacement upwards.[17] Note also that nondisplaced workers, and in particular stayers, have a better employment history than displaced workers prior to displacement.

In Figure 3 the outcome variable is average annual earnings. We …nd that displaced workers have lower earnings than nondisplaced workers even before the displacement occurs. There is also evidence suggesting that the relative earnings of displaced workers start to decrease one year before the displacement. After displacement there is a clear drop in earnings, as expected. Earnings of stayers grow faster than earnings of all nondisplaced workers. This suggests that comparing the earnings of displaced workers to stayers may lead us to overestimate the e¤ect of displacement on earnings.

Figures 4 and 5 provides pre- and postdisplacement employment and earnings patterns for the three di¤erent displacement groups. We …nd that early-leavers appear to have a higher probability of being reemployed in the short run as compared with the two other displacement categories. However, this does not hold in the long run. Exit-layo¤s appear to have lower earnings than other displacement categories, as well as the largest drop in earnings after displacement.

7 Regression Results

The descriptive evidence discussed above does not control for observable differences between displaced and nondisplaced workers. Such covariates may be correlated with postdisplacement employment and earnings. In this section we take this into account.

[17] The important study of Jacobson et al. (1993) uses stayers as the comparison group.

7.1 The effect of displacement on the probability of leaving the labor force

Figure 6 reports probit estimates for how displacement affects the probability of leaving the labor force in different postdisplacement years. The model is estimated separately for each year and controls for worker's age, years of schooling, predisplacement years of tenure, predisplacement marital status, predisplacement plant size measured by number of employees, predisplacement size of the regional labor measured by number of employees, the regional unemployment rate and dummies for two-digit ISIC industries. In accordance with the descriptive statistics, the regression results demonstrate that displaced workers have significantly higher probability of being outside the labor force after displacement as compared to the nondisplaced control group. Note that we do not distinguish between being temporary and permanent out of the labor force in this analysis. The effect is strongest immediately after displacement, but it is remarkably stable over time, varying from 0.042 to 0.056. The corresponding figure in Table 3 is 5.86 percent one year after displacement and 4.72 percent seven years after displacement.[18] Hence, controlling for observables does not appear to be important. The effect we find is larger than the effect stated by Eliason and Storrie (2004), the only comparable study of which we are aware. They found that workers 21-50 years old displaced due to plant closure in Sweden had a 1 to 2 percent higher probability of leaving the labor force after displacement as compared to similar nondisplaced workers. Their sample comprises all sectors, while we only analyze workers displaced from manufacturing firms.

One would suspect that older workers are particularly vulnerable after displacement. We investigate this by estimating the model separately for two age groups, those who are 25–44 years old in the predisplacement year, and those who are 45–55 years old. As expected, displacement increases the probability of leaving the labor force more for old workers than for young workers. The effect varies from 0.055 to 0.068, while for younger workers

[18] These numbers are calculated as (4.86+2.44–0.90–0.54) and (13.06–8.34) respectively.

it is between 0.035 and 0.052. When investigating how displacement a¤ects the probability of being outside the labor force for the di¤erent displacement categories, exit-layo¤s, early-leavers and downsizing-plant-separators, we discover surprisingly little di¤erence between these groups (see Figure A3 in the appendix). Furthermore, we have divided the sample by di¤erent observational characteristics than age. We reveal that the e¤ect of displacement on the probability of being outside the labor force is smaller for highly educated workers than for workers with low education. Similarly, we …nd that the e¤ect is smaller for workers displaced from large plants than for than for workers displaced from small plants. See Figure A4 in the appendix for these results.

7.2 Average e¤ects of displacement on employment for workers who remain in the labor force

In this section we examine the e¤ect of displacement on months of full-time employment for workers who remain in the labor force after displacement. That is, we restrict the sample to those who are in the labor force in 1998, the seventh year after displacement. We allow workers to be temporarily outside the labor force between 1991 and 1998.

Table 4 reports of the e¤ect of displacement on months of full-time employment. The main results are in column one. For comparison, a second column reports results for all workers, i.e., a sample including workers who are out of the labor force in 1998. The OLS speci…cation controls for worker's age, age squared, years of schooling, predisplacement years of tenure, predisplacement marital status, predisplacement plant size, predisplacement size of the regional labor market, the regional unemployment rate and dummies for region, two-digit ISIC industry and year. Displacement happens between 1991 and 1992. The speci…cation does not control for displacement taking place after this time period. From Table 3 we see that the treatment group experience more displacements in the years 1992 to 1998. We consider this a causal e¤ect of the displacement in 1991.

The coe¢cients on the variable D_t, represents the e¤ect in 1991. Given that all job relationships lasted at least until May that year, it will pick up both the e¤ect of working for a troubled …rm at the verge of closure or downsizing, and some immediate e¤ects of displacement. If displacements happen evenly throughout the year, the "average" displacement would take place in November 1991. Since the average displacement date is towards the end of the year, we expect to see at least as strong e¤ect in the calendar year 1992 as in 1991. The e¤ect for the calendar year 1992 is picked up by the dummy variable "Displaced at t ¡ 1" ($D_{t\,i\,1}$).

The OLS estimates indicate a negative and signi…cant employment e¤ect for all years before and after displacement.[19] This is consistent with …ndings from previous studies. Workers who remain in the labor force work on average 2.4 months less in the following year as compared to similar nondisplaced workers. The e¤ect diminishes over time and is only 0.15 months seven years after displacement, but it remains signi…cant. If we include workers who leave the labor force in the sample, the …rst year average e¤ect is 2.7 months and the seventh year e¤ect is 0.7 months.

If there are more low productivity workers among the displaced workers than in the control group, the OLS results will be biased and overstate the negative e¤ect of displacement. One way to correct for this potential selection bias is to include individual speci…c …xed e¤ects controlling for unobserved worker characteristics. Implementing this we demonstrate that the e¤ects of displacement become slightly smaller. The …rst-year e¤ect for workers who remain in the labor force is reduced from 2.4 months to 2.2 month, and the seventh-year-e¤ect is essentially zero. Note that the …xed e¤ects speci…cation simply measures the e¤ect relative to employment three years before the displacement incident, as this displacement dummy is removed in order to avoid perfect collinearity. The OLS speci…cation without …xed e¤ects sug-

[19] A large share of the workers will work 12 or 0 months, so our dependent variable is limited and not normally distributed. Given our large sample, this should not invalidate the OLS results, but as a robustness check, we have also used a Tobit speci…cation. The qualitative results in both cases are the same.

gests that there is an early negative effect of displacement already at that time of about 0.2 months. This corresponds to the difference between the OLS and the fixed effects results. The fixed effects results provides an unbiased estimate of the displacement effect, only if the relatively lower earnings of the displaced workers are due to unobservable permanent differences between the displaced and the nondisplaced workers, and are not due to the fact that they are working in a troubled firm. Lacking data to trace the workers' employment histories further back in time, we cannot identify whether this coefficient reflects selection or the effect of working for a troubled firm. Jacobson et al. (1993) report that the effect of displacement appears in their data in about three years prior to displacement but not before. Note that in our set up, the third predisplacement year is the period three to four years before the displacement. Thus it is realistic to assume that the relatively low earnings of displaced workers at that time do not refer to a future displacement event.

Next, we examine how the employment effects of displacement vary by different displacement categories, exit-layoffs, early-leavers and downsizing-plant-separators. Various potential selection biases could pertain to these groups, as explained in Section 5. In order to investigate this, we allow the displacement effect to differ between the groups, as described by equation (3). The results in Table 5 confirm negative employment effects for all displacement categories. The short-run negative effect is, however, much weaker for early-leavers than for the other two categories. Early-leavers work on average 1.7 months less in the year immediately following displacement. For exit-layoffs the average employment reduction immediately after displacement is 2.3 months. The effect is strongest for the downsizing-plant-separators. They work on average 2.9 months less in the year immediately following displacement than similar nondisplaced workers. The difference between exit-layoffs and downsizing-plant-separators may reflect differences in search behavior as discussed previously. The early-leavers category may consist of workers who have better outside opportunities and who leave the plant voluntarily before

the closure.

Finally, we want to examine how displacement e¤ect varies by observable predisplacement worker and plant characteristics. Table 6 reports the results of a speci…cation where the displacement dummies are interacted with various predisplacement characteristics: age, education, tenure and plant size. The results demonstrate that education and plant size signi…cantly decrease the employment loss after displacement. Surprisingly, when looking at the OLS results, the e¤ect of tenure is positive and signi…cant in most years after displacement. When including …xed e¤ects, there is no clear pattern. It is also surprising that age appears to have little e¤ect on the magnitude of the employment loss. In the OLS speci…cation, the interaction with age is negative and signi…cant only in the year of the displacement and in year six and seven after the displacement. In the …xed e¤ects speci…cation the e¤ect is negative and signi…cant only in year seven. It is important to note, however, that this is the sample of workers who remain in the labor force. When we estimated the model for all workers, the age-displacement interaction term is negative and highly signi…cant in all postdisplacement years. This is consistent with our …ndings in Figure 6.

7.3 Average e¤ects of displacement on earnings for workers who remain in the labor force

Having examined the e¤ect of displacement on employment for workers still in the labor force seven years after displacements, we next examine the e¤ect on earnings.[20] Table 7 shows that there is a signi…cantly negative, but relatively small, e¤ect for workers who remain in the labor force. From column 1, the OLS speci…cation, we see that in the displacement year, the average earnings loss is 2.7 percent relative to similar workers who were not displaced. One

[20] We exclude workers having labor earnings below NOK 50,000 from these regressions even if they have a plant identi…er and hence appear to belong to the labor force. NOK 50,000 a year, the equivalent of about 6000 Euros, is not enough to make a living in Norway. Most likely, these workers have some sort of welfare bene…t as their main income. This choice reduces the sample to about 40 observations per year.

year after displacement, the average earnings loss is 3.5 percent and two years after, the earnings loss peaks at 4.9 percent. This monotonic increase in the earnings loss early on may appear puzzling, particularly as it was revealed in Table 4 that the employment e¤ect peaks in the …rst year after displacement. We believe that we have captured the e¤ect of some workers receiving full wage from their previous employer as part of their layo¤ agreement. Such compensation schemes may last from two weeks to two years, cf. Section 4.2. From year two to seven after the displacement, the average earnings loss decreases monotonically. In year six the earnings loss is 2.2 percent and still signi…cant. In the seventh year the e¤ect is zero. The change to zero earnings loss in the seventh year after displacement is probably due to the way our sample is constructed. Recall that workers may temporarily be out of the labor force in year one through six after displacement, but they must be part of the labor force in the seventh year after displacement. Even though the unemployed and workers in rehabilitation programs are part of the labor force, this makes year seven somewhat special. The results of the …xed e¤ects speci…cation are very similar to the OLS results.

Compared to US studies, the e¤ect of displacement on earnings is relatively small in Norway. One reason for this is simply the small wage differences among Norwegian workers. Norway has for years had one of the smallest wage dispersions among the OECD countries (see, for instance, Salvanes and Førre (2003)). This limits the amount a worker can loose by changing jobs. Kahn (1998) and others have linked low wage dispersion to centralized wage bargaining. Centralized wage bargaining implies that there is a minimum wage for blue-collar workers bargained at sector level. Given that most reemployed workers …nd a new job in the same sector as their previous job, this minimum wage restriction is binding. In many other European countries, mandatory minimum wage laws provide the same e¤ect. The lack of mandatory minimum wages in Portugal is probably the reason why the recent study by Carneiro and Portugal (2004) revealed large wage reductions for displaced workers.

Table 8 reports earnings regressions for the di¤erent displacement categories. Both the OLS and the …xed e¤ects speci…cation agree that exit layo¤s experience the largest earnings loss after displacement. According to the OLS speci…cation, their earnings loss peaks at 8.7 percent two years after displacement. The same coe¢cients for early-leavers and downsizing-plant-separators imply a second year earnings loss of 4.3 and 2.4 percent respectively. The di¤erence between exit-layo¤s and early-leavers may re‡ect that the latter category is a selected sample of workers with good outside options. The di¤erence between exit-layo¤s and downsizing-plant-separators is, however, surprising, particularly since downsizing-plants-separators is the group with the largest average employment reduction after displacement (cf. Table 5).

In order to investigate potential heterogeneity in the displacement e¤ects, we run regressions where the displacement dummies are interacted with various predisplacement worker and plants characteristics. The results are reported in Table 9. As expected, we …nd that worker's age and tenure increase the magnitude of the earning loss after displacement. The e¤ect is about one and three percentage points per 10-year change in the respective variables. The age e¤ect may seem modest, but recall that the sample is conditioned on being in the labor force in the seventh year after displacement. From Figure 6 old age workers have a higher probability of leaving the labor force after a displacement incident. This suggests that the older workers who remained in the labor force are a selected group. Furthermore, Hamermesh (1989) and Jacobsen et al. (1993), using US data, also report modest earnings e¤ects of age. High-tenured workers are likely to have more …rm-speci…c human capital than workers with low tenure. This explains why the earnings loss increases with tenure. Our results at this point are also in line with previous research, e.g., Stevens (1997).[21]

Highly educated workers should have more general human capital than

[21] Note, that Kriechel and Pfann (2005) demonstrate that the speci…city of a job or function before and after separation is a much better predictor for earnings losses than the traditional tenure measures. Unfortunately, we do not have access to any job speci…city measure.

others. This makes them more ‡exible in the labor market, and the earnings loss for displaced workers diminishes with education. This is consistent with …ndings reported both in Kletzer (1989) and Stevens (1997). The more recent studies reported in Kuhn (2002) also …nd that less skilled workers fare worse than skilled workers after displacement. Finally, we examine how the earnings loss varies with plant size. The e¤ect of plant size is clearly positive, suggesting that large plants will be both in a better position to assist their workers transfer into new jobs and perhaps be under more pressure from special-interest groups. This di¤ers from the …ndings of Jacobson et al. (1993). They report that the earnings loss is most severe for workers displaced from large …rms. However, their data consist of workers from …rms with at least 50 employees, and they consider …rms large if they have more than 5000 employees. Our sample contains …rms with as few as …ve employees, and our average plant size is about 40.

8 Conclusions

We have examined the impact of displacement on workers' employment and earnings using administrative linked employer–employee data from Norway. We have focused on workers displaced by plant closure and on workers separating from downsizing plants. The comparison group is workers in …rms not exiting or downsizing signi…cantly.

Our descriptive analysis demonstrates that the employment e¤ects of displacement are far more pronounced than the earnings e¤ect in the short run. About 27 percent of the displaced workers are out of work one year after displacement, as compared to about 4 percent in the control group. Using a probit speci…cation to control for observed worker and plant characteristics, we demonstrate that displacement increases the probability of leaving the labor force by …ve percentage points. We also reveal that older workers, workers with low education and workers displaced from small plants are more vulnerable than other groups. Our …ndings imply that one might strongly

underestimate the e¤ect of displacement if the data used does not incorporate workers leaving the labor force.

Using a regression framework, we demonstrate that workers who are displaced and who do not permanently leave the labor force, work on average 2.4 months less in the following year as compared to similar nondisplaced workers. Seven years after displacement, displaced workers work on average only a few days less per year than the nondisplaced workers. When analyzing earnings, we …nd that in the second year after the job loss, displaced workers' earnings are reduced by about 5 percent. The e¤ect decreases slowly and fades away in seven years. Investigating heterogeneity in the e¤ects of displacement, we …nd that workers with fewer years of schooling perform worse than workers with more education. This is consistent with educated workers having more general human capital and therefore being more ‡exible in the labor market. We also …nd that predisplacement plant size positively a¤ects postdisplacement earnings.

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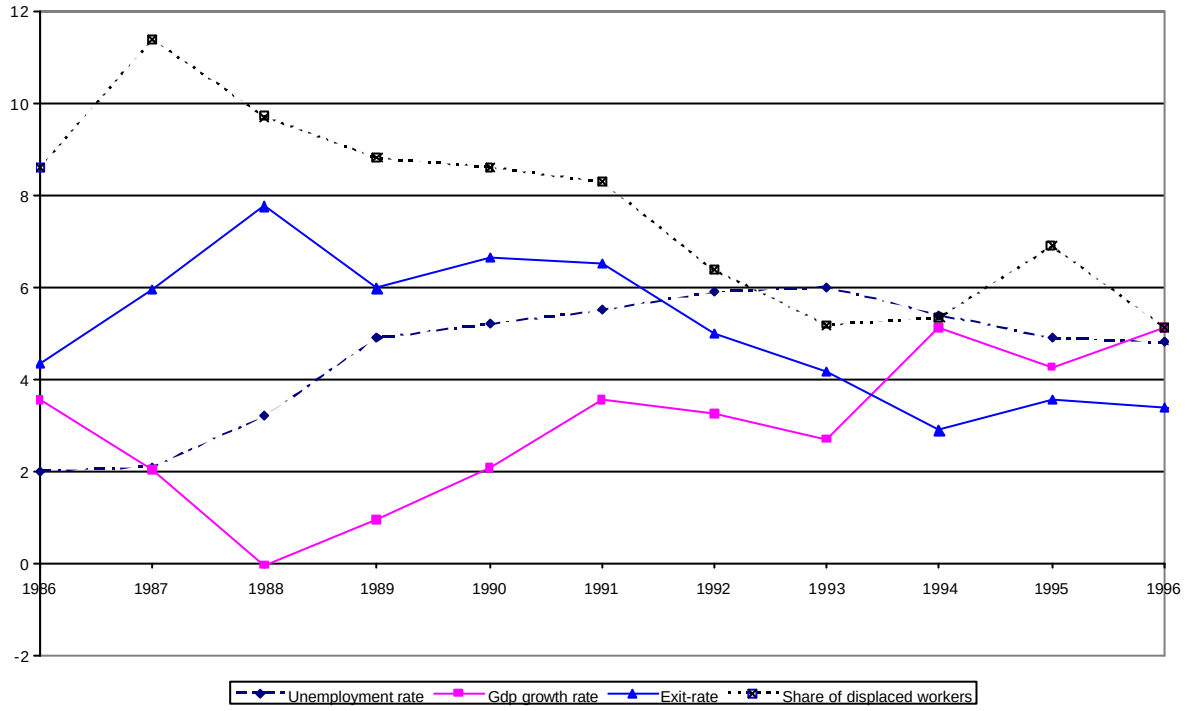
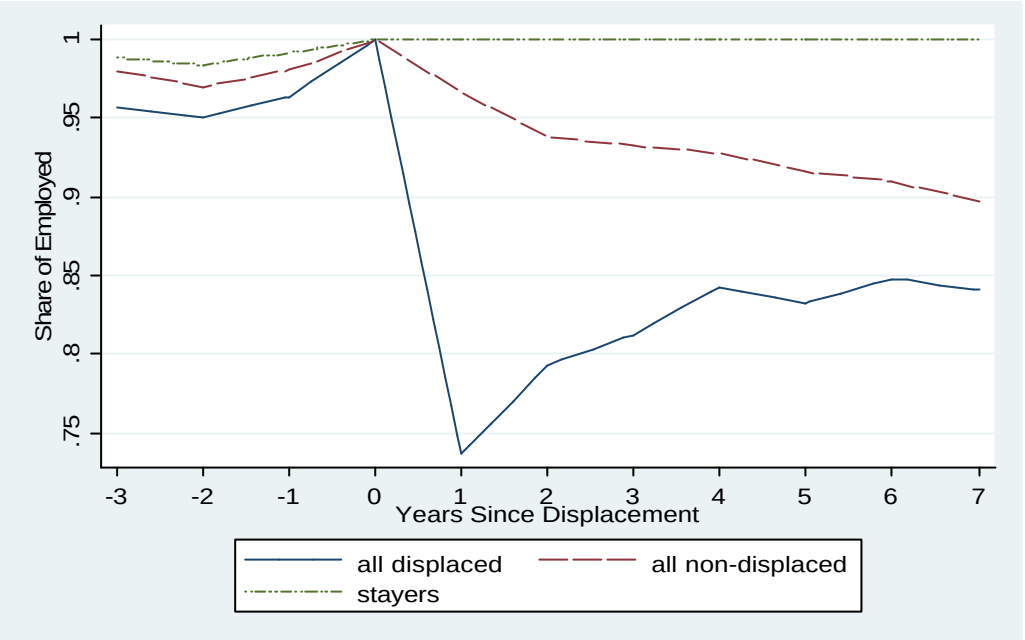
Figure 1 **Business cycle indicators , plant exit rate and share of displaced workers in Norway 1986-1996**



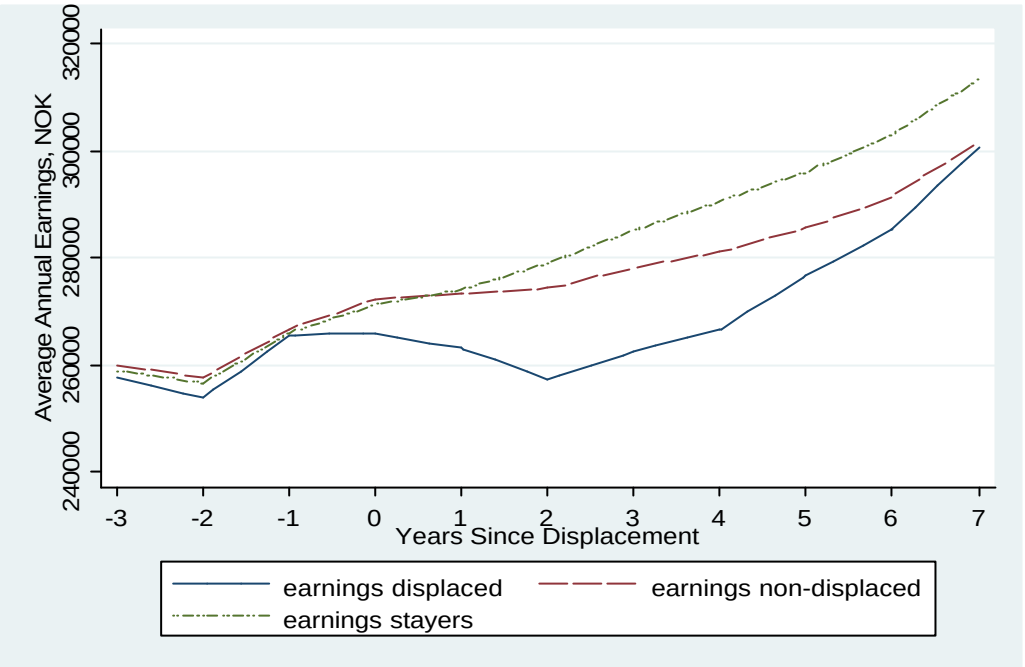
The growth rate is the percent change in GDP from year ***t***-1 to ***t***. A plant is defined as an exiting plant if it is present at ***t***, but absent at ***t***+1 and ***t***+2 (and later if that is possible to check). The displacement rate is the share of workers who were displaced from their jobs between ***t*** and ***t***+1 among workers who were working full time in plants with at least 5 employees in period ***t***. The displaced workers can be divided into three sub categories: Workers who separated between ***t*** and ***t***+1 from plants that exited between ***t*** and ***t***+1 (exit-layoffs), workers who separated between ***t*** and ***t***+1 from plants that exited between ***t***+1 and ***t***+2 (early-leavers), and workers who separated between ***t*** and ***t***+1 from plants that reduced their size by more than 30% between ***t*** and ***t***+1 (downsizing plant separators).

Figure 2 The share of employed before and after displacement



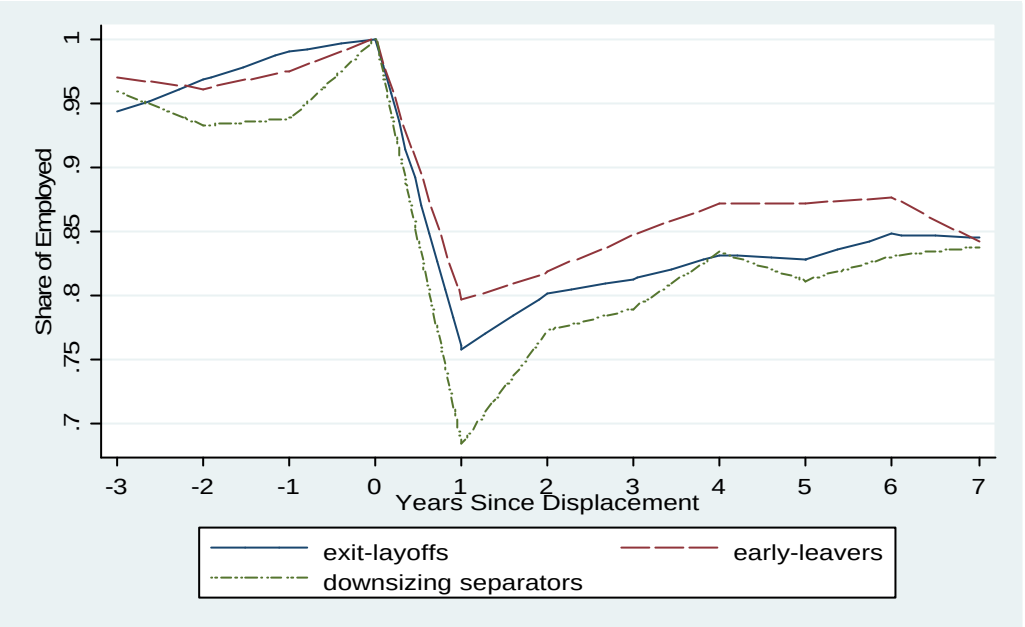
The sample consists of 25-55 year old male workers full time employed in manufacturing in 1991 (year zero), who were in the labour force and not displaced from their jobs in the previous three years.

Figure 3 Annual earnings before and after displacement



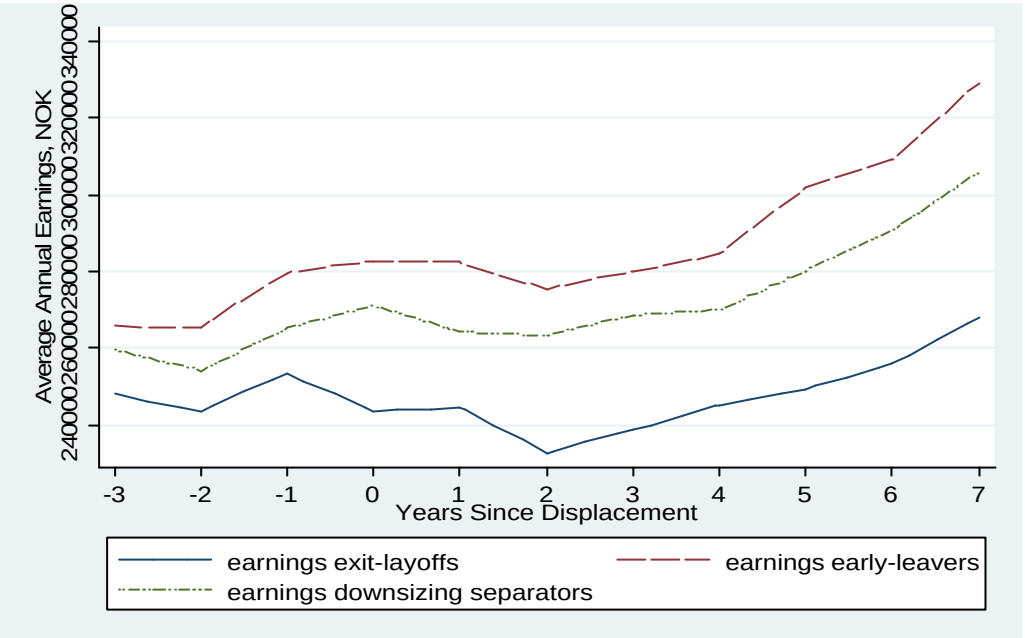
The sample consists of 25-55 year old male workers full time employed in manufacturing in 1991 (year zero), who were in the labour force and not displaced from their jobs in the previous three years.

Figure 4 The share of employed before and after displacement by displacement type



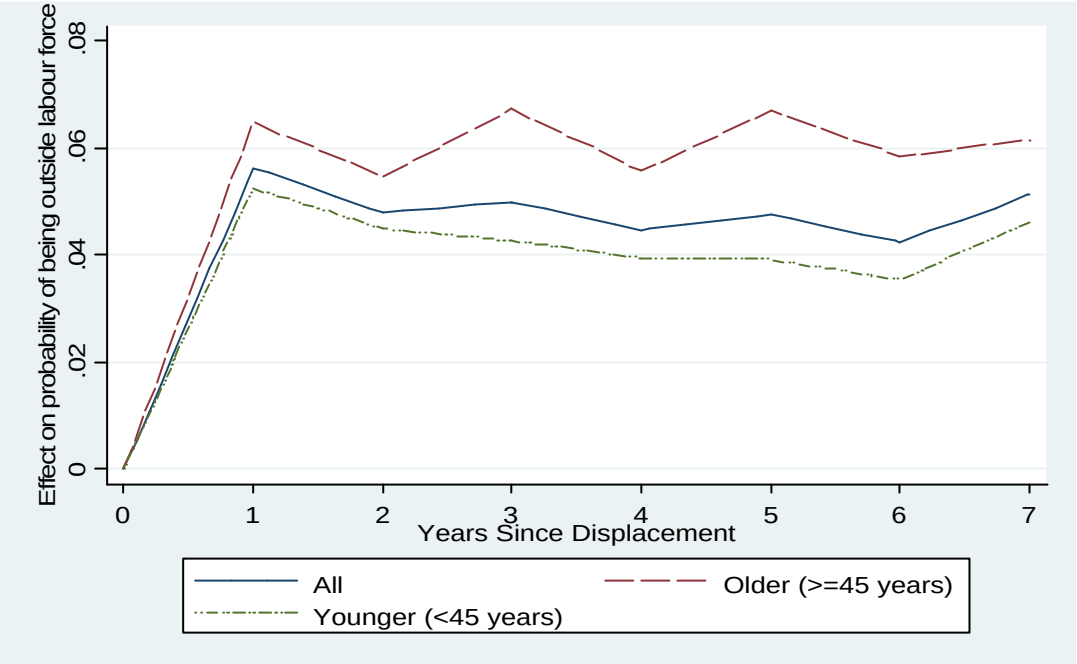
The sample consists of 25-55 year old male workers full time employed in manufacturing in 1991 (year zero), who were in the labour force and not displaced from their jobs in the previous three years.

Figure 5 Annual earnings before and after displacement by displacement type



The sample consists of 25-55 year old male workers full time employed in manufacturing in 1991 (year zero), who were in the labour force and not displaced from their jobs in the previous three years.

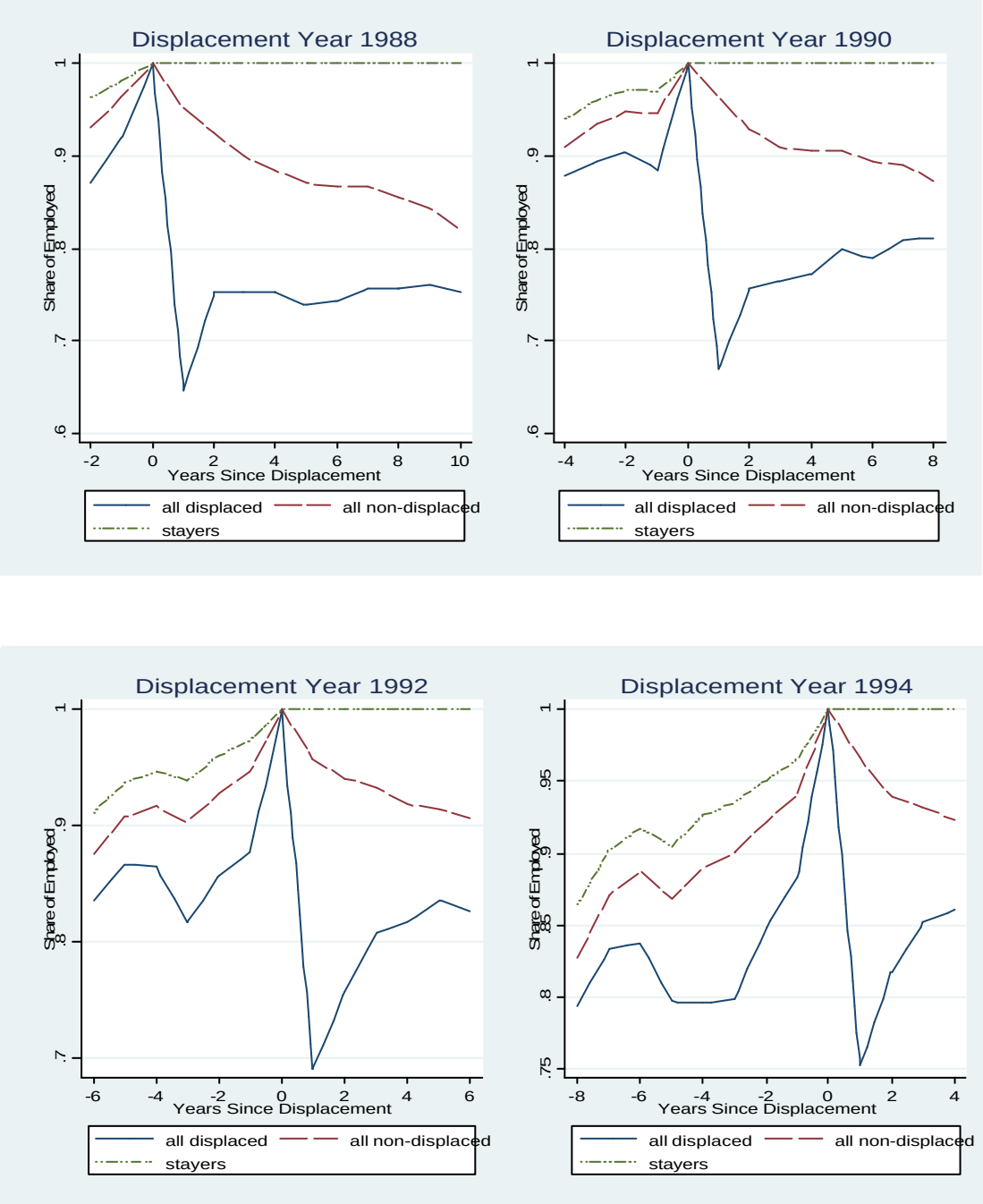
Figure 6 Effect of displacement on the probability of being outside the labour force



Estimated marginal effect of displacement on the probability of being outside labour force in different post displacement years. Displacements happened between May 1991 and May 1992. The sample consists of 25-55 year old male workers full time employed in manufacturing plants with at least five employees in 1991, who were in the labour force and not displaced from their jobs in the previous three years. The following control variables are included: Age, pre-displacement years of schooling, pre-displacement tenure, pre-displacement marital status, pre-displacement plant size, pre-displacement size of the regional labour market, local unemployment rate and industry dummies. The model is estimated separately for the age groups (25-44 years-old at the time of displacement and 45-55 years-old at the time of displacement).

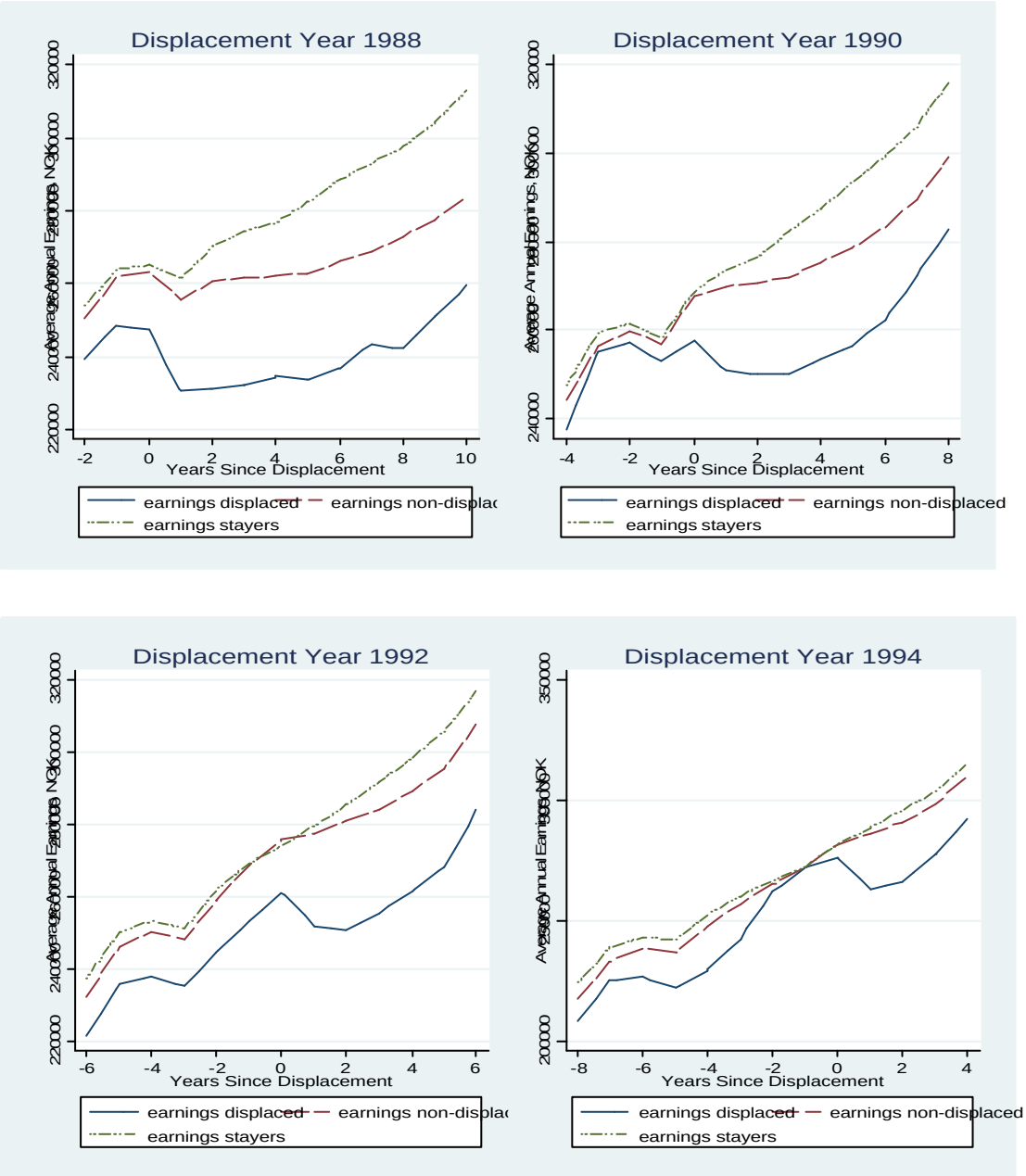
Apppendix

Figure A1 Share of employed by displacement year, 1988-1994



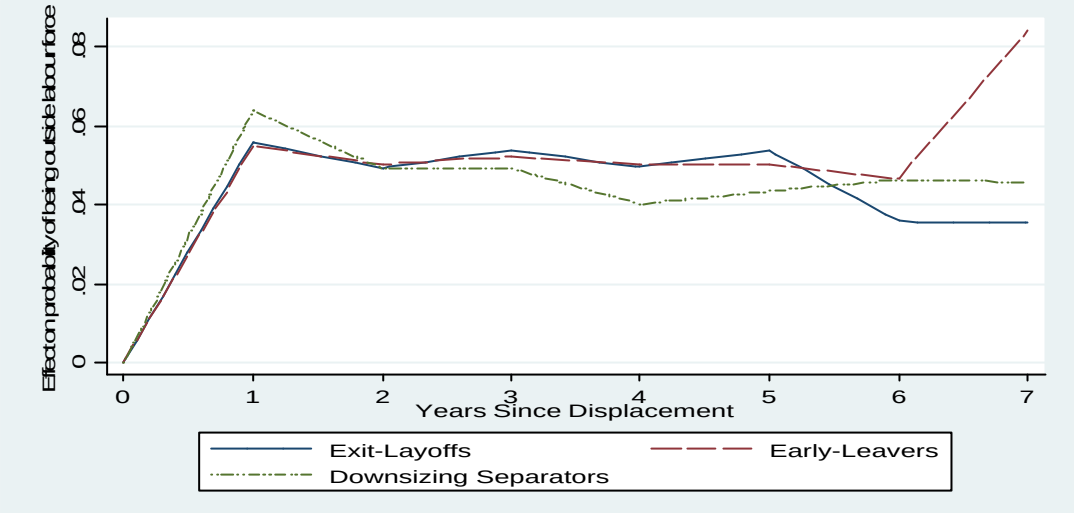
The sample consists of 25-55 year old male workers full time employed in manufacturing in year zero, who were not displaced from their jobs in the previous two years.

Figure A2 Average annual earnings by displacement year, 1988-1994



The sample consists of 25-55 year old male workers full time employed in manufacturing in year zero, who were not displaced from their jobs in the previous two years. Average annual earnings in thousand NOK.

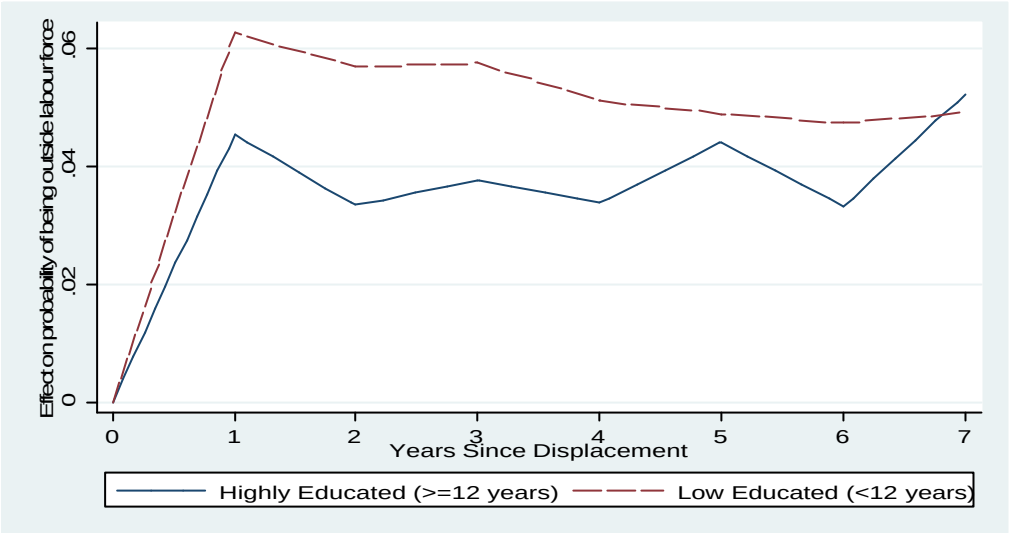
Figure A3 **Effect of displacement on the probability of being outside labour force for different displacement categories**



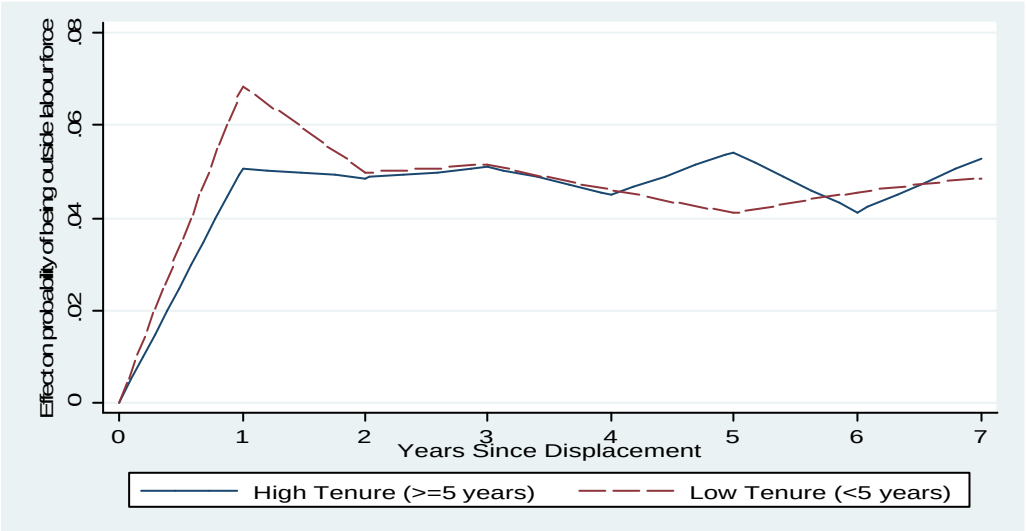
Estimated marginal effect of displacement on the probability of being outside labour force in different post displacement years. Displacements happened between May 1991 and May 1992. The sample consists of 25-55 year old male workers full time employed in manufacturing plants with at least five employees in 1991, who were in the labour force and not displaced from their jobs in the previous three years. The following control variables are included: Age, pre-displacement years of schooling, pre-displacement tenure, pre-displacement marital status, pre-displacement plant size, pre-displacement size of the regional labour market, local unemployment rate and industry dummies.

Table A4 **Effect of displacement on the probability of being outside labour force by pre-displacement characteristics**

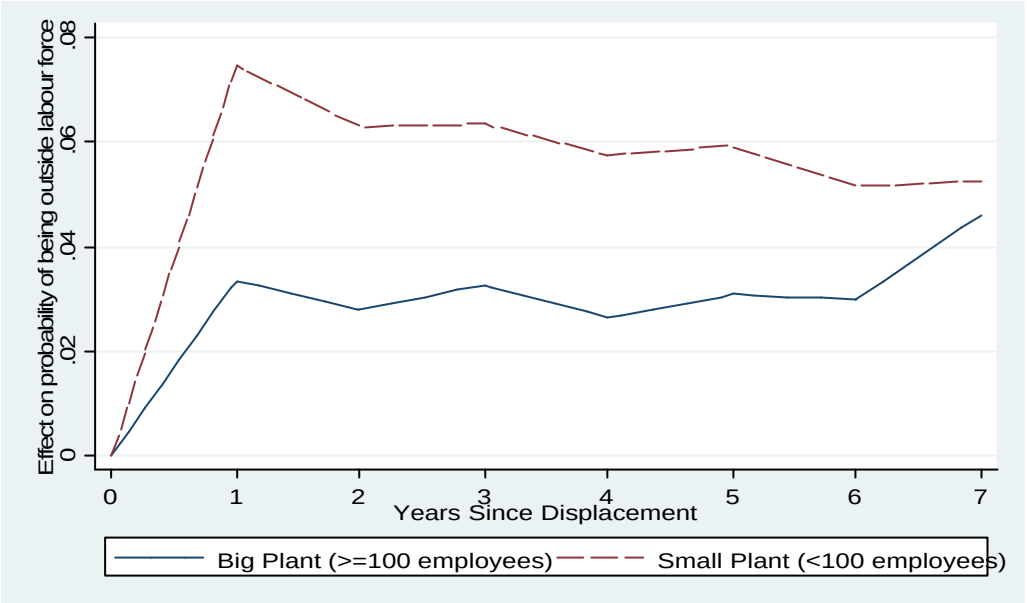
i) By education



ii) By tenure



iii) By plant size



iv) By labor market size

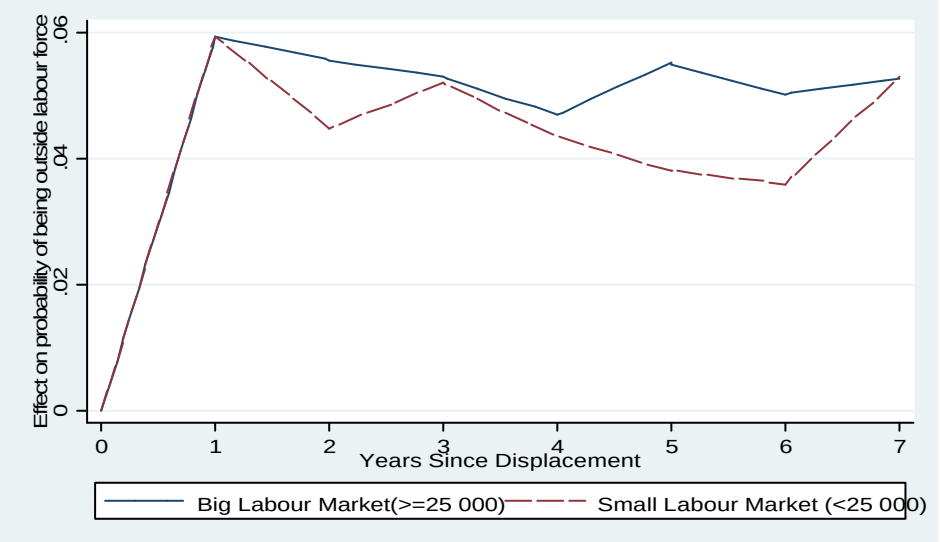


Table 1 Sample means of selected pre-displacement *worker characteristics* by displacement status

	All workers	All displaced workers	*Exit-layoffs*	*Early leavers*	*Downsizing plant separators*	All non-displaced workers	*Stayers*	*Separators*
Age at *t*	39.41	38.75	39.34	38.31	38.62	39.45	39.62	37.75
Education at *t*	10.73	10.92	10.55	11.32	10.93	10.72	10.69	11.03
Tenure at *t*	7.31	6.49	7.23	7.51	5.29	7.36	7.55	5.47
Married at *t*	0.65	0.62	0.66	0.59	0.61	0.65	0.66	0.56
Earnings at *t*-1	235435	230318	210957	244827	234731	235764	236641	226931
Earnings at *t*-3	199796	198174	190616	204279	199610	199900	200116	197726
No. of observations	114740	6935	2096	1904	2935	107805	98061	9744

Displacements happened between May 1991 and May 1992. The sample consists of 25-55 year old male workers full time employed in manufacturing plants with at least five employees in 1991 (year *t*), who were in the labour force and not displaced from their jobs in the previous three years.

Table 2 Sample means of selected pre-displacement *plant characteristics* by plant categories

	All plants	Exiting plants	Downsizing plants	Other plants
Employment at *t*	40.53	22.58	30.39	42.75
Employment at *t*-1	40.50	24.28	30.56	42.58
Average worker age at *t*	39.74	38.91	39.45	39.83
Average tenure at *t*	5.61	4.36	4.86	5.76
Average schooling at *t*	10.30	10.30	10.22	10.31
Share of female at *t*	0.28	0.28	0.28	0.28
Share of married at *t*	0.59	0.56	0.57	0.59
Plant age at *t*	18.30	16.49	16.65	18.54
Employment growth. *t-1* to *t*	0.00	-0.07	-0.01	0.00
Employment growth. *t* to *t+1*	-0.03	-	-0.50	0.01
Share of plants in "sunset" industries	0.08	0.06	0.11	0.08
Size of the regional labour market	62256	60518	56153	62984
Regional rate of unemployment*100	3.24	3.27	3.22	3.24
No. of observations	6509	405	509	5595

The sample consists of manufacturing plants with at least five employees in 1991 (year *t*). The plants are categorized based on what happens with employment from year *t* to *t+1*. Plant age is censored at 26. The sunset industries are 5 digit-industries with 15 percent (or more) decline in relative employment between 1980 and 1990. The employment growth rates are weighted by plant size in the beginning of the period (at t-1 or at t).

Table 3 Percentage of workers employed one and seven years after displacement by displacement type

One year after	All displaced	*Exit -Layoffs*	*Early-Leavers*	*Downsizing separators*	Other workers
Employed	73.29	75.57	79.10	67.90	96.34
same plant	–	–	–	–	90.96
different plant within the same firm	19.64	9.06	27.94	21.81	1.78
different firm within the same industry	28.26	47.90	20.64	19.18	1.42
other two digit manufacturing industry	4.33	2.48	8.51	2.93	0.32
private service	19.52	14.84	20.33	22.35	1.58
public service	1.54	1.29	1.68	1.64	0.28
Not-employed	26.71	24.43	20.90	32.10	3.66
temporary laid off	2.94	1.05	3.10	4.19	0.53
registered as unemployed	15.91	15.89	11.4	18.84	1.39
temporarily outside the labour force	4.86	4.29	3.99	5.83	0.90
permanently outside the labour force	2.44	2.91	1.79	2.52	0.54
Dead or Moved Abroad (Not observable in the data)	0.56	0.29	0.63	0.72	0.30
Seven years after	All displaced	*Exit -Layoffs*	*Early-Leavers*	*Downsizing separators*	Other workers
Employed	82.15	82.59	82.35	81.70	87.83
same plant	3.98	–	–	9.40	51.08
different plant within the same firm	9.92	6.25	21.85	4.80	6.51
different firm within the same industry	30.74	46.09	14.71	30.19	13.01
other two digit manufacturing industry	7.70	6.35	9.72	7.36	3.08
private service	26.47	21.23	32.77	26.13	12.50
public service	3.33	2.67	3.31	3.82	1.65
Not-employed	17.85	17.41	17.65	18.30	12.17
registered as unemployed	2.48	2.58	1.89	2.79	1.67
outside the labour force	13.06	12.65	13.61	13.01	8.34
Dead or Moved Abroad (Not observable in the data)	2.31	2.19	2.15	2.49	2.15
Share of workers that are displaced btw years 1 and 6	28.81	55.06	15.23	18.88	12.26
No. of observations	6935	2096	1904	2935	107805

Displacements happened between May 1991 and May 1992. The sample consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years. Permanently outside the labour force means outside the labour force at least until the seventh year after displacement. Temporary laid off workers have a formal recall possibility and are registered as unemployed.

Table 4 The effect of displacement on *employment* for workers remaining in the labour force

Sample:	Workers who are in the labour force in the seventh year after the displacement				All workers			
	OLS		FE		OLS		FE	
Age	0.076***	(0.004)	0.069	(0.003)	0.163***	(0.005)	0.125***	(0.003)
Age squared	-0.001***	(0.000)	-0.001	(0.000)	-0.002***	(0.000)	-0.003***	(0.000)
Years of schooling	0.039***	(0.002)			0.073***	(0.002)		
Pre displacement tenure	0.041***	(0.001)			0.050***	(0.001)		
Pre displacement marital status	0.248***	(0.009)			0.362***	(0.011)		
Pre displacement Plant size	0.019***	(0.001)			0.028***	(0.001)		
Pre dpl. size of the labour market	0.008***	(0.001)			0.008***	(0.001)		
Regional rate of unemployment	-0.181***	(0.007)	-0.021	(0.005)	-0.194***	(0.008)	-0.023***	(0.006)
Displaced at *t+3*	-0.183***	(0.028)			-0.195***	(0.027)		
Displaced at *t*+2	-0.270***	(0.030)	-0.088**	(0.035)	-0.296***	(0.029)	-0.103**	(0.040)
Displaced at *t+1*	-0.261***	(0.027)	-0.077**	(0.035)	-0.280***	(0.026)	-0.086**	(0.040)
Displaced at *t*	-0.381***	(0.017)	-0.196***	(0.035)	-0.398***	(0.016)	-0.203***	(0.040)
Displaced at *t-1*	-2.423***	(0.061)	-2.237***	(0.035)	-2.720***	(0.059)	-2.523***	(0.040)
Displaced at *t-2*	-1.593***	(0.056)	-1.411***	(0.035)	-1.890***	(0.057)	-1.700***	(0.040)
Displaced at *t-3*	-1.202***	(0.052)	-1.018***	(0.035)	-1.523***	(0.055)	-1.332***	(0.040)
Displaced at *t-4*	-0.840***	(0.048)	-0.657***	(0.035)	-1.194***	(0.053)	-1.004***	(0.040)
Displaced at *t-5*	-0.779***	(0.048)	-0.592***	(0.035)	-1.114***	(0.055)	-0.925***	(0.041)
Displaced at *t-6*	-0.411***	(0.040)	-0.224***	(0.035)	-0.792***	(0.053)	-0.602***	(0.041)
Displaced at *t-7*	-0.150***	(0.031)	0.036	(0.035)	-0.692***	(0.054)	-0.501***	(0.041)
No. of observations	1125187		1125187		1252572		1252572	
R-squared	0.0478		0.0209		0.0634		0.0463	

The dependent variable is months of employment. Displacements happened between May 1991 and May 1992. *t* is the year of the observation. The sample covers the years 1988 to 1998, and consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years. The specification without individual fixed effects contains region and industry dummies. Both specifications contain time dummies. Huber-White robust standard errors allowing for clustering of errors by individuals are in parentheses.

Table 5 The effect of displacement on *employment* for workers remaining in the labour force by displacement type

	OLS						FE					
	Exit layoffs		Early leavers		Down-sizing separators		Exit Layoffs		Early leavers		Down-sizing separators	
Displaced at *t*+3	-0.156***	(0.053)	-0.194***	(0.045)	-0.191***	(0.045)						
Displaced at *t*+2	-0.023	(0.044)	-0.344***	(0.055)	-0.396***	(0.052)	0.134**	(0.062)	-0.156**	(0.065)	-0.204***	(0.053)
Displaced at *t*+1	0.019	(0.031)	-0.274***	(0.046)	-0.449***	(0.051)	0.176***	(0.062)	-0.081	(0.065)	-0.257***	(0.053)
Displaced at *t*	-0.506***	(0.033)	-0.314***	(0.026)	-0.330***	(0.026)	-0.348***	(0.062)	-0.118*	(0.065)	-0.137***	(0.053)
Displaced at *t*-1	-2.304***	(0.109)	-1.702***	(0.099)	-2.970***	(0.102)	-2.144***	(0.062)	-1.507***	(0.065)	-2.776***	(0.053)
Displaced at *t*-2	-1.511***	(0.100)	-1.503***	(0.103)	-1.706***	(0.089)	-1.355***	(0.062)	-1.311***	(0.065)	-1.516***	(0.053)
Displaced at *t*-3	-1.192***	(0.094)	-1.051***	(0.093)	-1.302***	(0.083)	-1.037***	(0.062)	-0.854***	(0.065)	-1.111***	(0.053)
Displaced at *t*-4	-0.901***	(0.087)	-0.755***	(0.085)	-0.848***	(0.075)	-0.745***	(0.062)	-0.558***	(0.065)	-0.656***	(0.053)
Displaced at *t*-5	-0.674***	(0.085)	-0.573***	(0.081)	-0.983***	(0.078)	-0.517***	(0.062)	-0.371***	(0.065)	-0.790***	(0.053)
Displaced at *t*-6	-0.345***	(0.071)	-0.377***	(0.068)	-0.476***	(0.064)	-0.188***	(0.062)	-0.173***	(0.065)	-0.283***	(0.053)
Displaced at *t*-7	-0.152***	(0.057)	-0.163***	(0.051)	-0.135***	(0.049)	0.005***	(0.062)	0.041	(0.065)	0.056***	(0.053)
No. of obs.	1125187						1125187					
R-squared	0.0482						0.0214					

The dependent variable is months of employment. Displacements happened between May 1991 and May 1992. *t* is the year of the observation. The sample covers the years 1988 to 1998, and consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years, and who were in the labour force in the last observed post displacement year 1998. The following control variables are included, but not reported: Age, age squared, regional rate of unemployment and time dummies. The specification without fixed effects also includes years of schooling, tenure when displaced, marital status when displaced, plant size when displaced, size of the regional labour market when displaced, industry and region dummies. Huber-White robust standard errors allowing for clustering of errors by individuals are in parentheses.

Table 6 Heterogeneity in the effect of displacement on *employment* for workers remaining in the labour force

OLS	Displacement		Displacement*Age		Displacement*Education		Displacement*Tenure		Displacement*Plant size	
Displaced at *t+3*	-0.524*	(0.209)	-0.002	(0.004)	0.016	(0.011)	0.044***	(0.007)	-0.007	(0.005)
Displaced at *t+2*	-1.545***	(0.224)	0.004	(0.005)	0.068**	(0.012)	0.071***	(0.014)	-0.017***	(0.006)
Displaced at *t+1*	-0.994***	(0.213)	0.001	(0.004)	0.039***	(0.010)	0.044***	(0.013)	0.001	(0.005)
Displaced at *t*	-0.436***	(0.117)	-0.009***	(0.002)	0.033***	(0.006)	-0.004	(0.004)	0.028***	(0.003)
Displaced at *t-1*	-6.290***	(0.414)	0.004	(0.008)	0.216***	(0.023)	0.091**	(0.012)	0.238***	(0.011)
Displaced at *t-2*	-4.828***	(0.405)	0.007	(0.007)	0.196***	(0.022)	0.050***	(0.011)	0.154***	(0.010)
Displaced at *t-3*	-3.087***	(0.395)	-0.003	(0.007)	0.119***	(0.021)	0.060***	(0.011)	0.096***	(0.009)
Displaced at *t-4*	-2.246***	(0.363)	0.007	(0.006)	0.063***	(0.019)	0.024***	(0.009)	0.081***	(0.009)
Displaced at *t-5*	-1.564***	(0.372)	-0.005	(0.006)	0.062***	(0.020)	0.032***	(0.010)	0.039***	(0.010)
Displaced at *t-6*	-0.536*	(0.319)	-0.010*	(0.005)	0.038**	(0.017)	0.012	(0.008)	0.020**	(0.008)
Displaced at *t-7*	0.683***	(0.245)	-0.018***	(0.004)	0.008	(0.013)	-0.020***	(0.007)	0.011*	(0.006)
R-squared	0.0518									
FE										
Displaced at *t+2*	-1.028***	(0.239)	0.006	(0.004)	0.053***	(0.015)	0.026***	(0.007)	-0.011	(0.008)
Displaced at *t+1*	-0.490**	(0.242)	0.003	(0.004)	0.025*	(0.015)	0.000	(0.007)	0.007	(0.008)
Displaced at *t*	0.065	(0.245)	-0.007	(0.004)	0.019	(0.015)	-0.049***	(0.007)	0.034***	(0.008)
Displaced at *t-1*	-5.784***	(0.249)	0.006	(0.004)	0.203***	(0.015)	0.047***	(0.007)	0.245***	(0.008)
Displaced at *t-2*	-4.297***	(0.252)	0.009**	(0.004)	0.181***	(0.015)	0.006	(0.007)	0.160***	(0.008)
Displaced at *t-3*	-2.560***	(0.255)	-0.001	(0.004)	0.104***	(0.015)	0.015**	(0.007)	0.103***	(0.008)
Displaced at *t-4*	-1.724***	(0.259)	0.009	(0.004)	0.049***	(0.015)	-0.020***	(0.007)	0.088***	(0.008)
Displaced at *t-5*	-1.047***	(0.262)	-0.003	(0.004)	0.048***	(0.015)	-0.013*	(0.007)	0.046***	(0.008)
Displaced at *t-6*	-0.022	(0.266)	-0.008	(0.004)	0.025*	(0.015)	-0.032***	(0.007)	0.028***	(0.008)
Displaced at *t-7*	1.203***	(0.269)	-0.016***	(0.004)	-0.006	(0.015)	-0.065***	(0.007)	0.019**	(0.008)
R-squared	0.0243									
No. of observations	1125187									

The dependent variable is months of employment. Displacements happened between May 1991 and May 1992. *t* is the year of the observation. The sample covers the years 1988 to 1998, and consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years, and who were in the labour force in the last observed post displacement year 1998. The following control variables are included, but not reported: Age, age squared, regional rate of unemployment and time dummies. The specification without fixed effects also includes years of schooling, tenure when displaced, marital status when displaced, plant size when displaced, size of the regional labour market when displaced, industry and region dummies. Huber-White robust standard errors allowing for clustering of errors by individuals are in parentheses.

Table 7 The effect of displacement on *earnings* for workers remaining in the labour force

	OLS		FE	
Age	0.038***	(0.001)	0.053***	(0.000)
Age squared	0.000***	(0.000)	0.000***	(0.000)
Years of schooling	0.059***	(0.000)		
Pre displacement tenure	0.001***	(0.000)		
Pre displacement marital status	0.076***	(0.002)		
Pre displacement Plant size	0.004***	(0.000)		
Pre dpl. size of the labour market	0.003***	(0.000)		
Regional rate of unemployment	-0.015***	(0.001)	-0.013***	(0.000)
Displaced at *t+3*	-0.006*	(0.003)		
Displaced at *t+2*	-0.012***	(0.003)	-0,005*	(0.003)
Displaced at *t+1*	-0.005*	(0.003)	0,001	(0.003)
Displaced at *t*	-0.027***	(0.004)	-0,020***	(0.003)
Displaced at *t-1*	-0.035***	(0.004)	-0,030***	(0.003)
Displaced at *t-2*	-0.049***	(0.004)	-0,044***	(0.003)
Displaced at *t-3*	-0.044***	(0.004)	-0,039***	(0.003)
Displaced at *t-4*	-0.044***	(0.004)	-0,039***	(0.003)
Displaced at *t-5*	-0.027***	(0.004)	-0,022***	(0.003)
Displaced at *t-6*	-0.022***	(0.004)	-0,017***	(0.003)
Displaced at *t-7*	-0.004***	(0.004)	0,001	(0.003)
No. of observations	1117254		1117254	
R-squared	0.3369		0.1478	

The dependent variable is months of employment. Displacements happened between May 1991 and May 1992. *t* is the year of the observation. The sample covers the years 1988 to 1998, and consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years, whose annual earnings are at least 50 000 NOK and who were in the labour force in the last observed post displacement year 1998. The following control variables are included, but not reported: Age, age squared, regional rate of unemployment and time dummies. The specification without fixed effects also includes years of schooling, tenure when displaced, marital status when displaced, plant size when displaced, size of the regional labour market when displaced, industry and region dummies. Huber-White robust standard errors allowing for clustering of errors by individuals are in parentheses.

Table 8 The effect of displacement on *earnings* for workers remaining in the labour force by displacement type

	OLS						FE					
	Exit layoffs		Early leavers		Down-sizing separators		Exit Layoffs		Early Leavers		Down-sizing separators	
Displaced at *t*+3	-0.012**	(0.006)	-0.020***	(0.006)	0.008	(0.005)						
Displaced at *t*+2	-0.019***	(0.006)	-0.011*	(0.006)	-0.007	(0.005)	-0.006	(0.005)	0.010*	(0.005)	-0.015***	(0.004)
Displaced at *t*+1	-0.012**	(0.006)	0.003	(0.006)	-0.005	(0.005)	0.000	(0.005)	0.023***	(0.005)	-0.013***	(0.004)
Displaced at *t*	-0.070***	(0.006)	-0.003	(0.006)	-0.010*	(0.006)	-0.058***	(0.005)	0.019***	(0.005)	-0.018***	(0.004)
Displaced at *t*-1	-0.057***	(0.007)	-0.019***	(0.007)	-0.028***	(0.006)	-0.045***	(0.005)	0.001	(0.005)	-0.038***	(0.004)
Displaced at *t*-2	-0.087***	(0.007)	-0.043***	(0.007)	-0.024***	(0.006)	-0.077***	(0.005)	-0.022***	(0.005)	-0.034***	(0.004)
Displaced at *t*-3	-0.080***	(0.007)	-0.034***	(0.007)	-0.023***	(0.006)	-0.070***	(0.005)	-0.015***	(0.005)	-0.034***	(0.004)
Displaced at *t*-4	-0.079***	(0.007)	-0.033***	(0.008)	-0.025***	(0.007)	-0.068***	(0.005)	-0.013**	(0.005)	-0.035***	(0.004)
Displaced at *t*-5	-0.069***	(0.007)	0.004	(0.008)	-0.016**	(0.007)	-0.058***	(0.005)	0.022***	(0.005)	-0.025***	(0.004)
Displaced at *t*-6	-0.061***	(0.007)	0.006	(0.007)	-0.010	(0.007)	-0.050***	(0.005)	0.024***	(0.005)	-0.020***	(0.004)
Displaced at *t*-7	-0.050***	(0.007)	0.030	(0.008)	0.008	(0.007)	-0.039***	(0.005)	0.050***	(0.005)	-0.001	(0.004)
No. of obs.	1117254						1117254					
R-squared	0.3372						0.1481					

The dependent variable is months of employment. Displacements happened between May 1991 and May 1992. *t* is the year of the observation. The sample covers the years 1988 to 1998, and consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years, whose annual earnings are at least 50 000 NOK and who were in the labour force in the last observed post displacement year 1998. The following control variables are included, but not reported: Age, age squared, regional rate of unemployment and time dummies. The specification without fixed effects also includes years of schooling, tenure when displaced, marital status when displaced, plant size when displaced, size of the regional labour market when displaced, industry and region dummies. Huber-White robust standard errors allowing for clustering of errors by individuals are in parentheses

Table 9 Heterogeneity in the effect of displacement on *earnings* for workers remaining in the labour force

OLS	Displacement		Displacement*Age		Displacement*Education		Displacement*Tenure		Displacement*Plant size	
Displaced at *t+3*	0.023	(0.025)	0.001**	(0.000)	-0.005***	(0.002)	-0.001	(0.001)	-0.002***	(0.001)
Displaced at *t*+2	0.009	(0.025)	0.000	(0.000)	-0.003*	(0.002)	-0.001	(0.001)	0.001*	(0.001)
Displaced at *t+1*	0.006	(0.025)	0.000	(0.000)	-0.001	(0.002)	-0.001*	(0.001)	0.003***	(0.001)
Displaced at *t*	-0.027	(0.027)	0.000	(0.000)	0.000	(0.002)	-0.005***	(0.001)	0.010***	(0.001)
Displaced at *t-1*	-0.119***	(0.030)	0.000	(0.000)	0.007***	(0.002)	-0.002*	(0.001)	0.007***	(0.001)
Displaced at *t-2*	-0.147***	(0.031)	0.000	(0.001)	0.008***	(0.002)	-0.004***	(0.001)	0.008***	(0.001)
Displaced at *t-3*	-0.127***	(0.033)	0.000	(0.001)	0.007***	(0.002)	-0.003***	(0.001)	0.007***	(0.001)
Displaced at *t-4*	-0.126***	(0.035)	0.000	(0.001)	0.007***	(0.002)	-0.004***	(0.001)	0.006***	(0.001)
Displaced at *t-5*	-0.073**	(0.036)	-0.001	(0.001)	0.006***	(0.002)	-0.003***	(0.001)	0.009***	(0.001)
Displaced at *t-6*	-0.083**	(0.037)	-0.001*	(0.001)	0.010***	(0.002)	-0.004***	(0.001)	0.007***	(0.001)
Displaced at *t-7*	-0.065*	(0.037)	-0.002***	(0.001)	0.012***	(0.002)	-0.004***	(0.001)	0.009***	(0.001)
R-squared	0.3376									
FE										
Displaced at *t*+2	-0.016	(0.019)	-0.001**	(0.000)	0.003**	(0.001)	-0.001	(0.001)	0.004***	(0.001)
Displaced at *t+1*	-0.017	(0.020)	-0.001***	(0.000)	0.004***	(0.001)	-0.001	(0.001)	0.005***	(0.001)
Displaced at *t*	-0.045**	(0.020)	-0.001**	(0.000)	0.004***	(0.001)	-0.004***	(0.001)	0.012***	(0.001)
Displaced at *t-1*	-0.154***	(0.020)	-0.001***	(0.000)	0.013***	(0.001)	-0.001	(0.001)	0.009***	(0.001)
Displaced at *t-2*	-0.184***	(0.021)	-0.001	(0.000)	0.013***	(0.001)	-0.003***	(0.001)	0.011***	(0.001)
Displaced at *t-3*	-0.165***	(0.021)	-0.001*	(0.000)	0.013***	(0.001)	-0.003***	(0.001)	0.010***	(0.001)
Displaced at *t-4*	-0.162***	(0.021)	-0.001	(0.000)	0.012***	(0.001)	-0.003***	(0.001)	0.009***	(0.001)
Displaced at *t-5*	-0.110***	(0.021)	-0.001***	(0.000)	0.012***	(0.001)	-0.002***	(0.001)	0.011***	(0.001)
Displaced at *t-6*	-0.117***	(0.022)	-0.002***	(0.000)	0.015***	(0.001)	-0.003***	(0.001)	0.010***	(0.001)
Displaced at *t-7*	-0.094***	(0.022)	-0.002***	(0.000)	0.017***	(0.001)	-0.003***	(0.001)	0.011***	(0.001)
R-squared	0.1490									
No. of observations	1117254									

The dependent variable is months of employment. Displacements happened between May 1991 and May 1992. *t* is the year of the observation. The sample covers the years 1988 to 1998, and consists of male workers, who were 25-55 year old and full time employed in manufacturing plants with at least five employees in 1991, and who were in the labour force and not displaced from their jobs in the previous three years, whose annual earnings are at least 50 000 NOK and who were in the labour force in the last observed post displacement year 1998. The following control variables are included, but not reported: Age, age squared, regional rate of unemployment and time dummies. The specification without fixed effects also includes years of schooling, tenure when displaced, marital status when displaced, plant size when displaced, size of the regional labour market when displaced, industry and region dummies. Huber-White robust standard errors allowing for clustering of errors by individuals are in parentheses.