Job Displacement in Jobless Recoveries

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Abstract

In this paper, we provide estimates of the effect of job displacement on employment and earnings in jobless recoveries. While existing estimates show that the cost of job displacement has a systematic cyclical component, recent recessions seem to have been associated with above average earnings losses. We use a large employer-employee data source to investigate the effects of job displacement between 2000 and 2008. Following

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the existing literature, we define a job displacement when a worker leaves an establishment that closes or experiences a mass layoff. Conditional on reemployment, we find an average 5% loss in annual earnings after 4 years. Counting zero earnings in our calculation of losses, we find a 25% loss after 4 years. The results, especially without zeros, are somewhat smaller compared to other studies based on administrative data. This is possibly explained by broader sample than typically studied including lower-tenured workers and displacements from smaller employers. The findings presented here are preliminary and are meant to provide a benchmark to the existing literature. [Estimates by year and estimates including displacements in the 2008 recession are forthcoming.]

1 Introduction

Existing studies of the effect of job displacement based on administrative data find large and persistent earnings losses for affected workers (e.g., Jacobson, Lalonde, Sullivan 1993, Couch and Placzek 2009, von Wachter, Song, and Manchester 2009). These findings are mostly based on recessions from the 1980s and 1990s. However, the nature of recessions has been changing over time, with at least 2002 and 2008 having had slower than usual recovery in employment. Previous work finds a robust relationship of unemployment rate and size of earnings losses (Davis and von Wachter 2012). However, it appers displacements surrounding the 2002 recession have larger effects on earnings than the historical relation with the business cycle suggests. Yet, little more is known from administrative data about how the effect of job displacement differs in 2002 recession from previous recessions. This question important among others because 2008 recession was jobless as well.

Jobless recoveries could affect the cost of displacement in multiple ways. Lower reemployment rates lead to larger short-term earnings losses by virtue of nonemployment. Lower reemployment rates also lead to longer unemployment spells and possibly larger skill depre-

ciation or stigma. In contrast, worse outside options may also lower the incidence of job displacement if firms and workers bargain, or reduce unemployment durations if workers are more willing to take wage cuts to obtain a job. Patterns associated with jobless recovery itself (e.g., technological changes) may also imply larger earnings losses (perhaps due to larger skill losses). Hence, the structure of earnings losses are also informative about the nature of the recession itself.

This paper studies the effect of displacement events in the United States for the period 2000-2008 for firms and workers. Following the model of Jacobson, LaLonde and Sullivan (1993*a*), we leverage a longitudinal administrative dataset with linked employer-employee records to analyze the effects of displacement over time. We define a displacement event as a firm closure or mass-dismissal, and our data allow us to link displacement events with workers separations at a specific firm. All workers who are laid off by the firm in the year of the displacement event at the firm are classified as "displaced". Workers at firms that have no displacement event in a particular year are in a comparison group, as are workers at displacing firms that are not laid off, or are laid off at other times. Cohorts of workers "at risk of displacement" are defined by a set of firm and individual level characteristics including firm-size, industry, tenure and age. We follow 6 cohorts of "at risk" workers from 2000-2005 prior to and following the at-risk period, allowing us to compare earnings patterns of those who are displaced with similar workers who are not displaced over the same time period. To add additional context, we examine incidence of displacement and the contributing factors, and model the effect of firm events, in contrast to individual displacements, on workers' earnings.

In Section 2 we discuss the data sources we use and in Section 3 we discuss our definition of displacement. We then present our main findings in Section 4. These findings relate to the incidence of displacement, the effect of displacement on reemployment, and the effect of displacement on earnings. The last section offers a preliminary discussion.

2 Data sources

The analysis in this paper is based on the LEHD Infrastructure File system (Abowd et al., 2009). The LEHD Infrastructure File system is a job-based frame designed to be representative of the universe of individual-employer pairs covered by state unemployment insurance system reporting requirements. The underlying data are wage records extracted from Unemployment Insurance (UI) administrative files from each of the participating states in a state-federal partnership involving the U.S. Census Bureau and individual states. These records are augmented with information from several other administrative data bases and Census-administered surveys and censuses.

Other sources have been used to study displacement and mass layoffs in the past. Some use data stemming from the same universe of state-based individual wage records: UI wage records for Pennsylvania Jacobson, LaLonde and Sullivan (1993*b*), California Schoeni and Dardia (1996), Connecticut Couch and Placzek (2010). Surveys, such as the **PSID!** (**PSID!**) (Ruhm, 1991; Parent, 2000, f.i.), the **NLSY!** (**NLSY!**) Parent (2000); Kletzer and Fairlie (2003), and of course the Current Population Survey (CPS)'s **DWS!** (**DWS!**) Farber (2005), have less coverage but more demographic information. Time series on large localized employment reductions, including mass layoffs and firm closures, can also be obtained from several data series at the U.S. Census Bureau (**BDS!** (**BDS!**), **CBP!** (**CBP!**), and **SynLBD!** (**SynLBD!**)) as well as the Bureau of Labor Statistics (Business Employment Dynamics (BED) and Mass Layoff Statistics (MLS)). A full comparison of these sources and their impact on measurement of displacement and mass layoffs is beyond the scope of the current paper. Farber (2005) and Couch and Placzek (2010) provide an overview over several of the sources.

2.1 Sources of earnings information

Earnings data is collected from wage records reported by employers to states' unemployment insurance (UI) systems. Employing entities are identified by a state UI account number (recoded to the State Employer Identification Number (SEIN) in the LEHD system). Except for one state (Minnesota), the actual place of work (establishment) is not reported on wage records, only the in-state employer of record. An individual's UI wage record is retained in the processing if at least one employer reports earnings of at least one dollar for that individual during the quarter. Thus, an in-scope job must produce at least one dollar of UI-covered earnings during a given quarter in the LEHD universe. Maximum earnings reported are defined in a specific state's unemployment insurance system, and observed top-coding varies across states and over time. The wage records themselves provide no other demographic information other than the individual's Social Security Number (later replaced with the Protected Identity Key (PIK), within the LEHD system), first name, last name, and middle initial. The data used here cover about 97% (ref) of private-sector employment in the states in our sample. Local and state government employees are excluded if the industry associated with their place of work falls into the primary government NAICS sectors, but employees who work for non-private establishments classified in the education and health sector may be included. Federal government employees are not included.

The primary industry of the employer is derived from employer reports, which each state's Department of Employment Security collects and provides to the Census Bureau. The data are collected as part of the Covered Employment and Wages (CEW) program, also known as the ES-202 program, which is jointly administered by the U.S. Bureau of Labor Statistics (BLS) and the Employment Security Agencies in a federal-state partnership. Other information includes establishment-level employment and location; however, as noted, individual jobs cannot, in general, be linked to the establishment-level records. Most employers have one establishment ("single-units"), but most employment is with employers who have

multiple establishments ("multi-units"). One report per establishment per quarter is filed[1]. Employers are identified by an administrative identifier State employer identification number (SEIN) that is specific to each state. Due to this, no cross-state employers exist, and cross-border, intra-firm transfers are classified as employer changes. The Census Bureau computes the dominant (median) industry of an employer using establishment-employment as weights.

2.2 Demographic information

Demographic information on individuals comes from administrative data sources available to the Census Bureau. The Personal Characteristics File (PCF) contains information on sex, date of birth, place of birth, citizenship, and race, most of which is extracted from the Social Security Administration's Numident file–the data base containing application information for Social Security Numbers.Additional demographic information is limited to education for workers who also answered the Census 2000 long-form questions. Although a sophisticated impute exists for the approximately 85% of workers that have no observed education (cite), the analysis here does not report results for education.

2.3 Coverage

Data from 20 states are used and we restricted ourselves for the person- and job-level analysis to a 2% subsample of all workers having worked in those states between 2000 and 2008, linked to all their employers during that time period. Displacement indicators, however, were computed using the full population of workers and firms within the 20 states.

[1]These data are also used to compile the Covered Employment and Wages (CEW) and and Business Employment Dynamics (BED) data at the BLS.

Adequacy of the data

Research use of the entire LEHD data infrastructure is subject to some restrictions. While the LEHD infrastructure produces statistics covering 49 states and the District of Columbia (as of June 2013), only a subset of the input files to those statistics are available to researchers. Furthermore, even among the researcher-accessible states, the availability of data varies by state. Table 1 enumerates the 20 states used in this version of the paper, and the availability of data for each state. We furthermore restricted ourselves for the person- and job-level analysis to a 1% subsample of all workers having worked in those states between 2000 and 2008, linked to all their employers during that time period. Displacement indicators, however, were computed using the full population of workers and firms within the 20 states.

Tables 2 through 4 as well as Figures 1 through 4 compare a number of statistics computed for the analysis set used in this paper, and the equivalent statistics computed nationally (see Abowd and Vilhuber (2011) for more details on the creation of the national statistics, and details on the Quarterly Workforce Indicators (QWI) and derived rates presented here). For each statistic – accession and separation rates, job creation and destruction rates – we compute the aggregate rate for the states in our sample, overall and for each NAICS sector, age group, and gender ("classes"). We then compute the deviation of that rate from the national rate Abowd and Vilhuber (2011), and flag year-quarter-class cells that deviate by more than 2 or 3 standard errors (as computed for the national statistics). Table 2 shows the average deviation in percent and the incidence of deviations of more than two standard errors across all year-quarter-class cells, by type of class, without weighting. The average deviation is quite small, but the incidence of large deviations nevertheless seems high among NAICS sectors. However, in our analysis, we collapse several small industries to obtain large enough cells both for statistical analysis and disclosure avoidance. In Table 3, we have removed those small industries from the comparison. Although it slightly increases the average deviation to around 1.6% for accession and separation rates, the incidence of large deviations drops.

Table 4 shows that almost all of the remaining deviations occur in a catch-all service industry, with retail trade being the second biggest deviating sector. However, almost all deviations are less than three standard errors away from the national average. Figure 1 through 4 show the same information graphically, with the horizontal axis showing the relevant rate in the states in our sample, and the vertical axis showing the corresponding national rate for each plotted year-quarter-class cell with associated error bands (twice the standard error). Most rate pairs lie on the 45 degree line.

While not describing directly the incidence of displacement, the statistics here address both the stock of employment, its distribution across industries, as well as the characteristics of the workers. Based on this analysis, we believe that the sample of states, restricted by non-statistical factors, is nevertheless very similar in key characteristics to the entire nation.

3 Definitions

In the data used in this paper, employment is measured at quarterly frequencies. Information for each calendar year quarter pertains to whether or not any wages were earned by an individual at a particular firm in that quarter t (employment measure m_{ijt}). Employment at the beginning of the quarter t (b_{ijt}) or end of the quarter t (e_{ijt}) are derived from the presence of wage records (positive earnings in t, i.e., $m_{ijt} > 0$ and $m_{ijt-1} > 0$ for b_{ijt}). The actual amount of earnings earned at employer j during quarter t is denoted by $w_(ijt)$, and earnings at all employers by $w_{i \cdot t}$. Employer-level aggregates are denoted by capital letters, i.e., $B_{jt} = \sum_{i:j=J(i,t)} b_{ijt}$ where $J(i,t)$ is a function mapping workers i to employers at time t.

For the purposes of this paper, we use a point-in-time measure at a specific point of the calendar year. In particular, we choose April 1, as this is used in most official Census data products when looking at year-on-year measures. Denote by $t(Q)$ point in time that is measured during a particular calendar year quarter Q, i.e., $t(Q2)$ happens in a particular

year in quarter 2 (April-June). We will denote the four-quarter period that ends with Q2 as $y(t)$, and somewhat casually refer to it as a "year".

For equivalent yearly concepts, we will consider a person to be employed "during year $y(t)$" if the worker at some point in time (as defined above) during $y(t)$, i.e., $\tilde{m}_1 = 1$ if $\sum_{s=t-3}^{t} b_{ijs} > 0$. For some analysis, we will relax this condition to having had some employment, even if only brief, using $\tilde{m}_{2,ijy} = 1$ if $\sum_{s=t-3}^{t(Q2)} m_{ijs} > 0$ with $y = y(t)$. Employment "in year $y(t)$" is defined as employment "at the end of year $y(t)$", denoted by $\tilde{e}_{ijy} = 1$ if $b_{ijt(Q2)} = 1$.

Tenure can be measured in several ways as well. For this paper, we define tenure as the number of consecutive years with $\tilde{e}_{ijy} = 1$. Note that this allows workers to have prolonged periods of employment interruptions. Alternatively, tenure can be defined in terms of consecutive *quarters* employed at the same employer, with $b_{ijt} = 1$.

A displacement event is said to occur in year $y(t)$ when an employer experiences either a mass layoff

$$\Delta B_{jt(Q2)} = B_{jt(Q2)} - B_{jt-4} \geq 30\% B_{jt-4} \tag{1}$$

or a "firm shutdown"

$$B_{jt(Q2)} = 0 \wedge B_{jt-4} > 0 \tag{2}$$

with the additional restriction that only flows of 5 or more are counted, which we implement by only focussing on firms with 15 or more employees in $t-4$. In addition to the shutdown condition noted in (2), we further impose that the firm remain shutdown for at least four consecutive quarters.

All workers who are laid off by the firm in the year of the displacement event at the firm are classified as "displaced". Workers at firms that have no displacement event in a particular year are in a comparison group, as are workers at displacing firms that are not laid off, or are laid off at other times.

We focus on workers between ages 20 and 64 at time $t-4$, with tenure at that time of at least 1 year. People holding more than one job at time $t-4$ are excluded from the person-level analysis.[2] Note that all workers, including those with less tenure and with different ages, count towards the definition of the displacement event.

We measure (post-displacement) global earnings by summing across all jobs held at a specific point in time (after the displacement event).

Mobility is measured relative to each year, so that workers can be classified at time t as changing employers within the next x years, regardless of their displacement status in year $y(t)$. We measure post-displacement mobility by observing employment earnings in a different state than the location of the displacing establishment.[3]

3.1 Combining records

Wage records are combined with the demographic information using a masked version of the Social Security Number (SSN) called the PIK. Match errors may occur, as documented in Abowd and Vilhuber (2005) and Bureau of Labor Statistics (1997). Wage records are combined with employer reports using the SEIN. Match errors here are less likely, as most records are provided electronically, and are provided by the firm itself.

3.2 Correcting for changes in firm identifiers

Longitudinal match errors may occur at the firm and establishment level. Firms in the Quarterly Census of Employment and Wages (QCEW) system are identified by a UI account number assigned by the state (SEIN). As with all employer identifiers, an account number can change over time for a number of reasons, not all of which are due to economically

[2]We intend to relax this in further analysis by choosing a worker's primary or dominant job, regardless of the number of other jobs.

[3]We do not measure mobility of workers who do not find employment, since we do not have access to residential location for all workers. Longitudinal residential mobility is not currently available to the authors, but may be included in a future extension of this paper.

meaningful changes. State administrative units take great care to follow the legal entities in their system, but account numbers may nevertheless change for reasons which economists may not consider legitimate economic reasons. For instance, a change in ownership of a firm without any change in economic activity may lead to a change in the account number. Often, but not always, such a change is noted in the successor/predecessor fields of the ES-202 record. Other times, without changes in ownership, employees migrate *en masse* from one UI account to another. In this case, one might make a reasonable inference that there were continuous economic operations.

Since workers can be followed from one employer to the next, worker flows can be used to identify firms that are economically identical despite changing administrative identifiers. At one extreme, if all workers of firm A simultaneously "separate", to then be collectively hired by firm B, where they constitute the totality of employment, then firms A and B are very likely to be the same firm having changed administrative identifiers. More generally, in order for a firm B to be the economic successor of firm A, some fraction $f(A)$ of workers leaving firm A must be linkable to firm B, and possibly some fraction $f(B)$ of workers at firm B must have come from firm A.

For the purpose of this analysis, consistent with the way the Census Bureau applies these corrections to the data underlying the QWI, $f(A) = f(B) = 80\%$ was chosen, based on research by LEHD researchers (Benedetto et al., 2007) and consistent with similar methods in European countries (see Vilhuber (2009) for an overview of such methods for some European countries and the US). Following Benedetto et al. (2007) and Abowd et al. (2009), we computed flows between firms at all points in time, and flagged "strong" flows that corresponded to 80% of the predecessor's employment as well as to 80% of the successor's employment.[4] We then used such flows as an event filter when computing displacement events, i.e., we

[4]We used the same SAS code as used by the LEHD program to compute the Successor-Predecessor File (SPF), but recomputed all data from source records.

cancelled apparent "displacement events" that occurred at the same time as a strong flow to a successor occurred.

We note that all such flow corrections are computed within-state. A firm moving an establishment physically across a state line would not be captured by this correction, and may trigger a closure or mass layoff event.

4 Results

We are interested in reporting the impact on workers who are affected, but also focus to some extent on who is most likely to be affected by a displacement event. We will thus begin by an analysis of the incidence of job displacement, and the average characteristics of displaced vs. non-displaced workers. In a second step, we will consider the effect of job displacement on employment, and then move to an analysis of annual earnings. Finally, as additional outcome, we will look at mobility across states and industries. The companion project at the OECD also considers mobility across occupations, which unfortunately is not feasible with the LEHD data.

Sample construction

To estimate the effects of job displacement, we pursue a cohort-based analysis. Thereby, a cohort is based on a given reference year. A worker is displaced if a displacement event as defined above occurred in that reference year (or in the control group otherwise). The cohorts are then tracked for pre/post-reference-year outcomes. While we present some of our findings for each separate cohort, in some cases we present regression estimates where we stack cohorts to obtain the average displacement effect over our sample period. The workers we consider have only one job prior to displacement (i.e., we drop workers with multiple employers in the reference year).

Incidence of displacement

Figure 5 to 10 show the evolution of displacement rates over the time period of our sample, broken down by different demographics of the affected workers. Table 5 shows the corresponding displacement numbers by year for the full sample, while Tables 6 to 13 show the results by demographic and industry group and each year in our sample separately.

The results point to total mean quarterly displacement rates of about 7-8% per year surrounding the 2002 recession, and about 4-5% per year in the ensuing recovery (Table 5). Nevertheless, the increasing employment level (see Figure 6) means the number of displaced workers is increasing in the recovery despite dropping layoff rates. These findings are of a similar order of magnitude but somewhat larger than annual layoff rates calculated using Social Security data or survey data. The figures also show a possible downward trend, but to distinguish this from a cyclical pattern we would need additional years before and after our sample window.

We see some expected heterogeneity in the incidence of job displacement. Younger workers have higher displacement rates than older workers (Figure5). Men have higher displacement rates than women (Figure 6). High tenured workers have higher displacement rates than lower tenured ones (Figure 7). Workers in smaller firms (with 10-49 workers) are more likely to be displaced (Figure 8).

Employment losses of displaced workers

Figures 9 and 10 show the avrerage reemployment rate one and two years after job displacement following mass layoffs and plant closures over our time period, respectively. On average, reemployment rates are around 75They also tend to be higher for plant closings than for mass layoffs.

The fact that reemployment rates are substantially smaller one points towards a potential

issue of sample selection once we analyze earnings effects. The fact that they are lower for mass layoffs and lower tenured workers suggests that some of these workers may have been leaving employment and hence firms voluntarily. They could also be a sign of stronger negative selection of workers leaving firms experiencing mass layoffs. Since larger firms are more likely to experience mass layoffs, and larger firms often pay higher wages, it could also be that these workers have higher reservation wages and hence longer unemployment spells.

Earnings losses of displaced workers

Figures 15 to 18 summarize our preliminary analysis for earnings losses. As we have not been able to disclose earnings estimates by single year, we present estimates that are pooled over displacement cohorts. These are useful as a benchmark of our findings relative to the existing literature. All findings pertain to earnings from all employers past job displacement.

We estimate variants of the following regression model:

$$lny_{ict} = \alpha_i + \gamma_{ct} + \beta X_{ict} + \sum_{k>=-3}^{M} D_{ict}\delta^k \tag{3}$$

where i denotes individuals, t denotes a calendar year, c denotes a reference year, and M stands for the maximum number of years a cohort of workers belonging to a given reference year is observed. All models include separate year fixed effects for each displacement cohort, as well as dummy variables D_{ict} indicating whether a period is before, on, or after a displacement year (these dummies are zero for non-displaced workers). Thus, the coefficient estimates for δ measure the earnings changes before and after job displacement for affected workers relative to non-displaced workers, whose earnings trajectories are described by the γ coefficients. Models estimated differ in the type of control variables X_{ict} that are included. Some models also include a worker fixed effect α_i.

Figures 11 and 12 present models without worker fixed effects for workers that have a

job (i.e., dropping those with zero earnings). Figure 11 includes age, gender, and education (which has been partly imputed using standard Census practices). Figure 12 includes additional controls for pre-displacement industry. Overall, for those workers with employment, the figures show a 5% loss in annual earnings after 4 years. Figure 13 shows that the magnitude is similar once we control for worker fixed effects (note that the figure is shifted upwards because the figure is benchmarked at the mean of earnings throughout the sample, not the mean of earnings in the pre-displacement years; this affects the level but not the shape of the figure; as a result, one has to take the difference of the pre-displacement minus the post-displacement values to obtain the overall effect). Note that the fact that earnings differences before job displacements are found to be negligible in Figure 11 suggests that treatment and control group are reasonably similar, something that is not typically observed in other studies.

Clearly, these results may understate the cost of job displacment if there is sample selection. Once we include zeros in Figure 14, we find that there is a 25% loss after 4 years. While this is substantially larger and in line with comparable results in the literature that include zero earnings, it potentially overstates earnings losses since some of the workers counted as zero have moved to a state outside of our sample. While we require workers to be present in our sample at least once after job displacement (and we have 20 states in our sample), it is likely that Figure 14 overstates at least to some degree the cost of job displacement.

Overall, the results, especially the ones without zeros, tend to be somewhat smaller compared to other studies based on administrative data when zeros are excluded. This is possibly explained by broader sample than typically studied including lower-tenured workers and displacements from smaller employers, something we plan to explore further.

Mobility of displaced workers

Because we only observe mobility if the post-displacement move is to a state within the restricted sample, we adjust the observed mobility (Tables 15 and 16) using data derived from year-to-year U.S. migration data provided by the Internal Revenue Service (IRS) (Internal Revenue Service, 2012). The IRS data identifies tax returns, which is approximately equivalent to households, and exemptions, which is approximately equal to individuals in a household, including children, as well as earnings. Thus, while the first statistic will be an underestimate of the number of workers migrating, the second is an overestimate, and the third will be related to the overall income of migrants.

To assess how much migration is undercounted in our restricted sample, for each of the 20 states and all years, we compute a set of ratios as follows. Compute the number of filers (migrant households) leaving a given state for any of the 19 other states (the within-sample migrants). Count the number of filers to any destination, including foreign countries (all migrants), or to U.S. destinations only (domestic migrants). For each group, also compute the total (taxable) earnings.

Then we can compute the following ratios:

- Ratio of within-sample migrant households to all migrant households ($r_1 t$)
- Ratio of within-sample migrant households to domestic migrant households ($r_2 t$)
- Ratio of the earnings of within-sample migrants to earnings of all migrants ($r_3 t$)
- Ratio of the earnings of within-sample migrants to earnings of all domestic migrants ($r_4 t$)

The average ratios (across all time periods) are between 45% (r_1) and 49% (r_4). There is quite a bit of variation across states (ranging from 34% to 62%) but little variation over time (see Figure 15).

We use these estimates to scale up the migration rates of displaced workers. Under the assumption that displaced workers do not systematically search for jobs in different states than do non-displaced workers searching for jobs, the scaling factor is unbiased, and can be uniformly applied to the estimates.

For mobility across industries and states, we further distinguish between all jobs and dominant jobs. A dominant job is the job held in Q2 for which the worker received the most earnings in the past year. This allows us to refine the concept of mobility. Workers holding multiple jobs after displacement may hold such jobs in multiple industries. Some jobs may be in the same industry as the pre-displacement job, some may be in different ones.

We thus compute two estimates for industry mobility and four estimates for geographic mobility. First, Table 15 shows mobility based on all jobs workers held. Thus, industry mobility in Column (a) is the unweighted average across all jobs, not workers. Geographic mobility in Column (b) is the percentage of jobs that are in a different state than the pre-displacement job. For a state change to count towards Column (c), all jobs a worker may have held have to be in a different state, and thus more closely captures person mobility across borders, rather than job mobility across borders.

Then, in Table 16, we focus on the dominant jobs only. Columns (a) and (b) are straightforward mobility based on only the (single) dominant job, and thus again correspond more closely to person mobility. Column (c) is mobility across state lines if not only the dominant job, but all jobs are in a different state; but in contrast to the previous table, only the single dominant job counts toward the statistic.

5 Discussion

In this paper we have used administrative longitudinal worker-firm data from the LEHD to present preliminary estimates of the effect of job displacement from 2000 to 2008. These

initial findings are meant to provide a benchmark to the existing literature. Following the existing literature, we define a job displacement when a worker leaves an establishment that closes or experiences a mass layoff. We report displacement rates that are of comparable magnitude but somewhat higher than found in the existing literature. These displacement rates vary as expected by age, gender, prior job tenure, and firm size. While a majority of workers are reemployed after job displacement, the rate of nonemployment is permanently higher for displaced than for nondisplaced workers. Conditional on reemployment, we find an average 5% loss in annual earnings after 4 years. Counting zero earnings in our calculation of losses, we find a 25% loss after 4 years. The results, especially without zeros, are somewhat smaller compared to other studies based on administrative data. This is possibly explained by broader sample than typically studied including lower-tenured workers and displacements from smaller employers.

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Table 1: List of states included in the analysis

State abbreviation	Start period	End period
IL	1990Q1	2008Q4
MD	1990Q1	2008Q4
WA	1990Q1	2008Q4
WI	1990Q1	2008Q4
OR	1991Q1	2008Q4
FL	1992Q4	2008Q4
NC	1992Q4	2008Q4
CO	1993Q2	2008Q4
TX	1995Q1	2008Q4
NM	1995Q3	2008Q4
NJ	1996Q1	2008Q4
ME	1996Q2	2008Q4
WV	1997Q1	2008Q4
IN	1998Q1	2008Q4
SC	1998Q1	2008Q4
VA	1998Q1	2008Q4
IA	1998Q4	2008Q4
OK	2000Q1	2008Q4
VT	2000Q1	2008Q4
AR	2002Q3	2008Q4

Table 2: Comparison of analysis states to national QWI

		Accession rates		Separation rates		Job creation rates		Job destruction rates	
Class	N	Avg. dev.	Fraction sig. diff.	Avg. dev.	Fraction sig. diff.	Avg. dev.	Fraction sig. diff.	Avg. dev.	Fraction sig. diff.
Age groups	288	3.58	1.74	3.59	3.13	1.48	0.35	0.90	0.00
Gender	72	3.22	0.00	3.37	2.78	0.82	0.00	0.41	0.00
NAICS Sectors	684	0.89	21.64	1.03	24.71	0.15	9.50	-0.27	13.89

Note: Unit of analysis is a class-year cell. See text for details.

Table 3: Comparison of analysis states to national QWI, with exclusions

		Accession rates		Separation rates		Job creation rates		Job destruction rates	
Class	N	Avg. dev.	Fraction sig. diff.	Avg. dev.	Fraction sig. diff.	Avg. dev.	Fraction sig. diff.	Avg. dev.	Fraction sig. diff.
Age groups	288	3.58	1.74	3.59	3.13	1.48	0.35	0.90	0.00
Gender	72	3.22	0.00	3.37	2.78	0.82	0.00	0.41	0.00
NAICS Sectors	324	1.60	12.04	1.60	14.81	-0.03	6.17	-0.92	11.11

Note: Unit of analysis is a class-year cell.
Excludes NAICS Sectors '11', '21', '22', '51', '53', '54','61','62','71','72'.
See text for details.

Table 4: Deviations from national QWI, with exclusions: counts

Class	N	Accession rates		Separation rates		Job creation rates		Job destruction rates	
		> 2 std. err.	> 3 std. err.	> 2 std. err.	> 3 std. err.	> 2 std. err.	> 3 std. err.	> 2 std. err.	> 3 std. err.
Ages 14-18	36	1	0	1	1	0	0	0	0
Ages 19-21	36	3	0	2	1	0	0	0	0
Ages 22-24	36	1	0	1	1	0	0	0	0
Ages 25-34	36	0	0	1	1	0	0	0	0
Ages 35-44	36	0	0	1	0	0	0	0	0
Ages 45-54	36	0	0	1	0	0	0	0	0
Ages 55-64	36	0	0	1	0	0	0	0	0
Ages 65-99	36	0	0	1	0	1	0	0	0
Male	36	0	0	1	0	0	0	0	0
Female	36	0	0	1	1	0	0	0	0
Construction	36	1	0	1	0	2	0	2	0
Manufacturing	36	0	0	0	0	1	0	5	0
Wholesale Trade	36	0	0	1	0	0	0	2	0
Retail Trade	36	6	0	5	1	1	0	5	1
Transportation and Warehousing	36	0	0	4	0	0	0	2	0
Finance and Insurance	36	2	0	1	0	2	0	3	0
Management of Companies and Enterprises	36	2	0	1	0	1	1	4	0
Administrative, Support, Waste Management, Remediation	36	4	0	6	1	5	0	8	0
Other Services (except Public Administration)	36	24	6	29	9	8	1	5	3

Note: Unit of analysis is a class-year cell.
Excludes NAICS Sectors '11', '21', '22', '51', '53', '54','61','62','71','72'.
See text for details.

Table 5: Proportion of employees in year t-1 who are displaced between year $t-1$ and year t (%)

	Displaced workers (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
2000	3.01	3.91	6.92
2001	3.05	3.53	6.58
2002	3.37	2.91	6.29
2003	2.71	2.63	5.35
2004	2.21	2.72	4.93
2005	2.08	2.21	4.29
2006	2.05	2.33	4.38
2007	2.15	1.04	3.19

Table 6: Displacement rates by worker and job characteristics: 2000

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	4.75	6.98	11.72
NAICS Sector(s) 23	3.74	3.94	7.68
NAICS Sector(s) 31-33	3.37	4.27	7.64
NAICS Sector(s) 42	3.36	5.46	8.82
NAICS Sector(s) 44-45	2.47	4.48	6.95
NAICS Sector(s) 48-49,22	3.80	3.08	6.89
NAICS Sector(s) 52	2.90	6.79	9.69
NAICS Sector(s) 55,56	5.58	5.39	10.96
NAICS Sector(s) 81	3.07	3.40	6.47
Age at t-1			
20-24	3.41	4.35	7.76
25-34	3.11	4.33	7.44
35-44	2.99	4.02	7.01
45-54	2.95	3.61	6.56
55-64	2.85	3.47	6.32
Gender			
Men	3.23	4.13	7.36
Women	2.78	3.68	6.46
Firm size at t-1			
10-49	3.36	4.17	7.52
50-99	2.96	4.54	7.50
100-199	3.01	4.42	7.43
200-499	2.80	4.47	7.28
500+ employees	2.95	3.46	6.41
Job tenure at t-1			
1-4 years	3.52	4.04	7.55
5-9 years	2.18	4.00	6.17

Table 7: Displacement rates by worker and job characteristics: 2001

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	2.98	3.29	6.27
NAICS Sector(s) 23	4.99	2.77	7.77
NAICS Sector(s) 31-33	4.30	5.03	9.34
NAICS Sector(s) 42	2.61	4.71	7.32
NAICS Sector(s) 44-45	2.99	3.78	6.77
NAICS Sector(s) 48-49,22	2.35	2.25	4.60
NAICS Sector(s) 52	2.68	4.43	7.11
NAICS Sector(s) 55,56	7.69	5.09	12.78
NAICS Sector(s) 81	2.37	3.76	6.12
Age at t-1			
20-24	3.59	3.84	7.43
25-34	3.40	3.83	7.23
35-44	2.98	3.62	6.60
45-54	2.84	3.34	6.18
55-64	2.87	3.17	6.04
Gender			
Men	3.35	3.81	7.16
Women	2.74	3.24	5.98
Firm size at t-1			
10-49	3.53	4.20	7.73
50-99	3.57	3.93	7.50
100-199	3.31	4.25	7.56
200-499	3.36	3.98	7.34
500+ employees	2.64	2.97	5.61
Job tenure at t-1			
1-4 years	3.68	3.98	7.66
5-9 years	1.99	2.85	4.84

Table 8: Displacement rates by worker and job characteristics: 2002

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	2.86	3.27	6.13
NAICS Sector(s) 23	6.29	3.86	10.15
NAICS Sector(s) 31-33	4.57	3.79	8.36
NAICS Sector(s) 42	2.70	4.76	7.46
NAICS Sector(s) 44-45	2.44	2.61	5.05
NAICS Sector(s) 48-49,22	2.89	2.84	5.73
NAICS Sector(s) 52	2.54	3.15	5.70
NAICS Sector(s) 55,56	6.03	5.82	11.85
NAICS Sector(s) 81	2.36	2.83	5.19
Age at t-1			
20-24	3.44	3.13	6.57
25-34	3.64	3.07	6.71
35-44	3.30	3.06	6.37
45-54	3.28	2.74	6.02
55-64	3.26	2.66	5.92
Gender			
Men	3.65	3.17	6.83
Women	3.09	2.65	5.74
Firm size at t-1			
10-49	3.71	3.79	7.50
50-99	3.05	3.50	6.55
100-199	2.93	3.85	6.78
200-499	3.16	3.16	6.32
500+ employees	3.44	2.27	5.71
Job tenure at t-1			
1-4 years	4.22	3.25	7.46
5-9 years	1.97	2.49	4.46

Table 9: Displacement rates by worker and job characteristics: 2003

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	3.99	3.13	7.11
NAICS Sector(s) 23	4.74	2.48	7.22
NAICS Sector(s) 31-33	3.35	3.38	6.72
NAICS Sector(s) 42	2.80	2.57	5.37
NAICS Sector(s) 44-45	1.87	2.51	4.38
NAICS Sector(s) 48-49,22	3.04	2.41	5.45
NAICS Sector(s) 52	2.87	3.20	6.07
NAICS Sector(s) 55,56	4.83	4.25	9.08
NAICS Sector(s) 81	1.74	3.18	4.92
Age at t-1			
20-24	2.86	2.87	5.73
25-34	2.78	2.78	5.56
35-44	2.76	2.63	5.38
45-54	2.58	2.50	5.08
55-64	2.75	2.59	5.34
Gender			
Men	2.90	2.78	5.68
Women	2.53	2.48	5.01
Firm size at t-1			
10-49	3.14	3.75	6.89
50-99	2.53	3.57	6.11
100-199	2.50	3.33	5.84
200-499	2.60	3.15	5.75
500+ employees	2.67	1.83	4.50
Job tenure at t-1			
1-4 years	3.16	3.10	6.26
5-9 years	2.05	2.08	4.13

Table 10: Displacement rates by worker and job characteristics: 2004

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	1.68	3.41	5.09
NAICS Sector(s) 23	5.11	3.26	8.38
NAICS Sector(s) 31-33	2.35	3.13	5.47
NAICS Sector(s) 42	1.63	2.59	4.23
NAICS Sector(s) 44-45	1.99	3.03	5.02
NAICS Sector(s) 48-49,22	2.45	1.66	4.11
NAICS Sector(s) 52	2.20	4.81	7.01
NAICS Sector(s) 55,56	4.42	4.51	8.93
NAICS Sector(s) 81	2.26	2.17	4.43
Age at t-1			
20-24	2.50	3.33	5.82
25-34	2.35	2.92	5.27
35-44	2.19	2.86	5.05
45-54	2.11	2.49	4.61
55-64	2.11	2.40	4.52
Gender			
Men	2.26	2.74	5.00
Women	2.15	2.70	4.86
Firm size at t-1			
10-49	2.60	3.48	6.08
50-99	2.24	3.26	5.50
100-199	2.11	3.15	5.26
200-499	1.91	2.90	4.81
500+ employees	2.17	2.25	4.42
Job tenure at t-1			
1-4 years	2.54	3.29	5.84
5-9 years	1.85	2.10	3.95

Table 11: Displacement rates by worker and job characteristics: 2005

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	1.72	3.94	5.67
NAICS Sector(s) 23	3.64	2.26	5.90
NAICS Sector(s) 31-33	2.46	2.77	5.23
NAICS Sector(s) 42	1.39	2.46	3.85
NAICS Sector(s) 44-45	1.98	2.32	4.30
NAICS Sector(s) 48-49,22	1.89	1.28	3.17
NAICS Sector(s) 52	1.65	2.99	4.64
NAICS Sector(s) 55,56	3.55	3.52	7.07
NAICS Sector(s) 81	1.74	2.23	3.97
Age at t-1			
20-24	2.41	2.34	4.75
25-34	2.18	2.50	4.68
35-44	2.04	2.28	4.33
45-54	2.01	2.05	4.06
55-64	2.02	1.97	3.98
Gender			
Men	2.12	2.26	4.38
Women	2.04	2.15	4.19
Firm size at t-1			
10-49	2.51	3.39	5.90
50-99	1.83	2.90	4.74
100-199	1.93	2.80	4.73
200-499	2.17	2.61	4.78
500+ employees	1.98	1.50	3.48
Job tenure at t-1			
1-4 years	2.47	2.51	4.98
5-9 years	1.81	2.04	3.85

Table 12: Displacement rates by worker and job characteristics: 2006

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	2.21	4.35	6.57
NAICS Sector(s) 23	3.30	1.73	5.04
NAICS Sector(s) 31-33	2.83	3.07	5.90
NAICS Sector(s) 42	1.56	3.08	4.64
NAICS Sector(s) 44-45	1.34	2.45	3.80
NAICS Sector(s) 48-49,22	2.95	1.66	4.61
NAICS Sector(s) 52	1.35	4.08	5.43
NAICS Sector(s) 55,56	3.49	3.44	6.93
NAICS Sector(s) 81	1.89	2.30	4.19
Age at t-1			
20-24	2.02	2.52	4.53
25-34	2.08	2.46	4.55
35-44	2.12	2.46	4.58
45-54	2.01	2.18	4.19
55-64	1.99	2.17	4.16
Gender			
Men	2.10	2.44	4.54
Women	2.00	2.22	4.22
Firm size at t-1			
10-49	2.45	3.43	5.88
50-99	1.99	3.22	5.21
100-199	1.90	2.99	4.89
200-499	2.00	2.72	4.72
500+ employees	1.97	1.60	3.57
Job tenure at t-1			
1-4 years	2.40	2.70	5.10
5-9 years	1.77	2.11	3.88

Table 13: Displacement rates by worker and job characteristics: 2007

	Displacement rates (by reason of displacement)		
	Mass dismissal	Firm closure	Mass dismissal OR closure
Industry			
NAICS Sector(s) 11,21	3.22	0.88	4.10
NAICS Sector(s) 23	4.78	0.90	5.68
NAICS Sector(s) 31-33	2.55	0.97	3.52
NAICS Sector(s) 42	1.84	0.96	2.80
NAICS Sector(s) 44-45	2.24	1.62	3.87
NAICS Sector(s) 48-49,22	1.74	0.35	2.09
NAICS Sector(s) 52	2.71	1.11	3.82
NAICS Sector(s) 55,56	4.13	1.30	5.43
NAICS Sector(s) 81	2.08	1.18	3.25
Age at t-1			
20-24	2.60	1.21	3.81
25-34	2.35	1.15	3.50
35-44	2.09	1.00	3.09
45-54	2.09	0.99	3.08
55-64	1.98	0.98	2.96
Gender			
Men	2.31	1.08	3.40
Women	1.99	0.99	2.98
Firm size at t-1			
10-49	3.16	1.05	4.21
50-99	2.39	0.96	3.35
100-199	2.35	0.85	3.20
200-499	2.41	0.93	3.34
500+ employees	1.67	1.11	2.78
Job tenure at t-1			
1-4 years	2.69	1.09	3.78
5-9 years	1.78	1.25	3.03

Table 14: Average characteristics of displaced workers compared with employees, 2000 to 2008

	Displaced workers (by reason of displacement)			
	Mass dismissal	Firm closure	Mass dismissal OR closure	All "base sample" employees at time $t-1$
Age at t-1				
20-24 years	6.52	6.52	6.52	5.97
25-34 years	22.04	22.53	22.29	20.60
35-44 years	28.32	29.61	28.97	27.95
45-54 years	27.92	27.05	27.48	29.08
55-64 years	15.20	14.28	14.74	16.39
Gender				
Women	46.45	46.85	46.65	49.59
Job tenure at t-1				
1-4 years	72.35	68.59	70.45	58.88
5-9 years	22.12	25.77	23.97	29.47
N	84,794	86,757	171,551	3,744,440

Table 15: Percent of displaced workers that change industry or location: all jobs

	(a)	(b)	(c)
All workers			
2000	10.86	1.06	0.61
2001	10.80	1.01	0.58
2002	9.54	0.95	0.53
2003	8.96	0.95	0.55
2004	9.19	1.00	0.57
2005	9.46	1.04	0.60
2006	9.78	1.06	0.58
2007	9.66	1.05	0.56
2008	9.94	0.95	0.51
Mass dismissal			
2000	26.75	2.07	1.40
2001	28.22	2.16	1.59
2002	32.92	3.19	2.41
2003	28.18	2.55	1.94
2004	26.81	2.59	1.95
2005	27.28	2.37	1.75
2006	26.56	2.49	1.71
2007	26.53	3.02	2.13
2008	30.58	2.62	1.91
Closure			
2000	24.84	1.28	0.85
2001	28.03	1.18	0.59
2002	22.65	1.22	0.71
2003	22.45	1.51	1.05
2004	22.74	1.40	0.87
2005	21.45	1.28	0.70
2006	24.44	1.42	0.94
2007	21.14	1.49	0.83
2008	20.30	0.98	0.56
Mass dismissal, closure			
2000	25.72	1.65	1.10
2001	28.11	1.58	1.00
2002	26.98	2.05	1.42
2003	25.30	2.03	1.49
2004	24.70	1.97	1.39
2005	23.93	1.74	1.15
2006	25.41	1.92	1.29
2007	23.53	2.17	1.41
2008	26.67	2.00	1.40

Percent of displaced workers who are employed at year t and who (a) changed industry (b) changed workplace location (c) changed workplace location at all jobs.

Table 16: Percent of displaced workers that change industry or location: dominant jobs

	(a)	(b)	(c)
All workers			
2000	7.18	0.68	0.58
2001	7.43	0.65	0.54
2002	6.60	0.60	0.50
2003	6.17	0.61	0.51
2004	6.29	0.62	0.53
2005	6.44	0.65	0.55
2006	6.54	0.66	0.55
2007	6.53	0.68	0.54
2008	7.10	0.61	0.48
Mass dismissal			
2000	23.24	1.69	1.40
2001	24.09	1.84	1.61
2002	30.36	2.88	2.48
2003	25.31	2.27	1.92
2004	23.85	2.10	1.82
2005	23.94	1.96	1.70
2006	23.34	2.10	1.73
2007	23.31	2.68	2.15
2008	28.05	2.29	1.84
Closure			
2000	21.51	1.01	0.83
2001	25.51	0.77	0.60
2002	20.11	0.90	0.70
2003	20.23	1.14	0.95
2004	20.28	1.11	0.85
2005	18.59	0.92	0.75
2006	21.47	1.09	0.91
2007	18.66	1.11	0.80
2008	17.40	0.68	0.55
Mass dismissal, closure			
2000	22.31	1.33	1.09
2001	24.93	1.21	1.02
2002	24.37	1.72	1.44
2003	22.74	1.70	1.43
2004	21.98	1.58	1.31
2005	20.85	1.36	1.15
2006	22.33	1.55	1.28
2007	20.71	1.80	1.39
2008	23.97	1.67	1.35

Percent of displaced workers who are employed at year t and who (a) changed industry (b) changed workplace location (c) changed workplace location at all jobs.

Table 17: Adjusted percent of displaced workers that change location: any jobs

	Job weighted		At all jobs		IRS data
	lower bound	*upper bound*	*lower bound*	*upper bound*	
All workers					
2000	2.28	2.40	1.31	1.38	1.34
2001	2.13	2.26	1.22	1.30	1.26
2002	2.02	2.14	1.13	1.19	1.18
2003	1.98	2.10	1.15	1.22	1.18
2004	2.07	2.20	1.18	1.25	1.22
2005	2.12	2.27	1.22	1.31	1.28
2006	2.19	2.36	1.20	1.29	1.22
2007	2.19	2.33	1.17	1.24	1.17
2008	1.98	2.10	1.06	1.13	1.07
Mass dismissal					
2000	4.45	4.68	3.01	3.17	–
2001	4.56	4.83	3.36	3.56	–
2002	6.77	7.17	5.12	5.42	–
2003	5.31	5.65	4.04	4.30	–
2004	5.37	5.69	4.04	4.28	–
2005	4.83	5.18	3.57	3.82	–
2006	5.16	5.53	3.54	3.80	–
2007	6.30	6.69	4.45	4.72	–
2008	5.46	5.80	3.98	4.23	–
Closure					
2000	2.75	2.90	1.83	1.92	–
2001	2.49	2.64	1.24	1.32	–
2002	2.59	2.74	1.51	1.60	–
2003	3.14	3.35	2.19	2.33	–
2004	2.90	3.08	1.80	1.91	–
2005	2.61	2.80	1.43	1.53	–
2006	2.94	3.16	1.95	2.09	–
2007	3.11	3.30	1.73	1.84	–
2008	2.04	2.17	1.17	1.24	–
Mass dismissal, closure					
2000	3.55	3.73	2.37	2.49	–
2001	3.33	3.53	2.11	2.24	–
2002	4.35	4.61	3.02	3.19	–
2003	4.23	4.50	3.10	3.30	–
2004	4.08	4.33	2.88	3.05	–
2005	3.55	3.80	2.35	2.51	–
2006	3.98	4.27	2.67	2.87	–
2007	4.53	4.81	2.94	3.12	–
2008	4.17	4.43	2.92	3.10	–

Percent of displaced workers who are employed at year t, adjusted for the undercount due to the restricted geography coverage. IRS data is the ratio of taxable earnings of migrants to the other US states, relative to total taxable earnings for all filers.

Table 18: Adjusted percent of displaced workers that change location: dominant jobs

	Job weighted		At all jobs		IRS data
	lower bound	*upper bound*	*lower bound*	*upper bound*	
All workers					
2000	1.46	1.54	1.25	1.31	1.34
2001	1.37	1.45	1.14	1.21	1.26
2002	1.27	1.35	1.06	1.12	1.18
2003	1.27	1.35	1.06	1.13	1.18
2004	1.28	1.36	1.10	1.16	1.22
2005	1.33	1.42	1.12	1.20	1.28
2006	1.37	1.47	1.14	1.22	1.22
2007	1.42	1.51	1.13	1.20	1.17
2008	1.27	1.35	1.00	1.06	1.07
Mass dismissal					
2000	3.64	3.82	3.01	3.17	–
2001	3.88	4.11	3.40	3.60	–
2002	6.12	6.47	5.27	5.57	–
2003	4.73	5.03	4.00	4.25	–
2004	4.35	4.61	3.77	4.00	–
2005	4.00	4.28	3.47	3.71	–
2006	4.35	4.67	3.58	3.84	–
2007	5.59	5.93	4.49	4.76	–
2008	4.77	5.07	3.84	4.07	–
Closure					
2000	2.17	2.28	1.79	1.88	–
2001	1.62	1.72	1.27	1.34	–
2002	1.91	2.02	1.49	1.57	–
2003	2.37	2.53	1.98	2.10	–
2004	2.30	2.44	1.76	1.87	–
2005	1.88	2.01	1.53	1.64	–
2006	2.26	2.42	1.88	2.02	–
2007	2.32	2.46	1.67	1.77	–
2008	1.42	1.50	1.15	1.22	–
Mass dismissal, closure					
2000	2.86	3.01	2.35	2.47	–
2001	2.55	2.71	2.15	2.28	–
2002	3.65	3.87	3.06	3.24	–
2003	3.54	3.77	2.98	3.17	–
2004	3.27	3.47	2.72	2.88	–
2005	2.77	2.97	2.35	2.51	–
2006	3.21	3.44	2.65	2.84	–
2007	3.76	3.99	2.90	3.08	–
2008	3.48	3.70	2.81	2.99	–

Percent of displaced workers who are employed at year t, adjusted for the undercount due to the restricted geography coverage. IRS data is the ratio of taxable earnings of migrants to the other US states, relative to total taxable earnings for all filers.

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Figure 1: Sample vs. national statistics: Accession rates

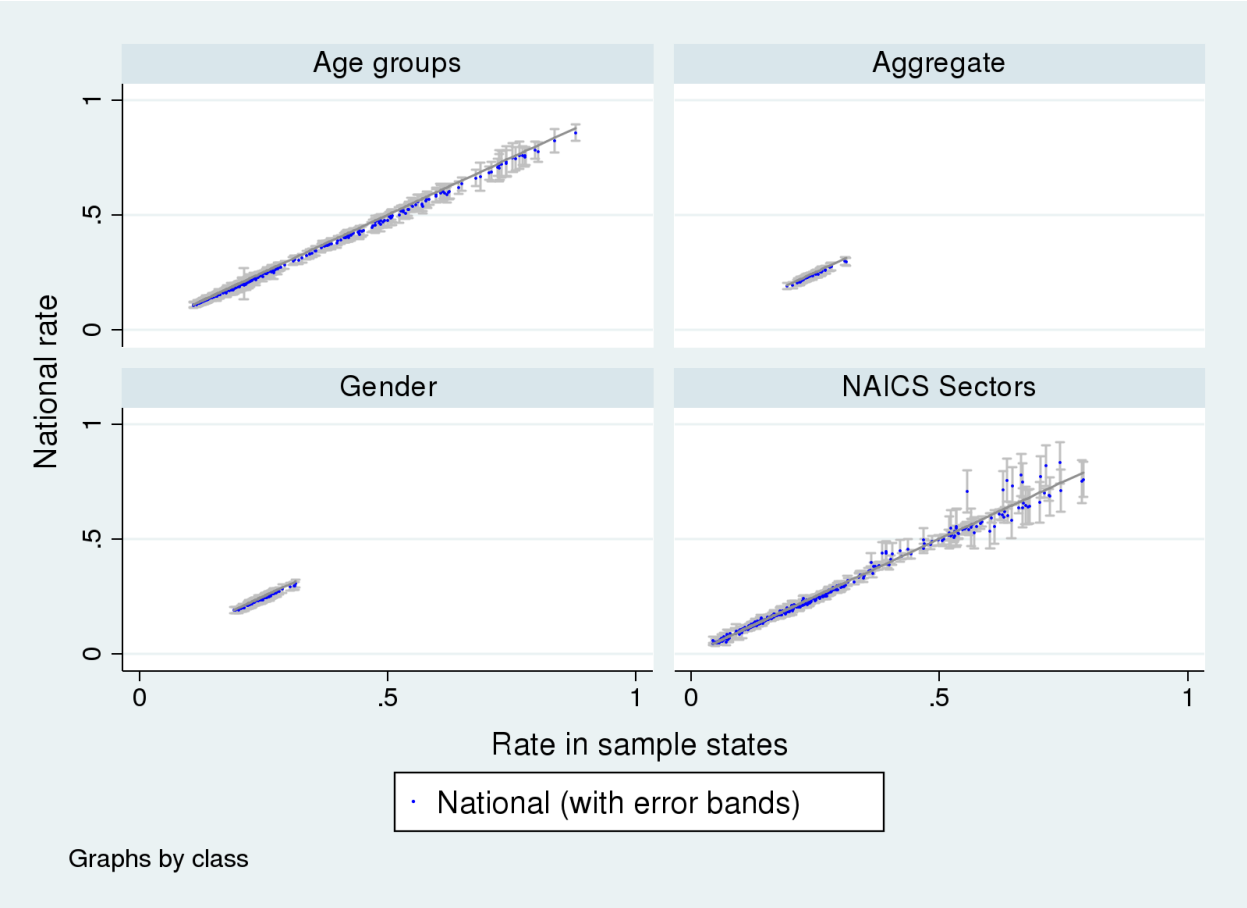


Figure 2: Sample vs. national statistics: Separation rates

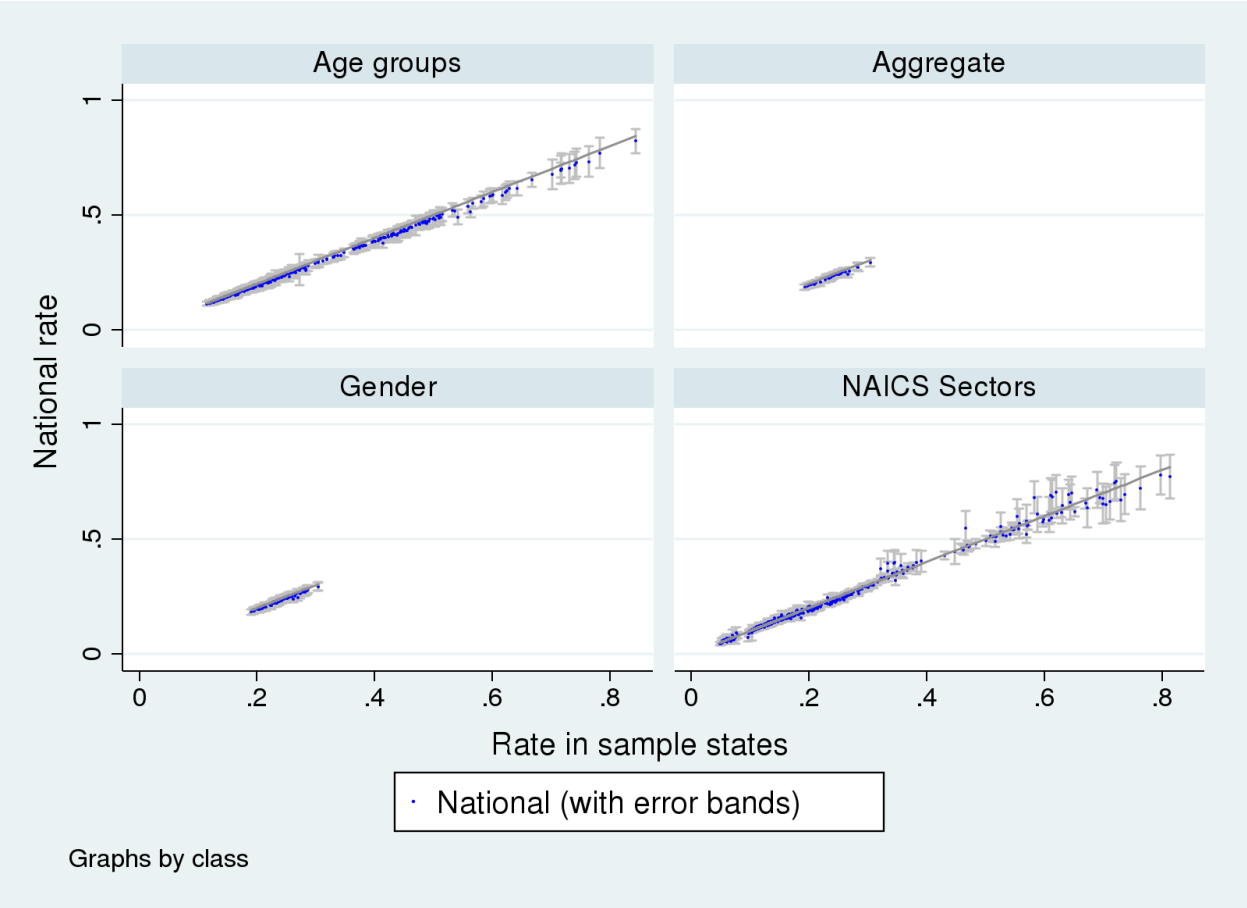


Figure 3: Sample vs. national statistics: Job destruction rates

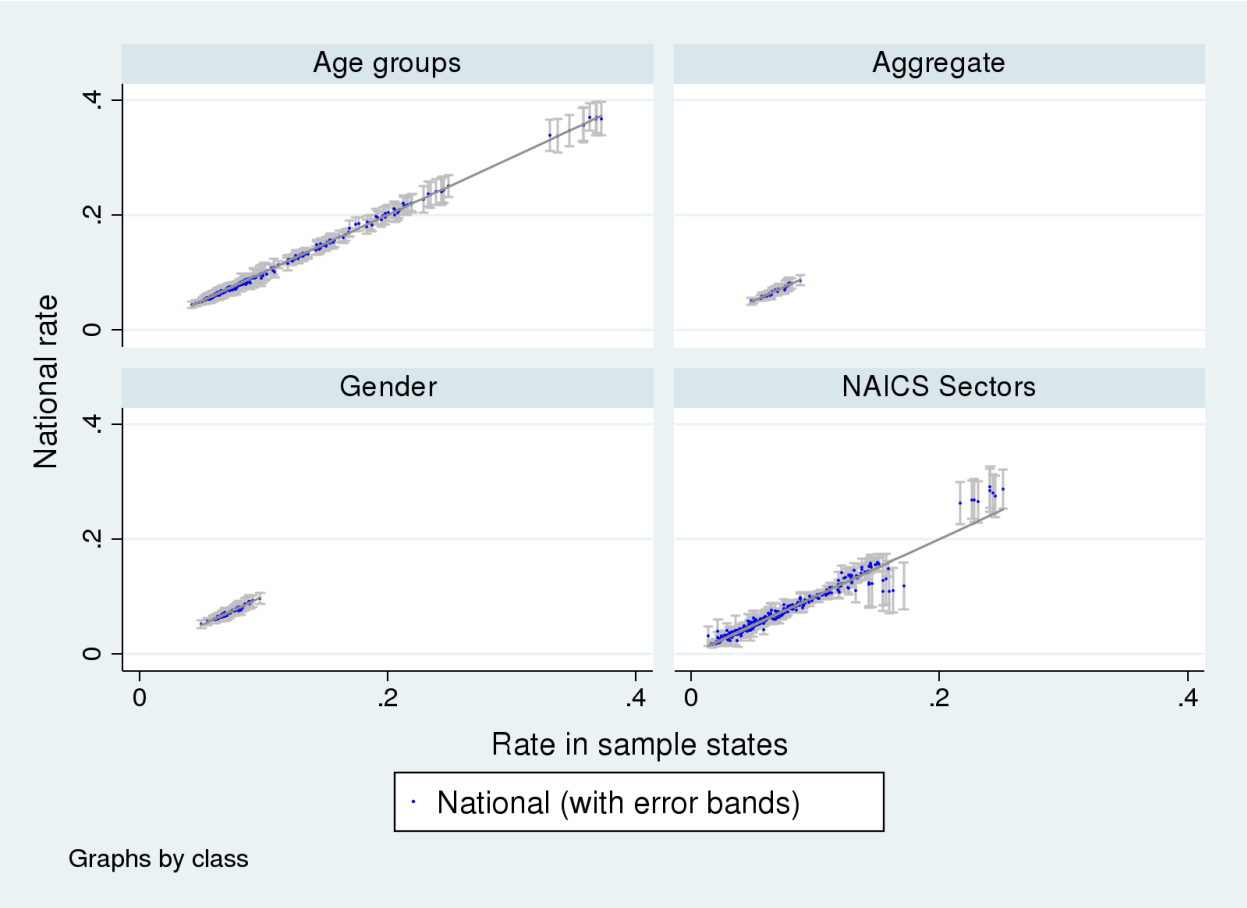


Figure 4: Sample vs. national statistics: Job creation rates

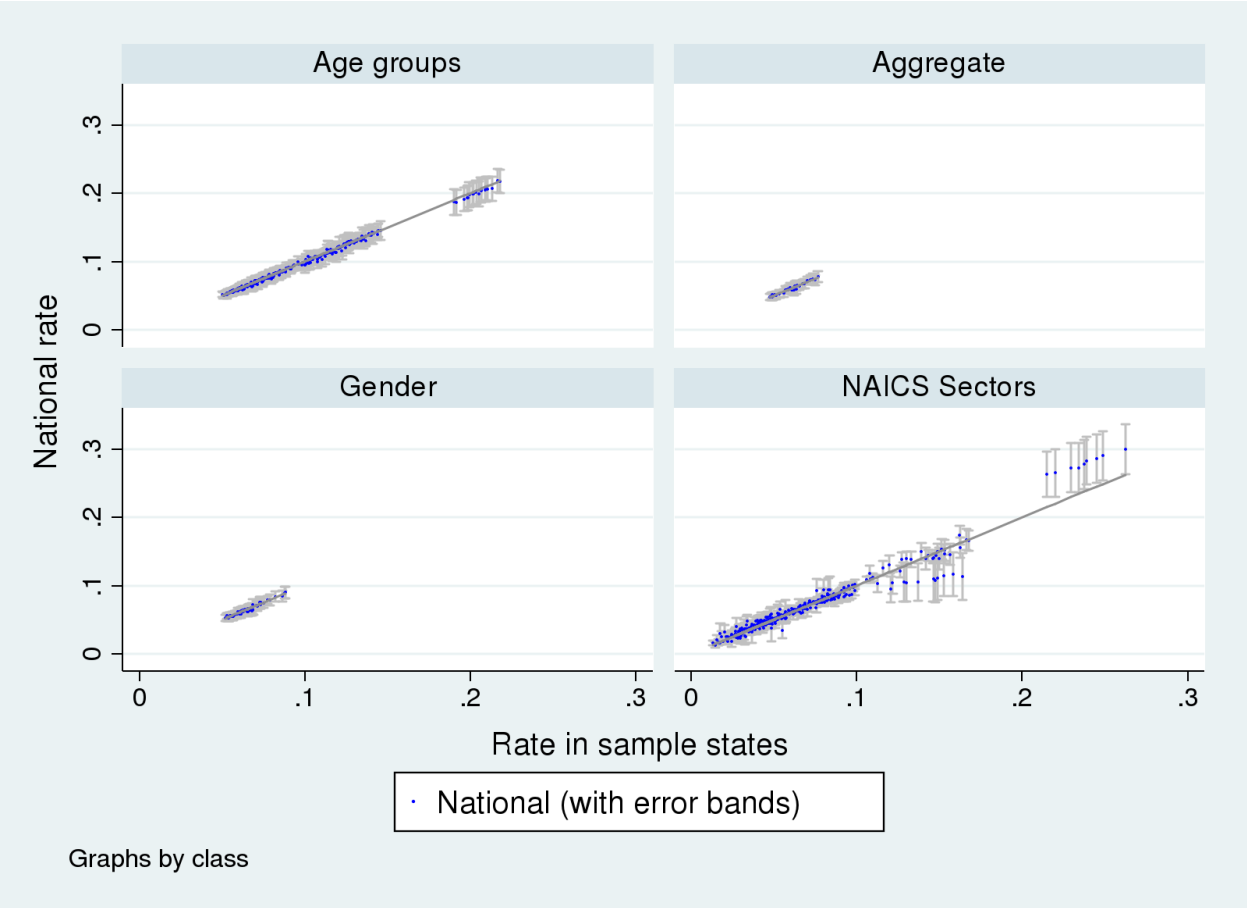


Figure 5: Displacement rates over time: by age

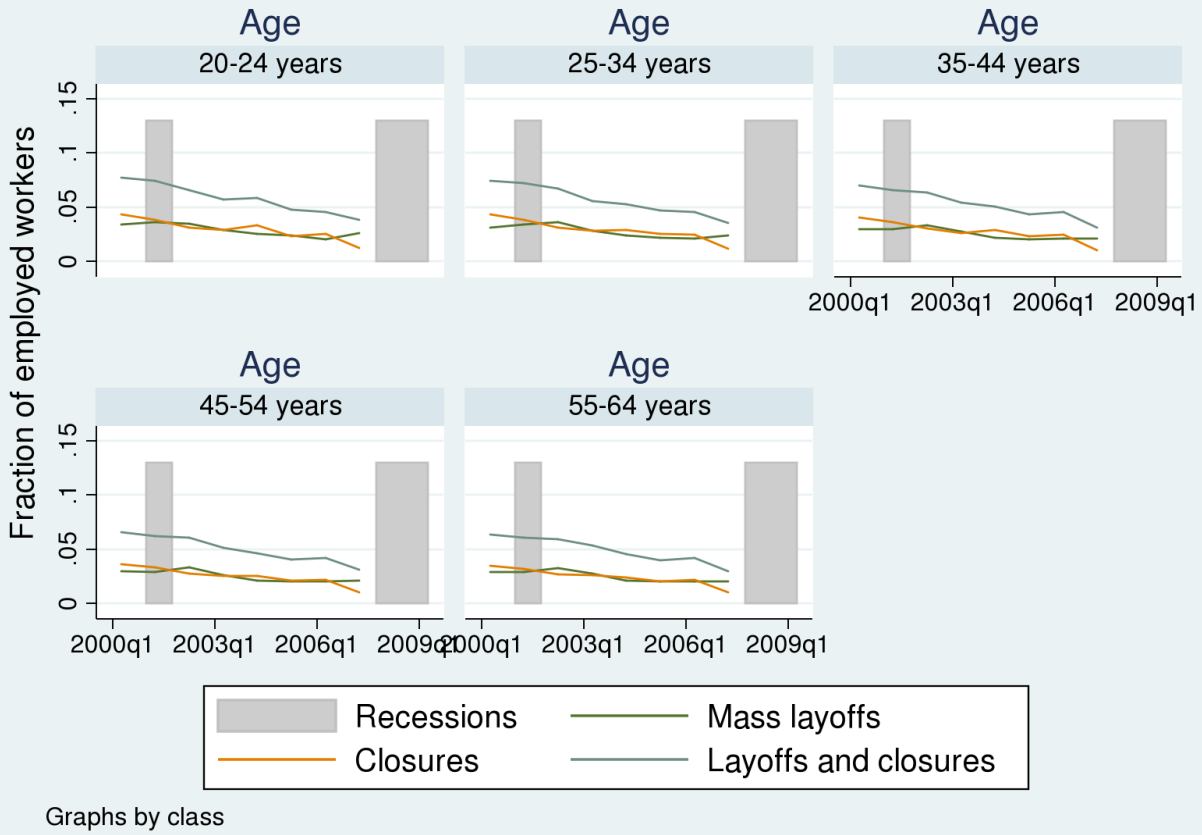


Figure 6: Displacement rates over time, by sex

Figure 7: Displacement rates over time: by Tenure

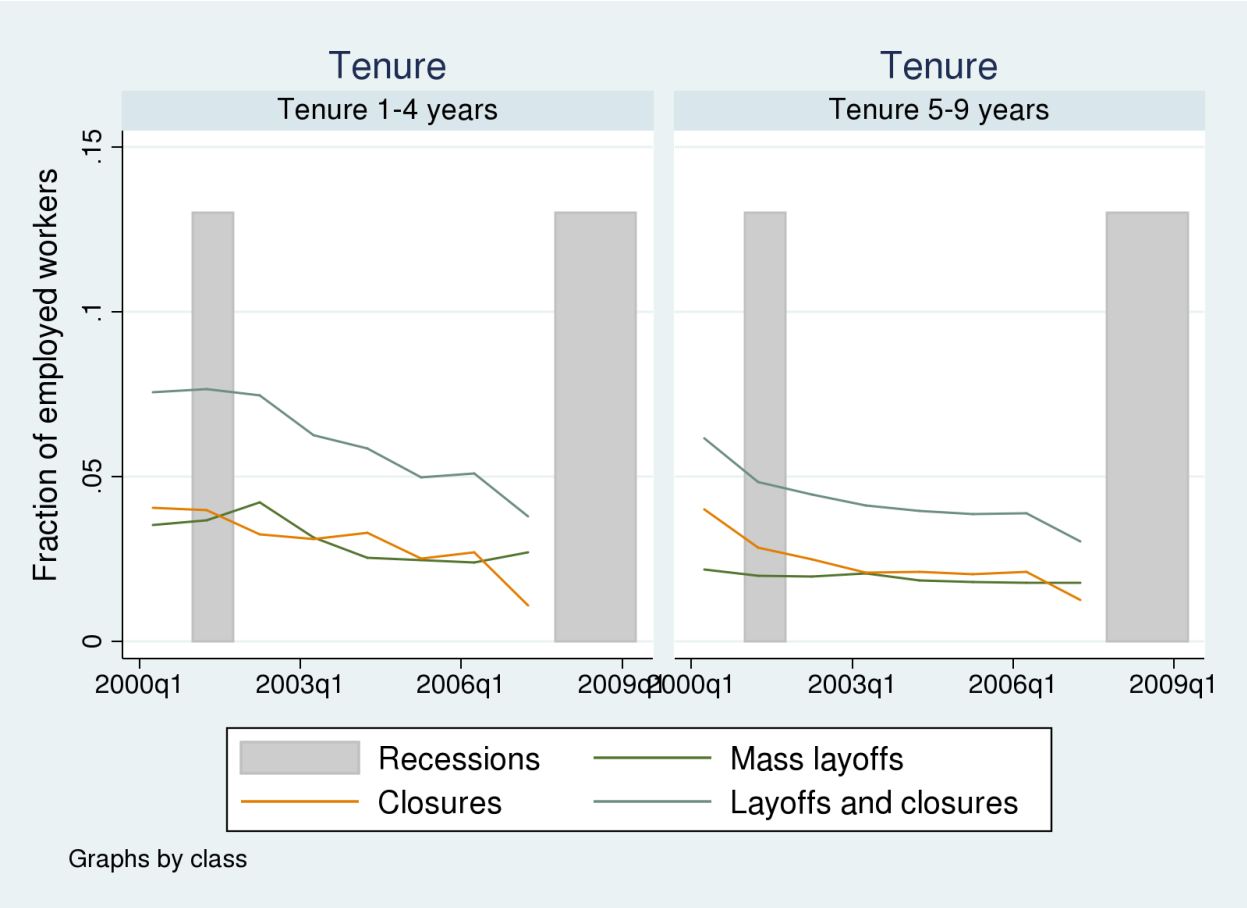


Figure 8: Displacement rates over time: by Size of firm

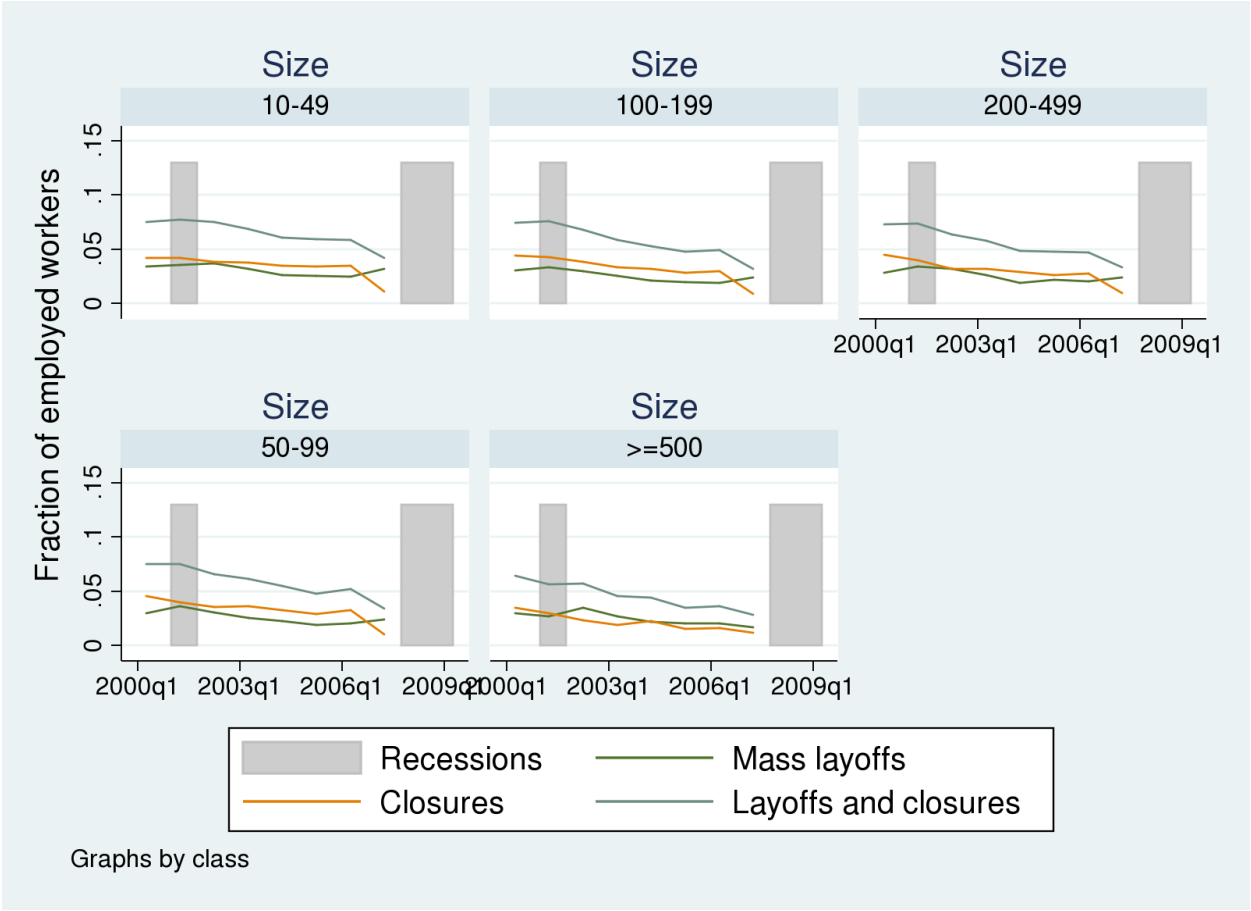


Figure 9: Re-employment in t

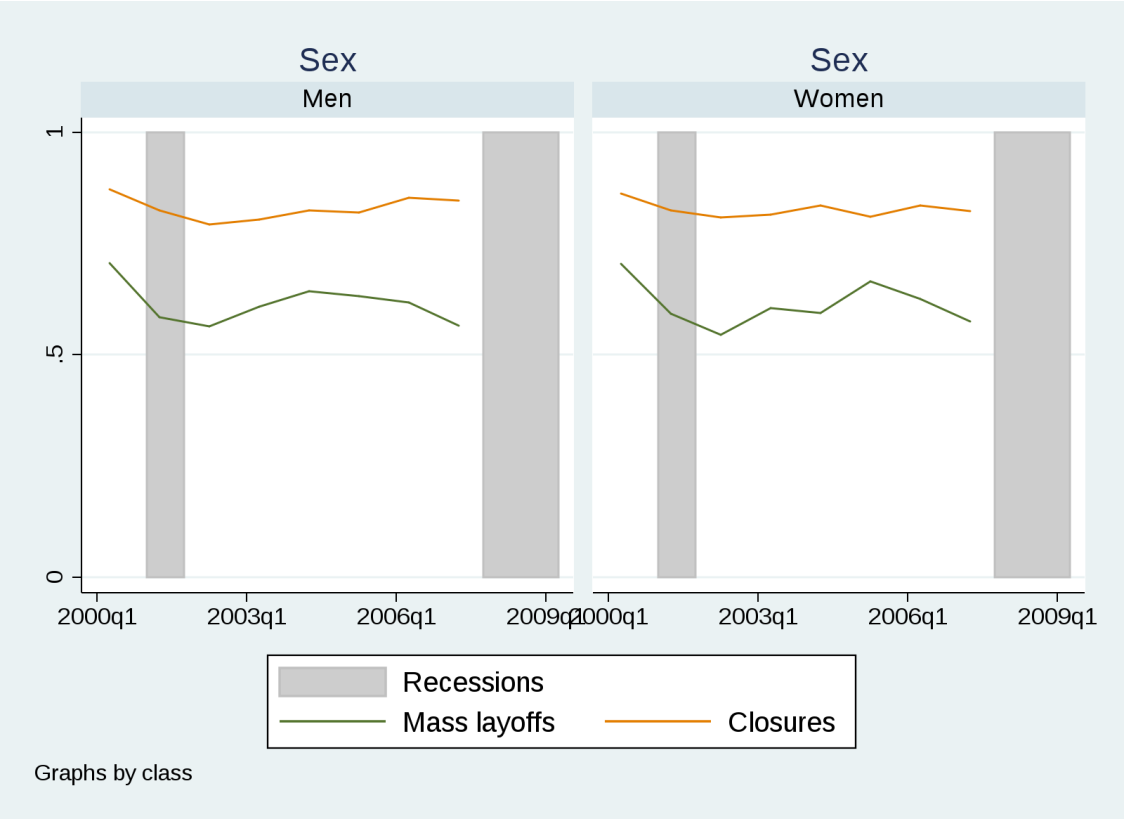


Figure 10: Re-employment at $t + 2$

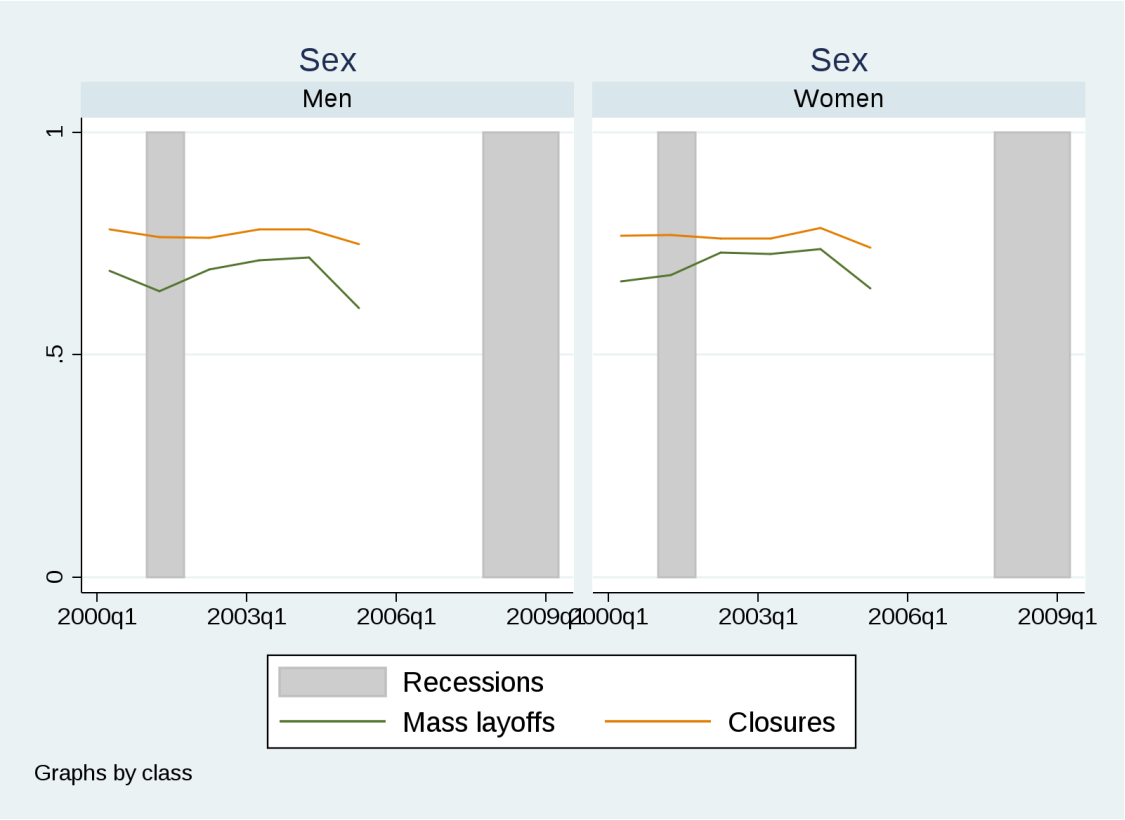


Figure 11: OLS (age, age^2, sex, education)

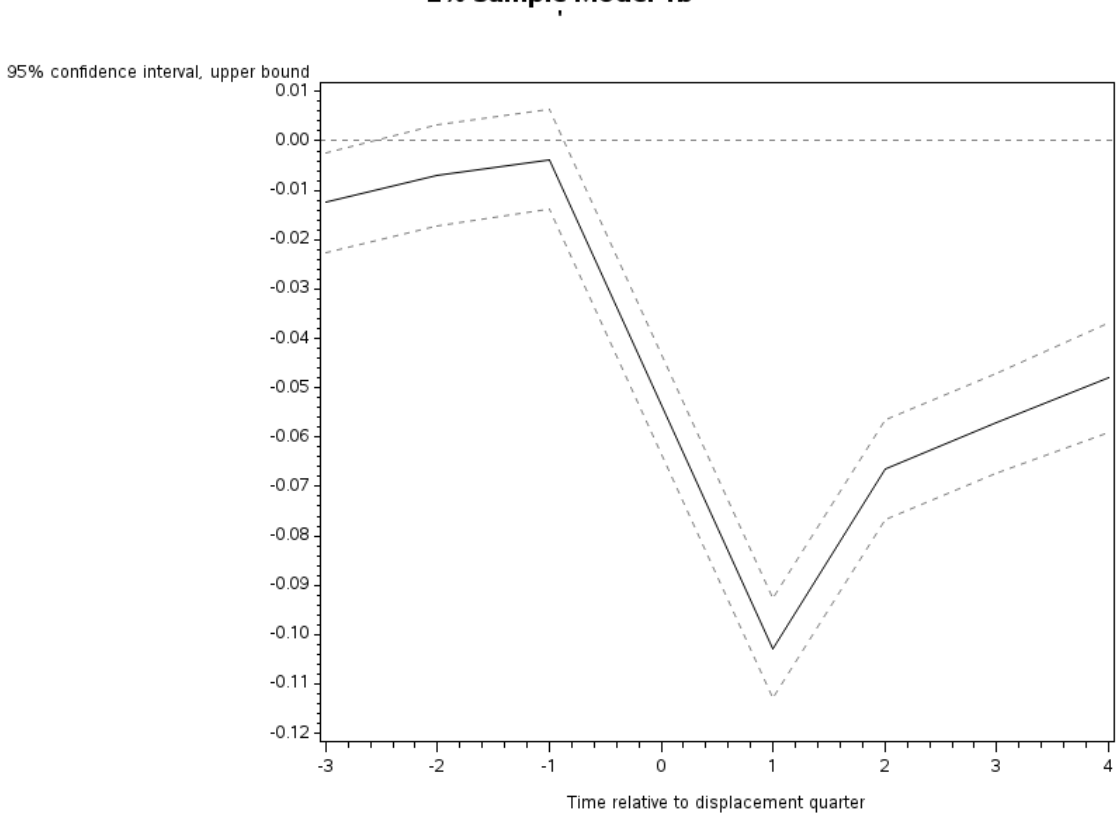


Figure 12: OLS (additional industry controls)

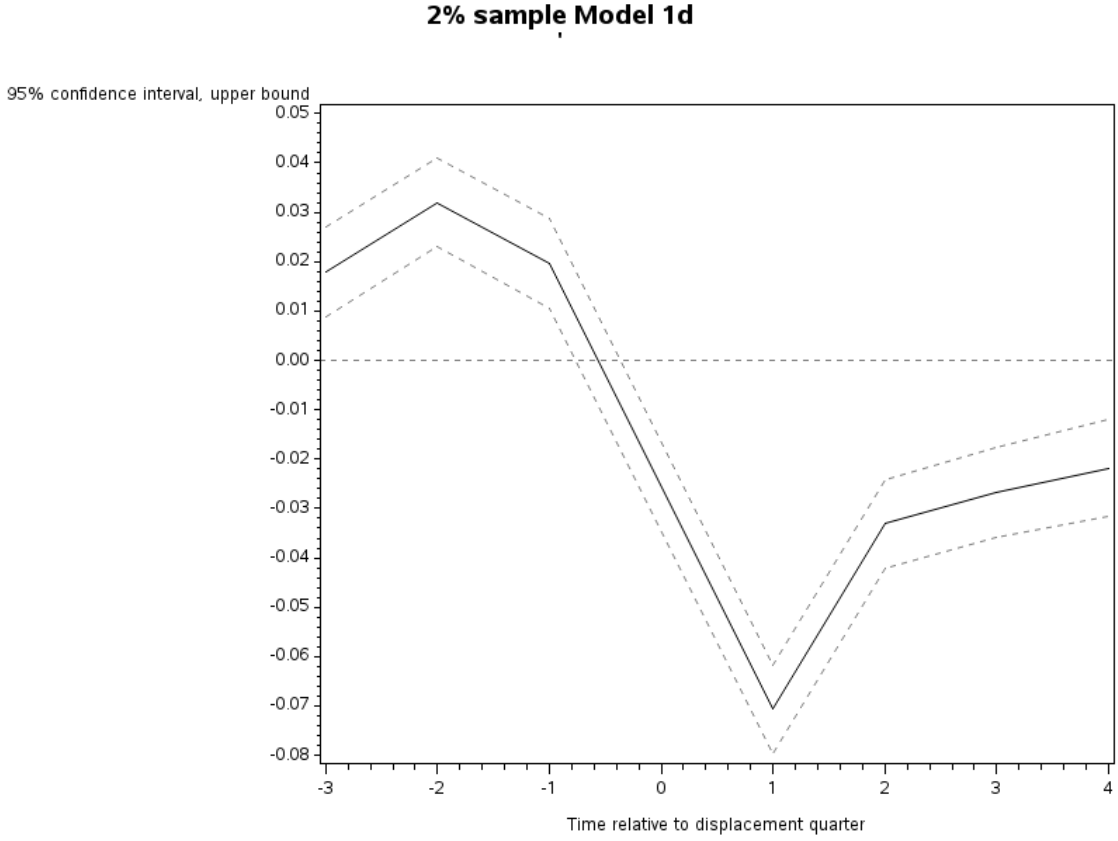


Figure 13: Person-effect model (age^2, industry)

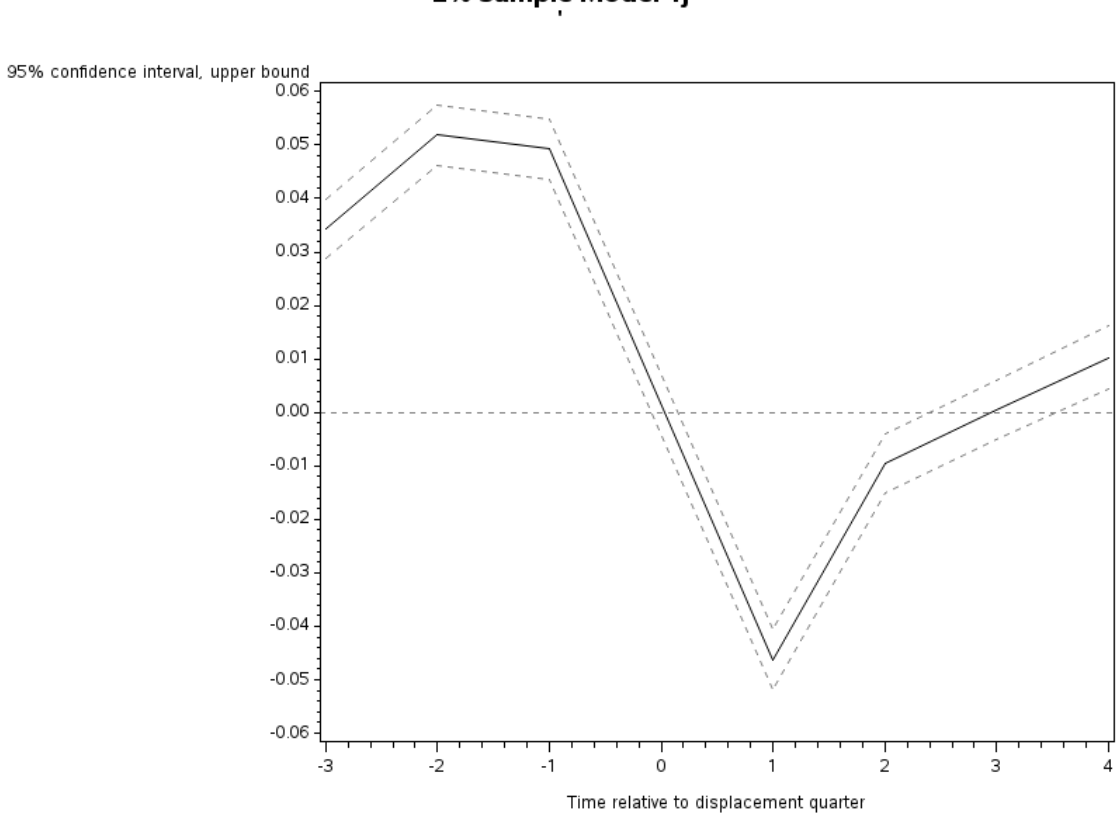


Figure 14: Person-effect model (age^2, industry, includes zero post-employment earnings

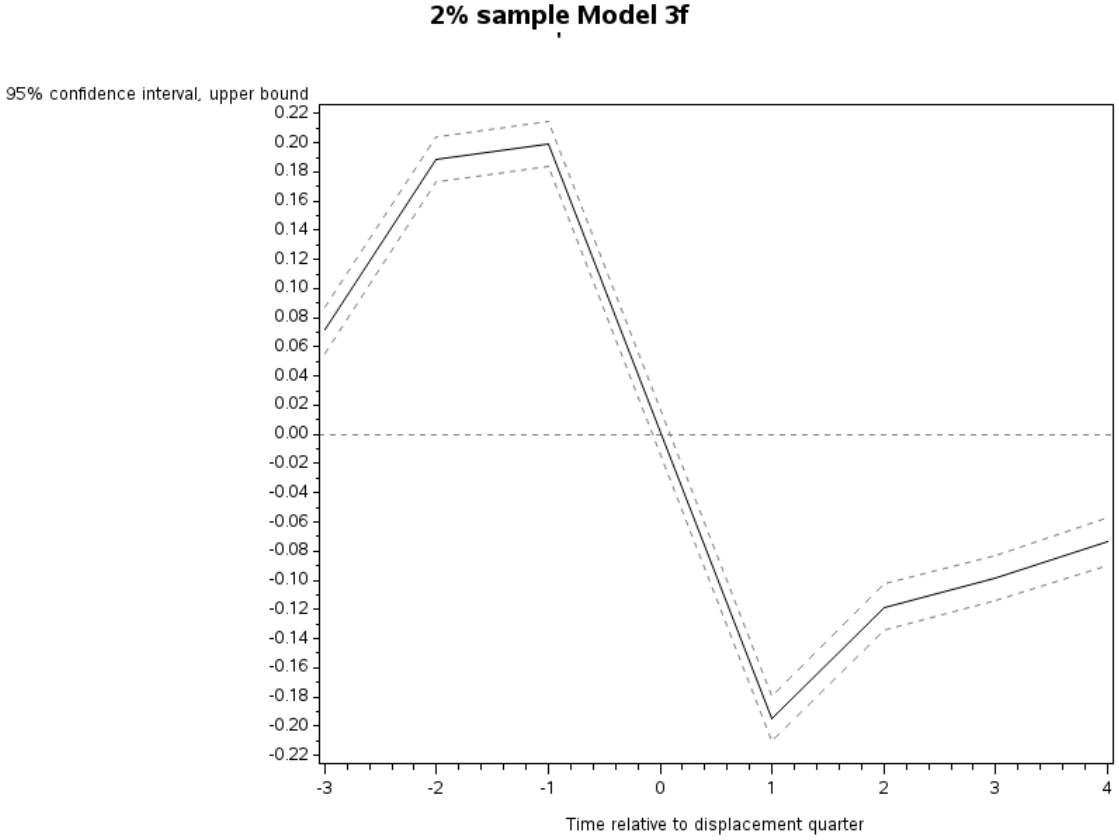
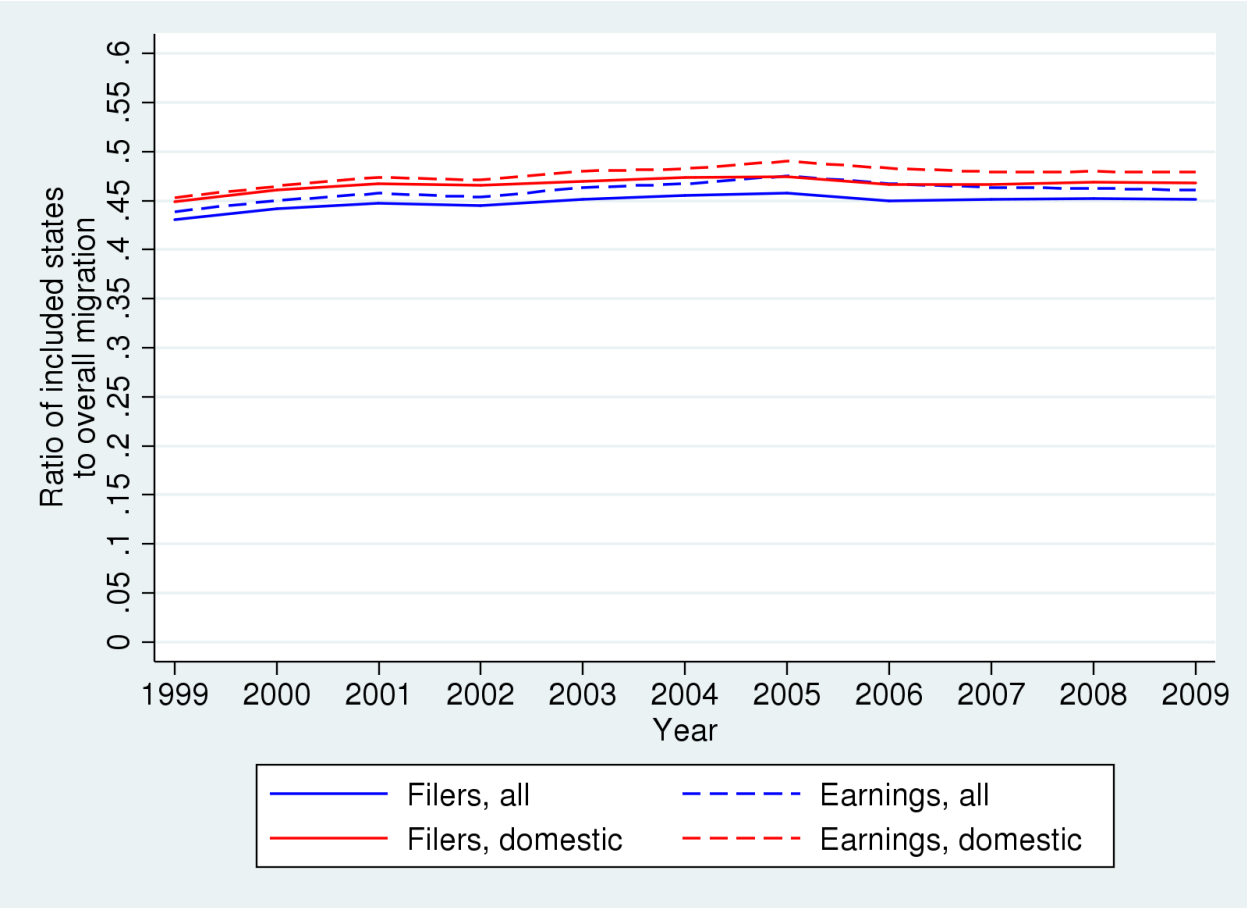


Figure 15: Within-sample Migration as a fraction of overall migration, over time



Appendix

BED Business Employment Dynamics

BLS Bureau of Labor Statistics

CPS Current Population Survey

FIPS Federal information processing standards codes issued by National Institute of Standards and Technology (NIST)

IRS Internal Revenue Service

IRS Internal Revenue Service

MLS BLSMass Layoff Statistics

NIST National Institute of Standards and Technology

PCF Personal Characteristics File

PIK Protected Identity Key

QCEW Quarterly Census of Employment and Wages, managed by the Bureau of Labor Statistics (BLS)

QWI Quarterly Workforce Indicators

SEIN State employer identification number. It is constructed from the state Federal information processing standards codes (FIPS) code and the UI account number. The BLS refers to the UI account number in combination with the reporting unit number as SESA-ID

SSN Social Security Number

UI unemployment insurance

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